

A Review of US Approaches to Integrated Watershed Management and their Applicability in the Ontario Region

Mark S. Winfield, Ph.D.
Director

Hugh J. Benevides, LL.B.
Legal and Policy Analyst

Environmental Governance Program

Environment Canada Contract: KW405 – 02- 0719

March 2003

Table of Contents

1. Introduction	3
2. An Overview of the US Federal Government Role in Integrated Watershed Management	6
2.1. The Clean Water Act.....	6
2.1.1. Point Source Pollution Control under the CWA	7
2.1.2. Nonpoint Source Pollution Measures under the CWA.....	8
2.1.3. Total Maximum Daily Loads (TMDLs).....	10
2.1.4. TMDLs and Watershed-based Approaches.....	12
2.1.5. Best Management Practices.....	13
2.2. The Safe Drinking Water Act	13
2.3. Recent Developments in the EPA’s Watershed Approach	14
2.4. Other Federal Government Agencies with Watershed Management Functions	15
2.5. Summary and Conclusions.....	16
3. Integrated Watershed Management in Selected US States	18
3.1. New York State: New York City’s “Watershed Memorandum of Agreement”	18
3.1.1. Land Acquisition and Stewardship.....	19
3.1.2. Watershed Protection and Partnerships	20
3.1.3. Watershed Regulations.....	21
3.1.4. Assessment of the New York City Watershed Initiative	23
3.1.6. Conclusions	25
3.2. Wisconsin’s Nonpoint Source Administrative Rules.....	26
3.2.1. Runoff Rules.....	26
3.2.2. Milwaukee Metropolitan Sewerage District Land Conservation Purchases	31
3.2.3. Conclusions	31
3.3. Oregon: Nonpoint Source Measures and the Oregon Plan for Salmon and Watersheds	32
3.4. Other US examples	34
3.5. Summary and Conclusions on US State Initiatives.....	35
4. Integrated Watershed Management in Ontario	37
4.1. Federal.....	37
4.1.1. Environment Canada	37
4.1.2. Agriculture and Agri-Food Canada.....	37
4.1.3. Department of Fisheries and Oceans.....	39
4.2. Ontario	39
4.2.1. Ministry of the Environment	39
4.2.2. Ministry of Natural Resources.....	40
4.2.3. Ministry of Agriculture, Food, and Rural Affairs	40
4.3. Post-Walkerton Initiatives.....	41
4.3.1. The Recommendations of Part II of the Walkerton Inquiry	41
4.3.2. The State of Implementation of the Walkerton Inquiry’s Recommendations	41
5. Summary and Conclusions	43

1. Introduction

Over the past decade there has been growing international interest in water resource management, with an emphasis on the need to integrate the supply, use, quality and management of water resources across sectors and regions sharing the same resource.

The 1992 United Nations Conference on Water and the Environment (the Dublin Conference) established four guiding principles for the concept of integrated water resource management (the Dublin principles):¹

- Freshwater is a finite and vulnerable resource, essential to sustain life, development, and the environment;
- Water development and management should be based on a participatory approach, involving users, planners, and policymakers at all levels;
- Women play a central part in providing, managing, and safeguarding water; and
- Water has an economic value in all its competing uses and should be recognized as an economic good.

These principles were reinforced through Agenda 21, adopted at the United Nations Conference on Environment and Development in the same year.² More recently, integrated water resource management has been defined as follows:

Integrated water resources management is a process, which promotes the coordinated development and management of water, land and related resources in order to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems.³

Although not specifically referencing these principles and definitions, the Ontario Commission of Inquiry into the Walkerton Water Tragedy made a series of recommendations regarding the protection of source waters for drinking water in its May 2002 report, *A Strategy for Safe Drinking Water*, that reflected their overall direction. In particular, the Commission placed a strong emphasis on a watershed-based approach to source water protection, incorporating local planning processes to ensure that local considerations are fully taken into account, and to develop goodwill and acceptance within local communities.⁴

¹ See Asian Development Bank, "Heightened Awareness of Water Issues," http://www.adb.org/Documents/Reports/Water/heightened_awareness.asp.

² World Conference on Environment and Development, *Agenda 21*, Chapter 18, "Protection of Freshwater Resources."

³ Global Water Partnership Technical Advisory Committee, 2000. Cited in "Why & How IWRM." <http://www.gwp.ihe.nl/wwwroot/GwpORG/handler.cfm?event=infoWhyToolbox>. For a detailed discussion of the concept of Integrated Water Resource Management see also I.W.Healthcote, *Integrated Water Resources Management in Canada: Strategies and Opportunities* (March 2002), prepared for Environment's Water Governance Working Group.

⁴ The Hon. D.R.O'Connor, *Report of the Walkerton Inquiry Part II: A Strategy for Safe Drinking Water* (Toronto: Queen's Printer, 2002) pg.90.

The Commission's proposed approach to watershed-based source protection planning contained a number of key integrative features, including⁵

- water budgets for each watershed, and the identification of all significant water withdrawals;
- the identification of all major point and nonpoint sources of contaminants in the watershed and the modelling of the fates of those contaminants;
- the regulation of point and nonpoint sources of contaminants in a manner consistent with the source protection plan;
- land use and wellhead area mapping;
- the integration of source water protection measures into municipal official plans and zoning decisions;
- requirements that provincial government decisions affecting the quality of drinking water be consistent with source protection plans; and
- the identification of significant knowledge gaps or research needs to support planning activities.

The Government of Ontario has committed to address all of the Commission's recommendations, including those related to source water protection.⁶ However, the government's implementation of the Commission's source water protection recommendations remains a work in progress, and no specific legislative, regulatory, or policy changes related to source water protection have been implemented by the province to date.⁷

Over the past decade, the United States Environmental Protection Agency (USEPA), and a number of state governments have been placing an increasing emphasis on the control of nonpoint sources of pollution, and more generally integrated watershed management. Some of these initiatives were examined in a preliminary manner as part of the research for Part II of the Walkerton Inquiry.⁸ This study seeks to provide a more detailed examination of these developments and their applicability to Ontario. In particular, it seeks to investigate the degree to which US initiatives on integrated watershed management may inform the role of the Canadian federal government in its efforts to facilitate and promote integrated water resource management as the Walkerton Inquiry's recommendations are implemented in Ontario.

⁵ A Strategy for Safe Drinking Water, Chapter 4.

⁶ See Statement to the Ontario Legislature by The Honourable Chris Stockwell Minister of Environment and Energy Queen's Park, Toronto, May 27, 2002, <http://www.ene.gov.on.ca/envision/news/2002/052701s.htm>.

⁷ A *Nutrient Management Act* was adopted by the provincial legislature in June 2002, providing a framework for the regulation of agricultural, industrial and municipal sources of nutrient loadings. However the legislation is enabling in character, and specific regulations needed to implement a nutrient management regime have yet to be promulgated. A multi-stakeholder advisory committee on source water protection planning was established in the fall of 2002, and is expected to report in April 2003.

⁸ See, for example, C.Johns, "Policy Instruments to Management Non-Point Source Water Pollution" (Toronto: Commission of Inquiry into the Walkerton Water Tragedy, 2001).

Specifically, this study

- examines the current role of the US federal government in integrated watershed management, including the legislative, policy and fiscal framework, and the roles of individual federal agencies, particularly the EPA;
- reviews selected regional, state and local responses to the federal legislation and programs intended to promote integrated watershed management;
- identifies potential models and approaches that might be applicable to the Ontario situation;
- assesses the current situation in Ontario at the federal and provincial levels with respect to integrated watershed management; and
- identifies potential points of influence available to the federal government in Ontario to promote better approaches to integrated watershed management, taking into account jurisdictional and potential policy constraints.

