WATER UNDER THE BRIDGE? THE ROLE OF INSTREAM FLOW NEEDS (IFNs) DETERMINATIONS IN ALBERTA'S RIVER MANAGEMENT

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ABSTRACT

The existence and effectiveness of efforts to maintain "instream flow needs" (IFNs) are critical benchmarks for determining whether a river management framework is sufficient to protect aquatic ecosystems. In simple terms, IFNs are river flow regimes that are needed to protect aquatic ecosystems. This paper analyses the role of IFNs in the province's river management framework, focusing particularly on the text of Alberta's water allocation legislation and the province's record of water management decisions in implementing that law. (Our companion paper in this volume addresses the role of IFNs in the federal and inter-jurisdictional frameworks for managing Alberta's rivers.) The paper concludes that, while Alberta has committed to protect aquatic ecosystems, its commitment falls short in the lack of legislative requirements to maintain IFNs. The record of the province's attention to IFNs in its actual implementation of water management legislation is much less certain, because of the lack of a central data base of river-wide flow-based requirements adopted by the province. Although further research is needed, the evidence compiled to date suggests that the province has paid only spotty attention to IFNs in its actual water management decisions.

KEYWORDS/PHRASES: Alberta, ecological sustainability, instream flow needs (IFNs), provincial, federal, river management, watershed management.

INTRODUCTION

"When rivers can no longer support living things, they will no longer support human affairs" (Karr and Chu 1999).

It is now widely recognized that human welfare is dependent on ecological health but this general view, by itself, does not answer the question of how environmental and natural resource management frameworks should be designed at an operational level to meet both ecosystem and human needs. There is a growing consensus that the answer to this question lies with a holistic, integrated ecosystem- or landscape-based management approach. In the context of rivers, the core of this approach involves "preserving the processes and functions of the river ecosystem" (Annear *et al.* 2004). One of the key components of this task, in turn, involves maintaining "instream flow needs" or "IFNs". In simple terms, IFNs are river flow regimes that are needed to sustain aquatic ecosystems. The existence and effectiveness of efforts to maintain IFNs are critical benchmarks for determining whether a river management framework is sufficient to

protect aquatic ecosystems.

The Alberta government is the primary owner of fresh water located in the province and the government has considerable legislative authority to manage the province's rivers and specifically to maintain IFNs. Alberta's principle water management statute, the *Water Act* (R.S.A. 2000, c. W-3), recognizes the importance of healthy aquatic ecosystems and, at the policy level, the province has voiced its commitment to protecting aquatic ecosystems in the celebrated "Water for Life" strategy (Alberta Environment 2003).

This paper takes a hard look at Alberta's commitment by analyzing the role of IFNs in the province's river management framework. Our companion paper in this volume addresses the role of IFNs in the federal and inter-jurisdictional frameworks for managing Alberta's rivers. The next part of the current paper provides background on IFNs — their rationale, the methodologies for determining them, and the history of IFN determinations in Alberta.

The following two parts analyse the role of IFNs in Alberta's generic legislative and policy frameworks for river management, respectively. (The term "generic" is used here to refer to laws and policies as expressed in an abstract rather than an applied context.) These parts show that, while IFN protection is not mandated in any Alberta laws or policies, several legislative and policy tools may be useful for restoring and protecting IFNs.

The paper then considers the province's use of IFNs in its implementation of these generic legal and policy frameworks. This analysis was frustrated by the lack of a central, readily accessible data base of flow-related river management decisions. However, the available data suggests that the IFN gap in the province's generic river management laws and policies is not being filled in river-specific management contexts.

IFN DETERMINATIONS — RATIONALE, METHODOLOGIES, AND PREVALANCE IN ALBERTA

Human utilization of rivers for transportation, water supply, power generation and effluent discharge, combined with the watershed effects of land-use, have dramatically altered the condition of rivers around the world (UNESCO 2006).

These interventions have had significant impacts reducing the total flow of many rivers and affecting both the seasonality of flows and the size and frequency of floods. In many cases, these modifications have adversely affected the ecological and hydrological services provided by water ecosystems … There is now an increasing recognition that modifications to river flows need to be balanced with maintenance of essential water-dependent ecological services (Brown and King 2003).

Rivers must be managed in a more holistic, integrated manner that embraces an ecosystem approach to aquatic systems and their interface with terrestrial systems (Williams, Wood and Dombeck 1997). This is consistent with an overall paradigm shift in natural resource management towards "ecosystem management". A central tenet of this approach is that natural resource planners and managers must shift the focus of their efforts away from extraction and commodities (e.g. wood, fish and water) towards sustaining the integrity and adaptive capacity of the ecosystem (Grumbine 1994; Meffe *et al.* 2002; Quinn 2002). In other words, the more holistic focus of management becomes more about what is left behind than trying to maximize a desired output or extraction.

An additional tenet of the emerging ecosystem-based management philosophy is that ecosystems are dynamic systems characterized by natural disturbance regimes that fluctuate

within a natural range of variation (Gunderson and Holling 2002). Ecosystem-based management embraces the uncertainty and complexity of managing human activities in dynamic systems through the application of active, adaptive management (Oglethorpe 2002).

In the context of aquatic ecosystems, the holistic philosophy of ecosystem-based management is embodied in the (integrated) watershed approach. This approach focuses on the integral whole of a hydrologically-bounded area to coordinate the management of water resources. It embraces the complex dynamics of geo-ecological systems that include not only the surface water bodies, but also the floodplains, associated uplands and groundwater connections (Ward *et al.* 2001). A watershed approach explicitly links land-use to water quality and quantity and acknowledges the linkages between terrestrial and aquatic ecosystems (DeBarry 2004). Furthermore, watersheds act as viable social units to engage public partners in place-based planning and management activities (Sabatier *et al.* 2005).

A requirement of maintaining or restoring healthy aquatic ecosystems is the protection or re-establishment of natural flow regimes. The variation in flow within and between years constitutes an essential dynamic element that enables other critical ecological processes within the system. Accordingly, the Instream Flow Council, a North American association dedicated to improving the effectiveness of instream flow programs, promotes the goals of "maintaining the ecological integrity of unregulated rivers" and of "restoring regulated rivers to the ecological conditions that more nearly approximate their natural form and function" (Annear *et al.* 2004), which is referred to as the "natural flow paradigm" (Poff *et al.* 1997). Similarly, Richter *et al.* (1997) conclude, "If conservation of native biodiversity and ecosystem integrity are objectives of river management, then river management targets must accommodate the natural flow paradigm."

The process of determining the flows needed to maintain the health of identified aquatic ecosystem components or of entire aquatic ecosystems is commonly referred to as an IFN assessment or determination. Oregon was the first jurisdiction in North America to establish instream flow protection in 1915 (Gillilan and Brown 1997) but, prior to the middle of the twentieth century, most resource managers paid little attention to maintaining IFNs and, accordingly, to developing accurate methodologies for determining IFNs. Initially developed in the 1950s, those methodologies evolved significantly in the 1970s following the U.S. Congress' passage of the *National Environmental Policy Act*, 42 U.S.C. 4321-75, which impliedly required federal consideration of IFN issues before approving or otherwise supporting projects that might affect natural flows.

The work of Donald Tennant with the U.S. Fish and Wildlife Service between 1958 and 1975 set the standard for the scientific approach to establishing IFNs (Postel and Richter 2003). The availability of computers for modelling, coupled with a growing knowledge of aquatic ecosystem function, spawned more sophisticated methodologies. However, early methods suffered from a propensity to identify a single minimum flow value to be applied across the seasons and year (e.g. flat line value) and a focus on single (or a small number of) focal species (generally, economically valuable sport fish). In a review of IFN methods at the end of the 1990s, Richter *et al.* (1997) concluded, "Virtually all methods currently in widespread use for determining instream flow needs will possibly lead to inadequate protection of ecologically important flow variability, and ultimately to the loss of native riverine biodiversity and ecosystem integrity."

Contemporary IFN assessment methods are more holistic and embrace an ecosystem approach to maintaining aquatic system integrity. Ecosystem-based IFN assessment is not a process of identifying minimum flows; it is a complex science focused on determining the

amount and timing of water needed to protect aquatic ecosystems or valued components of those ecosystems. As such, it is an interdisciplinary amalgam of art and science that encompasses highly complex ecosystem science and systems modelling of five riverine components: hydrology, geomorphology, biology, water quality and connectivity. Of course, this scientific modelling operates and is influenced by a broader social context of diverse public values (often in dispute) and a morass of institutional, legal, and policy constraints (Annear *et al.* 2004).

Given this complex, broad focus of ecosystem-based IFN assessments, the more holistic term 'Environmental Flow Assessment' has been adopted in other parts of the world (e.g. Australia and South Africa) (King, Tharme and Brown 1999). Environmental flow is defined as: the water regime provided within a river, wetland or coastal zone to maintain ecosystems and their benefits where there are competing water uses and where flows are regulated. Environmental flows provide critical contributions to river health, economic development and poverty alleviation. They ensure the continued availability of the many benefits that healthy river and groundwater systems bring to society (Dyson, Bergkamp and Scanlon 2003).

For this article, we will use the term "instream flow needs" (IFNs) as it is consistent with the usage in Alberta. Furthermore, we will restrict our discussion to the application of IFNs to lotic systems, that is, flowing water systems, and not to other systems such as lakes and ponds.

