

**Canadian Environmental Law Association
Environmental Advocates of New York
Great Lakes United
Lake Michigan Federation
Michigan Environmental Council
National Wildlife Federation Great Lakes Office
The Nature Conservancy Great Lakes Program
Ohio Environmental Council
Stratégies Saint-Laurent
Wisconsin Environmental Decade**

January 21, 2003

Dr. Samuel Speck
Ms. Maggie Grant
Co-chairs, Water Management Working Group

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Charter Annex negotiating process: Basin

BY ELECTRONIC MAIL

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Dear Director Speck and Ms. Grant,

Happy new year and thank you for the continuing opportunity to contribute to the deliberations of the Water Management Working Group. Thank you also for your positive, detailed response to our December 9 interim letter, in which we made a number of process-related suggestions.

In that letter we also pledged to deliver a full response to the Working Group's November materials in time for distribution at its first meeting in 2003. That response is attached.

The Working Group materials distributed to the Advisory Committee totaled sixteen pages and our response is also voluminous. In order to make the material more understandable at a glance, throughout the text we have boxed and shaded those paragraphs that propose specific concepts or language. However, the unboxed material is important and in some cases indispensable for understanding our proposals.

In this response we respond specifically to the suggestions and questions contained in the November materials. But we have also attempted to go beyond direct response to propose both a complete framework for implementing the annex principles and the needed legal and scientific mechanisms that could make this framework a practical reality.

This response represents scores of hours of discussion and drafting by the signatories and their colleagues. To make future efforts of this type more efficient, we would like to request a formal, point-by-point response to our suggestions before the next Advisory Committee meeting. This would enable us to avoid unneeded discussion of proposed directions no longer under consideration by the

Working Group, provide more informed comment on proposed directions still under active consideration, and make clearer the issues of most importance to the basin environmental community.

We are looking forward to an exciting year of interchange and collaboration in our joint effort to protect and restore the Great Lakes and St. Lawrence River basin ecosystem.

Thank you again for the opportunity to contribute.

Sincerely,

Sarah Miller
Coordinator, Canadian Environmental Law Association

David Higby
Great Lakes Project Director, Environmental Advocates of New York

Reg Gilbert
Senior Coordinator, Great Lakes United

Cameron Davis
Executive Director, Lake Michigan Federation

James Clift
Policy Director, Michigan Environmental Council

Andy Buchsbaum
Director, National Wildlife Federation Great Lakes Office

John A. Andersen, Jr.
Great Lakes Director, The Nature Conservancy

Molly Flanagan
Water Program Associate, Ohio Environmental Council

Marc Hudon
President, Stratégies St-Laurent

Derek Scheer
Water Policy Director, Wisconsin Environmental Decade

Great Lakes Charter Annex negotiating process

**Basin environmental groups' response to November 2002
Water Management Working Group materials**

January 21, 2003

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Note: Shaded areas in the text indicate specific proposals or suggested agreement wording.

General issues

This section of our response includes a summary of the key recommendations we made in our spring letters to the Water Management Working Group, followed by definitional issues that apply to all the specific issue papers distributed by the Working Group subcommittees in November.

Summary of previous recommendations

In our letters of April 18 and May 6, 2002, and in comments at Advisory Committee meetings, we have recommended:

Application to all withdrawals

The Great Lakes Charter Annex states, “The new set of binding agreement(s) will establish a decision making standard that the states and provinces will utilize to review new proposals to withdraw water from the Great Lakes Basin as well as proposals to increase existing water withdrawals or existing water withdrawal capacity.”

As clearly intended by this passage, the new standards for judging withdrawals must apply to *all* significant proposals for new or increased withdrawals of water from the Great Lakes basin, whether the resulting use takes place in or out of the basin, or whether potential impacts concern remote headwater ecosystems or the Great Lakes and St. Lawrence River themselves.

We assume that the standards should *not* apply to very small withdrawals nearly certain to have no significant adverse ecological impact and disproportionately costly to permit, the so-called “de minimis” withdrawals such as household well withdrawals.

Dual “de minimis” determination

We propose two means, to be applied consecutively, for classifying water withdrawals as provisionally exempt from the proposed Great Lakes Charter Annex standards: 1) withdrawals below 50,000 litres (13,200 gallons) per day of water withdrawal, averaged over thirty consecutive days,¹ and 2) an easy-to-use, government-provided ecological impact checklist by which the applicant affirms that the withdrawal is unlikely to cause significant adverse ecological impact.

A withdrawal’s de minimis classification should be rendered void if it at some point it comes to light that the withdrawal is in fact likely to cause significant adverse ecological impact.

Trigger for regional review

Regional review of a proposed water withdrawal should be triggered if it exceeds 1 million gallons (3,785,000 litres) or more of water withdrawal per day averaged over thirty consecutive days.

Interruptibility

A water withdrawal permit should be able to be modified or revoked if information comes to light that the withdrawal project does not in fact meet the annex standards.

Permit monitoring

To ensure compliance, each permit should be monitored by the permittee and by the water-permitting ministry or agency. The ministry or agency should use monitoring methods that rely heavily on self-monitoring with periodic checks by ministry or agency personnel.²

Restoration plan

The region's ten state and provincial jurisdictions should create a comprehensive plan for protecting and restoring the Great Lakes and St. Lawrence River basin. The plan should address restoration of natural flows, fluctuations, and channels where ecologically appropriate; provide goals and timelines for reducing water consumption by use sector; protect groundwater recharge areas; and designate and protect areas of special importance for watershed and basin hydrological functioning, among other things.

Improvement projects associated with permitted water withdrawal projects should be drawn from this restoration plan.

Indigenous consultation and deference

The governors and premiers should commit to instituting means for consulting with Tribes and First Nations on any water withdrawal proposal that may affect them, and for assuring that water withdrawal projects do not violate treaty rights.

Citizen suit

The proposed new regional system for judging water withdrawals is intended to justify retaining authority over basin waters within the region. The new system can work over the long term only if it is enforceable and enforced. The best way to ensure this is to enhance government enforcement with citizen enforcement. Where government is adequately enforcing the new system, citizens should be able to participate, but need not be enforcers. However, where government will not or cannot enforce the new laws, citizens must be able to fill the gap.

The U.S. Clean Water Act provides an excellent model for citizen enforcement. The CWA is recognized as having the highest compliance rate and being the best-enforced federal environmental law on the books in the United States. A critical part of its enforcement scheme is citizen suits.

¹ This level is the current de minimis for Ontario water takings permits and for Canadian federal prohibition of water removed from Canada's "Atlantic" (Great Lakes) basin. A slightly lower level, 10,000 gallons, is the threshold for permitting in Minnesota.

² The U.S. Clean Water Act's National Pollutant Discharge Elimination System uses such a method.

Citizen enforcement should be incorporated into new water management laws required under the annex-based agreement by allowing citizens to bring suit against 1) withdrawers who fail to comply with the terms of their permits, 2) agencies that issue withdrawal permits in violation of jurisdictional law, the regional agreement, or regional decisions, and 3) state or provincial regional bodies that do not adhere to the terms of the regional agreement.

General definitions

Great Lakes – St. Lawrence River basin

As we understand it, the Great Lakes Charter Annex was intended to apply to the Great Lakes, the St. Lawrence River, and their watersheds. Members of the Québec negotiating team have told us in the past that Québec intends for the annex-based agreement to apply to the St. Lawrence River watershed.

We suggest that references to the “Great Lakes” and the “Great Lakes basin” in Working Group materials and the eventual text of the proposed annex-based agreement be enhanced to say “Great Lakes – St. Lawrence River” and “Great Lakes – St. Lawrence River basin.”

Basin groundwater

The Working Group has proposed that the proposed agreement define “Waters of the Great Lakes Basin” as

(also termed in the Great Lakes Charter as “Great Lakes Basin Water Resources”)—the Great Lakes and all streams, rivers, lakes, connecting channels, and other bodies of water, including tributary groundwater, within the Great Lakes Basin.

Although the Great Lakes Charter and its annex include groundwater in the definition of the basin, it is not clear that they intend to include groundwater that is hydrologically connected to the Great Lakes basin but not within the surface watershed boundaries. Nor is it clear that “tributary groundwater” refers to groundwater other than groundwater that can be demonstrated to flow into surface tributaries or the lakes themselves. Finally, similar to our suggestion above, although the Great Lakes Charter implicitly includes the St. Lawrence River basin when it refers to the Great Lakes, the Charter never says so explicitly and we think it should.

Suggested language

Waters of the Great Lakes and St. Lawrence River Basin (also termed in the Great Lakes Charter as “Great Lakes Basin Water Resources”) are the Great Lakes and St. Lawrence River and all streams, rivers, lakes, connecting channels, and other bodies of water, including groundwater, within or hydrologically connected to the Great Lakes – St. Lawrence River surface basin.

Source watershed / subwatershed

“Source watershed” and “source subwatershed” should be explicitly defined using a nested watershed delineation such as those developed for the U.S. portion of the basin by the U.S. Geological Survey and for the Ontario portion of the basin by the Ontario Ministry of Natural Resources.³

Most aspects of the discussion of prospective standards reference the source of the withdrawal. The Standards Subcommittee employs the term “source watershed” and throughout this response we employ the similar term “source subwatershed.” But what exactly is the watershed of a withdrawal? Without a precise definition, the watershed of a withdrawal at, say, the headwaters of the Little Muskegon River could be interpreted to be the watershed of the Muskegon River or even of Lake Michigan. Assessments of ecological harm, improvement, return flow, and water withdrawal and consumptive use conservation would all then be applied at the larger scale.

The concept of source watershed or subwatershed should be specifically defined in the annex-based agreement as being of the same scale as the smallest watershed that defines the site of the withdrawal, since that is the scale at which impacts are likely to be most significantly experienced.

Suggested language

“Source subwatershed” is the same subwatershed as defined by geographical level at the point of withdrawal.

³ For more information on these delineations, see, for the U.S. Geological Survey, <http://water.usgs.gov/GIS/huc.html>, and for the Ontario Ministry of Natural Resources, <http://www.mnr.gov.on.ca:80/MNR/water/watershed.html>. United States watersheds are divided and subdivided into successively smaller hydrologic units classified into four levels: regions, subregions, accounting units, and cataloging units. The hydrologic units are arranged within each other, from the smallest (cataloging units) to the largest (regions). Each hydrologic unit is identified by a unique “hydrologic unit code” consisting of two to eight digits based on the four levels of classification in the hydrologic unit system. To complement this federal watershed classification, these hydrologic units are further subdivided by states. Their watershed delineations are often considered fifth- or sixth-level watersheds, building on the first four levels defined by USGS. The Ontario watershed delineation system defines primary, secondary, tertiary, and quaternary watersheds. This four-level delineation system is reasonably compatible with the U.S. system described above.