2. An Overview of the US Federal Government Role in Integrated Watershed Management

2.1. The Clean Water Act

The Clean Water Act (CWA) provides the basic legislative framework and is the foundation for surface water quality protection in the United States. The broad objective of the CWA is to restore and maintain the chemical, physical and biological integrity of the nation's waters so that they can support the protection and propagation of fish, shellfish, and wildlife.⁹ Attention has shifted in recent years to biological and physical integrity, where formerly the focus was on chemical integrity.

Water quality standards (WQS) are intended to translate the broader goals of the CWA into waterbody-specific objectives. The WQS are implemented through three components: designated uses of water (DUs); water quality criteria (WQC); and antidegradation policies.

DUs are the uses that communities choose as the desirable uses for water bodies in a watershed. They may be considered “desired uses,” as they are often a combination of actual uses and uses that have not yet been attained. Uses can range from drinking water (treated or untreated) to supporting aquatic life; from water-based human recreation to supplying water for agricultural or industrial purposes. Different portions of a water body will have more than one DU assigned to them. A principle of the Act is that a body of water should be classified as fishable and swimmable unless it is “impractical” to meet such goals. Implementation is driven by the DU that requires the cleanest water, for the simple reason that if a body of water meets that requirement, it will meet all lower standards.

WQC are descriptions of the conditions necessary to support the DUs. WQC are expressed in terms of pollutant concentrations, toxicity units, turbidity, temperature, pH, etc., or as narrative statements such as “no toxic chemicals in toxic amounts.”

Antidegradation policies, by contrast to DUs and WQC, apply to water bodies whose quality and integrity have generally not been compromised. They apply where water quality exceeds what is necessary to achieve the applicable DUs.

In a given water body (and this can be extended to include a watershed), both WQS and antidegradation policies may be applied. Although WQS are intended to apply to degraded waters and antidegradation to unimpaired waters, the regime acknowledges that a water body may be impaired with respect to one substance or standard, and unimpaired with respect to another. The result is that a WQS and antidegradation policy may apply simultaneously.

⁹ The similarity to the self-evident goals of the “fish habitat protection and pollution prevention” sections (ss. 34 - 42.1) of the Canadian federal *Fisheries Act* is obvious.

Also, antidegradation policies, WQS, and WQC are inextricably linked as a result of the antidegradation policy that a state¹⁰ cannot allow the level of a given pollutant to rise so that it only marginally meets WQS/WQC for that substance.

Complex procedures are in place for “downgrading” a body of water by removing a use from its list of DUs. The details are not relevant here, except for one element: in order to meet the requirements for downgrading, a state government must demonstrate that the DU cannot be achieved by a combination of point source controls and cost-effective and reasonable best management practices (BMPs) for nonpoint sources.¹¹

Because “the EPA has no regulatory authority over nonpoint sources, [the EPA may] not force a state to require that BMPs be applied by normal farming operations or other nonpoint sources.”¹² However, as the above rule makes clear, EPA oversight of the WQS process means that a state must strive to meet applicable standards by combined implementation of both point and nonpoint source controls. The distinction between regulatory and non-regulatory may therefore be seen as increasingly unclear.

WQS must be reviewed and proposed every three years by states. Monitoring tools are critical in meeting this requirement. State monitoring reports are required by sections 303 (d) and 305 (b) of the CWA, reporting on conditions of waters not meeting WQS (“threatened or impaired waters”) and an overall picture of state waters, respectively. These reports are filed every two years by states.

Monitoring now indicates that nonpoint sources “are the sole cause of impairment of nearly half of the waters” reported on by states in their 303 (d) reports, and that “in many of the 50 percent of the impaired waters where both point and nonpoint sources are significant contributors, nonpoint sources contribute considerably more pollutant loads than do point sources.” EPA attributes this fact to the implementation of CWA programs controlling point sources over three decades.¹³ This may partly explain the current focus on nonpoint sources, and increased attention paid to safe drinking water programs (described below). Still, CWA tools for addressing point and nonpoint source pollution are useful for establishing what needs to be done to ensure water quality, and actions to take in implementing watershed management.

2.1.1. Point Source Pollution Control under the CWA

A key implementation tool for point source pollution is the National Pollutant Discharge Elimination System (NPDES) permit program for point source pollution. Created by section 402 of the CWA, the NPDES program is similar to the Ontario Environmental Protection Act and Ontario Water Resources Act regimes insofar as each prohibits pollution subject to

¹⁰ Throughout this section, “state” should be read to include territories of the United States and tribes, which are also subject to the *Clean Water Act*.

¹¹ See below for further discussion of BMPs.

¹² United States Environmental Protection Agency, Clean Water Act On-Line Training Module, Section 9, www.epa.gov/watertrain/cwa/.

¹³ Clean Water Act On-Line Training Module, Section 28.

permitting. The relevant state government issues discharge permits if it is so authorised by the EPA. Otherwise the EPA issues these permits itself.¹⁴ The system generally applies only to discharges to surface water, although some discharges to groundwater have also been included.

A wide variety of manmade [sic] conveyances are considered point sources, including pipes, ditches, channels, tunnels, certain kinds of ships, and offshore oil rigs.

NPDES permits cover industrial and municipal discharges, discharges from storm sewer systems in larger cities, storm water associated with numerous kinds of industrial activity, runoff from construction sites disturbing more than one acre, mining operations, and animal feedlots and aquaculture facilities above certain thresholds.¹⁵

Animal feedlots, a significant source of pollution, have always (that is, since 1972) been part of the NPDES program, due to this broad definition of point sources; however, for various reasons implementation has been spotty. For this reason, and in response to the increased need to respond to pollution from such operations, the EPA Administrator signed a new federal rule into force in December 2002. This rule includes new requirements for nutrient management plans, manure and soil testing, and record keeping.¹⁶

The categories of exemptions to the point source regime include “indirect” dischargers (those whose discharges are treated by municipal sewage treatment plants), abandoned mines on non-federal lands, sewage from ships otherwise regulated by the EPA, return flows from irrigated agriculture, drainage ditches associated with logging roads, and most smaller feedlots and aquaculture facilities. Certain categories of industrial indirect dischargers have to pre-treat their effluents before sending them to waste water treatment plants (WWTPs).¹⁷ WWTPs are subject to further discharge standards themselves.

2.1.2. Nonpoint Source Pollution Measures under the CWA

A nonpoint source (NPS) of pollution is considered to be any source not defined by the CWA or the regulations as a point source.¹⁸

¹⁴ All states are currently authorized, with the exceptions of Alaska, Idaho, Massachusetts, New Hampshire, New Mexico, and the District of Columbia and a number of the territories. See “State Program Status” at http://cfpub.epa.gov/npdes/statestats.cfm?program_id=12.

¹⁵ Clean Water Act On-Line Training Module, Section 39.

¹⁶ See J. Speir, M.-A. Bowden, D. Ervin, J. McElfish, F.P. Espejo, *Comparative Standards for Intensive Livestock Operations in Canada, Mexico, and the US* (Montreal: CEC, February 2003), at pp. x and 30. http://www.cec.org/pubs_docs/documents/index.cfm?varlan=english&ID=1082.

¹⁷ For a detailed description of the pretreatment program, see US EPA, *Introduction to the National Pretreatment Program* (February 1999), at <http://www.epa.gov/npdes/pubs/final99.pdf>.