While there is an increasing trend toward using ecosystem-based IFN methodologies, a wide range of IFN methodologies are still in use and no single methodology is considered the best for all applications. Within this range, there are three main methodologies: 1) hydrologic (historical stream flow); 2) river hydraulics (wetted perimeter), and 3) habitat modelling (Caissie and El-Jabi 2003, Leclerc *et al.* 2003). Selection of the appropriate method is typically dependent on site-specific variables relating to:

(1) Management goals, study objectives, professional judgement and appropriateness to the specific project;
(2) Physical, chemical and thermal characteristics of river systems, as a result of hydrological, hydroldynamic, morphologic, sediment transport, water quality, temperature and ice processes;
(3) Ecological, biological and habitat functions that rivers provide for different fish species and aquatic organisms;
(4) Site-specific and project-specific information;
(5) Available knowledge and expertise;
(6) Available data, models and data processing tools; and,
(7) Economics, including costs for pre- and post-studies and costs for implementing specific flow scenarios (Katopodis 2003).

It is beyond the scope of this paper to provide a detailed review of all the methods available for IFN assessment; for comprehensive methodological reviews, see Arthington and Zalucki (1998); Dunbar *et al.* (1998); Courtney (1995); Leclerc *et al.* (2003); Brown and King (2003); Annear *et al.* (2004); and Tharme (2003). For this paper, it is worth pointing out that there is much discussion in the literature concerning the application of '(hydrologic) desktop methods' versus more comprehensive methods. In general, desktop methods were developed for rapid, relatively inexpensive IFN estimations when little or no ecological information was available to define aquatic ecosystem requirements (Committee on Review of Methods for Establishing Instream Flows for Texas Rivers 2005). However, even these 'desktop' methods range from the simplest

approaches using only historical flow records, to more complex models that incorporate other environmental variables.

These 'desktop' methods are generally useful in providing a relatively inexpensive ballpark estimate of IFNs, but should be applied with caution and are not a substitute for more comprehensive approaches with adequate ecological data. In other words, desktop methods are ideal for providing interim guidance while more time consuming and expensive field-based methods are being planned or conducted or in situations where more comprehensive approaches are not feasible (Committee on Review of Methods for Establishing Instream Flows for Texas Rivers 2005).

What is the track record of IFN determinations in Alberta? The answer is hardly clear because, based on library searches and an extensive effort to contact relevant Alberta Government staff, the only documented, consolidated history of IFN determinations in the entire province is a chronological listing of IFNs in a PowerPoint presentation prepared by a provincial scientist (Locke undated, 2006; Paul and Locke 2006).

Based on this and other sources, the chronology starts in the 1970s, when Alberta applied the Tennant Method (Tennant 1975) for IFN studies on the Bow, Belly, Elbow, Highwood, Kananaskis, Oldman, Red Deer, Sheep, St. Mary, and Waterton Rivers (Locke 2006). In the 1980s, IFNs were developed using fish habitat models for these same rivers and for the Battle, Sturgeon, and Vermilion Rivers and Pekisko and Willow Creeks (see for example, Frenet 1983; Locke 1988, 1989; Frenet and Courtney 1990). The 1980's also marked the testing of two other IFN approaches including the Oregon Method (Thompson 1972) on Pekisko Creek and Multi-Spectral Videography on the Peace River. The late 1980s and early 1990s saw the development of water quality and temperature models (e.g., Dissolved Oxygen Stochastic Model and Water Quality Analysis Simulation Program) for the Bow, Belly, Highwood, Elbow, Kananaskis, Oldman, Red Deer, St. Mary, and Waterton Rivers and Willow Creek. IFNs for fish below the Oldman River Dam were determined as part of the assessment of the dam impacts (Frenet, Courtney and Bjornson 1990). IFNs for recreational uses were also calculated for the Bow, Kananaskis, Highwood, Oldman, Red Deer, St. Mary, Belly, and Waterton Rivers and Willow Creek in the early 1990s (see for example, Wood Bay Consulting Group Ltd. 1992). A holistic approach encompassing riparian vegetation, water quality, fish habitat, and channel maintenance, was applied to the South Saskatchewan River Basin (Clipperton *et al.* 2003). Holistic IFN studies were being applied to the Lesser Slave and Athabasca Rivers at the time of this writing. In addition to the provincial IFN determinations, the Northern River Basins Study, a joint undertaking of the Alberta, Northwest Territories and federal governments, included IFN considerations as part of its comprehensive cumulative effects analysis on the Peace, Athabasca, and Slave Rivers (Northern River Basins Study Board 1996).

The above chronology suggests that the history of IFN assessments in Alberta follows the more general evolution in IFN methods toward comprehensive ecosystem-based assessments. The chronology also suggests that IFNs have been determined for only a relatively few of Alberta's numerous rivers, although further research is needed to precisely identify the total length of Alberta's river reaches — on a province-wide and specific river system basis — for which IFN determinations have been made.

THE LEGAL FRAMEWORK

This part addresses whether Alberta's generic legal framework for river management requires or

addresses the maintenance of IFNs. The discussion starts with the constitutional context for provincial river management, and then addresses the common law and federal legislative water rights frameworks that preceded Alberta's legislative regimes. The analysis then turns to provincial legislation, focusing on the two provincial statutes — the *Water Resources Act* and its successor the *Water Act* — that govern the establishment and allocation of provincial rights to withdraw or divert surface water.

Admittedly, these two provincial statutes comprise only part of the overall provincial legislative river management framework — other relevant statutes include the provincial *Public Lands Act* (R.S.A. 2000, c. P-40), *Municipal Government Act* (R.S.A. 2000, c. M-26), and *Environmental Protection and Enhancement Act* (R.S.A. 2000, c. E-12). However, the two water rights statutes are arguably the most important for IFN purposes because of the close link between water withdrawals and diversions that are permitted under these statutes and river flows needed to maintain IFNs. Suffice it to say none of the other provincial statutes that make up the rest of the overall river management framework call for the maintenance of IFNs or even specifically address the topic, although further research is warranted to consider the statutes' indirect implications for maintaining IFNs and for river and watershed management more generally.

The constitutional bases for provincial river management

As with numerous aspects of environmental protection, the Constitution's provisions (in the *Constitution Act*, 1867) allocating powers between the federal government and the provinces do not expressly address IFNs or even river management more generally. Notwithstanding this silence, the Constitution implicitly distributes water management authority generally between the federal government and the provinces. These constitutional provisions imply that both Alberta and the federal government have considerable IFN-related river management authority. The specific constitutional bases for the federal government's authority are discussed in the companion paper by Wenig *et al.* (2006). The following is a brief discussion of Alberta's corresponding authority.

The Constitution gives each level of government — federal and provincial — the right to enact legislation to address a wide range of subjects (commonly referred to as "heads of power") including the management of each government's property. Alberta is the owner of water resources that occur on provincial public lands and on private lands within the province. The Alberta government has exercised its legislative authority over this provincially owned resource by passing water legislation that enables it to manage water by allocating rights to withdraw (or divert) water either to itself or to others. Because withdrawals are often the greatest threat to IFNs, one might say that Alberta's ownership-based water management rights are themselves a threat to IFNs rather than a positive source of authority to maintain IFNs. This view is unfair, however, in that these rights include correlative provincial rights to leave water instream, either by *forego*ing its own withdrawals, by not granting private withdrawal allocations, by cancelling or reducing existing allocations, by issuing water rights to leave water instream, or by setting flow-based limits in new water licences or other allocation instruments.

While Alberta's ownership-based management rights are considerable sources of authority to maintain IFNs, the full scope and nature of those provincial rights are uncertain, in part, because these rights stem from a complex mix of legal sources. Besides the division of powers in the Constitution, these sources include common law principles and successive federal and provincial

legislative declarations of Crown ownership of water (Kennett 1991). As relevant here, the primary uncertainty with respect to Crown ownership is whether there is a corollary "public trust" or analogous duty to exercise ownership rights in the public interest in general and to safeguard environmental values — including aquatic ecosystem values sustained by natural river flows — in particular (Wenig 2006).

Other uncertainties as to the scope of Alberta's ownership-based water management rights stem from the interaction of those rights with those of the federal government as well as those of other upstream and downstream jurisdictions, and the interaction of those rights with federal legislative powers — particularly federal power to legislate for the protection of fish habitat (Wenig *et al.* 2006). The extent to which the province's rights may be limited by a provincial allocation (through a water licence or other allocation instrument) is still another uncertain aspect of the province's proprietary powers.

Besides giving provinces legislative power to manage their own property, Canada's Constitution allocates numerous other specific legislative powers to the provinces. None of these legislative subjects expressly includes IFN maintenance or even river management, but several of the subjects — most notably the provincial legislative powers with respect to provincial lands, "property and civil rights within the province," matters of a "merely local or private nature," "local works and undertakings," facilities that produce electrical energy, and agriculture (shared with the federal government) — likely provide Alberta with considerable additional implied constitutional river management authority (Kennett 1991). However, as with Alberta's legislative rights to manage provincial property, the scope and nature of these other provincial legislative powers are far from certain, when viewed by themselves and especially in relation to the legislative powers which the Constitution has allocated to the federal government, including the so-called federal residual power — i.e. the power to legislate with respect to all matters not specifically allocated to either the federal government or the provinces (Wenig *et al.* 2006).

Because of these constitutional uncertainties, and closely related political constraints, the federal and provincial governments have purported to maintain a "cooperative federalism" approach in the environmental arena. While positive in some respects, this approach is criticized for blurring lines of government accountability and responsibility (Boyd 2003). This blurring may be a significant reason for the lack of focus on IFNs, as noted in this paper and in the companion paper, in both the provincial and federal river management contexts.