Water conservation

In the Great Lakes Charter Annex, the Great Lakes governors and premiers committed to requiring proposals for new or increased water withdrawals to demonstrate that they would be “Preventing or minimizing Basin water loss through return flow and implementation of environmentally sound and economically feasible water conservation measures.”

General context: a basinwide conservation plan

When the Great Lakes provinces and states signed the Great Lakes Charter in 1985, they committed to develop a “Basin Water Resources Management Program” that would “guide the future development, management, and conservation of the water resources of the Great Lakes Basin.” This was further defined to include:

- “The development of cooperative policies and practices to minimize the consumptive use of the Basin’s water resources; and
- “Recommended policies to guide the coordinated conservation, development, protection, use, and management of the water resources of the Great Lakes Basin.”

The water conservation measures currently being developed for the annex-based agreement only partially address the Great Lakes Charter’s water conservation commitments. The annex-based agreement will ensure that water conservation measures are included in new or increased water withdrawals, but it will not ensure that water conservation measures are applied to existing withdrawals unless the withdrawers apply for increases.

Canada and the United States use water at a much higher per-capita rate than most developed countries. The Organization for Economic Co-operation and Development, an organization of the world’s thirty most economically developed nations, found that, as of 1998, Canada and the United States were withdrawing water at a per-capita rate three times higher than two-thirds of the other OECD countries and two times higher than 85 percent of OECD countries.⁴

Suggested language

The Great Lakes – St. Lawrence River provinces and states shall collectively develop a basinwide strategy for water conservation that includes targets and timetables for reducing current basinwide water use by individual jurisdiction and use sector, and measures to be taken by the provinces and states to increase water conservation by existing water withdrawers and users.

Definitions

In November 2002, the Working Group’s Decision-making Standards Subcommittee offered the following approach for defining terms used in the annex’s “conservation” principle:

⁴ Organisation for Economic Co-operation and Development, “The Price of Water: Trends in OECD Countries,” 1999, p. 16.

- “ ‘Environmentally sound and economically feasible water conservation measures’—measures that reduce the water loss resulting from a withdrawal and consumptive use of water to reasonable quantities without jeopardizing the economic and social benefits associated with the use of the water.
- “ ‘Water conservation plan’—a water conservation plan prepared by the applicant for a proposed water withdrawal to minimize consumptive use and system water loss.”

The proposed definitions lack precision. Their focus on consumptive use overshadows the intent of the conservation standard to reduce the need for withdrawals in the first place, and to demonstrate to others that we are using water wisely by reducing our existing excessive per-capita water use rates as a foundation for regional water management.

Withdrawals themselves, not just their resulting consumptive uses, are factors in the sustainability of water-dependent ecologies. Requiring best water conservation practices in effect requires establishment of need . This is critical to help ensure sustainable water withdrawals, including meeting other annex standards such as no significant individual or cumulative adverse impacts to the basin’s waters or water-dependant natural resources.

“Environmentally sound and economically feasible water conservation measures”

The Decision-making Standards Subcommittee’s proposed definition creates case-by-case tradeoffs between the environment and commerce through the use of phrases such as “reasonable quantities” and “without jeopardizing the economic and social benefits associated with the use of the water.”

Suggested language

“Environmentally sound and economically feasible water conservation measures” are measures that 1) for the applicant’s water use sector, represent best conservation practices for water withdrawals and consumptive uses, as carried out by the best performing withdrawers in the developed world for the given sector,⁵ and 2) have been evaluated to assure that they do not cause an adverse ecological impact when implemented.

Our proposed definition, by relying on sectoral best conservation practices, considers such factors, but on a sector-wide scale so as to avoid resource intensive and politically charged decisions about individual proposals. Also, our proposal uses proven regulatory mechanisms successfully employed under the U.S. Clean Water Act over the past thirty years. Ontario used a similar approach when it developed sectoral water discharge regulations under its Municipal/Industrial Strategy for Abatement.

Basing “best conservation practices” on the real-life track record of the top-performing facilities in each sector avoids the untested and inherently subjective phrases used in the

⁵ This is similar to the Clean Water Act’s definition of “best available technology economically achievable,” in which the U.S. EPA develops technology-based standards based on the best-performing actors in each sector. See U.S. Clean Water Act, 33 U.S.C. sections 1311(b)(2)(A); 1314(b)(2)(A) and (B).

committee's proposed definition while ensuring that the required conservation measures are economically feasible.

This approach is consistent with the subcommittee's focus on consumptive loss. Since nearly all water withdrawals and subsequent uses entail at least some loss, the first step in preventing water loss is to prevent the need for water withdrawal in the first place.

"Water conservation plan"

The Decision-making Standards Subcommittee's proposed requirement that applicants submit a plan to "minimize consumptive use and system water loss" should be broadened to include minimizing withdrawal as well.

The conservation principle is included in the annex as a precautionary measure. Under the annex principles, withdrawal proposals must demonstrate that they will cause "no significant adverse impact." Unfortunately, the state of science for determining such impacts cannot yet detect all such impacts. Therefore conservation is needed to minimize unknown impacts.

The subcommittee seems to consider water loss (consumptive use) as the only source of such potential impacts, but the withdrawal itself can also have unknown impacts and the applicant should accordingly be required to propose the smallest feasible withdrawal. In any case, minimizing withdrawal usually also minimizes consumptive use.

Minimizing withdrawals is best achieved by requiring the use of best conservation practices by the applicant.

Suggested language

A "water conservation plan" is a plan prepared by the applicant using best conservation practices to minimize both the size of the proposed water withdrawal and the consumptive use and resulting system water loss caused by the proposed withdrawal.

We have offered a definition for best practices under the proposed definition of "environmentally sound and economically feasible water conservation measures," above.

"Description of intent"

The Decision-making Standards Subcommittee's proposed "description of intent" in the area of conservation contains excellent sentiments that we think should be more precisely phrased.

"Purpose"

The proposed "declaration of intent" declares that, "The purpose of this standard provision is to reduce demand, water use and unaccounted for water loss." We believe the purpose of the conservation standard is to reduce 1) water withdrawal, rather than demand and use per se, and 2) loss in general, not merely unaccounted loss.

Suggested language

The purpose of the conservation standard is to reduce withdrawal and consumptive use by reducing water demand, water use, system leakage, and other means, and . . .

The distinction is one of implicit versus explicit performance standard. Reducing demand and use can be required, but it may or may not result in a smaller withdrawal. For example, neither demand nor use necessarily affect municipal drinking water and sewage pipe leakage, which is determined by use but also by the independent variable of repair effort.

“Best practices”

The proposed “declaration of intent” declares that, “It is the intent that the applicants consider the best practices available in developing and documenting their water conservation plan.” We think it should be the intent of the jurisdictions that the applicants actually *deploy* and *use* best available water conservation practices, not simply consider them

Suggested language

The purpose of the conservation standard is to reduce withdrawal . . . and to ensure that applicants use the best practices available in developing and documenting their water conservation plan.

We have offered a definition for best practices under the proposed definition of “environmentally sound and economically feasible water conservation measures,” above.

Documenting the amount of withdrawal needed

We support the Decision-making Standards Subcommittee’s identification of “need for a withdrawal” in the conservation plan. However, the subcommittee is silent as to who decides if the amount of the proposed withdrawal is needed, and what the consequences should be if the proposed amount is *not* needed. We think both should be explicitly identified.

Suggested language

The province or state, and, for regional reviews, the state-provincial decision-making body, should determine whether the amount of the proposed withdrawal is real and reasonable to meet the requirements of the intended use. If the need is not real and reasonable, then the withdrawal amount should be reduced or the withdrawal proposal rejected.

The subcommittee materials imply that water conservation plans would be required only for project applications that require regional review. The Working Group made clear at the November 21, 2002, Advisory Committee meeting that it intended all proposals above household-well-type “de minimis” levels, including all proposals that would initially be reviewed at the provincial and state level, to be

subject to all four parts of the annex's decision-making standard. This should be made explicit in future subcommittee drafts.

Criteria for decisions

The two initial criteria for decisions listed by the subcommittee, "the contents of the water conservation plan," and "the list of conservation measures considered and included," are process- rather than performance-based. The third criterion, "the effectiveness of proposed conservation measures in minimizing water loss and consumption," is performance-based, but should be made more precise.

A proposal's water conservation plan needs to be judged on the basis of 1) its reduction of withdrawn water *used* per unit of purpose (that is, per item produced, per service delivered, or per resident provided with domestic supply), 2) its reduction in water *consumed* per unit of purpose, and 3) an evaluation of the *total amount* of water withdrawn. The evaluation of total amount of water withdrawn should be made in light of the carrying capacity of the local watershed and in the context of local and regional (basinwide) objectives for reducing water withdrawal and consumptive use.

Suggested language

In determining if a project application meets the standard for water conservation, the application's conservation component will be evaluated for its effectiveness in reducing water withdrawal and consumption per unit, using best conservation practices. The application will also be evaluated on the basis of total amount of water withdrawn in the context of local watershed capacity and local and regional conservation objectives.

We have offered a definition for best practices under the proposed definition of "environmentally sound and economically feasible water conservation measures," above.

Local master plans

Where the local government with jurisdiction over the location of the withdrawal has a local master plan, the withdrawal should not be allowed if it is inconsistent with the water elements of that master plan.

Suggested language

Proposed water withdrawals should be consistent with current and future water use needs identified in any master land use or zoning plan adopted by the community in which the withdrawal is proposed.

Questions to consider

1. How often should water conservation plans be updated?

On permit application or permit renewal application.

2. Should conservation measuring and reporting be required? If so, what information should be required and at what reporting frequency?

We presume that basic withdrawal and use information to be required under other aspects of the state-provincial agreement will provide the basic information needed to assess the efficacy of water conservation practices in general.

What is needed here is a commitment by the jurisdictions to system-wide monitoring of permits such that general compliance with them, including their conservation-related terms, is assured.

3. Should a minimum level of conservation or specific percentage saving, benchmarks, or targets be required of all projects?

Yes. Just as the U.S. Clean Water Act and Ontario's Municipal/Industrial Strategy for Abatement are designed to meet measurable objectives, the annex-based agreement should be structured to result in actual water withdrawal reductions. See our comments under "General context: A basinwide plan" in this section of our response.

4. Should conservation plans be required for all water withdrawals, regardless of the potential consumptive loss associated with the withdrawal?