¹⁸ Clean Water Act On-Line Training Module, Section 57.

NPS pollution measures are generally covered by section 319 of the CWA. The section was added relatively recently, in 1987, in response to an increasing realization of the contribution of NPS pollution to US waterways.

Section 319 obliges states (a) to assess and report on NPS pollution contributing significantly to waterbodies in a given watershed failing to meet WQS; and (b) to submit management programs for control of NPS in, and improving quality of, navigable waters.

The assessment reports are to describe, among other things, the process for identifying BMPs and measures to control and reduce NPS pollution, and to identify existing state programs for this purpose.

Management programs proposed by a state must identify the BMPs and measures that will be undertaken to reduce pollutant loadings from each NPS source or category. The state must identify the range of regulatory, educational, and other programs to achieve the BMPs and measures and provide a certification by the state's attorney general that the laws of the state give adequate authority for the implementation of the program proposed and, if not, provide a list of additional required authorities, and a schedule for and commitment to seeking such legal authorities as soon as practicable.

Section 319 also emphasizes the importance of involving communities in developing and implementing programs. States are required, in both the development and implementation of management plans, to involve local public and private agencies and organizations with expertise in NPS control. Both assessment and management program reports must be prepared in cooperation with local, substate regional, and interstate entities that are recognized by state authorities for these functions and are actively planning for NPS pollution control implementation.

Where a state fails to submit a management program, or where the EPA does not approve one submitted by a state, it is open to a "local public agency or organization with expertise in and authority to control water pollution from non-point sources," and, provided the EPA determines that the subject area "is of sufficient geographic size," to submit a plan for approval. If approved, the plan is eligible for funding as if that local public agency were a state.

The section also includes rigorous reporting obligations for the EPA Administrator in administering the program and, of particular interest in the Canadian context, a legal requirement that not less than five percent of the funds appropriated for the administration of the 319 program "shall be available to the Administrator to maintain personnel levels at the EPA at levels which are adequate to carry out this section" in a given year.

The EPA Administrator is obliged under section 319 to make grants for both the development and implementation of management plans approved by the EPA. Applications must stipulate BMPs and measures that the state or local body "proposes to assist, encourage, or require" using the federal funds. Section 319 funds may be used by state or local recipients to provide technical assistance, education, training, technology transfer, demonstration projects and

regulatory programs. A Clean Water State Revolving Fund has been established for administering grants to qualifying states.

Proposals accounting for the impact of BMPs on groundwater quality, and those proposing groundwater protection strategies, are among those that may attract priority funding from the EPA. Other priority items include programs designed to “control particularly difficult or serious non-point source pollution problems including, but not limited to, problems resulting from mining activities;” programs that “implement innovative methods or practices . . . , including regulatory programs where the Administrator deems appropriate;” and those that will control interstate NPS pollution.

Federal funds provided under section 319 are not to exceed 60 percent of the state’s actual cost of implementing the measures (50 percent in the case of groundwater programs). Recipients are determined “in accordance with a state-by-state allocation formula that EPA has developed in consultation with the states.” States submit their proposed funding plans to EPA. If a state’s funding plan is consistent with grant eligibility requirements and procedures, EPA then awards the funds to the state.¹⁹

In terms of accountability for funds, the EPA Administrator is empowered to request information and grantees are required to report on progress in meeting the NPS pollution reduction milestones submitted in plans.²⁰

Compliance with section 319 of the CWA alone is not “enforceable” in the sense of EPA having the power to enforce compliance with it. Rather, the emphasis is on the availability of funds to states submitting acceptable management programs, as well as the promise of federal advice and expertise, which may be especially attractive to states having less capacity in this area.

2.1.3. Total Maximum Daily Loads (TMDLs)

A major tool for determining both point and nonpoint source pollutant loads is Total Maximum Daily Loads (TMDLs). TMDLs are based on the principle that overall water quality is not to be deteriorated (the principle applies to WQS generally, as well as to approaches like water quality trading).

The CWA requires that TMDLs be established for waters where technology-based controls, imposed by the NPDES, will not result in achievement of WQS. The evolution of CWA implementation has moved from technology-based discharge limits imposed by NPDES permits to more stringent, water-quality based permit limits. Even the more stringent controls

¹⁹ See <http://epa.gov/owow/nps/319hfunds.html>.

²⁰ Except where otherwise noted, the above details of section 319 are taken from the legal text, available at <http://www.epa.gov/owow/nps/sec319cwa.html>. Information on application for section 319 funds, monitoring programs, EPA guidance materials, and management plan “success stories” can be found at <http://www.epa.gov/owow/nps.cwact.html>.

have not resulted in attainment of WQS. TMDLs therefore become increasingly important in addressing NPS pollution.

TMDLs incorporate the concept of allowable loads / pollutant caps, which in turn incorporate a margin of safety (MOS). The temporal equivalent of MOS is “reserve capacity,” a concept that tries to account for and accommodate future sources. Load share can be allocated among sources in any manner as long as the cap is not exceeded. TMDLs are critical in accounting for point and nonpoint sources and generating a picture of the carrying capacity of the watershed and assigning appropriate shares of the load.

Although addressing nonpoint sources of pollution has been considered “non-regulatory,” the combined obligations of section 319 and the TMDL process clearly gives the EPA a supervisory role over states. A 2000 decision of the US federal court in California illustrates this point.

In *Pronsolino v. Marcus*,²¹ the Garcia River was found to be impaired by nonpoint sources only, including sediment from logging operations. The EPA directed California to list the river as impaired in 1992, and later issued a TMDL calling for 60 percent reduction in sediment from various sources. Landowners affected by the order, fearing compliance costs of ten million dollars, challenged the EPA’s power to order TMDLs based on nonpoint sources, on the basis that section 303 of the CWA did not include nonpoint pollution. The court rejected this argument because the mandate of the Act to give effect to water quality standards would be defeated if TMDLs could not include nonpoint sources.

The plaintiffs argued further that section 319’s emphasis on nonpoint sources and BMPs would have been unnecessary had section 303 (d) been intended to regulate nonpoint sources (section 319 was part of the 1987 CWA amendments). The court found no conflict between sections 303 and 319, and observed that the pre-1987 Act also included NPS-related provisions.

Finally, the plaintiffs argued that the EPA’s actions were an attempt to regulate California land-use practices, a matter for state control. The court found that the TMDL merely established load limits; it did not amount to land-use regulation because California was also free to adopt whatever practices allowed the achievement of the TMDL. California was free to alter the TMDL. Because it is normally the state’s responsibility to establish the TMDL (and apparently in this case the EPA stepped in and issued the TMDL), the court said that

California could have altered the TMDL or refused to enforce it *although subject to the potential withdrawal of federal grants*. While the process may be coercive, the court ruled that this procedure did not constitute direct federal regulation.²²

²¹ “TMDL Authority Upheld for Non-point Source Pollution (re *Pronsolino v. Marcus*, No. C 99-01828-WHA (N.D. Cal. March 30, 2000))”, by Tim Peeples, J.D. and Kristen Fletcher, LL.M. at olemiss.edu/orgs/SGLC/nsp.htm (accessed 24 March 2003), 3 pages. While EPA’s *power* to implement TMDLs has been upheld, other cases have determined that the EPA does not have a *duty* to exercise that power.

²² “TMDL Authority Upheld for Non-point Source Pollution”, p. 3 (emphasis added).