The pre-provincial water rights regimes

To be properly understood, Alberta's legal framework for river management must be viewed, not only in its constitutional context, but also in the historical context of federal management of the prairie region before the three prairie provincial governments were established (Manitoba in 1870, Saskatchewan and Alberta in 1905). Until the late 1800's, the common law of riparian rights governed surface water rights in this area. These rights were held by people who owned or occupied land that adjoined a water body and entitled these 'riparians' to use water for domestic and non-domestic purposes, subject to the equivalent rights of downstream riparians to a sufficient water quality and quantity for their own domestic and non-domestic uses. However, the case law is unclear or mixed as to the extent to which the riparian system allowed water quality and quantity to be successively diminished from one riparian owner to the next by the owners' exercise of these rights (Percy 1988). To the extent a pure riparian rights model did not allow a progressive diminishment of water quality and quantity in a river that flowed from one

riparian owner to the next, the model might have sustained IFNs.

The Federal Government realized early on that the riparian water rights system would discourage settlement of the arid prairie region, in part because the riparian system restricted water availability to owners or occupiers of riparian lands (Bankes 1995). Therefore, in 1894 — just 24 years following confederation — Parliament adopted the *North-west Irrigation Act* (S.C. 1894, c. 30) which replaced the common law riparian rights system (in many, but not all respects including riparian household uses) with a licencing system whose key characteristics have carried forward through present provincial water rights legislation (Bankes 1995).

As relevant here, a notable aspect of the federal Act is that it did not require the maintenance of an instream flow. In fact, it made no mention of maintaining an instream flow whatsoever. However, the Act's general licencing requirement for water withdrawals arguably gave water managers discretion to include flow-based licence conditions, including conditions to ensure sufficient flows to maintain aquatic needs.

Another significant feature of the Act's licencing system is its reliance on the "first in time, first in right" principle, also known as the principle of "prior allocation," for prioritizing rights among licencees. Under this principle, licencees' rights were prioritized by the date of their completed licence applications. The rights of senior licencees then trumped those of all junior licencees on the same river so that, in times of shortage, the government could cut off junior licensees until all of the more senior rights had been satisfied.

By its nature, the 'prior allocation' principle is aimed at resolving competing human demands when they collectively exceeded the available water supply. In theory, the principle is neutral with respect to maintaining IFNs, i.e. it is not affirmatively aimed to help or to hurt that cause. However, the principle may not have a neutral *effect* in the context of "instream licences" which, as discussed further below, are licences issued for instream uses — including maintaining IFNs — rather than for consumptive withdrawals. When instream licences have senior status, whether by date of application or by government declaration, the 'prior allocation' principle protects the licenced instream uses against competing, junior consumptive uses. But when instream licences have junior status, the 'prior allocation' principle greatly undercuts their effectiveness.

Alberta's water rights legislation and IFNs — the big picture

The Federal Government retained ownership and legislative authority over water in the prairies until 1930, when it transferred public lands and natural resources to Manitoba, Saskatchewan, and Alberta. Shortly after this transfer, the Alberta Legislature passed the *Water Resources Act* (*WRA*) (S.A. 1931, c. 71). In 1999, the Legislature officially repealed and replaced the *WRA* with the *Water Act*. The following is a summary of the most salient features of both provincial statutes as they relate to IFNs.

The Water Resources Act

Notwithstanding the wholesale transfer of legislative water allocation authority from the federal government to Alberta (except for water on federal lands), the basic federal water licencing model, including the principle of 'prior allocation,' carried through to the new provincial statute, with minor changes noted below.

As with the predecessor federal legislation, the *WRA* did not expressly require the maintenance of IFNs as a limit on the province's grant of water rights or in any other river

management context. The *WRA's* inattention to IFNs is not surprising, given when that Act was adopted, and its primary function of simply carrying forward the federal water rights regime under provincial legislation. Yet, as with the federal model, the original *WRA* gave provincial water managers implied discretion to adopt conditions in new water licences; amendments to the Act in the 1970s made this discretionary authority express (S.A. 1971, c. 113, s. 8 and S.A. 1975, c. 88, s. 21). Both before and after the amendments, this authority arguably included discretion to include conditions in new licences to ensure the maintenance of IFNs (Ferner 1992). On the other hand, the *WRA* continued the validity of licences issued under the preceding federal legislation by "grandparenting" these licences. Further research is needed to assess the full scope and nature of these limits, but the grandparenting of pre-*WRA* licences likely posed significant, if not insurmountable, hurdles on any efforts to maintain IFNs.

Finally, as originally adopted, the *WRA* granted the provincial Cabinet considerable discretion to adopt regulations or issue orders governing numerous aspects of the legislative water management, starting with a broad power to adopt any regulations or orders that were "necessary" to carry out the *Act*'s provisions, as read according to their "obvious intent" (S.A. 1931, c. 71, s. 68(1)(b)). It is unclear whether this authority was sufficient to enable the Cabinet to adopt regulations or issue orders to limit allocations as necessary to maintain IFNs and, at any rate, the provincial Legislature later deleted this open-ended authority (R.S.A. 1980, c. W-5, s. 72). However, during its entire history, the *WRA* also authorized Cabinet to adopt regulations governing the "extent of diversion" from provincial rivers, for the "protection of any source [originally "sources"] of the water supply," and "in the interests of all water users," for the control of water "flow" "through, by or over any works" (S.A. 1931, c. 71, s. 68(1)(b)(xv) and (xvii); R.S.A. 1980, c. W-5, s. 72(c.1) and (h)). Although the plain text of these provisions is hardly clear, one or more of these powers may well have included implied authority to adopt regulations designed to maintain IFNs or other desired instream flows.

The Water Act

The *Water Act* includes numerous environmental provisions that were lacking from the *WRA* and, thus, that purported to bring Alberta's water management more in line with contemporary, environmentally-oriented resource management approaches. Chief among these provisions are recognitions of: the need to "manage and conserve water resources to sustain our environment and to ensure a healthy environment" (s. 2 (a)); the need for "integrated" and "comprehensive" management; and, the importance of "comprehensive and responsive" action (s. 2(a)). On the other hand, the *Act* also recognizes the need for "economic growth and prosperity," but without explaining how that objective can or should be rationalized with environmental protection. Besides elaborating on underlying principles for water management, the *Water Act* broke new ground by including: a requirement for the development of an "aquatic environment protection strategy" as part of a provincial framework for water management and planning; comprehensive, holistic definitions of the terms "environment" and "aquatic environment"; and several provisions enabling comprehensive watershed planning.

While purporting to put an environmental face on Alberta's traditional water management framework (Wenig 2004a), the *Water Act* retained the *WRA*'s basic licencing model and "prior allocation" principle, but continued to say nothing expressly about IFNs. As with the *WRA*, however, the *Water Act* gives cabinet broad discretion to adopt regulations governing the licencing and other water management functions, and gives provincial water managers broad

discretion — subject to any cabinet regulations — to adopt flow-based conditions in new water licences. In fact, the *Water Act* arguably bolstered this licencing discretion by stating expressly that the province can consider a broad range of environmental factors in issuing new water licences (s. 51(4)).

Then again, the *Water Act* continued the *WRA*'s tradition of grandparenting existing water licences, while arguably narrowing the express circumstances provided by the *WRA* in which the province could cancel or modify those pre-existing licences. By themselves, those limits likely pose significant hurdles on the province's ability to maintain IFNs in areas like the South Saskatchewan River Basin, where the bulk of water allocations are covered by existing licences. However, further research is necessary to assess the legal character of the *Water Act*'s limitations, and of the terms and conditions of those grandparented licences, to see what if any authority the province still has under the *Water Act* to cut back grandparented licenced allocations in order to maintain IFNs.

Alberta's water rights statutes revisited — specific tools for maintaining river flows

Besides their salient characteristics described above, both the *WRA* and the *Water Act* authorize the province's use of specific tools that could help maintain IFNs, if the province desired to do so. As shown below, several *WRA* tools were downgraded in the *Water Act*, although the latter includes several tools that were not in the former.

Tools in both the Water Resources Act and the Water Act

Instream licences

By definition, instream licences grant rights to use water instream, so they are designed to keep water in a river rather than to take it out. As such, these licences could be a lynch-pin in any water management model that seeks to maintain IFNs while honouring the historic "prior allocation" principle. However, the licences' ability to serve this purpose is dependent on their relative priority, the scope of parties who can hold them, and the types of instream uses to which they can be applied.

The *WRA* allowed both private parties and government agencies to obtain instream licences to "use water in its natural state for the purpose of conservation, recreation or the propagation of fish or wildlife or for any like purpose" (s. 11(1)(c)). This tool thus had considerable potential to replenish flows for IFNs, at least, if it had been used at an early enough time to obtain a senior priority relative to other licencees on the same river (Ferner 1992). However, this strategic opportunity was not taken. Only one instream licence was ever granted under the *WRA*, in respect of the "Wagner Bog," a series of ecologically rich wetlands just west of Edmonton. At least one other application for an instream licence was submitted, but it was denied (Kwasniak 1992). Worse yet, as noted below, a 1991 regulation precluded the province's issuance of new instream licences in the South Saskatchewan River Basin.