Yes. Conservation plans will decrease the actual amount of water needed to be withdrawn, regardless of the size of the consumptive loss of the proposed withdrawal. Reductions in withdrawals will reduce the likelihood of unanticipated impacts for both individual projects and cumulatively.

Conservation plans for individual withdrawals should conform with local municipal or county master plans in states, and with municipal, regional, or conservation area master plans in provinces.

Return Flow

In the Great Lakes Charter Annex, the Great Lakes and St. Lawrence River governors and premiers committed to requiring proposals for new or increased water withdrawals to demonstrate that they would be “preventing or minimizing Basin water loss through return flow.”

The annex writers included this crucial clause because return flow is the single most important means for assuring that water withdrawal does not have a significant adverse impact on the ecosystem. Given this purpose, as a practical matter the overall return flow requirement of the annex-based agreement must have three components: 1) minimizing withdrawal, so that the smallest amount of water needs to be returned, 2) minimizing consumptive use, so that as much withdrawn water as possible is returned, and 3) returning used water as close as possible to the withdrawal site to minimize unknown effects of the water withdrawal.

Suggested language

Proposed water withdrawal projects shall prevent or minimize water loss and its associated harm to the basin ecosystem by maximizing return flow as a percentage of withdrawn water, using best conservation practices applied to consumptive uses for a given use sector, and returning withdrawn water in close proximity to the site of the withdrawal.

Definitions

The Decision-making Standards Subcommittee has offered the following approach for interpreting terms related to “return flow”:

- “ ‘Consumptive use’—that portion of water withdrawn or withheld from the Great Lakes Basin that is lost or otherwise not returned to the Great Lakes Basin due to evaporation, incorporation into products or other processes (Great Lakes Charter definition).
- “ ‘Return flow’—the remaining portion of water withdrawn which returns naturally or is returned to the source watershed after use and thus becomes available for further use in the Great Lakes Basin.
- “ ‘Water loss’—a loss of the waters of the Great Lakes Basin due to withdrawals resulting in consumptive use, diversion, or removal of water.”

Even if they are not detectable due to the state of current scientific knowledge, ecological impacts may occur when water is permanently lost to a watershed. Thus the current reform effort seeks to minimize consumptive use and maximize return flow. The annex’s focus on the basin’s “Water-Dependent Natural Resources” supplements the traditional large scale of concern about consumptive use and return flow (the entire Great Lakes and St. Lawrence River basin) with that of local watersheds that support specific “Water-Dependent Natural Resources.” However, the subcommittee’s proposed definitions do not seem to acknowledge this fact—that the concern about impacts from consumed or non-returned water apply not only to the Great Lakes – St. Lawrence River basin as a whole, but especially to specific subwatersheds that are the source of the losses.

We recommend that subwatersheds be the focus of the consumptive use and return flow definitions and requirements.

Suggested language

“Consumptive use” is that portion of water withdrawn or withheld from a source subwatershed within the Great Lakes and St. Lawrence River basin that is lost or otherwise not returned to the source subwatershed from which it is withdrawn due to evaporation, incorporation into products or other processes.

“Return flow” is the remaining portion of withdrawn water that returns to the source subwatershed proximate to the point of the withdrawal after it is used, thus becoming available for further use in the source subwatershed.

“Water loss” is loss of the waters of the source subwatershed due to consumptive use, diversion, or removal of water.

Since the term is central to the suggested language above, we think it bears repeating here the definition of “source subwatershed” we have proposed in the “General issues” section of this response. Please see that section for explanation of this proposed definition:

Suggested language

“Source subwatershed” is the same subwatershed as defined by geographical level at the point of withdrawal.

Questions to Consider

1. Should non-Great Lakes Basin water be allowed as part of return flow? If so, how should water quality, issues related to invasive species, and impacts to the originating watershed be addressed?

Non-basin water should *not* be allowed as part of return flow. There is no known technology for certainly preventing the introduction of invasive species in water originating in an extra-basin watershed. Thus extra-basin return flows fail to meet the annex principle of assuring no significant adverse impact to the basin’s water-dependent natural resources.

2. Should the question of seasonality or the timing of return flow be considered?

Yes, as part of the ecological (“no significant adverse impact”) analysis. Return flow that does not closely mimic original flow can damage the ecosystem.

3. What requirements should be put in place regarding the location of return flow?

See above suggested language for the definition of “return flow.”

4. What are appropriate return flow requirements for irrigation and agricultural water use?

Return flow requirements for irrigation and agricultural use should be tied to employment of best water conservation practices, which we have proposed be sectorally based. See our proposed definition of “environmentally sound and economically feasible water conservation practices” in the “Conservation” section of this response.

Ecological impacts

In the Great Lakes Charter Annex, the Great Lakes and St. Lawrence River governors and premiers committed to requiring proposals for new or increased water withdrawals to demonstrate that they will cause “no significant adverse individual or cumulative impacts to the quantity or quality of the Waters and Water-Dependent Natural Resources of the Great Lakes Basin.”

Evaluation of ecological impacts—both significant adverse impacts and improvements—is the linchpin of the three-part decision-making standard proposed in the annex. The success of the annex in retaining regional control of basin waters depends on its success over time in *both* preventing ecological harm caused by water withdrawals, and, on that basis, successfully carrying out effective restoration.

In this section we offer general comments for implementing the annex’s ecological impacts principle. For specific, science-based means for implementing the principle accurately and economically, see the section of this response entitled “A proposed method for evaluating ecological impact and improvement.”

Definition of “significant”

In November 2002, the Decision-making Standards Subcommittee proposed the following definition of “significant” in the context of the annex impact principle: “important, notable, valuable.”

This definition is insufficient to determine if a project has a significant ecological impact. Ultimately, what is deemed significant to an ecosystem will depend on the characteristics of the ecosystem within which the project is proposed. The definition needs to be clear, specific, and quantifiable. It also needs to have sufficient flexibility to account for differences in the type and scale of ecosystems within the Great Lakes – St. Lawrence River basin.

We think that “significant” adverse individual impacts of a proposed water withdrawal should be defined as those general, physical, chemical, biological, or other impacts that fail to meet the criteria detailed below.

Criteria for decisions

General criteria

Determining the potential for harm (as well as improvement) requires a process that 1) establishes current (baseline) and target conditions (based on the earliest, least disturbed condition that is defensible) for each ecosystem and 2) uses these two conditions to establish system-specific criteria against which proposals will be evaluated. Although past impairments may preclude restoration of the system to natural condition, natural condition must be understood in order to define the target condition and guide ecosystem improvement. Movement from the baseline toward the target condition could be considered an improvement; movement away from the target condition could be considered harm (figure 1, “Defining ‘harm’ and ‘improvement’”).

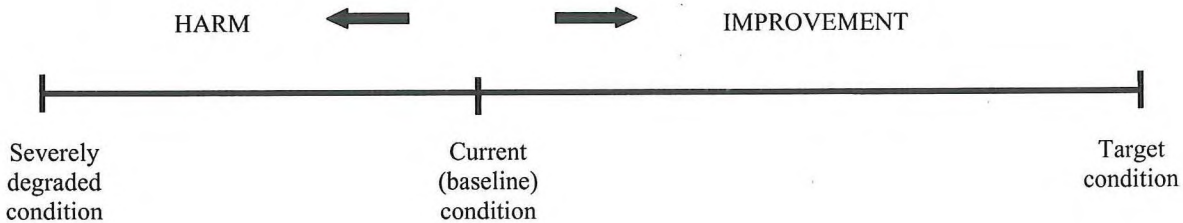


Figure 1. Defining “harm” and “improvement”

Suggested language

Water withdrawal projects must assure that the physical, chemical, and biological integrity of affected ecosystems is maintained or improved.

Applications must include plans for preventing harm to the current (baseline) condition. The baseline condition referenced in a water withdrawal application must incorporate improvements already or expected to occur in the future in conjunction with previously approved water withdrawal proposals. Determination of potential harm by future proposals will be made in the context of this updated baseline condition.

Applying the criteria

To be usefully applied, current and target conditions should be subcategorized as physical, chemical, biological, and precautionary. They should then be developed for individual ecosystems.

The physical, chemical and biological criteria should be universally applicable to all withdrawals in all ecosystems at all scales regardless of jurisdiction. However, to meet these broad requirements, a given withdrawal application must meet these criteria in the context of the ecological requirements of the specific system within which the withdrawal is proposed.

Suggested language

A water withdrawal proposal has a significant ecological impact if it fails to meet any of following criteria:

Physical criteria

- No measurable change to the natural range of variability of the hydrologic regime. The natural range of variability is defined for multiple parameters that measure magnitude, frequency, duration, timing, and rate of change. Taken together, the natural range of variability of the individual parameters comprise the natural range of variability of the hydrologic regime.
- No degradation of structural habitat (for examples, degradation of substrate; loss of woody debris that functions as instream or in-lake habitat; degradation of emergent, submergent,

or riparian vegetation; changes to natural distribution of riffles and pools)

- No disruption of natural connections between and among habitats, including lateral (that is, riparian) and longitudinal (that is, up and downstream) connections
- No disruption of natural temperature regime of the hydrologic system (that is, the natural variability of its thermal conditions)

Chemical criteria

- No disruption of natural productivity of the ecosystem
- No introduction of potentially harmful toxins, contaminants, and excessive nutrients⁶
- No disruption of the hydrologic system's ability to process toxins, contaminants, and nutrients (that is, no disruption of chemical and nutrient cycling)

Biological criteria

- No decline in population levels or health of native species
- No introduction of non-native species
- No disruption of biological interactions such as predation and competition
- No introduction of harmful microorganisms and no elevation of microorganisms to harmful levels

Precautionary criterion

In addition, in order to guard against irreparable damage caused by inadequate scientific knowledge, water withdrawal projects shall not pose *any* risk of *permanent* or *irreversible* change to the biological, physical, and chemical characteristics of the hydrologic system that could impair its ecological function.

We include the precautionary criterion because there should be a screen for projects whose effects, known or unknown, cannot be practically remedied once the project begins. Thus projects whose effects cannot be reversed should be considered de facto causes of significant harm to the basin's water-dependent natural resources.

Questions to Consider

1. What criteria should be used to ensure a systematic evaluation of the water and water-dependent natural resources of the Great Lakes Basin prior to the withdrawal and associated impacts?

See discussion under "Criteria for decisions" above.

⁶ Damage caused by a withdrawal project's introduction of toxins, contaminants, and excess nutrients should be prevented by existing laws, but to the extent they are not, the annex-based state-provincial agreement should prevent them.