Although the courts have upheld the constitutional validity of TMDLs, “the most frequently cited criticism of TMDL programs across the country is the failure of states to implement pollution control measures following TMDL calculations.”²³

There appears to be little in the way of coercive measures that EPA can apply either in the calculation of TMDLs or implementation strategies to achieve load reductions. In fact, “it is likely that the CWA tools alone may not be sufficient to achieve needed reductions, especially in situations where non-point sources dominate loadings.”²⁴ While the point source contributions to loadings can be addressed by the NPDES permit program, section 319 and TMDLs are really funding rather than regulatory tools.²⁵

This paper nevertheless aims to demonstrate the potential of the TMDL obligation as one important driver for implementation of local watershed management programs. Particular circumstances will determine how this will occur, but the federal presence should tend to provide pressure towards better results.

2.1.4. TMDLs and Watershed-based Approaches

Increasingly, the EPA is encouraging states to determine TMDLs and to issue NPDES permits on a watershed basis.²⁶ Section 319 of the CWA requires states to develop and implement their management programs, “to the maximum extent practicable,” on a watershed basis.

The differences between point and nonpoint source measures, and between regulatory and non-regulatory measures are likely to become even less distinct as these watershed-based approaches are implemented.

The EPA can thus be seen as having very real leverage in addressing NPS pollution by requiring the achievement of TMDLs. EPA’s exercise of this leverage varies with a combination of financial support and regulatory control, depending on the resources and capacities of the state in question. Examples from states described in Part 3 of this report will reinforce this argument.

²³ Committee to Review the New York City Watershed Management Strategy Watershed Management for Potable Water Supply: Assessing the New York City Strategy (National Academy Press, 1999), at approx. p. 18 (hereinafter “Assessing the NYC Strategy”).

²⁴ Clean Water Act On-Line Training Module, Section 37.

²⁵ A funding mechanism parallel to the Clean Water State Revolving Loan program under section 319 is the Drinking Water State Revolving Loan Fund established under the 1997 Safe Drinking Water Act amendments. While it is not clear how a state’s qualification for funds under one of these programs affects its eligibility for the other program, in terms of nonpoint source pollution they can be seen as serving the same ends.

²⁶ G. Tracy Mehan, III, “Memorandum committing EPA’s Water Program to Advancing the Watershed Approach” to Office Directors, Regional Water Division Directors, EPA (Dec. 3, 2002; available on Internet), 5 pages; and “Memorandum: Watershed-Based NPDES Permitting Policy Statement” from G. Tracy Mehan, III to Water Division Directors, Regions I-X (Jan. 7, 2003; available on Internet), 4 pages.

2.1.5. Best Management Practices

The evolution of best management practices (BMPs) in the context of NPS pollution in the CWA suggests that the concept applies to a broad range of circumstances.

Section 208 of the 1972 CWA requires states to develop area-wide (watershed or regional) water quality management plans. One step in developing area-wide water quality protection programs was to “identify, if appropriate, agricultural and silvicultural nonpoint sources of pollution” and to develop “procedures and methods (including land-use requirements) to control, to the extent feasible, such sources.” The EPA developed regulations interpreting section 208, including the concept of BMPs as the appropriate tool for NPS control. The EPA defined a BMP as

A practice or combination of practices, that are determined by a state, or designated area-wide planning agency, after problem assessment, examination of alternative practices, and appropriate public participation, to be the most effective, practicable (including technological, economic and institution considerations) means of preventing or reducing the amount of pollution generated by nonpoint sources to a level compatible with water quality goals.²⁷

The general nature of this definition explains the generic use of the term BMP. A BMP can range from a process, policy or regulation to a physical project.

It is not clear, however, that a proposed measure must somehow be determined as the “best” option before being implemented. Without such an obligation to evaluate an option against some standard(s), “*best* management practice” may be something of a misnomer.

2.2. The Safe Drinking Water Act

The Safe Drinking Water Act (SDWA) was first enacted in 1974. Although the initial focus of the Act was on drinking water quality, subsequent amendments have placed an increasing emphasis on source water protection.

Amendments to the Act adopted in 1986, in addition to accelerating the development of drinking water standards with a focus on carcinogens, introduced provisions related to Surface Water Treatment Filtration Requirements and Ground Water Protection Grants. These provisions established grant programs related to the establishment of procedures to develop, implement and assess critical aquifer protection areas, and voluntary programs for protecting wellhead areas around public water systems wells.²⁸

²⁷ Dr. George Ice and Dr. Ray Whittemore, “Alternatives for Evaluating Water Quality and BMP Effectiveness at the Watershed Scale” (1998?) (Nwqmc.org/98proceedings/Papers/08-ICE.html; accessed 26 March 2003).

²⁸ See <http://www.epa.gov/region4/water/drinkingwater/sdwahistory.htm>.

The 1996 amendments to the Act required states to implement Source Water Assessment Programs to assess the quality of drinking water sources. The assessment regime is complementary to the source protection goals of the CWA, in particular the NPS program. The EPA Office of Water is charged with integrating actions taken under the two laws.²⁹

A funding mechanism parallel to the Clean Water State Revolving Loan program under CWA section 319 is the Drinking Water State Revolving Loan Fund established under the SDWA amendments. While it is not clear how a state's qualification for funds under one of these programs affects its eligibility for the other program, in terms of NPS pollution they can be seen as serving the same ends.

The original SDWA established allowable maximum contaminant levels for multiple contaminants in "finished" water. The Surface Water Treatment Rule (SWTR) concept was included to address the health risks, particularly those posed by microbial pathogens, of drinking water derived from surface supplies. The SWTR describes the criteria, including the creation of a watershed management program that must be met by surface water supplies proposed to forgo filtration.

The description of the New York City Memorandum of Agreement (MOA) will explain further how the SDWA requirements apply to state water protection efforts. The SDWA reflects a focus on drinking water quality, whereas the CWA has a broader focus on overall water quality.

2.3. Recent Developments in the EPA's Watershed Approach

Recent program direction from the EPA's Assistant Administrator (Office of Water) in the form of a memorandum proposes a renewed commitment to watershed-based management, based on the watershed as both a social and hydrological reality, and with the watershed approach as "the fulcrum of our restoration and protection efforts."³⁰

The memorandum exhorts senior EPA staff in the regions to strive for better program integration of EPA and other federal programs, and for the resulting approaches to be consistent with local objectives in a watershed. It also urges further training of EPA staff on basic features of CWA, SDWA and other applicable federal and state laws. The memorandum urges that to access funds barriers to more holistic watershed strategies be eliminated, and encourages more efficient and effective local capacity building. As mentioned above, the EPA is also encouraging greater use of watershed-based permitting.

Another newly proposed EPA initiative is a policy for water quality trading. The new policy is predicated on the assumption of better environmental results accompanied by economic

²⁹ See Memo Re Source Water Assessment and Protection to Regional Administrators from G. Tracy Mehan III, Assistant Administrator, Office of Water, US EPA, 8 February, 2003 (available on Internet).

³⁰ G. Tracy Mehan, III, "Memorandum committing EPA's Water Program to Advancing the Watershed Approach" to Office Directors, Regional Water Division Directors, EPA (Dec. 3, 2002; available on Internet), 5 pages.

savings. It is also based on priorities of meeting existing statutory requirements and promoting watershed-based initiatives.

Under the policy, “The baseline for generating pollution reduction credits should be derived from and consistent with water quality standards.” Credits available for trading are defined as “pollutant reductions greater than those required by a regulatory requirement or established under a TMDL.”