The *Water Act* replaced the *WRA*'s instream licence provision with one that expressly allowed the Crown, but no one else, to hold instream licenses specifically to meet "water conservation objectives" (WCOs) adopted under the *Act* (discussed further below) (s. 51(2)). This change arguably further diminished the tool's effectiveness in restoring IFNs by expressly precluding private parties from holding WCO-based instream licences. However, this preclusion

does not address whether private parties may nevertheless obtain instream licences intended to restore IFNs, but that are not expressly related to WCOs. The *Act* provides confusing signals on this issue. On the one hand, the *Act's* general licencing provision allows the province to issue licences to private parties for any purpose specified in implementing regulations (s. 51(1)). Those regulations in turn list a wide range of permissible licencing purposes several of which — water, fish, and wildlife "management," "habitat enhancement," and any other purpose specified by an Alberta Environment Director — impliedly include IFN maintenance (Alberta Government 1998: s. 11(h), (i), (k), (m) and (n)). While allowing licences to serve a wide range of purposes, the Act permits the province to issue licences only (as relevant here) for "diversions" of water intended to serve these purposes (s. 51). The *Act* defines "diversion" as the "impoundment, storage, consumption, taking or removal" of water (s. 1(m)(i)). At first blush, none of the activities listed in this definition plainly includes simply leaving water instream for IFNs, although arguments based on a closer reading may be made to the contrary (Kwasniak 2006) However, the *Act's* "diversion" definition also includes any "thing" specified in Ministerial regulations further defining the term (ss. 1(m)(i) and 169(b)). While this provision arguably allows the regulations to link licenced "diversions" to instream uses for IFN purposes, the implementing regulations do not make this link (Alberta Government 1998), although they could be readily amended to do so (Kwasniak 2006).

Even absent this Ministerial step, the *Act's* provisions allowing licences for IFN purposes but only through "diversions," clearly sanction the removal of prioritized water that is immediately returned to its instream source to meet an IFN. Given the patent absurdity of this scenario, either the definition in the regulations should be changed so that "diversion" includes instream uses, or the *Act* should be amended to clarify that licences can be issued to private parties for instream uses (Watrecon Consulting 2005). To make instream licences even more effective, the Act should be further amended to allow private parties to apply for and hold instream licences intended to achieve WCOs, which legislative fix has been recommended by Alberta Environment's own staff (AE 2006).

Emergencies

The *WRA* authorized the provincial cabinet to suspend a licenced allocation or restrict the purposes for which water could be use "under any conditions declared" by Cabinet to constitute an "emergency" on a province-wide or region-specific basis and for any length of time (s. 13(1)). On its face, this provision conferred substantial discretionary power on Cabinet which, combined with courts' general deference to cabinet-level decisions, may have given cabinet broad authority to cut back allocations and take related steps, if only on a non-routine basis, to ensure the attainment of IFNs.

The *Water Act* changed these emergency provisions by: narrowing somewhat the cabinet's breadth of discretion in deciding what circumstances constitute an emergency; transferring the function of choosing emergency measures from cabinet to Alberta Environment regional Directors; and providing for possible compensation for losses incurred by water rights holders due to any such measures (s. 107). While these new provisions are unclear in several respects, they may well continue to enable the province to limit licenced water withdrawals, again possibly only under non-routine circumstances, to maintain IFNs.

Besides changing the cabinet's emergency powers, the *Water Act* allows Alberta Environment Directors (among other water management officials) to restrict licenced allocations

or take other "emergency measures" as needed to "prevent immediate and significant damage to the aquatic environment" or to public health and safety (s. 105). By specifically mentioning aquatic environmental damage, this provision arguably makes an even clearer case for the use of emergency powers to address IFNs, although this enhanced authority is limited by the need to justify any such action as necessary to "prevent immediate and significant damage" to the aquatic environment.

Reservations

The *WRA* enabled Cabinet to "reserve" unallocated water and to set out the purposes for which the reserved water could be used (s. 12). Cabinet's use of this authority in the South Saskatchewan River Basin is discussed below. The reservation power was continued in the *Water Act* but vested in the Alberta Environment Minister rather than with Cabinet (s. 35). This power could be used to help protect IFNs (Watrecon Consulting 2005; Ferner 1992), at least, in areas that are not fully allocated (such as the Athabasca and Peace basins) and if the reserved water is not made available for out of stream diversions. However, the power is only of limited value in areas that are already fully or nearly fully allocated.

Cancellations

As originally enacted, the *WRA* allowed the Minister responsible for water management to cancel a licence if the Minister believed the licencee had stopped using any water to which it was entitled under the licence; alternatively, the Minister could reduce the licenced allocation by the extent of any actual shortfall between the volume of water actually used and that allocated in a licence (S.A. 1931, c. 71, s. 44). In amendments adopted in the 1970s, the Alberta Legislature narrowed this power by deleting the Minister's authority to reduce an allocation (short of canceling the underlying licence outright), and by requiring at least two inspections as a predicate to the Minister's determination that the circumstances triggering a cancellation had occurred. However, the Legislature arguably expanded those circumstances by changing the focus from a failure to use water, in particular, to a failure to "exercise" any "rights" granted under the licence (R.S.A. 1980, c. W-5, s. 51(1)(a)). As well, the *WRA* enabled the Minister to cancel or amend a licence to decrease the amount that may be diverted if the licensee "wasted" water (R.S.A. 1980, c. W-5, s. 51(1)(b)).

In theory, under either its original or amended version, this *WRA* tool could be of use in maintaining IFNs by in effect liberating water allocated under canceled senior licences for use under a reservation for aquatic ecosystem protection and/or for an ecosystem-based instream licence. However, the newly unallocated volume of water was subject to any other senior rights to that volume. In addition, this tool could be applied to licences or other allocation instruments grandparented under the *WRA*, but only to the extent its use was "not inconsistent" with the terms and conditions of those grandparented rights (R.S.A. 1980, c. W-5, s. 10(1)). Further research is necessary to determine the practical effectiveness of this tool given these two constraints.

The *Water Act* retained this tool but modified it somewhat. First, water managers' use of the tool is now subject to any regulations adopted by the Environment Minister (ss. 55(1)(f) and 169(2)), although there are currently no relevant regulations. Second, the new Act added that the tool could be triggered, not only by a licencee's failure to exercise its "rights" under the licence,

but also where there has been "no diversion of any of the water allocated in the licence". While perhaps more consistent with the tool's focus in the original version of the *WRA*, this additional triggering circumstance seems somewhat redundant given that a licenced diversion is arguably one of a set of "rights" under a licence. Nevertheless, the *Act's* specific text regarding the other trigger strongly suggests that, unlike the *WRA* (at least according to its original version), there must be a failure to divert any water whatsoever under a licence before the province can cancel the licence.

The *Water Act* arguably narrowed the tool's availability even further by stating that it can now be used only when the Director finds that a licencee's failure to divert or to exercise another licence right occurred over a three-year period and that there is "no reasonable prospect" the licencee will "resume" diverting any water or exercising the relevant licence right. The *Water Act* also did not retain water managers' ability to cancel a licence in whole or part on account of "waste". Instead it enables the Director to issue a water management order to a licensee who is wasting water, but only where the wastage is contrary to a water conservation "guideline" (s. 97(2)). There currently are no such guidelines. Further research is needed to determine this tool's utility for IFNs in light of these new restrictions, as well as those originating in the *WRA*.

Finally, the *WRA* provided water managers with authority to cancel a water licence under several other circumstances, including a breach or non-performance of any obligation imposed by a licence condition (R.S.A. 1980, c. W-5, s. 52). The *Water Act* retained this authority subject to several modifications that are not relevant here (R.S.A. 2000, c. W-3, s. 55). As noted below, some licence conditions may relate to IFN maintenance, so the use of this cancellation tool to enforce any such condition could benefit IFNs. Then again, even if a breached condition did not relate directly to an IFN, its enforcement through licence cancellation could indirectly benefit the IFN. However, the utility of any such strategy is likely quite limited.

Additional IFN tools in the Water Act

Involuntary Licence Amendments

The *Water Act* enables an Alberta Environment Director to amend a water licence to address significant adverse effects on the aquatic environment that were not reasonably foreseeable when the licence was issued, provided the licencee is compensated for any ensuing losses (ss. 54(2) and 158). The obligation to pay compensation may chill the government's enthusiasm to use this authority and its justification is somewhat unclear given the longstanding legislative direction that water belongs to the province. Even more significantly for IFNs, this provision only applies to licences issued after January 1, 1999, and so it is likely of limited use in reducing licenced allocations to meet IFNs on rivers the majority of whose flows have been allocated to senior licences (and if the licence terms themselves do not allow such modifications).

Transfers and conservation holdbacks

Under the *WRA*, water licenses could not be sold separately from the land to which they attach. The *Water Act* changed this restriction by enabling transfers between qualified licence holders of all or part of a licenced allocation under specified conditions. As relevant here, these conditions include the province's exercise of a right to retain up to 10% of the amount of water to be transferred for protecting the aquatic environment or to help implement a "water conservation

objective" (ss. 81-83; Bankes 2006). These "conservation holdbacks" can provide some help in restoring IFNs, but this help is likely limited for several reasons. First, in order to require a conservation holdback, there must be a transfer. Second, even when there is a transfer, provincial water managers need not insist on an accompanying holdback. To date, there only have been fifteen or so transfers implemented under the *Act*, and holdbacks have not been required for all of them. Third, where holdbacks are required to help achieve WCOs, the WCOs themselves may not be based on IFNs. As the next part shows, this is the likely scenario for WCOs in the South Saskatchewan River Basin (SSRB), a basin that is in dire need of IFN protection. And fourth, the allocation being transferred is typically expressed in a volume of water that can be withdrawn or diverted *per year*, so the holdback will be expressed as a portion of that same annual volume. But that kind of holdback may not actually improve the actual *flow* (as typically expressed in volume — e.g. cubic metres – per second) needed in a river for aquatic ecosystem purposes at any given time of the year. However, further research is needed to determine whether Alberta Environment could frame the holdback requirement in a way to ensure that the volume held back is available instream when it is actually needed for IFN purposes and, if so, whether the government has used this strategy in its holdback requirements to date.