2. How should elements of the decision making standard related to impacts be structured to allow flexibility in adapting to improvements in scientific understanding?

The best available information should be regularly incorporated into the evaluation of potential impacts by means of a system that has independence and integrity. This information includes measurements of specific ecosystem conditions, models of specific ecosystem conditions, and revised understanding of the hydrologic needs of biota.

New and improved data on physical, chemical, and biological conditions should be incorporated into definitions of current and target conditions. The ability to define current and target conditions will improve over time as a) real field and/or remotely-sensed data on physical, chemical and biological conditions improve and b) the ability to model these data improves.

In either case, the definition of system-specific criteria should be reevaluated periodically to ensure that a) the most current real data are incorporated into permitting regulations, b) when models are used to define current and/or target conditions, the best available *data* are put into the model, c) when models are used to define current and/or target conditions, the best available *models* are used, and d) when revised understanding of the hydrologic requirements of biota have reached peer-reviewed maturity, they are incorporated into permitting regulations.

To ensure that the best available information is used, the definition of system-specific criteria should be reevaluated periodically, for example, every five years.

Please see our comments under the “Interstate-interprovincial / compact” section of this response for details on how we think the system for incorporating new information should be institutionalized under the state-provincial agreement.

3. Are criteria similar to those currently used by the jurisdictions appropriate for use in guiding region-wide approval or denial decisions?

No. Current criteria do not include deviation from target hydrologic regime as an impairment. In order to ensure no significant adverse impacts to the waters and water-dependent natural resources, a new set of hydrologic criteria must be developed.

4. What are appropriate criteria for consideration in determining “no significant adverse individual or cumulative impact?”

See discussion under “Criteria for decisions” above.

5. What should be the relationship between ecological and other types of impacts?

The Great Lakes Charter Annex (Annex 2001) does not mention other types of impacts.

6. How should connected actions and phased actions be defined and considered in the context of evaluating individual and cumulative impacts? Fundamentally, what should constitute a single project?

Defining current and target conditions facilitates the evaluation of both individual and cumulative impacts. See discussion under “Criteria for decisions” above.

7. What should be the role of the applicant in assessing potential cumulative impacts? What should the role of state/provincial/regional authorities be in assessing and responding to cumulative impacts?

There should be minimal role by the applicant in assessing potential cumulative impacts, but applicants should be required to provide information about their withdrawals and associated improvements to provincial, state, and regional authorities as they are carried out in order to help determine if cumulative impacts are occurring.

State, provincial, and regional water management authorities should 1) reevaluate baseline conditions periodically (say, every five years), 2) use system-specific criteria (rather than only basin-wide criteria) to direct comprehensive water management planning efforts, and 3) issue permits within the context of likely future climate and demand scenarios.

Improvement

In the Great Lakes Charter Annex, the Great Lakes and St. Lawrence River governors and premiers committed to requiring proposals for new or increased water withdrawals to demonstrate that they would achieve an “improvement to the Waters and Water-Dependent Natural Resources of the Great Lakes Basin.”

In this section we offer general comments for implementing the annex’s improvement principle. For specific, science-based means for implementing the principle accurately and economically, see the section of this response entitled “A proposed method for evaluating ecological impact and improvement.”

The Decision-making Standards Subcommittee and the Advisory Committee stakeholders have wrestled with the question of how a proposed withdrawal should be matched to an appropriate location, size and type of improvement required under the annex improvement principle. We propose the following general context, and general and specific criteria, for making this determination.

Context for all improvement projects

Improvement vs. mitigation

We wholly support the subcommittee’s finding that “mitigation” (perhaps more appropriately termed “harm prevention”) and “resource improvement” are separate efforts. This is the plain intent and only legitimate reading of the annex text.

Durability

All improvements projects should be assured to function as improvements in perpetuity.

This condition is critical for assuring that the basin ecosystem as a whole moves toward restoration, rather than simply a slowed rate of degradation.

We are aware of a need to define “in perpetuity” in a way that is legally defensible.

“Surplus, real and quantifiable”

Improvements should be “surplus”: they should not be measures already required by existing law, even if they are not underway prior to the application for the withdrawal; otherwise the applicant can claim credit for an improvement that would have taken place in any case. Also, improvements should be real rather than speculative, and quantifiable rather than vague.⁷

⁷ For an example of the use of these concepts, see Michigan Proposed Part 30, Water Quality Trading Rules, first published in the 1999 Michigan Register, MR 12, January 31, 2000.

Suggested language

Acceptable improvement proposals should be required to be “surplus, real, and quantifiable.”

Measuring improvement

Suggested language

Assessments of a withdrawal proposal’s improvement component shall be based on ecological rather than economic measurements.

By assessing proposed improvements in this way, the region avoids turning the improvement component of proposed water withdrawals into a fee for withdrawing water.

Measuring improvement could be as simple as assessing the condition of the ecological system before and after the change.

One of the most useful attributes of the annex’s improvement principle is its flexibility—the applicant is not required to take any specific action, much less pay any specific amount. Instead, the applicant has a wide range of potential actions from which to choose known and yet-to-be-created means for improving the functioning of the ecosystem. The only requirements are that the improvements 1) actually improve, and 2) be measurable in some way. As noted immediately above, we propose that this way be defined as “surplus, real, and quantifiable.”

See also our discussion of assessing significant adverse impact under “Criteria for decisions / General Criteria” in the “Ecological impacts” section of this response. In important respects the criteria for determining improvement are the mirror image of the criteria for assessing potential adverse impacts.

Source watershed preference

Improvement projects should preferably address the source subwatershed of the proposed withdrawal. We proposed defining “source subwatershed” in the conservation section of this response as “the same subwatershed as defined by geographical level at the point of withdrawal.”

Please see the “General issues” section of this response for more detail on this proposed definition.

Restoration plan

If an ecosystem is already at its target condition, the improvement project should be tied to a Great Lakes – St. Lawrence River basin ecosystem restoration plan that sets restoration priorities agreed upon by the jurisdictions.

The plan should include a map of priority ecosystems in need of protection or restoration.⁸ The restoration plan should also identify the physical, chemical, and biological characteristics that need to be restored in order for individual ecosystems to reach their target condition, and the priority in which individual restoration efforts should occur.

Prioritizing hydrologic improvements⁹

Alteration of hydrologic regimes is often identified as the most serious and continuing threat to ecological sustainability of freshwater ecosystems.¹⁰

We propose that priority be given to improvements to hydrologic conditions over other possible improvements to the ecosystem.

See figure 2, “Guiding proposed improvement projects,” in this section of our response for a graphical representation of our proposal for prioritizing hydrologic improvements among other kinds of improvements.

We make this proposal for two reasons: 1) the annex-based agreement now being negotiated by the Working Group is currently the only potential mechanism for ensuring *hydrologic* improvement to the basin ecosystem, and 2) by prioritizing improvement to hydrologic conditions over improvements to the other elements of ecosystem function the region can avoid trading unforeseen impairments to an ecosystem’s hydrologic conditions for improvements to other aspects of the ecosystem

Clearly, hydrologic alteration (that is, impairments to the natural hydrologic regime) is not the sole factor controlling ecosystem health. However, the hydrologic regime remains a master variable that drives variation in many other components of a freshwater ecosystem—for example, fish populations, floodplain forest composition, and nutrient cycling—in both direct and indirect ways.¹¹ Linkages between hydrologic impairment and ecosystem impairment are well established.¹²

Therefore, as noted in our comments in “Restoration plan” above and in figure 2, we also propose that prioritizing hydrologic improvements take place in the context of a comprehensive basin restoration plan that addresses all forms of ecosystem impairment and all forms of planned ecosystem

⁸ The Nature Conservancy and the U.S. Environmental Protection Agency are jointly convening conservation leaders who have identified important or high quality ecosystems in the Great Lakes basin (for example, the Great Lakes Ecoregional Plan, led by The Nature Conservancy; the Critical Ecosystems model developed and applied by U.S. EPA Region 5; Biodiversity Investment Areas identified by U.S. EPA Great Lakes National Program Office). These plans will be correlated with one another and the resulting set of mutually agreed-upon areas could be the foundation for the annex-related restoration plan / map of candidate improvement areas. Results are expected in summer 2003.

⁹ With support from the Great Lakes Protection Fund, The Nature Conservancy is convening conservation leaders for a workshop on Ecologically Sustainable Water Management for the Great Lakes on January 28 and 29, 2003, in Chicago. The workshop will focus on a framework for evaluating ecological impact and improvement in terms of hydrologic conditions.

¹⁰ S.E. Bunn and A.H. Arthington. 2002. “Basic principles and ecological consequences of altered flow regimes for aquatic biodiversity,” *Environmental Management* 30:494–507.

¹¹ B.D. Richter, R. Mathews, D.L. Harrison, and R. Wigington. “Ecologically sustainable water management: Managing river flows for ecological integrity,” *Ecological Applications*, in press.

¹² Bunn and Arthington, 2002.

restoration.

When hydrologic improvement to the source subwatershed need not be made because the source subwatershed's hydrologic condition is at its target condition, then the physical, chemical, and biological conditions of the source subwatershed can be subject to improvement activities.

General criteria for improvement projects

Resource improvement can be evaluated with the same general principles that we propose be used to evaluate ecological impact and assure prevention of harm.

Determining the potential for improvement (as well as harm) requires a process that 1) establishes current (baseline) and target conditions (based on the earliest, undisturbed condition that is defensible) for the ecosystem and 2) uses these two conditions to establish system-specific criteria against which proposals will be evaluated.

Although past impairments may preclude restoration of many systems to natural condition, natural condition must be understood in order to define the target condition and guide ecosystem improvement.