In addition to acknowledging existing legal requirements, the policy appears implicitly to recognize the limitations of trading regimes suggested in the critical literature. For example, the policy emphasizes the need for trades and trading to be consistent with the assumptions on which a given TMDL is based. Trading activity should not delay the implementation of a TMDL, nor (not surprisingly) should it cause combined point and nonpoint source loadings to exceed the cap imposed by a TMDL. The policy also urges that trading regimes be incorporated into core water quality programs. The importance of quantification, monitoring and allowing for uncertainty (particularly where nonpoint sources are involved in trades) is also emphasized.³¹ The existing tools administered by the EPA will therefore continue to be important.

Based on a cursory examination of the policy, these self-imposed cautions on the use of trading appear to reflect some of the limitations urged in the literature. For an excellent analysis of effluent trading in watersheds, see “Point–Non-point Effluent Trading in Watersheds: A Review and Critique.”³²

2.4. Other Federal Government Agencies with Watershed Management Functions

The traditional watershed role of the Natural Resources Conservation Service (NRCS) of the US Department of Agriculture (USDA) was the construction of dams for irrigation, flood control, and other functions under the authority of the 1954 Watershed Protection and Flood Prevention Act. The NRCS played this role in helping to construct over 11,000 dams beginning in 1948. The primary focus respecting dams is now rehabilitation of those dams, many of which are nearing the end of their fifty-year life spans.

The role of the NRCS was further defined in 1996. The Watershed Surveys and Planning Program combines watershed planning and river basin surveys:

The purpose of the Watershed Program, including River Basin operations, is to assist Federal, State, local agencies, local government sponsors, tribal governments, and program participants to protect and restore watersheds from

³¹ For information in this and the preceding two paragraphs, see US EPA, Final Water Quality Trading Policy (January 13, 2003); 10 pages. Accessed at epa.gov/owow/watershed/trading/finalpolicy2003.html.

³² Jarvie, Michelle and Barry Solomon. (1998). Environmental Impact Assessment Review Vol. 18, 13–157.

damage caused by erosion, floodwater, and sediment, to conserve and develop water and land resources, and solve natural resource and related economic problems on a watershed basis. The program provides technical and financial assistance to local people or project sponsors, builds partnerships, and requires local and state funding contribution.

Resource concerns addressed by the program include watershed protection, flood prevention, erosion and sediment control, water supply, water quality, opportunities for water conservation, wetland and water storage capacity, agricultural drought problems, rural development, municipal and industrial water needs, upstream flood damages, water needs for fish, wildlife, and forest-based industries, fish and wildlife habitat enhancement, wetland creation and restoration, and public recreation in watersheds of 250,000 or fewer acres. Both technical and financial assistance are available.³³

There is a focus in the planning process on the use of conservation practice and non-structural measures, but program funds also support construction projects.

The current watershed approach of the NRCS is encompassed by a larger strategy characterized as “locally-led conservation.”³⁴ The USDA also administers “incentive-based” conservation programs through two of its other services: the Consolidated Farm Services Agency and the United States Forest Service.

The EPA, together with the National Oceanic and Atmospheric Administration (NOAA), also oversees implementation of the 1990 Coastal Zone Act Reauthorization Amendments, which require coastal states to submit Coastal Non-point Pollution Control Programs for approval, similar to those required under section 319 of the CWA. These measures treat coastal zones like watersheds, with states having the task of defining the outer boundaries of zones affecting coastal areas. EPA offers guidance in the “best available, economically achievable” management measures for controlling NPS, which may be proposed along with enforceable measures.

2.5. Summary and Conclusions

The control of NPS pollution on a watershed basis has been a growing theme in the EPA’s water programs over the past twenty years. This reflects the reality that NPS pollution has emerged as a major source of impairment of surface waters in the US.

The federal CWA was amended in 1987, adding section 319 specifically to address the growing NPS pollution issue. Section 319 of the Act obliges states (a) to assess and report on NPS

³³ From <http://www.nrcs.usda.gov/programs/watershed/index.html>

³⁴ The NRCS Watershed Program Role In Locally-Led Conservation - A Strategy For The 21st Century, at http://www.nrcs.usda.gov/programs/watershed/Locally_Led/locallyled.html

pollution contributing significantly to waterbodies in a given watershed failing to meet WQS; and (b) to submit management programs for control of NPS in, and improving quality of, navigable waters.

Compliance with section 319 of the CWA alone is not “enforceable” in the sense of EPA having the power to enforce compliance with it. Rather, the emphasis is on the availability of funds to states submitting acceptable management programs, as well as the promise of federal advice and expertise.

A second major tool under the CWA for determining both point and nonpoint source pollutant loads is TMDLs. TMDLs reflect the concept that there are limits to the total levels of contaminant loading that a given water body or watershed can withstand before it is degraded. Increasingly, the EPA is encouraging states to determine TMDLs, issue permits for point source pollution and develop and implement section 319 NPS programs on a watershed basis. Either the state or the EPA may develop TMDLs. Like section 319 of the CWA, the primary enforcement mechanism for TMDLs is financial, specifically the availability (or withholding) of federal funds to state and local agencies for their implementation.

The 1996 amendments to the 1974 SDWA require states to implement Source Water Assessment Programs to assess the quality of drinking water sources. This is also emerging as an important driver of state initiatives related to NPS pollution.

Recent program direction from the EPA’s Assistant Administrator (Office of Water) has emphasized the need to better integrate CWA and SDWA program activities on a watershed basis.

Finally, the USDA’s Natural Resources Conservation Service, Consolidated Farm Services Agency and the United States Forest Service also play significant roles in water resources management. Although there has been a strong traditional focus on dam construction, irrigation and water supply, the more recent focus has been on wider watershed management issues.

3. Integrated Watershed Management in Selected US States

The US federal government sets a framework for water resources management through the CWA and SDWA, provides financial support for state and local government activities, and in recent years has sought to promote an integrated watershed management approach. However, the overwhelming bulk of implementation responsibilities are at the state level.

This section examines three examples of approaches to integrated watershed management adopted at the state level in the US:

- New York City's Watershed MOA related to the watersheds that provide the city with its drinking water in New York State;
- Wisconsin's initiatives related to NPS pollution; and
- Oregon's recent watershed-based initiatives to protect the salmon fishery.

A discussion of more general approaches and developments related to efforts at watershed management among the US states is also provided.

3.1. New York State: New York City's "Watershed Memorandum of Agreement"

New York City is party to a 1997 MOA with New York State, the EPA and environmental groups respecting an "enhanced watershed protection program for the New York City drinking water supply."³⁵ Among the drivers for this agreement were the considerable needs of the city (1.3 billion gallons of drinking water per day) and the concomitant need for upstream watershed protection, ENGO litigation against the city challenging shortcomings in earlier proposed regulations,³⁶ the need for septic system standards, and the city's wish to be granted a "filtration waiver" of compliance with the EPA's SWTR under the SDWA. The agreement includes updated regulations, a land acquisition program, storm water controls, plant upgrades, an inspection regime and other programs.

The agreement, signed January 21, 1997, is a response to a number of pressures and imperatives brought to the table by the City of New York government, the state government, 79 local municipalities, five environmental groups, and the EPA.

³⁵ Except as otherwise cited, materials in this section are from City of New York Department of Environmental Protection, New York City's Water Supply System: Watershed Agreement Overview (nyc.gov/html/dep/html/agreement.html; 6 pages) and the text of the Agreement (available at the above web address). For details, see also NYC DEP, New York City's 2001 Watershed Protection Program Summary, Assessment and Long-Term Plan (Dec. 2001), at <http://www.nyc.gov/html/dep/pdf/moapdf/fadplan.pdf> (657 pages) ("NYC 2001 Plan").