Finally, to be effective, conservation holdbacks must stem from transfers of fairly senior licences. This is likely a significant hurdle in the heavily allocated South Saskatchewan River Basin, where roughly 75% of whose licenced allocations have been granted to irrigation districts most of whose licences have relatively senior priority (Watrecon Consulting 2005). Although there have been a few transfers of portions of irrigation districts' licenced allocations, one irrigation district recently successfully applied to amend its water licence to allow it to supply water, that was licenced for irrigation, for a variety of non-irrigation uses through private, fee-based agreements with other users (Bankes and Kwasniak 2005). This amendment allowed the irrigation district to in effect 'rent' its licenced allocations to other users which scenario is likely more preferable to irrigation districts than transferring their allocations outright (Bankes and Kwasniak 2005). Because of the extent and generally senior status of the districts' licenced allocations, if the districts are not active in the water transfer market because they can simply 'rent' any part of their licenced allocations instead of transferring it, conservation holdbacks from transferred licences offer little hope for servicing aquatic needs.

Water Conservation Objectives

As noted above, the *Water Act* enables Alberta Environment Directors to establish "water conservation objectives" (WCOs). The *Act* defines these WCOs as an amount (expressible as desired flow rates or water levels) and quality of water that Directors deem "necessary" for one or more of the follow specific purposes:

(1) protection of a natural water body or its aquatic environment, or any part of them,
(2) protection of tourism, recreational, transportation or waste assimilation uses of water, or
(3) management of fish or wildlife (s. 1(1)(hhh)).

On their face, these categories implicitly allow the adoption of aquatic ecosystem- and fish-based IFNs, respectively. In fact, the first and third of these three purposes implicitly *require* that a WCO intended to satisfy either purpose reflect an aquatic ecosystem- or fish-based IFN. (The second purpose implicitly requires a corresponding WCO to reflect an instream flow need for

tourism, recreation, transportation and waste assimilation.) However, as this paper later points out, provincial water managers do not appear to share this view, as reflected at least by the water management planning to date for the South Saskatchewan River Basin.

While arguably mandating the *bases* for WCOs, the *Act* gives the province virtually blanket discretion to decide both whether and when to adopt a WCO in the first instance and, if it chooses to adopt a WCO, which of the three listed purposes the WCO should be designed to attain. As discussed in below, the province's Water for Life Strategy arguably calls for the adoption of aquatic ecosystem- and hence IFN-based WCOs, as a matter of policy, but this policy is not strictly binding and does not appear to have been interpreted this way by the provincial government.

The *Water Act* provides water managers with several tools to implement WCOs: denial of applications for new licences; inclusion of WCO-based conditions in new licences; amendments of existing licences where there are significant aquatic environmental impacts not foreseen at the time of issuance; and non-renewals of licences with fixed terms. However, none of these tools apply to licences issued before the *Water Act* came into effect. Thus, they do not enable WCOs to play a significant role in meeting IFNs in rivers like those in the SSRB that are already substantially allocated under grandparented licences. However, as noted below, some grandparented licences contain minimum flow conditions the enforcement of which may provide a significant benefit for achieving WCOs.

Water managers can also use government-held instream licences and conservation holdbacks in approvals of licence transfers to attain WCOs but, as shown above, these tools have limited utility for maintaining IFNs in rivers where grandparented licence allocations are prevalent.

ALBERTA WATER POLICIES

As noted in the previous part, while not mandating the maintenance of IFNs, provincial laws have given water managers considerable discretion to at least further that aim, while providing mixed signals as to how they should exercise their discretion. In the absence of clear legislative guides, provincial policies may provide significant guides for water managers' exercise of their broad legislative discretion. The term "policies" is used here to mean written goals and objectives, and generic rules, instructions, or strategies. While not legally enforceable in a direct or strict sense, policies are expected to be followed at least as a general matter. As such, Alberta's policies must be considered, in addition to provincial laws, to fully assess the role of IFNs in the province's overall river management framework. This part addresses Alberta's three province-wide water management policies and one of the province's "integrated resource plans" which serve as regional policies. All four policies are addressed in chronological order from the earliest to the most recent.

Eastern Slopes Policy

The *Eastern Slopes Policy* (AE 1984) is one of a number of "integrated resource plans" (IRPs) the provincial government has adopted to manage developments on public lands in several areas of the province (Kennett 2002). An IRP generally provides specific management direction by dividing its region into zones and then indicating the acceptable levels of industrial, recreational, and other activities in each zone. One might argue that IRPs are of questionable relevance for assessing Alberta's river management policy, because they apply only to public lands, yet they

were not even adopted for all provincial public lands and they have generally not been updated or even actively used in recent years (Kennett 2002). However, the *Eastern Slopes Policy* is discussed briefly here because of the longstanding recognition of the Eastern Slopes' particular importance from a water management standpoint (Kennett 2002). Covering roughly 90,000 square kilometers of Alberta's Rocky Mountains and foothills, including extensive areas adjacent to Jasper and Banff National Parks, the Eastern Slopes contain the headwaters of most of Alberta's major rivers and tributaries, including the Athabasca, and North and South Saskatchewan rivers.

As relevant here, the *Policy* recognizes the Eastern Slopes' importance in supplying water for downstream uses. The *Policy* also makes an integrated watershed management approach its "highest priority" (AE 1984:4) and commits the province to "establish optimal instream flows for fish through the modification of land/water use practices" (AE 1984:7). The *Policy* supplements this fish-based IFN objective with the related objective of maintaining "natural flows" (AE 1984:6). But the *Policy* applies this objective only to the North Saskatchewan and Athabasca river basins; by contrast, it aims for "intensive" management of the South Saskatchewan basin for water supply "stability" (AE 1984:6).

Fish Conservation Strategy

Alberta Sustainable Resource Development (SRD) recently adopted the 2006 *Fish Conservation Strategy* to update a prior version adopted by Alberta Environment and to "guide planning and priority-setting" for fish management and conservation through 2010 (ASRD 2006:ii). The new policy document does not expressly mention IFNs or even river "flows", but it does include a management principle and goal related to fish habitat protection more generally (10, 12). The document also calls for the maintenance of the biological diversity of fish fauna, and it recognizes the need for fisheries management to consider aquatic ecosystems "in … [their] entirety" (10). These general statements arguably provide implied policy support for efforts to maintain IFNs.

However, this IFN linkage to fish conservation is weaker than in the previous version of the *Strategy* which, while lacking a roadmap for protecting IFNs, at least expressly recognized the importance of IFNs for fish and fisheries management. More specifically, the prior version sought to "minimize" adverse effects to several watershed characteristics, including "stream flows", and recognized that "[s]ufficient year-round stream flows are essential for the maintenance of all life stages of fish populations" (AE 1998:7).

The updated *Strategy*'s omission of express references to IFNs may have resulted from SRD's authorship of the newer policy document, given SRD's limited role in regulating water withdrawals that affect stream flows. The new strategy does refer to Alberta Environment's legislative and policy authority with respect to water quality and quantity and aquatic ecosystem health (and it also notes that the federal Department of Fisheries and Oceans is the primary regulatory agency for dealing with the harmful alteration of fish). But the strategy makes no explicit reference to the need for *integrated* approaches to fisheries and aquatic ecosystem management. Goal 1, Objective 1 of the strategy is "to maintain the productive capacity of aquatic habitats to support healthy and diverse fish resources" (p.12); it seems remiss not to mention instream flow protection as an essential step in achieving that objective.

Framework for Water Management Planning and Aquatic Environmental Protection Strategy

The *Water Act* required the Environment Minister to establish before 2002 a provincial water management planning framework that contained an aquatic environmental protection strategy (s. 7). The *Framework* adopted by the government (AE 2001) contains a general policy commitment to protect and conserve the aquatic environment, but nothing specific to IFNs. The *Framework* also confirms the 'prior allocation principle' and the province's commitment to forego disturbing existing uses. The *Strategy* element in chapter 5 of the Framework is hardly a "strategy" if that word generally implies a clear action plan to meet specific goals. The *Strategy* mentions "instream needs" along with WCOs as objectives for protection (AE 2001:34), but only enumerates the *Water Act* tools as ways to achieve these objectives. It neither states how these tools will be used, nor even commits to using them.

Water for Life Strategy

The concept of healthy aquatic ecosystems plays a prominent role in Alberta's celebrated 2003 *Water for Life Strategy*. In its first three pages of text, the *Strategy* notes that Alberta's "quality of life, and life itself" "depends" on a "healthy and sustainable water supply for the environment" (AE 2003:5) and, more specifically: recognizes that "[h]ealthy aquatic ecosystems … must be preserved" (6); "commit[s]" to "maintain[ing] and protect[ing]" Alberta's aquatic ecosystems (7); and lists "[h]ealthy aquatic ecosystems" as one of three overall goals (7). While the *Strategy* also stresses the importance of water use for economic development (5-7), the statements quoted above suggest that the Strategy views aquatic ecosystem protection as a bottom line or overall constraint within which water-based economic objectives can be pursued.