As indicated in the figure also presented above in the "Ecological impacts" section of this response, movement from the current condition toward the target condition could be considered an improvement; movement away from the target condition could be considered harm:

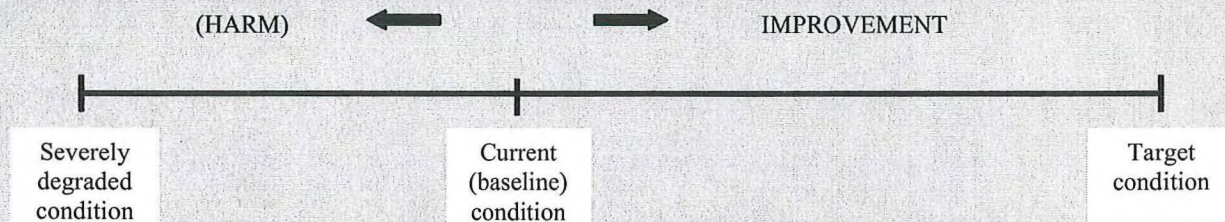
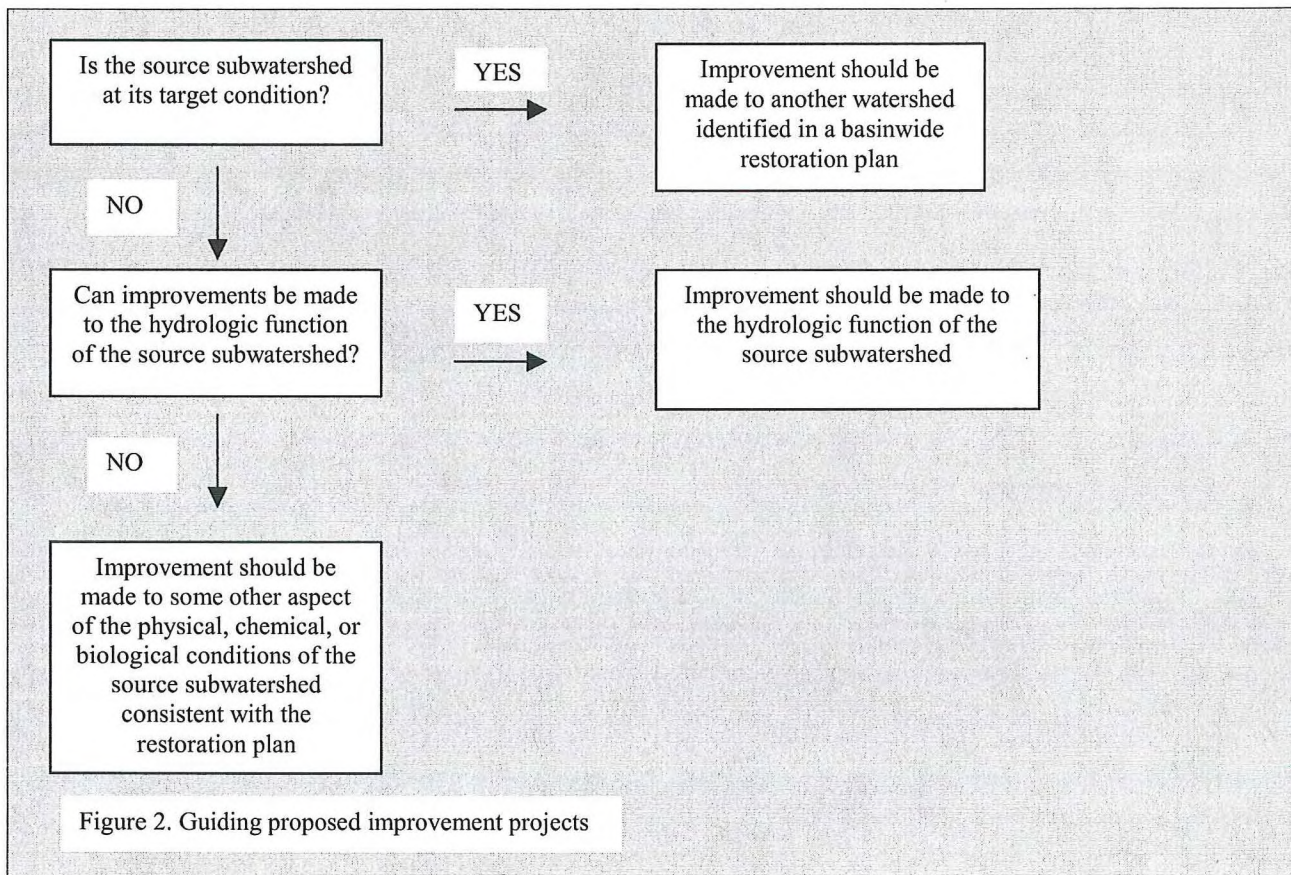


Figure 1. Defining "harm" and "improvement"

Evaluating improvement, like evaluating harm, requires knowledge of current condition and the past impairments, if any, that have led to deviation from target condition. As stated in the "Ecological impacts" section of this response, withdrawal applications should include plans for preventing harm to the current (baseline) condition. A new baseline condition should be established when improvements are made to the ecosystem as part of any previous water withdrawal proposal. Determination of potential harm by the current and future proposals must be made in the context of this updated baseline condition to ensure that the Great Lakes – St. Lawrence River ecosystem as a whole, as well as its component ecosystems, moves toward restoration.

Understanding specific impairments to physical, chemical, and biological conditions is the precursor for determining appropriate improvements. Based on this understanding, a flowchart can be used to guide where and what kind of improvements are appropriate (figure 2).



Matching specific withdrawal and improvement proposals

The Decision-making Standards Subcommittee has proposed that the jurisdictions make the “temporal and spatial scale” of “potential individual or cumulative impacts, if any, of the proposed withdrawal” a “major consideration in determining the appropriate level of improvement.”

We agree with this language so long as it remains precise—types of “potential” ecological impact could be used to help *guide*, but not *direct*, the type of improvement proposed as part of a water withdrawal application. And the improvement standard’s implementing language must make very clear the distinction between “potential” ecological impacts and actual impacts, which are disallowed under the ecological impacts standard and therefore unavailable as a measuring stick for improvement.

Therefore, modifying the means for judging proposed improvements that we proposed in our May 2002 letter, we recommend:

Suggested language

After the location and type of improvement have been determined using the flow chart above, a proposed withdrawal's associated improvement shall correlate to the:

1. Size of the proposed withdrawal (small, medium, large)
2. Size of the proposed consumptive loss (small, medium, large)
3. Type and size of the proposed source ecosystem (deep aquifer, shallow aquifer, small tributary, large tributary, Great Lake or St. Lawrence River)
4. Degree of uncertainty about the ecological impacts of the proposed withdrawal (small, medium, large)

Public input should be solicited during development of this evaluation process, and the public should have access to relevant analyses and documents used by the jurisdictions during the development effort.

Questions to Consider

1. What, if any, relationship should there be between improvement and a Great Lakes Basin restoration plan or a watershed-based restoration plan?

See figure 2, "Guiding proposed improvement projects," and above comments.

Requiring that all improvement projects be consistent with a basinwide restoration plan will maximize the likelihood that basinwide restoration does in fact occur over the long term.. In addition, assuring that basinwide restoration in fact occurs is essential in achieving the central annex aim of retaining authority over basin waters within the region.

2. What type of activities should be qualified as improvements?

See figure 2, "Guiding proposed improvement projects," and above comments.

How can we prevent trade-offs between water loss and unrelated improvements?

Preventing and minimizing water loss should be addressed through the water conservation and return flow portion of the decision-making standard.

In figure 2, "Guiding proposed improvement projects," we propose prioritizing hydrologic restoration over other types of improvements. This could guard against tradeoffs between potentially unrelated improvements.

3. What is the appropriate relationship between the location of the withdrawal and the improvement?

See figure 2, “Guiding proposed improvement projects,” and above comments.

Should scale considerations be taken into account based on the location of the withdrawal relative to the improvement?

Yes. Taking a proposed withdrawal’s scale and location into account when assessing a proposed improvement will protect against unforeseen local degradation caused by the project.

4. What is the appropriate temporal scale of the improvement?

See our comments under the “Durability” section above. We have recommended that improvements be required “in perpetuity.” Examples of such improvements would be permanently retired conservation easements and removal of structures inhibiting natural functioning of the hydrologic system with guarantees that they will never be replaced.

5. What improvement requirements, if any, should be placed on withdrawal proposals that are determined to have no significant adverse impacts?

All withdrawals above de minimis levels must show an improvement to the basin ecosystem.

The annex mandates that all withdrawal projects comply with annex principles, including the showing of an improvement. This is one of the principle reasons why national and international bodies would allow the region to retain authority over basin water withdrawals in the long term. Requiring improvement from every water withdrawal project shows a commitment to conserving and enhancing the ecosystem that justifies associated restrictions on out-of-basin removals. In the world of trade law and agreements present and future, limiting water removals from the basin potentially harms the economic and other interests of out-of-basin jurisdictions. However, if such limitations are instituted according to the principles of the annex, they would then be carried out for ecological protection reasons that are justifiable in the context of U.S. national trade law and international trade arrangements.

The question problematically implies that withdrawal proposals determined to have significant adverse ecological impacts might be allowed to go forward. The annex requires withdrawal proposals to show that they will not cause such impacts.

6. Would it be appropriate, when feasible, to consider mitigation in framing the improvement? For example, if mitigation is required to ensure that no significant adverse impact occurs as a result of the withdrawal, would it be appropriate to consider a greater degree of that mitigation activity as the improvement? In this case, the mitigation and improvement would be considered as discrete factors.

While theoretically this should be acceptable, we remain concerned that in practice the distinction between mitigation-as-preventing-ecological-impacts and mitigation-as-improvement would

collapse. So long as mitigation and improvement are truly considered as discrete factors, the type of activities used to prevent ecological harm could also be employed to achieve improvement.

However, to fully ensure that activities to mitigate (that is, prevent) ecological harm do not double as improvement activities, we recommend that there be separate decision processes for them. The process to assess ecological impacts of a water withdrawal proposal should be fully separate from assessing its proposed improvement effort.

7. Should a minimum level of improvement be designated? If so, how should this level be established?

Yes. The annex requires that all proposed water withdrawal projects comply with its principles, one of which is a showing of improvement.

See the “Judging improvements” section of this response. We recommend broad categories of correspondence between sizes and types of withdrawals and sizes and types of improvement. The minimum level of improvement would be an improvement in the smallest categories of size of withdrawal, size of consumptive loss, and degree of uncertainty regarding ecological harm, and of a type corresponding to the type of withdrawal.

8. What, if any, relationship should there be between cumulative impacts and improvement/restoration (i.e. could improvement be considered, in part, a contribution toward the "mitigation" of past, present and future cumulative impacts of Great Lakes Basin water use)? In other words, against what baseline should improvement be measured?

The annex disallows projects determined to cause cumulative ecological impact. Therefore, strictly speaking, there should be no relationship between a given proposed project’s improvement and its known contribution to cumulative ecological impacts.

However, there could and should be a relationship between improvement projects and pre-existing ecological impacts of human activity whether individual or cumulative.

Suggested Language

The baseline against which improvement activities shall be measured is the current condition. The goal toward which improvement projects shall be applied is the target condition, as established in the basinwide restoration plan and by local planners.