³⁶ The litigation was initiated by the Riverkeepers Society, Environmental Defense and a number of other organizations.

The New York City Department of Environmental Protection (NYC DEP) is required to evaluate and report on implementation of the MOA, and is also responsible for operating and protecting the city's water supply and distribution system.

The New York City MOA is an example of a system's ability to comply with the EPA's SWTR. The 1986 SDWA amendments require states to implement a SWTR. The New York SWTR requires that source water meets certain turbidity and fecal coliform standards; that no source-related violations of coliform standards occur; and that there are no waterborne disease outbreaks in the city. Subjective criteria require the city "to demonstrate through ownership or agreements with landowners that it could control human activities in the watershed which might have an adverse impact on microbiological quality" in the watershed. Operational criteria include compliance with disinfection requirements for *Giardia* and viruses, minimum chlorine residual levels throughout the system, and on-site inspection of disinfection equipment.

A key driver from New York City's perspective was to achieve a "filtration avoidance determination" under the SDWA. The agreement therefore features measures specifically aimed at compliance with the SWTR more prominently than with CWA measures. This greater prominence for the SDWA considerations may also reflect the fact that SWTR compliance is often achieved by meeting section 319 and TMDL requirements, which still apply to the waterways covered by the agreement. The MOA can be seen to implement both SDWA and CWA measures simultaneously. Lawsuits filed against the city by environmental groups regarding its compliance with the federal legislation were also a factor.

The agreement has three principal elements: land acquisition and land stewardship, watershed protection and partnership, and watershed regulations, all of which are described below.

3.1.1. Land Acquisition and Stewardship

One aspect of resistance from communities upstream of New York City, particularly the less affluent "West of Hudson" watershed, was memory of nineteenth- and twentieth-century land takings for the purposes of flooding and creation of some of the reservoirs in the system. Delaware County in the West of Hudson area has a very low median income compared to East of Hudson and New York City, little history of land use regulation, and historically little positive contact with its downstream neighbours. In contrast, the city wanted to establish setbacks and buffer zones for streams, in precisely those locations where West of Hudson settlement and transportation have occurred.³⁷ A compromise had to be reached whereby landowners were appropriately compensated for lands that are purchased.

In order to facilitate the land purchase part of the agreement, New York State issued a ten-year land acquisition permit to the city. The city has focussed on obtaining interest in undeveloped land near reservoirs, wetlands and watercourses on a priority basis (based on the proximity of subject lands to reservoir intakes, and their distance from the city itself). Over 33,700 acres

³⁷ "Protecting New York's Drinking Water." George A. Rodenhauen. Presentation at 2000 APA National Planning Conference, April 19, 2000. asu.edu/caed/proceedings00/rodenhau/rodenhau.htm, at pp. 2-3 of 12.

have so far been acquired or are under purchase contract. The city's objective is to spend \$250–\$300 million on land acquisition West of Hudson, and \$7.5 million East of Hudson in the Croton watershed. Local concerns must be considered before the city acts on purchase proposals. Towns may exclude a scheduled amount of acreage from acquisition; villages may exclude all their land from purchase.³⁸

3.1.2. Watershed Protection and Partnerships

New York City is charged with funding various watershed cooperation and planning measures under the agreement. A Watershed Protection and Planning Council was formed. Membership comprises member communities, and serves as the regional forum for discussing concerns in the watershed.

In addition, the Catskill Watershed Corporation was established as part of the agreement. It is a non-profit corporation that administers much of the \$240 million committed by New York City to water quality and economic development west of the Hudson River. Its Board of Directors comprises representatives of watershed municipalities, the NYC DEP, the State Governor, and the environmental community. East of the Hudson different arrangements apply: \$60 million in water quality planning and infrastructure improvement projects are funded by direct agreements with two counties, Westchester and Putnam.

Projects to be funded by the corporation include an extensive program of septic system inspection, rehabilitation and maintenance; new, centralized sewage system construction and extensions; storm water management measures; environmental education; improved sand, silt and de-icing material storage; and stream corridor protection.

A Catskill Fund for the Future is endowed with \$60 million, issuing loans and grants to projects compatible with water quality goals. Under these programs, more than 1,300 failing septic systems have been remediated; 30 winter road de-icing material storage facilities have been upgraded; and a number of storm water control projects have been undertaken.

West of the Hudson, 34 non-city-owned surface-discharging WWTPs accounting for 60 percent of waste water plant flow have signed agreements to upgrade based on approved upgrade compliance schedules. About 83 percent of this flow was to have been upgraded by mid-2002.

A range of technological measures, such as a turbidity curtain and preventive dredging above key transfer points from the Kensico Reservoir (the most important reservoir in the Catskill/Delaware watershed system), waterfowl management in the reservoir, and voluntary practices such as better pesticide and road salt use, controlling storm water runoff and discouraging waterfowl roosting have been taken on by corporate landowners, under the auspices of the Kensico Watershed Improvement Committee.

³⁸³⁸ [Watershed Agreement Overview](#), pg.3.

Storm water BMPs in tributaries to the Kensico Reservoir have resulted in pollutant removals (particularly fecal coliform, total suspended solids and turbidity).³⁹

3.1.3. Watershed Regulations

The following provisions of the Watershed Rules and Regulations explain the context and authority for the regulations, including the linkage to both the WQS in the CWA, and the SDWA:

Section 18-11 Preface

(a) The health, welfare and economic well-being of nearly nine million residents in the five counties of New York City (“the City”), and of an increasing number of upstate New York communities is inextricably tied to the quality of the source waters in the watersheds of the New York City Water Supply located in Westchester, Putnam, Dutchess, Delaware, Ulster, Greene, Sullivan and Schoharie Counties, and Fairfield County in Connecticut. The high quality of these waters faces a continuing threat from the cumulative and episodic impacts of pollution sources generated by certain land uses and activities in the watersheds. It is the duty of the Commissioner of the New York City Department of Environmental Protection (the “Department”) to protect the high quality of waters from which the City’s water supply is drawn and preserve it from degradation for the purpose of protecting the health and general welfare of its consumers.

(b) These rules and regulations repeal in their entirety and supersede the Rules and Regulations for the Department of Water Supply, Gas and Electricity of the City of New York enacted the 11th day of June, 1953.

(c) These rules and regulations are hereby enacted pursuant to the authority vested in the Commissioner of the Department of Environmental Protection, as set forth in Section 18-13.

Section 18-12 Purpose and Findings

(a) The quality of the drinking water supplied to the City and upstate communities that draw from the New York City water supply depends primarily on the quality of the source waters that feed the reservoirs. The source waters and reservoirs are vulnerable to degradation and contamination from various sources and activities, including, but not limited to:

(1) Wastewater discharges to surface water and groundwater;

(2) Urban, suburban, rural, mining, silvicultural and agricultural land use practices that result in non-point source runoff of pollution and/or in adverse changes in the natural rate at which water flows into and through a delineated drainage basin; and

(3) Improper use, handling, storage, transport and/or disposal of substances, including but not limited to, hazardous substances, radioactive materials, pesticides, fertilizers, winter highway maintenance materials, solid wastes, and

³⁹ See “Stormwater BMP Pollutant Removals” at page xvii of “NYC 2001 Plan.”

animal wastes.