Given the *Strategy's* ecosystem-based goals and commitments, one would expect IFNs, and actions specifically designed to maintain them, to be given a strong role in the *Strategy*'s list of implementation "outcomes" and "actions." But those lists make no mention of IFNs (26). The *Strategy* does reference the term "instream needs," which the Strategy defines as covering flowing and non-flowing waters and non-environmental as well as environmental needs. However, the *Strategy* makes only a single reference to this term and that reference occurs in a glossary at the end of the document (29).

While not mentioning IFNs expressly, the *Strategy*'s list of short-, medium-, and long-term "outcomes" (collectively spanning the period from 2004-2014) arguably implies a strong role for IFNs. In particular, the medium-term outcome — adoption of "water management objectives and priorities for sustaining aquatic ecosystems" through watershed plans (26) — strongly suggests that WCOs should be based on aquatic ecosystem IFNs, because WCOs are arguably the principle tool for expressing water management objectives. Several of the *Strategy*'s listed "actions" to achieve these "outcomes" likewise arguably impliedly include determining and maintaining IFNs (26). This interpretation is shared by the Alberta Water Council, a multi-stakeholder advisory group established by the province, whose 2005 report on the province's implementation of its *Water for Life Strategy* urged the province to make the "setting and enforcement" of IFNs a *short term* priority (Alberta Water Council 2005:i).

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Viewed collectively and from a broad perspective, Alberta's water management policies have

expressed general commitments to protecting aquatic environments, but have not backed up these commitments with express commitments to maintain IFNs. However, the maintenance of IFNs is arguably strongly implied in the policies' list of water management goals, outcomes, and implementing measures. From a narrower perspective, the policies are not consistent among themselves in their references to aquatic ecosystem protection and the hierarchy among them is unclear.

ALBERTA'S USE OF IFNs in RIVER MANAGEMENT

This paper started with a discussion of the prevalence of actual IFN determinations in Alberta, before turning to the role of IFNs in the province's generic legal and policy frameworks for river management. This part returns to Alberta's river-specific IFN experience, by considering the extent to which the province has actually used IFN determinations as the primary or one of several factors in basin-, river-, and project-specific management decisions. The analysis starts with the province's only basin-wide water management regulation and then addresses provincial water licence and project approval decisions. The analysis next turns to several current watershed planning contexts, including the recent *Water Management Plan* for the SSRB (AE 2006). Finally, it considers a unique, controversial IFN management framework for the lower Athabasca River.

Basin-specific regulations

As noted above, the province adopted basin-wide regulations for the SSRB in 1991 pursuant to its broad regulation-making authority under the *WRA*. The SSRB regulation has two notable aspects. First, it required water managers to cap the total amount of water that could be allocated for irrigation under new or existing licences. The regulation called for caps to be set as the volume of water deemed necessary to irrigate the maximum acreages specified in the regulation (ss. 4-5). Further research is needed to determine whether these caps actually reduced the impacts of irrigation on instream flows.

Second, the regulation reserved all water in the Basin that had not already been allocated while allowing new allocations of that reserved portion. This reservation alone would seem to be a meaningless addition to the *WRA*'s allocation provisions, except that the regulations themselves included a specified framework for granting any allocations from the reserved portion (ss. 2-3). This framework consisted, in part, of a list of specified purposes for which reserved water could be allocated (s. 6). This list copied the set of licensable uses in the *WRA* *except* instream uses, thus, effectively precluding the government's use of 'instream licences' to restore and maintain IFNs in the SSRB (Kwasniak 1992). While precluding government-held instream licences, the regulations authorized provincial water managers to include provisions in other new licences limiting licenced diversions "when necessary to maintain minimum instream flows" (s. 7). However, this provision did not actually *require* water managers to use licences to achieve minimum flows on any given river in the Basin. And the regulation did not clearly state that water managers had to enforce minimum flows, if at all, through *all* new licenced withdrawals from any given river. The provision did limit water managers' discretion somewhat by specifying river-specific minimum flows for the Waterton, Belly, and St. Mary rivers, but it allowed water managers to choose minimum flows for all other rivers in the Basin (s. 7(2)).

With the exception of the regulation's specified minimum flows for the three rivers, the

breadth of discretion reflected in the regulation's minimum flow provisions arguably rendered them a relatively insignificant regulatory action, because the provisions added little to the implied discretion that Alberta's water managers already had under the *WRA* itself. In addition, even if water managers adopted minimum flows for all rivers in the Basin and uniformly implemented them through all new licences, it is unclear whether any minimum flow targets specified in, or adopted under, the regulation were achievable from an instream standpoint given that the regulations provided for the use of flow-based conditions only in licences issued after the regulation came into effect.

In sum, the SSRB regulation is notable at a superficial level for specifically addressing the topic of instream flows. However, it did not actually direct provincial water managers' exercise of their broad legislative discretion to further an IFN-based objective. In fact, by precluding the use of instream licences, on balance, the regulation arguably only further limited water managers' ability under the *WRA* to actually maintain IFNs. However, to fully understand the regulation's relevance for IFNs, further research would be useful to determine whether the regulation's specified minimum flows were based on then-existing determinations of the IFNs for the three relevant rivers. Whether or not they were based on then-current IFN determinations, at least several of the regulations' minimum flows are significantly lower than the IFNs determined by Clipperton *et al.* (2003) over two decades after those minimum flows were adopted (AE 2005a).

Water licence and project approval conditions designed to maintain IFNs

Besides applicable basin-specific regulations, water licences provide the most obvious data base for analyzing the province's use of IFNs in water management decisions, because water licences are arguably the primary water management tool. Hence, any provincial effort to maintain IFNs would likely be reflected in flow conditions included in those licences. However, analyzing individual water licences is problematic, in part, because the threshold data set is extremely large — thousands of licences (or analogous instruments) have been granted since statutory allocation programs were instituted.

A reasonable picture of Alberta's use of IFNs in river management decisions might be developed just by analyzing the licences issued specifically for those rivers for which IFNs have been determined. However, even this refined licence set likely encompasses a considerable number of water licences and, thus, is still quite large and beyond the scope of research for this article.

After identifying the relevant set of licences, a definitive analysis of the role of IFNs in water licensing must then address how IFN considerations might have been factored in to the setting of flow-based conditions and other possibly relevant terms, in each relevant licence. This analysis of licence terms is problematic — and, again, was beyond the scope of research for this article — because the licences themselves are not all readily accessible and because the province generally does not produce a public 'record of decision' or an analogous written explanation of licence terms when it issues water licences. Nor does the province maintain a readily accessible public registry of records compiled in individual licence proceedings (other than the licences themselves many of which are posted on an on-line database). Thus, it would likely be quite difficult in most instances, and impossible in some, to determine whether or how licence conditions are based on actual IFN determinations. (The lack of a central data base of the numeric values of the IFNs that have actually been determined only compounds this research

problem.)

This research exercise may be eased somewhat for any licences that included "minimum flow" conditions adopted under the SSRB regulation discussed above, but further research is needed to determine the extent to which the regulation's discretionary minimum flow provisions were actually applied to specific licences and how they were implemented in specific licence conditions.

To its credit, Alberta Environment recently developed a list of flow-based requirements for water licences in the Central Region, which is one of the three geographic regions that the agency has designated for its internal management purposes. According to this list, flow-based requirements exist for seven rivers in the North Saskatchewan basin and nine rivers in the Red Deer river basin. Of these sixteen different flow requirements, ten are expressed as single, year-round numeric minimum flows, four are seasonal (including one weekly) numeric minimum flows, and two are seasonal prohibitions on withdrawals (AE 2005).

As for the bases of the flow requirements, the list expressly links only one of the sixteen requirements to a specific IFN methodology. This link implies that the requirement is equal to 100% of the IFN determined from using that methodology, although further research is needed to confirm this implication. Two others of the sixteen flow requirements are noted as "allegedly" being based on an IFN methodology; thus, suggesting that Alberta Environment itself is unsure about the basis for these flow requirements. Of the remaining thirteen flow requirements, seven are noted as being intended to "protect fisheries," or "for fisheries," but the list does not indicate whether these seven requirements were based on 100% or less of any fish-based IFN that may have been determined for the relevant rivers.

Although the list itself is not clear, these flow requirements were presumably incorporated into actual water licences. However, the requirements were implemented only prospectively — i.e. they were not applied to licences existing before the requirements were adopted (Stevens 2006). Thus, in theory, the numeric flow requirements might not achieve the numeric flow target on which they are based, whether or not that requirement was based on an IFN. Further research is needed to determine how many licensees, if any, are exempt from the flow requirements and how any such exemptions might impede achievement of the flow targets under various flow conditions.

In sum, Alberta Environment's list of flow requirements for its Central Region provides only a starting point for assessing the extent to which water licences have paid heed to IFNs in that Region. Of course, the list is also limited to the Central Region. Besides this list, the province has produced a list of "instream objectives" (IOs) that have been developed for selected "parts" of all rivers in the SSRB (AE 2006; AE 2004). (The list of flow requirements for the Central Region does not use the term IO so it is unclear whether any of those requirements are also considered "IOs".) The scope and purposes of IOs are not defined in legislation or regulations. One report describes them as a "compromise" of IFNs or IFN-like objectives and water needed for other instream and consumptive (i.e. non-instream) purposes (Clipperton *et al.* 2003:267). However, a recent government document defines IOs more simply as "[f]lows that are to remain in the river via dam operations or as a restriction on licences" (AE 2006). The definition later states that IOs have "usually" been based on "fish habitat instream needs (the Fish Rule Curve) and/or water quality" (AE 2006). But the document also notes that "some" of the IOs established for rivers in the SSRB provide only "limited protection of the aquatic environment" (21; AE 2004).