9. What should be the relationship between estimated water loss/consumption and improvement?

We have proposed that the degree of a proposed withdrawal’s consumptive loss be one factor in a matrix for guiding an appropriate improvement. See the “Judging improvements” section of this response.

A proposed method for evaluating ecological impact and improvement

A specific application of a general framework

In the “Improvement” and “Ecological impacts” sections of this response, we assert that resource improvement and ecological impact can be evaluated using the same general principles. Determining the potential for improvement and harm requires a process that 1) establishes current (baseline) and target conditions (based on the earliest, undisturbed condition that is defensible) for the ecosystem and 2) uses these two conditions to establish system-specific criteria against which proposals will be evaluated.

This section outlines an accurate, economical, and scientifically defensible way in which these processes could be practically carried out.

Although past impairments may preclude restoration of many systems to natural condition, natural condition must be understood in order to define the target condition, fully understand ecological impact, and guide ecosystem improvement. As indicated in text and a diagram presented in the “Ecological impacts” and “Improvement” sections of this response, movement from the current condition toward the target condition could be considered an improvement; movement away from the target condition could be considered harm (figure 1, “Defining ‘harm’ and ‘improvement’”):

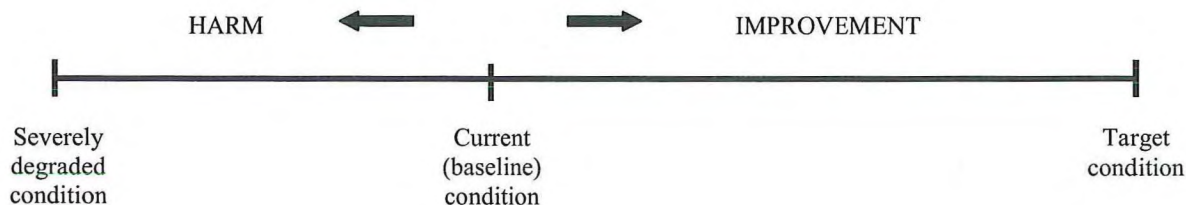


Figure 1. Defining “harm” and “improvement”

This approach can be applied to physical, chemical, and biological components of any ecosystem. In this proposal, we further develop this general concept to apply specifically to hydrologic conditions.

Application of proposal to evaluate hydrologic alteration

The annex standards must address withdrawals from three sources of water:

- Inland watersheds, including streams, inland lakes, wetlands, and groundwater that is hydrologically connected to surface water¹³
- Deep aquifers that are not hydrologically connected to surface water

¹³ Surface water commonly is hydraulically connected to ground water, but the interactions are difficult to observe and commonly have been ignored in water-management considerations and policies (Winter and others in *Ground Water and Surface Water, A Single Resource*, USGS Circular 1139). It is appropriate to consider surface water and shallow groundwater as a single hydrologic system.

- The Great Lakes, the St. Lawrence River, and the connecting channels

Theoretically, the method proposed here can apply to all three sources. Using available data and tools, this method can be applied most readily to withdrawals from the first of these three water sources.

Why evaluate ecological impact in terms of hydrologic impact?

Alteration of hydrologic regimes is often identified as the most serious and continuing threat to ecological sustainability of freshwater ecosystems.¹⁴ We propose that priority be given to improvements to hydrologic conditions over other possible improvements to the ecosystem.¹⁵

We propose this for two reasons: 1) The annex-based agreement currently being negotiated by the Working Group is currently the only potential mechanism for ensuring *hydrologic* improvement to the basin ecosystem(s), and 2) by prioritizing improvement to hydrologic conditions over improvements to the other elements of ecosystem function, the region can avoid trading unforeseen impairments to an ecosystem's hydrologic conditions for improvements to other aspects of the ecosystem.

Bunn and Arthington (2002) emphasize the following four principles to highlight the mechanisms that illustrate the links between hydrology and ecosystem health.

1. Flow is a major determinant of the physical habitat in streams, which in turn is a major determinant of biotic composition.
2. Aquatic species have evolved life history strategies primarily in direct response to the natural flow regimes.
3. Maintenance of natural patterns of longitudinal and lateral connectivity is essential to the viability of populations of many riverine species.
4. The invasion and success of exotic and introduced species in rivers is facilitated by the alteration of natural flow regimes.

Clearly, hydrologic alteration (that is, impairments to the natural flow regime) is not the sole factor controlling ecosystem health. That said, a river's flow regime is a master variable that drives variation in many other components of a river ecosystem – e.g., fish populations, floodplain forest composition, nutrient cycling – in both direct and indirect ways.¹⁶ Linkages between hydrologic impairment (that is, altered flow regimes) and ecosystem impairment are well-established.¹⁷ There is considerable evidence that the hydrologic regime is one of the key drivers of freshwater ecosystems, yet the ability to predict *specific* ecological impacts to *specific* ecosystems is limited.

¹⁴ S.E. Bunn, and A.H. Arthington. 2002, "Basic principles and ecological consequences of altered flow regimes for aquatic biodiversity," *Environmental Management* 30:494-507.

¹⁵ See figure 2, "Guiding proposed improvement projects," in the "Improvement" section of this response for a graphical representation of our proposal for prioritizing hydrologic improvements among other kinds of improvements.

¹⁶ B.D. Richter, R. Mathews, D.L. Harrison, R. Wigington, "Ecologically sustainable water management: Managing river flows for ecological integrity," *Ecological Applications*, in press.

¹⁷ Bunn and Arthington, 2002.

Given the challenges of predicting specific ecological impact associated with proposed withdrawals, significant ecological impact should be evaluated in terms of hydrologic alteration.

Development of ecosystem-specific hydrologic criteria

One approach to implementing ecosystem-specific hydrologic criteria across the basin would be to characterize hydrologic regimes for ecosystems in the Great Lakes basin. By characterizing hydrologic regimes in terms of key parameters,¹⁸ “groups” or “classes” of ecosystems emerge that share similar functionality. Grouping individual ecosystems into classes permits the interpretation of expected, or target, hydrologic conditions and deviation from these expectations.

- 1) “Groups” or “classes” of ecosystems that share similar hydrologic function should be defined throughout the Great Lakes – St. Lawrence River basin
- 2) Target conditions should be defined for each of these classes based on multiple criteria, taking into account the appropriate natural range of variability for each of these criteria
- 3) Target conditions should be reviewed periodically to ensure that the best and most current scientific information is incorporated into the definition of target condition.

Feasibility of this approach

We are fortunate that much of the work to characterize hydrologic regimes for watersheds¹⁹ in the Great Lakes – St. Lawrence River basin is under way. Flow data from U.S. Geological Survey gauges are used to develop regression models based on watershed characteristics; these models can be used to predict flow behavior for ungauged streams.²⁰ Thus it is possible to predict flow behavior at any point on any stream in Michigan. This modeling approach (and possibly the Michigan models themselves) is almost certainly applicable to streams in other parts of the Great Lakes basin. Efforts are underway to evaluate the applicability of these models in Wisconsin and Illinois. If necessary, additional flow models can be developed for these and other Great Lakes states and provinces and states using the same regression modeling methods.

These models can be used *now*, and, in fact, they are already being used for other applications. Furthermore, the input data needed to run these models are already available. These models predict specific flow patterns at specific locations extremely well; the models explain 90 to 99 percent of the variation in flow behavior.

There are several models and tools currently available to characterize current hydrologic conditions, develop ecosystem-specific target conditions, and predict potential changes to hydrologic

¹⁸ For example, potential parameters include magnitude of low and peak flows.

¹⁹ These inland watersheds, which include streams, inland lakes, wetlands, and groundwater that is hydraulically connected to surface water, are considered together as one water resource.

²⁰ In Michigan, Paul Scelbach and colleagues at the Michigan Department of Natural Resources and the University of Michigan have characterized the current behavior of streams based on a) the magnitude of flow (water budget) and b) the path that water takes through the watershed to the stream.

conditions.²¹ This work could provide the foundation for economically and accurately evaluating hydrologic change that could potentially result from withdrawals and diversions.

²¹ In addition to the hydrologic modeling described above, the Indicators of Hydrologic Alteration (IHA) software has been developed for calculating hydrologic regime characteristics and analyzing changes in those characteristics over time. See <http://www.freshwaters.org/eswm/iha/> for more information.

Interstate-interprovincial review of proposals / Compact arrangement

A blended response

Background

The intent of the Great Lakes Charter arrangement is to review withdrawals in a manner that retains decision-making in the region and strengthens ecosystem protection. The different constitutional provisions and division of powers within the region makes this effort a challenge, but there appears to be the will to overcome these differences. This will has grown over the past two decades directly from our growing awareness of the value and efficacy of the ecosystem approach to protection of the integrity of the Great Lakes and St. Lawrence River. Once completed, the annex-based agreement could serve as a global model for the management of shared waters.

The regional decision-making system will need to be consistent, uniform and implementable across the border among the states and provinces. To achieve this aim most effectively, the compact arrangement should support and be subsidiary to a fully regional (international) arrangement. We have approached this issue by identifying areas of commonality that will result in parity for each jurisdiction and its residents.