(b) The Department finds that such sources and activities, either alone or in conjunction with any other related activities, may constitute a source of contamination to or degradation of the water supply, may cause a contravention of the State water quality standards set forth in 6 NYCRR Parts 701–705, and Subchapter D of these rules and regulations, and may result in the impairment of the use of the water supply for drinking, culinary or food processing purposes.

(c) In response to the Safe Drinking Water Act Amendments of 1986, the United States Environmental Protection Agency has begun implementing a significant expansion of regulatory requirements for public water systems. In order to protect the public health, and to satisfy the legislative mandates of the Safe Drinking Water Act Amendments and the rules and regulations in 40 CFR Parts 141 and 142, the New York State Department of Health has amended the State Sanitary Code, 10 NYCRR Part 5, Subpart 5-1, Public Water Systems, which contains New York State’s Surface Water Treatment Rule. Although both Federal and State law propose filtration as a method for water quality treatment for pathogen control, the effectiveness of the filtration process and complexity of plant operation is dependent upon the quality of the water entering the filtration plant. In addition, many contaminants are not removed by conventional filtration. Therefore, it is clear that enhancement of the City’s existing watershed rules and regulations would be necessary even if the City were to build filtration plants to filter its entire water supply.

(d) It is the goal and intent of these rules and regulations to protect the public health by averting future contamination to and degradation of the water supply and by remediating existing sources of pollution or degradation of the New York City water supply. These rules and regulations implement the Department’s intention to minimize the discharge of pollutants into the source waters from both point and non-point sources, minimize the adverse impacts of erosion, limit the discharge of phosphorus to source waters which may accelerate the eutrophication process, and provide notification to the City of ongoing or proposed activities, which either alone or in conjunction with other existing and proposed regulated activities, may cause contamination to or degradation of the water supply.

(e) It is the purpose of these rules and regulations to insure compliance with the Federal and State standards by providing a comprehensive watershed protection program. Furthermore, these rules and regulations articulate an anti-degradation policy for the New York City water supply system. These rules and regulations are promulgated to govern those activities in the watershed that threaten the quality of the water supply of the numerous upstate communities and the City of New York. While bound by its responsibility to protect the public health, the City has also taken the needs of the communities and businesses in the New York City watershed into consideration in drafting and promulgating these rules and regulations.

(f) The City reserves the right to re-examine these rules and regulations periodically to insure that they continue to further the goal and intent referred to in paragraph (d) of this subdivision and the purposes referred to in paragraph (e) of this subdivision. Without limiting the foregoing, and without limiting the City’s rights to continue, modify, amend, suspend, waive or revoke any or all of these rules and regulations at any time in accordance with applicable law, the City intends to re-examine these rules and regulations ten (10) years after the effective date hereof to ascertain whether, and to what extent, these rules and regulations should be modified or amended so that they continue to serve their intended purposes.

Section 18-13 Authority

These rules and regulations are promulgated pursuant to Article 11 of the New York State Public Health Law and Section 24-302 of the New York City Administrative Code, and have been duly promulgated by the Commissioner of the Department of Environmental Protection of the City of New York and approved by the Commissioner of the New York State Department of Health. These rules and regulations shall become effective upon completion of any conditions set forth in the approval issued by the New York State Department of Health pursuant to section 1100(1) of the Public Health Law; publication of these rules and regulations pursuant to section 1100(2) of the Public Health Law; and upon completion of the requirements of the New York City Administrative Procedure Act.

The new regulations establish design, construction and operation standards for WWTPs; set design standards and setback requirements for septic systems; and require implementation of storm water control measures for projects in commercial, residential, institutional and industrial sectors. It is reported that, as a result, total phosphorous loads from WWTPs in 1999 were down 65.7 percent from 1994 levels, “largely due to the attention paid to these facilities by DEP’s Regulatory Compliance and Inspection group and corrective actions taken by WWTP operators.”⁴⁰

The regulations also require review and approval by the city of proposed activities with potential adverse effects on water quality.⁴¹

The Watershed Agricultural Program (WAP) is a voluntary program developed by the city with upstate farm groups. In the 1990s farmers complained that farm regulations proposed by the city would force them out of business. Under this program, the city funds farm plans and BMPs through a Watershed Agricultural Council. More than 90 percent of farms now participate. Also, a city–federal cost-sharing program called the Conservation Reserve Enhancement Program pays farmers to take sensitive riparian buffer lands out of active farm use in order to re-establish a vegetative buffer. More than 85 percent of the farms are funded by DEP to undertake Whole Farm Plan programs. Although the WAP is voluntary, the web of factors bringing together the parties included the fact that New York City, needing to satisfy the daily demand for drinking water, and the additional costs of filtration if it could not obtain the filtration waiver, had the incentive to ensure farms participate. Farmers and landowners are presumably motivated to participate by the available funds. The WAP can therefore be seen as a viable surrogate for regulation, in those areas where it applies.

3.1.4. Assessment of the New York City Watershed Initiative

The National Research Council assessment of the MOA⁴² cites the failure of states to implement pollution control measures following TMDL calculations as the most common

⁴⁰ NYC 2001 Plan, p. xvi.

⁴¹ NYC 2001 Plan, p. 417.

criticism of TMDL programs, saying “it is unclear what specific measures are being taken to reduce phosphorus loading to the Cannonsville Reservoir and several Croton reservoirs other than WTP upgrades.” The assessment also recommends that baseline and minimum phosphorus levels be required as a prerequisite to identifying further phosphorus reductions as “surplus.” Where offset or trading programs for phosphorus are proposed to offset increased phosphorus loading due to increased development, the assessment recommends that evidence be adduced in advance that such a program will result in a net reduction in loadings. These recommendations can be seen as applying to all trading regimes.

New York City claims that monitoring indicates that relevant watershed quality “remains high” and that localized upstream water quality is “showing quantifiable improvement.” Results also indicate phosphorus and ammonia reductions from farms.

While difficult to assess qualitatively, early implementation of the MOA appears to be a good example of comprehensive watershed water quality monitoring; 300 sites are tested annually and more than 300,000 lab tests are done of over 35,000 samples. In 1997, although it was too early to evaluate implementation, the US National Research Council gave the MOA framework high marks for a water supply area of its size and complexity.

Assessments led to identification of key potential sources of NPS pollution: waterfowl on reservoirs, failing septic systems, approximately 350 farms in the watershed, and storm water runoff from development (all nonpoint source); and WWTPs discharging into watershed streams (point source, although usually considered separately from point source).

General outcomes, according to New York City’s own 2001 assessment, include better water quality throughout the entire Catskill/Delaware system than required by state or federal regulatory benchmarks, including fecal coliform and turbidity standards.⁴³ NYC DEP attributes successes to both size and design of the system; for example “there is a general pattern of decreasing concentrations” of substances from upstream to downstream locations, “attributable to dilution, sedimentation, and other processes that occur along the transport path.” There is sufficient indication that standards can also be met during extreme weather events.

Extensive modelling shows the relative impacts of different measures on levels of eutrophication. For example, modelling showed that point source WWTP upgrades and agricultural BMPs resulted in the highest phosphorus load reductions, followed next by septic system remediation, compared to lower contributions from urban storm water and population growth (because of the relatively low level of urbanization west of the Hudson River).

Monitoring, assessment and reporting serve several other functions: they provide accountability by confirming high water quality results and ongoing justification for investments.