This limited protection is partly confirmed by the province's list of IOs for the SSRB, which

links IOs to the "Fish Rule Curve" only for the mainstem reaches of the Bow River Basin down to the Bassano Dam on the Bow River and for the six mainstem reaches of the Oldman River from the Oldman Reservoir to the river's mouth (AE 2006). None of the other SSRB IOs reported by the province are expressly linked to fish or other aquatic habitat or general ecosystem needs and, for any given river reach, they vary between irrigation and non-irrigation licencees (AE 2006).

Further research is needed to confirm what if any use IOs has been for restoring or maintaining IFNs in the SSRB and other Alberta river basins. In particular, more information is needed with respect to the: full geographic scope of all IOs that have been developed; the relationship between those IOs and any IFNs determined when the IOs were adopted and current IFN determinations; the number of water licences on a given river to which an IO for that river has have been applied and the proportion of water allocated under those licences relative to all allocated water; and, the kinds of licence conditions or other mechanisms that water managers have used to implement IOs for those licences to which they have been applied.

Besides expressly incorporating numeric IOs and other generic flow-based requirements, water licences can include a variety of other narrative conditions that might allow provincial water managers to adjust numeric licence allocations over time to meet IFNs. A review of over 200 water licenses for the Bow River (ranging in date from 1906–2005) indicated that the vast majority included some kind of express or implied, quantitative or narrative flow-based conditions. Of the narrative conditions, the most salient were ones giving provincial water managers discretion to modify the licenced allocations to "ensure the most beneficial use of the water in the public interest". Read broadly, this condition arguably permits the province to reduce the licenced allocations for IFN purposes, although further research is needed to confirm this interpretation. In particular, roughly one-third of the licenses with these conditions also included a specific numeric minimum flow condition which might be construed as overriding any provincial right, under the narrative "public interest" condition, to impose a more stringent flow-based limit for IFN purposes. The specific minimum flow condition in the licenses examined was 1400 cubic feet per second. Additional research is needed to determine the basis for this number, as well as to fully identify and categorize all direct and indirect flow conditions and to assess their actual and potential use by the province for restricting licenced flows, or requiring return flows (Watrecon Consulting 2005), to maintain IFNs.

Other than water licences, project authorizations under the *EPEA* or possibly other provincial regulatory regimes — for projects like dams, weirs, or irrigation diversions that impede or otherwise affect river flows — provide still another relevant data set for determining the role of IFNs in provincial river management decisions. However, there is no central, readily accessible registry of all of these authorizations, and the records of each relevant authorization could well be lengthy and complex. Thus, an analysis of the role of IFNs in these authorization proceedings would itself be cumbersome and complex, and is beyond the scope of research for this article.

Watershed planning processes and IFNs — the South Saskatchewan River Basin

As mentioned above, the *Water Act* enables comprehensive watershed planning, that is, planning on a watershed basis that takes an integrated approach in respect of land, water and other resource uses (ss. 8 and 9). However there are currently no official, Cabinet approved, comprehensive, integrated watershed plans for any basin in the province. This said, the government is conducting several less ambitious *water management* planning processes, the

most advanced of which not surprisingly is for the South Saskatchewan River Basin (SSRB). The SSRB include the Red Deer, Bow, and Oldman River sub-basins, the urban centres of Calgary, Lethbridge, Red Deer, and Medicine Hat, and all of the province's thirteen irrigation districts. There are over 20,000 statutory water allocations in the SSRB but, as noted previously, the irrigation licences collectively account for roughly 75% of the total volume of those allocations (AE 2003c).

Because of actual and potential water scarcity, the Alberta government stopped accepting new water licence applications for the Belly, Waterton, and St. Mary Rivers, and new irrigation applications for the Highwood River, Ross Creek and Willow Creek (AE 2003c). The government acknowledges that in some areas of the SSRB, all allocations cannot be satisfied and accordingly junior licencees — i.e. those with relatively low priority — have frequent and even substantial deficits (AE 2003c). An assessment of 33 river reaches in the SSRB for riparian and aquatic ecological condition revealed that 31 range from near or approaching unacceptable conditions to below acceptable conditions (AE 2003c).

The province has completed a two-phase water management planning process for the SSRB. The main feature of the Phase I plan is an approved system for transferring water licences within the basin. Thus, the Phase I plan has no direct relevance to IFNs except that the licence transfer system provides for the use of the conservation holdback tool discussed above.

The province recently adopted the Phase II SSRB plan which, among other things, recommends a balance between protecting the aquatic environment and the amount of river water required for economic development (AE 2006). The Phase II plan was based on numerous background studies, including considerable work to determine IFNs in the Basin. Notwithstanding these efforts, the plan does not attempt to actually *maintain* those IFNs, at least, in the sense that the plan itself does not purport to do so; nor does it even address the topic of IFNs expressly. However, in view of the IFNs, the WCOs recommended for the Bow, Oldman and South Saskatchewan Rivers provide direction to decisions makers to take opportunities for flow restoration when they arise, and to stop accepting applications for new allocations (Ohrn 2006).

Do the plan's recommended WCOs nevertheless mirror the SSRB IFN determinations? Answering this question is somewhat problematic because there is no simple, straightforward numerical relationship between the plan's recommended WCOs, and the IFNs and corresponding natural flows (Ohrn 2006). (Alberta Environment has addressed this problem by graphing WCOs, natural flows, and IFNs for numerous SSRB river reaches. There are different graphs for each week of the year and each graph charts a range of numbers for each of the three variables across a statistical range of 'theoretical' actual flows (AE 2005a).) This said, generally speaking, the recommended WCOs are roughly 55% of the IFNs in the majority of the year (Ohrn 2006).

Why has the province's SSRB plan precluded maintaining IFNs in most of the basin? This decision purported to reflect the province's balancing of, or compromise among, competing interests in and demands on the available water supply. For example, in its terms of reference for the Phase II plan, the province stated its desire to adopt WCOs that achieve an "acceptable and realistically achievable long-term compromise between two extremes of consumptive use of all of the water and a natural aquatic environment" (AE 2003d)

There are two problems with this position. The first is that, as discussed above, the *Water for Life Strategy* appears to require, as a matter of policy, the development of aquatic ecosystem WCOs and the plain text of the *Water Act* suggests that any such WCOs should be based only on aquatic ecosystem needs, rather than on a compromise of those needs with humans' consumptive

needs. Rather than follow this tack, the plan treats WCOs like the "instream objectives" that the province developed prior to the *Water Act*.

However, even putting aside their misplaced label as WCOs, the plan's flow targets were based on the premise that, in determining how far it could go in maintaining IFNs, the government would not consider either cancelling outright or even reducing the allocations in licences issued before the *Water Act* was passed (other than licences that might not be in good standing) (AE 2003d). As noted above, several licence conditions may enable the province to require these allocation reductions without having to cancel the licences outright or even amend them. And, while the current *Water Act* likely provides water managers with insufficient authority to cancel or amend those grandparented licences for IFN purposes, the province has constitutional power to amend the *Act* in order to provide this authority.

Without the option of reducing existing grandparented allocations, SSRB planners concluded not surprisingly that it would generally be impossible to maintain IFNs in the SSRB (at least in low flow years) (AE 2003c). Yet, the province's refusal to consider ratcheting back those allocations hardly reflects a true compromise or balancing approach from a broad public interest standpoint, because the holders of those considerable allocations — which were issued without expiration dates and with little or no environmental considerations (Thompson 1992) — are not expected to make any sacrifices for the sake of compromise.

Watershed planning and IFNs outside of the SSRB

Planning processes for three other watersheds outside of the SSRB are currently underway. One of these processes is for the Battle River watershed. Starting at Battle Lake southwest of Edmonton, the Battle River flows 800 km to the Alberta-Saskatchewan border after which it ultimately joins the North Saskatchewan River. A 2004 Terms of Reference called for a two-phase planning process, with the first phase focusing on water supply and instream needs of the Battle River and its major tributaries (Alberta Government 2004).

Another planning process applies to the Cold Lake basin and the lower Beaver River basin (collectively termed the Cold Lake-Beaver River basin), in northeast Alberta. This process is intended to update an existing management plan that was adopted in 1985, in response to increasing water demands from several sectors including bourgeoning local oilsands operations. The existing plan does not mention the determination or use of IFNs *per se*, but the plan does include rules for lake withdrawals (except for oilsands operations, which were required, on a phased basis, to meet their water needs from a pipeline carrying water directly from the North Saskatchewan River). These rules appear to have been based, in part, on considerations of appropriate downstream river flows (AE 1985).

The third ongoing planning process is for the Lesser Slave Lake and accompanying river basins (collectively, the Lesser Slave Basins). The 2003 Terms of Reference for this process envisions multi-phase plans, with the first phase addressing water quantity and flow in the Lesser Slave River and issues related to Lesser Slave Lake management (AE 2003a).

All three Terms of Reference for these planning processes commit their respective planning outcomes to include aquatic ecosystem protection strategies, but they differ on the use of IFNs in these strategies. Two of the three expressly call for IFN determinations; all three contemplate the development of aquatic ecosystem WCOs, but two are unclear as to whether WCOs are *required* outcomes and none specify that the government will be bound to apply any plan-based WCOs. Two Terms of Reference make it clear that any WCOs developed through the planning processes

will reflect economic or social factors as well as instream needs (the third is silent on this issue). And two suggest that existing water licences will not be changed to reflect any new WCOs.