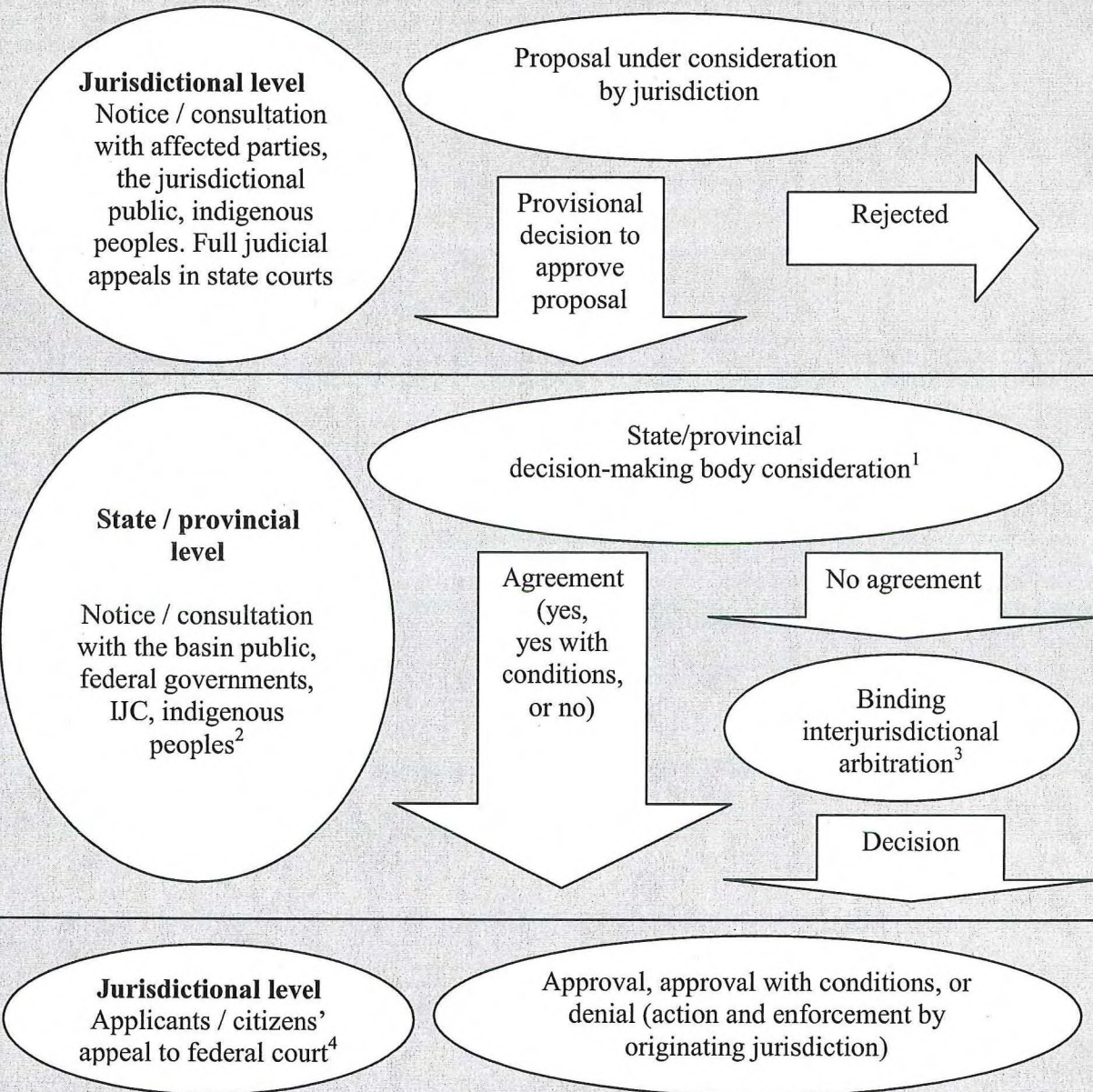
The compact is a U.S. tool to enable the states to participate in regional decision-making. It need not result in a separate “compact commission” with a different role than the regional decision-making body. Similar contractual arrangements can be made to bind the provinces to participate. While the compact may require federal government approval in the United States, it is not likely that the Canadian government would intervene in the provinces’ agreement unless it violated the *Boundary Waters Treaty*.

Appeals of decisions could be heard by different courts and allowed on different grounds in the Canada and the United States, but we think that similar decision-making trees can be designed for both nations. We have provided two charts of these proposed trees, one plotting the process in the United States and the other in Canada. The two charts share three distinct phases:

1. An initial jurisdictional review
2. A regional review by the Great Lakes and St Lawrence River states and provinces, with provision for binding arbitration
3. Final decision implementation with applicant / citizen appeal in the United States and (almost certainly rare) appeals limited to errors of administrative law or judicial review in Canada.

Each province and state and the U.S. compact should enact binding laws that set forth the process for international/regional review and the jurisdictional, federal and state/provincial decision-making body guarantees of public participation, appeals, and citizen suits. Each jurisdiction and the U.S. compact should adopt the same set of processes (outlined in the charts below), and provide the same authority to the state/provincial decision-making body. As described in the charts, appeals and citizen suits will be brought in the appropriate provincial, state (and in the United States, federal) court. We are not proposing an independent international judicial review body.

Review of proposals requiring regional review: United States



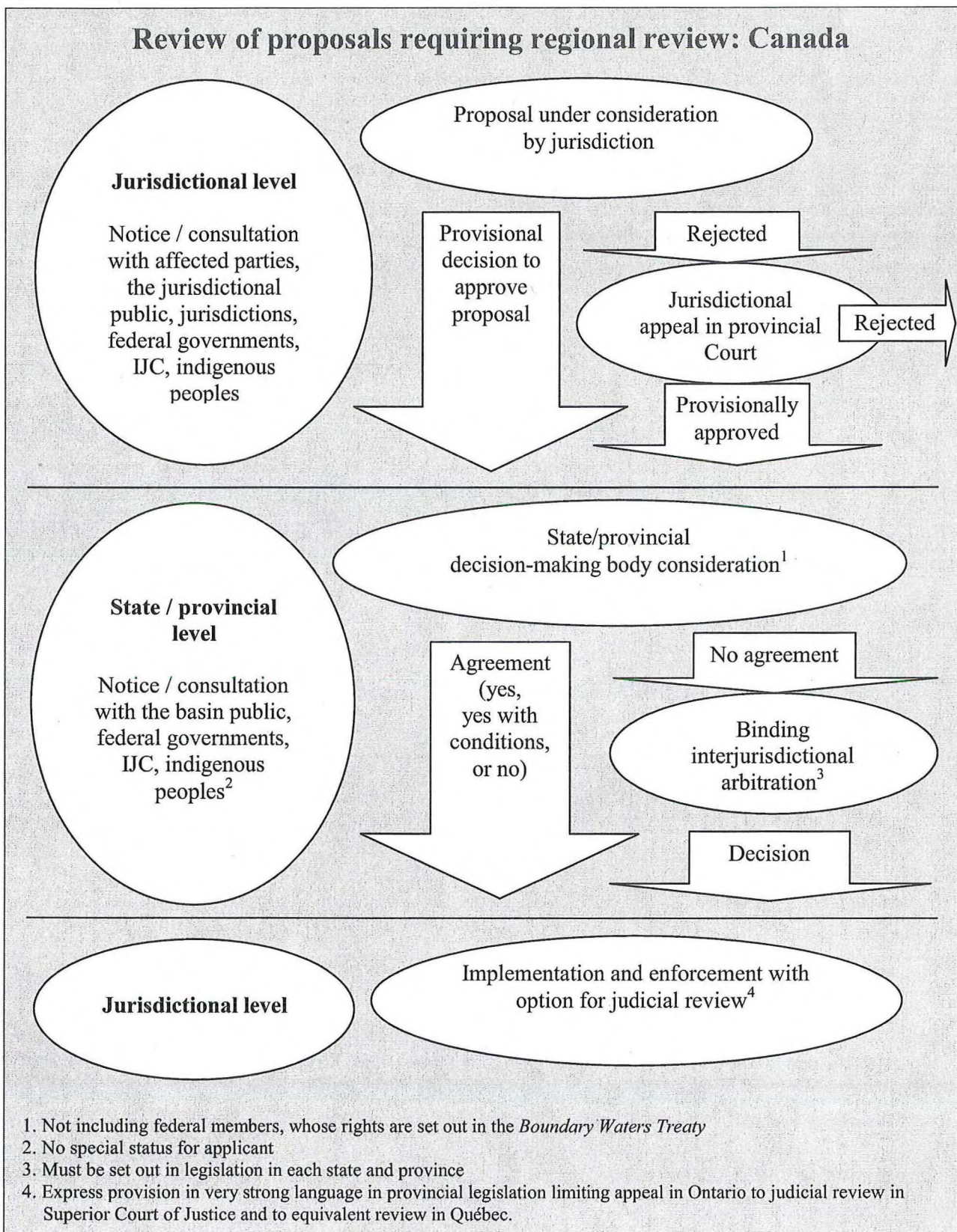
1. Not including federal members, whose rights are in the *Boundary Waters Treaty*.

2. No special status for applicant.

3. Must be set out in legislation in each state and the U.S compact

4. Express provision in very strong language in legislation in each state of no right of appeal by jurisdictions, who have agreed to binding arbitration. The law on which the appeal is based would be U.S. federal law: the congressionally approved compact. The compact will set the legal standard for decision in U.S. law, which will be an adoption of the exact same standard that the state-provincial body follows (the state-provincial body standard would be set first, with then the U.S. law designed to be the same). The compact will also bind the United States and the states to the decision made by the inter-jurisdictional arbitration. On appeal, the U.S. federal court will determine whether the decision made by arbitration is consistent with U.S. federal law. If so, the appeal fails, and the arbitration decision is upheld; if not, then the decision is reversed. If a proposal is denied and the applicant chooses to submit a modified or new proposal, it will be subject to the full review process from the beginning.

Review of proposals requiring regional review: Canada



Decision-making body functions

The future manner of exercising authority over basin waters should be regional. This regional authority should:

- ♦ Create a formal process for approving or rejecting withdrawal proposals based on the new decision-making standards
- ♦ Create a means for appeal of these approvals and rejections
- ♦ Implement high-quality water use demand and cumulative impacts forecasting
- ♦ Achieve reasonably dependable regional climate change effects forecasting
- ♦ Support and coordinate new science on system hydrological functioning and ecological impacts of withdrawals
- ♦ Establish accurate and timely water withdrawal and consumptive use data-gathering
- ♦ Establish and update guidelines for best water conservation practices
- ♦ Routinely infuse new science and practices into the decision-making process
- ♦ Conduct restoration planning and facilitate integration of restoration planning and withdrawal-based improvement activities

These activities should be conducted by a regional (international) institution because:

- 1) The Great Lakes – St. Lawrence River ecosystem is an integrated ecosystem and decisions that impact it need to be made on an ecosystem-wide basis
- 2) A strong international decision-making process is a key element of the future state-provincial agreement's long-term ability to withstand challenge from both domestic and international quarters
- 3) High-quality forecasting and science-based decision-making require collective, regional resources, both in terms of money and scientific institutions.

Compact body

We question the need for any institutional body created by the U.S. compact, so long as the jurisdictions agree to a regional body that can carry out its functions. The usefulness of the compact lies primarily not in the new institutions it can create, but in its binding character.

The national option

In the unhappy event that the Working Group does not recommend a binding state-provincial decision-making body and creates a compact authority with permitting and enforcement powers, all of our comments in this section should be applied to the compact authority and, we hope, to a analogous body proposed for Canada's provinces.

Questions to consider—International-interprovincial

1. How and at what point should the public input or comment on proposals be included in the process? Who is the Public?

In general:

- ♦ The definition of the public should be as inclusive as possible to include all groups or individuals with interests in proposals.
- ♦ Current systems for public involvement in water withdrawal decision-making among the U.S. states and Canadian provinces should be compared for best practices.
- ♦ The public should have the right to intervene and comment at all stages of project consideration for approval.
- ♦ New public involvement processes should not diminish the access, rights and transparency of current public notification and participation systems.
- ♦ Public rights should be as consistent as possible.
- ♦ Records of initial public intervention and comments on a proposal should be part of any higher levels of review.
- ♦ The public should have the opportunity for input prior to each ruling on a proposal and whenever the proposal under consideration is altered or a decision is appealed.
- ♦ The public should have access to proposal applications, supporting studies, communications between governments and the applicants as well as the record of others' comments in a timely way.

Specifically, the public input system should provide for:

- ♦ Notification to all affected parties and the affected watershed governments and public, preferably to include listing on a basinwide centralized registry, on receipt of an application
- ♦ Immediate, simple public access to all documents relevant to the proposal until it is disposed of, preferably to include 24-hour Internet access. All relevant documents should include supporting studies submitted by the applicant or commissioned by the deciding agency or ministry, and court documents, if any
- ♦ Holding a public hearing on the proposal in the area of the proposed withdrawal
- ♦ Accepting written comment on proposals from any member of the basin public
- ♦ A public response by government to all relevant comments on the application decision drafts and final document
- ♦ Subjecting the draft instrument of approval to a second, shorter period of written public comment if it significantly alters the terms of the original proposed withdrawal

As discussed earlier in this section, these public input and citizen suit provisions should be adopted into the laws of each jurisdiction, in the U.S. compact, and in any agreements between the provinces. The public input elements discussed above should be included as part of the institutional framework of the state/provincial decision-making body.

2. How do we see the Regional Advisory Committee process working among the ten jurisdictions? Are there particular issues raised by cross-border consultation that the jurisdictions should take into consideration?

Please see the charts above for a graphical representation of our suggestions for how the regional decision-making should work both within and among the jurisdictions.

The state-regional decision-making body should:

- Not be “advisory.” We think the decisions of the regional body should be binding on member jurisdictions as set out in parallel legislation in each jurisdiction and implemented in a binding arbitration process. Each state and province should have equal rights in decision-making.
- Be made of one representative from each of the ten jurisdictions.
- Not distinguish between types of jurisdictions. For example, the objections of a state over a proposed provincial withdrawal should have equal weight to the objection of another province and be handled by similar means.

At both the jurisdictional and regional levels, provision should be made to carry out the specific public input system described above.

3. What is an appropriate time frame for the decision making process on proposals requiring regional review? In other words, how long should it take?

The time frame for regional water withdrawal decisionmaking should balance the imperatives of 1) accurately reaching the correct, ecologically protective decision in all but the smallest fraction of proposals, and 2) the need for predictability and, in some cases, speed.

Therefore the time frame for water withdrawal decisions should be 1) designed in general to be as long as necessary but of a predictable length, and 2) customized in length according to sector for those few sectors that have special timing needs.

4. Do you see a problem with suspending a decision on a proposal for the settlement of inter-jurisdictional disputes? What types of disputes would be appropriate for the dispute settlement mechanism?

In general, the regional decision-making process should be accountable to the public for faithfully implementing all terms of the binding agreement and the compact respectively. It should:

- Specify interstate and interprovincial consultation and provide a means for mediating disputes remaining after consultation is completed
- Provide an independent means for assuring that the states and provinces implement the decisions of the regional body. We believe that citizen suits are a critical component of such assurance in that they provide an incentive before the fact for official parties to act consistently with their

formal commitments—in this case, their commitments under the annex-based state-provincial agreement. Please see our discussion of the need for citizen suit capability in the “General issues” section of this response.

Consensus decision-making should be the objective of the decision-making body. This is currently required by the decision-making process outlined in the U.S. Water Resources Development Act of 1986. However, in an improvement on WRDA, failure to reach consensus under the state-provincial agreement should trigger a binding dispute resolution process, namely, binding arbitration. Such a process will reduce resentments entailed by adverse decisions.

Please refer to the above charts for a graphical representation of how we think interjurisdictional disputes should be resolved.

5. Should a State-Provincial Advisory Body have a structured calendar and pre-determined agenda or maintain greater scheduling flexibility? Should meetings to consider proposals above a defined threshold be ad hoc or periodic?

We do not have a position on various means for scheduling decision-making about water withdrawal proposals. They should balance ecological protection with efficiency and expeditiousness. If recent history is any guide, meetings related just to judging water withdrawal proposals would need to be convened only as referrals are made.

As detailed above under “Decision-making body functions,” the state-provincial decision-making body that makes final decisions on water withdrawal proposals should also be in charge of the various processes that support their decision-making, including:

- ♦ Data-gathering and analysis
- ♦ Forecasting water withdrawal demand
- ♦ Assessing cumulative impacts
- ♦ Determining best conservation practices
- ♦ Supporting generic scientific research, including basin climate change effects forecasting
- ♦ Incorporating the latest scientific understanding into the decision-making process
- ♦ Conducting restoration planning
- ♦ Integrating restoration planning and improvement activities

To carry out these duties, the body should have a standing character and hold regular meetings.

6. Should a State-Provincial Advisory Body meet every year or periodically to assess and evaluate the agreements and consider changes?

Please see the answer to question 5.

Questions to consider—Compact (answered in a state-provincial context)

1. Compact creation

- Should the Great Lakes Basin Compact be amended to enact a binding compact?
- Should a new stand-alone compact be created?

A new, stand-alone compact should be created. The primary purpose of the Great Lakes Charter Annex, and of a compact based on annex principles, is the creation of new unique system with undeniable integrity, clearly devoted to regional ecosystem conservation and restoration. It is important that the basic regional intent to protect the ecosystem not be questioned. It should not be tied to the Great Lakes Basin Compact, which has a mixture of economic and environmental purposes.

- What if any changes should be made to the Water Resources Development Act of 1986 as amended in 2000?

We advocate long-term retention of the existing requirement in U.S. law, the Water Resources Development Act of 1986, for unanimous gubernatorial concurrence in diversion of water from the U.S. portion of the Great Lakes – St. Lawrence River basin.

WRDA's concurrence requirement is an important backup support for protective water withdrawal decision-making and the simplest way to ensure binding enforcement in the United States of decisions by the state-provincial decision-making body to reject U.S.-based water withdrawal proposals.

2. Compact membership

- Who should be members of the Compact Commission?
- How should voting be structured in the Compact?

We do not see the need for a separate compact commission with separate membership from the regional decision-making body. Please see our discussion under "Background" and "Questions to consider—International-interprovincial," questions 2 and 4 above.

3. Review and appeals process

- What process should the Commission use to receive citizen and stakeholder input?
- What conflict resolution process should the Compact provide to resolve State, citizen, stakeholder or others conflicts?

We do not see the need for a separate compact commission. With regard to public involvement in

regional water withdrawal decisionmaking, please see our discussion under “Questions to consider—International-interprovincial,” question 1 above. With regard to conflict resolution among the jurisdictions, see our discussion above under “Questions to consider—International-interprovincial,” question 4.

4. Compact authority and enforcement

- What powers of the States should be exercised jointly through the Compact Commission? Please refer to the Compact Authority section above to review some of the options the Sub-committee has identified.

With respect to water-withdrawal decision-making, wherever the *Boundary Waters Treaty* does not apply, the states and provinces have significant authority: 1) in the *content* of standards, relative to application of science, 2) in the *context* into which standards are placed, relative to climate change impacts, analysis of cumulative impacts, and restoration planning, and 3) in *implementation* of standards, relative to individual approval and rejection of applications.

The purpose of the Great Lakes Charter Annex, and the source of its greatest promise, is for the states and provinces to share this sovereign authority to set and interpret water withdrawal decision-making standards.

We do not support the creation of a compact authority that has permitting and enforcement powers in this area; instead, as discussed above, we think that authority should be granted to a state-provincial decision-making body. However, we wish to stress the importance of the compact itself, because it creates the authority for the states and the U.S. federal government to implement the decisions made by the state-provincial body.

The totality of the Working Group’s materials seem to be proposing a binding mechanism within the United States and effectively a voluntary one across the border. Since we support a binding mechanism for the basin as a single whole, we have proposed that all regional decision-making reside in a state-provincial body, whose decisions may be taken to binding arbitration if necessary.

Therefore, we address the possible areas of authority listed in the Compact Subcommittee’s materials in the context of a state-provincial decision-making body rather than that of a compact commission:

A. Review / approve projects.

Yes. The state-provincial body should review 1) proposals deemed to be of de facto regional interest (according to the criteria in the state-provincial agreement) and 2) state and provincial approvals of other projects on appeal by any member of the state-provincial body.

B. Create a comprehensive plan.

Yes. The state-provincial body should create a comprehensive plan, as promised in the annex's directive 6, to ensure that improvement projects cumulatively restore the basin ecosystem and to ease state and provincial assessment of proposed improvements.

C. Allocate waters.

No. Allocation of water between jurisdictions is needed only in the context of decision-making systems that permit significant ecological impacts, such as substantially reduced flows.

D. Establish drought programs and E. Issue emergency orders.

No. There is no need to lodge this authority at a regional level. Water emergencies and their sometimes dire ecosystem effects are not experienced basinwide.

F. Develop policy plans and regulations to implement general policy statement in the Compact.

Yes. However, general policy statements in the state-provincial agreement should not be so broad as to permit implementing plans and regulations contrary to the protection and restoration spirit of the annex and its standards.

G. Review all State permits for consistency with the regional standard and/or a regional plan.

Yes. Any state and provincial permits and jurisdictional permit programs as a whole should be able to be reviewed for consistency with the principles of the state-provincial agreement.

H. Issue orders for permits not consistent with policy plan or regulations.

No. We are not certain why this is being suggested.

I. Adopt and modify the standard.

The state-provincial decision-making body should not be adopting standards, which should be specified in the state-provincial agreement and mirrored in the U.S. compact and in the jurisdictions' binding legislation.

However, the state-provincial decision-making body should be engaged in modifying the means for implementing the standards in accordance with new knowledge: 1) for the conservation standard, specific criteria for determining contemporary best conservation practices, 2) for the significant

adverse impacts standard, the specific criteria for incorporating a) existing and new scientific knowledge, b) contexts such as demand and climate change effects forecasting, and c) methodologies for assessing cumulative impacts, and 3) for the improvement standard, a planning context. See our discussion of this topic under “Decision-making body functions.”

J. A combination of some or all of the above.

Yes.

5. With what tools should the Compact organization enforce its decisions?

Although we do not see the need for a compact organization or decision-making body, we do think that the most useful aspect of a compact arrangement is its potential enforcement role, providing access to federal courts to assure that state implementing laws and decisions are consistent with the compact.