In sum, while the Terms of References for these three planning processes vary, they are at least alike in not calling for the development of binding WCOs that are tied directly to IFN determinations and that apply to all water users. In this sense, none of the Terms of Reference takes a more aggressive approach than the SSRB plan with respect to the implementation of IFNs.

Of course, the Terms of Reference provide only a limited basis for determining the actual *outcomes* of these planning processes. Research to date suggests that the Battle River process may actually result in a WCO that equals the applicable IFN (King 2006), but the process is not yet complete and additional research is needed to determine how effective the WCO will be if, as likely, it is inapplicable to pre-existing licences. By comparison, a draft plan for the Cold Lake-Beaver River Basin generally discusses surface flow issues and aquatic ecosystem protection, and lists several measures to enhance declining flows, but the draft plan does not measure the effectiveness of any of these tools against IFNs. In fact, it does not mention IFNs at all except to include the similar term "instream needs" in a list of acronyms in an appendix (AE 2006b).

The lower Athabasca River

Instream flow needs of the lower Athabasca River have garnered significant attention in recent years, prompted by river withdrawals from bourgeoning oilsands operations in the lower Athabasca region. This attention arguably has been represented or accompanied by considerable regulatory foot dragging which may well continue.

Oilsands mines are licensed to divert 349m^3 of water from the Athabasca River, less than 10% of which is readily returned to the river (Griffiths *et al.* 2006). While diversions occur year-round, those diversions are a concern for fish, especially during winter low flow periods and there is no established methodology for determining IFNs for rivers that are ice covered (AE 2006a; Griffiths *et al.* 2006) Until recently, the province's primary strategy for addressing these concerns was to await the long-delayed development of a recommended IFN and implementation framework from the Cumulative Effects Management Association (CEMA), a multi-stakeholder organization (including Provincial and Federal Government Representatives) charged with adopting regional environmental standards and cumulative effects management strategies for the Athabasca oilsands region. While bemoaning CEMA's ongoing delays, the province's Energy and Utilities Board has continued approving, and Alberta Environment has continued issuing new water licences for, successive oilsands operations.

This two-track response was destined to fail to provide sufficient incentive for CEMA to complete its work (Wenig 2004). However, this flaw may have been mitigated somewhat by Alberta Environment's position that it can amend its oilsands water licences to incorporate conditions to implement a future IFN management regime (Griffiths *et al.* 2006). Further research is needed to confirm the legal support for this view; however, one report suggests that this amendment authority is at least more clearly expressed in conditions for more recent oilsands licences than for earlier ones (Griffiths *et al.* 2006).

In addition, in a recent oilsands regulatory proceeding, the province committed to adopt an IFN framework by the end of 2005, if CEMA did not complete its IFN work by then (Griffiths *et al.* 2006). Accordingly, Alberta Environment released an "Interim" Framework in January, 2006 for a 130 km segment of the river downstream of Fort McMurray. The Framework is considered

"Interim" because it was intended to be used only until CEMA completed its work and the province adopted CEMA's recommendations (AE 2006a:3).

In a nutshell, the Interim Framework adopted different management strategies for different specified ranges (termed "zones") of river flows. These strategies included: allowing licensees to operate "normally" when flows are in the highest range, expecting licensees to conduct "voluntary conservation practices" for achieving a maximum total diversion rate (as a percentage of available flow) in the middle flow phase, and imposing "mandatory reductions" and off-site storage requirements in the lowest phase (AE 2006a:5).

The agency labelled its initial version a "draft" for public comment and had not finalized the Framework as of early June, 2006. The draft Framework was criticized by ENGOs (Griffiths *et al.* 2006, Woynillowicz and Severson-Baker 2006). It also apparently did not satisfy federal concerns, resulting in the initiation of a provincial-federal effort to develop a new framework altogether (Courtney 2006). While the province's Interim Framework may never get past the drawing board, in some sense it provided the leading precedent for provincial incorporation of IFN considerations in water management decisions.

It is too early to know how the final IFN framework for the lower Athabasca River will be structured (and how soon it will be adopted and implemented). However, Alberta Environment has made clear its expectation that the long term framework will account for "social and economic considerations" (AE 2006a:3). This approach suggests, in turn, that the framework will not recommend adoption of an IFN as a direct regulatory standard.

CONCLUSIONS

Effective steps to maintain IFNs are essential to fulfill any meaningful commitment to restore and sustain aquatic ecosystems. The title of this paper asks whether IFNs are metaphorical "water under the bridge" — i.e. whether the numerous IFNs that have been determined for Alberta rivers (more than once for some rivers), have served any purpose in actually maintaining IFNs and thereby protecting aquatic ecosystems.

The analysis above suggests the answer is yes, but not wholeheartedly. Alberta's generic legal framework for river management has, from its inception over a century ago to the present, provided mixed signals with respect to maintaining IFNs on Alberta's rivers. On the one hand, it has provided water managers with considerable implied discretion to make water licences conditional on IFN-based flow limits, and it has provided several other specific tools for maintaining desired instream flows. On the other hand, Alberta's laws have never actually mandated IFN-based objectives. And Alberta's retention of a 100 plus year-old licencing system, with the 'prior allocation' principle and reflexive grandfathering of old licences under successive water allocation statutes, likely pose significant hurdles to meeting IFNs. However, further research is needed to determine what legal flexibility the province has at present in modifying the allocations under those senior licences.

Alberta's water policies have also provided somewhat mixed messages, by generally not mentioning IFNs as express policy objectives, but by implying a strong role for IFNs through other narrative objectives and implementing steps.

The record of Alberta's implementation of its generic laws and policies is much more complex and difficult to discern due, in large part, to a lack of information on the nature and even occurrence of river-specific flow-based requirements adopted by the province and also on the extent to which water licences and other project approval decisions have been, or could be,

used to implement any such requirements. For transparency, consistency, and otherwise sound and sustainable river management, Alberta Environment should develop a province-wide list of river-specific, flow requirements and indicate the extent to which any such conditions are tied to actual IFN determinations. The Appendix provides a detailed set of questions that should be answered in this kind of data base.

While considerable further research is needed to assess the role of IFNs in Alberta's river-specific management decisions, research to date suggests that the role has historically been minimal and is, at best, spotty at the present. While IFNs are largely being ignored as planning objectives within the SSRB, other forthcoming water management plans and efforts like those for the lower Athabasca River might suggest that IFNs will play a more significant future river management role outside of the SSRB. They could also arguably play a more significant role within the SSRB if Alberta's water managers were willing to consider modifying existing, long-standing allocations — particularly those for the irrigation districts that hold the majority of SSRB allocations — as among the full set of available river management tools.

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APPENDIX

RECOMMENDED CATEGORIES OF INFORMATION FOR PROVINCE-WIDE LIST OF RIVER-SPECIFIC FLOW REQUIREMENTS

WCOs

Has a WCO been adopted by AENV, under ss. 1(1)(hhh) and 15 of the *Water Act*?

- If yes:
- When?
- For what portion of the water body?

- Based on what criteria & methodology?
- What is the WCO?
- How does the WCO compare to that recommended by the local watershed advisory council, if one exists?
- How does the WCO compare to the applicable IFN determination, if any exists?
- How does the WCO compare to any previously existing WCO or other flow-based standard?
- How does the WCO compare to flow levels assumed for applicable water pollution approvals?
- To what proportion of water rights holders does the WCO apply?
- How does the WCO compare to natural flows minus: a) all applicable water allocations (per water licences and other forms of allocation rights); and b) current and predicted future actual water withdrawals?
- If no:
- Has a WCO been proposed by AENV or by a local watershed advisory council?
- Was there a previous WCO in effect that has been rescinded?

MINIMUM INSTREAM FLOW REQUIREMENTS (IFR) OTHER THAN WCOs ("instream objectives", "instream requirements" etc.)

Has an IFR been adopted by the province under the *Water Act* or *Water Resources Act*?

- If yes:
- When?
- For what portion of the water body?
- Based on what criteria & methodology?
- What is the IFR?
- How does the IFR compare to the applicable IFN determination, if any exists?
- How does the IFR compare to any previously existing IFR for that same water body?
- How does the IFR compare to flow levels assumed for applicable water pollution approvals?
- To what proportion of water rights holders does the IFR apply?
- How does the IFR compare to natural flows minus: a) all applicable water allocations (per water licences and other forms of allocation rights); and b) current and predicted future actual water withdrawals?
- If no:
- Has an IFR been proposed by AENV or by another stakeholder or multi-stakeholder organization?
- Was there a previous IFR in effect that has been rescinded?

IFN DETERMINATIONS

Has an IFN been determined by the province or by a non-governmental source?

- If yes:

- When?
- For what portion of the water body?
- Based on what criteria & methodology?
- What is the IFN?
- How does the IFN compare to natural flows minus: a) all applicable water allocations (per water licences and other forms of allocation rights); and b) current and predicted future actual water withdrawals?
- How does the IFN compare to flow levels assumed for applicable water pollution approvals?
- Is further work being planned to enhance or otherwise revise the IFN? If yes, describe.
- Does the IFN replace a previously determined IFN and, if yes, how are they different?
- Has the province proposed or adopted a plan, strategy, or other mechanism to achieve all or part of the IFN?

BASIC FLOW DATA

- Natural flow, incl. future trends
- Portion of natural flow covered by: a) all applicable water allocations (per water licences and other forms of allocation rights); and b) current and predicted future actual water withdrawals.
- Flow level used for calculating conditions in applicable water pollution approvals