The New York City example provides an unusual model insofar as a local authority (the NYC DEP) has regulatory authority in other local jurisdictions. While this may be neither desirable

⁴² National Research Council, *Assessing the NYC Strategy*. The assessment suggests tightening of standards, pointing out for example the need for stricter setback requirements (see pp. 23-24).

⁴³ See *NYC 2001 Plan*, p. xviii for technical details.

nor possible in the Ontario context,⁴⁴ it does underscore possibilities and options for the exercise of authority at different levels of government. On the positive side in the New York City example,

The Watershed Rules and Regulations (WR&Rs) have also changed the manner in which local communities and developers address DEP's concerns. In particular, DEP is now consistently recognized as a regulatory authority and as an involved agency for purposes of environmental review under [the State Environmental Quality Review Act], and DEP's attendance at Planning Board meetings has become generally accepted. To assist communities and developers in understanding what the WR&Rs require, DEP encourages pre-application conferences, has developed Applicant's Guides for each regulated activity, and has conducted workshops with Planning Board members.⁴⁵

While this may be an advantage from NYC DEP's perspective, it may create problems at the local level in those communities where DEP exercises its new authority.

Regardless of such perceptions, however, it appears from the above description that DEP pursues pro-active measures during local planning processes to prevent later problems.

3.1.6. Conclusions

In the case of the New York City Watershed Agreement, federal and state regulatory requirements were just one important factor in arriving at an agreement for achieving a watershed planning and management regime. Other factors included the complexity of the interwoven needs of the various parties including upstream and downstream users, the availability of funds to satisfy some of those needs, and the willingness of the state governor to intervene.

On the issue of funds, cost sharing and leveraging appears to be the preferred method for many initiatives taken under the agreement. For example, the WAP is primarily funded by New York City, with some USDA NRCS funds. NRCS will also pay up to \$150,000 per year in fiscal years 2002–2004 for implementation of Nutrient Management Plans.⁴⁶ The city's DEP provided core funding for a watershed forestry program; matching grants came from the USDA forest service to develop forest management plans and to pay for a wide variety of other projects and initiatives.⁴⁷

It is difficult to imagine a situation where so many diverse parties arrive — and remain — at a negotiating table in pursuit of such a complex range of socio-economic, environmental and

⁴⁴ The parallel situation in Ontario, for example, would involve the City of Toronto having some regulatory authority over land use in the Credit, Humber, Don, Rouge and Ganaraska watersheds.

⁴⁵ NYC 2001 Plan, p. 417.

⁴⁶ See NYC 2001 Plan, p. 48.

⁴⁷ See NYC 2001 Plan, pp. 51–56.

regulatory goals (all of which, it might be argued, were mutually reinforcing, although not all the parties may have seen that in the beginning). Its usefulness as an example derives in part from its very complexity.

3.2. Wisconsin's Nonpoint Source Administrative Rules

Wisconsin recently legislated performance standards to control polluted runoff from both agricultural and non-agricultural activities. These standards went into effect on October 1, 2002 following interagency development and public consultations beginning in 1998. The rules provide the essential details ordered by two Wisconsin state laws: Wisconsin Act 27 of 1997 that required the runoff program, and Act 9 of 1999 that provided the framework for the budgetary aspects of the program. The standards are to be phased in through 2013.

The Wisconsin Department of Natural Resources (DNR) was charged with developing the administrative rules. The Department of Agriculture, Trade and Consumer Protection (DATCP) also plays a key role.

The state government claims that these standards are the most comprehensive in the US, however no evaluations of the plan or of early implementation were found.

The standards address both rural and urban areas. Urban approaches include mandatory storm water management plans accompanied by mandatory programs for public education, nutrient application standards, and detection and elimination of illicit discharges. Rural approaches include management practices for crops and manure, and nutrient management planning obligations.

3.2.1. Runoff Rules

The rules comprise nine new “runoff management program administrative rules.” At the centre of the rules is the “Runoff Management (Performance Standards and Prohibitions)” (rule number NR 151). The other rules deal with

- Priority watersheds / priority lakes (NR 120)
- Model ordinances for construction site erosion control and post-construction storm water management (NR 152)
- Targeted runoff management grants (NR 153)
- Best management practices, and cost-share conditions (NR 154)
- Urban NPS water pollution abatement and storm water management grant program (NR 155)
- Storm water discharge permits (NR 216)
- Animal feeding operations (NR 243)
- Soil and water resource management program (ATCP 50).

Considerable consultation efforts were made during the development of the rules, as indicated by 34 public hearings in 17 locations over two years, and amendments to drafts following consideration of 4,000 oral and written comments. DNR documents a list of both supportive and critical feedback to the proposed rules.

3.2.1.1. Runoff Management (performance standards and prohibitions) (NR 151)

Subchapter II: Agricultural performance standards and prohibitions

The cost-sharing rules in NR151 require that for existing facilities and practices, the agricultural standards do not apply unless 70 percent of costs are “made available” to the owner/operator of the farm. However, this requirement only applies to existing farms. There are no such cost-sharing limitations for new facilities.

Features of Subchapter II include the following:

- All fields in crops must meet the applicable soil erosion rate established for that soil subject to sheet, rill and wind erosion.
- All new, substantially altered or abandoned manure storage facilities must be constructed, maintained, or abandoned in accordance with “accepted standards.”
- Clean Water Diversion rules apply: runoff must be diverted from feedlots, manure storage areas and barnyards located in water quality management areas (300 feet from streams, and 1,000 feet from lakes or other areas susceptible to groundwater contamination), or areas upgradient from private wells.
- Nutrient Management rules apply to agricultural operations.
- Manure Management Prohibitions include no overflow of manure storage facilities; no unconfined manure piles in a water quality management area; no direct runoff from feedlots or stored manure into state waters; and limited livestock access to state waters where high numbers of animals result in limited sod cover.
- Subchapter II will be implemented and enforced following consultation among DNR, DATCP, local governments and other state agencies. County land conservation departments are expected to play a key role. Enforcement will fall to the state where the county fails to work with a landowner to achieve compliance.

Subchapter III: Non-agricultural performance standards

These standards apply to construction sites and cities, villages and towns with population density of 1,000 or more per square mile:

- Construction sites (both new developments and redevelopments)
 - Sites will need to control 80 percent of sediment load coming off them where the site is one acre or more (reduced from five acres or more on March 10, 2003).

- Sites will have to implement storm water management plans. Storm water performance standards will be implemented through storm water construction permits issued by the DNR under NR 216. These standards include the need to control 80 percent of total suspended solids that would run off the site if uncontrolled (40 percent for redevelopment sites); peak discharge rates must be maintained or reduced; a portion from 60 percent (for non-residential land use) to 90 percent (for residential) of pre-development run-off would have to be captured by infiltration. In other cases, infiltration will be prohibited where groundwater must be protected.
- Vegetative buffers must be maintained around lakes, streams and wetlands, ranging from 50–75 feet.
- Fuelling and maintenance areas must be free of petroleum product runoff producing visible sheen.
- Cities, villages and towns with population density of 1,000 or more per square mile must implement storm water management plans by March 10, 2008. The plans must include public education on garden and lawn clippings, fertilizers, pet wastes, and oil and chemicals disposal; a grass and leaves management program; a nutrient application program and schedule for municipal lands; and a program for detection and elimination of illicit discharges.
- By 2008 property owners applying fertilizer to more than five acres of lawn or turf must do so according to an application schedule based on soil tests.

Subchapter IV: Transportation performance standards

Roads and associated structures are subject to the non-agricultural performance standards in Subchapter III, with the following changes:

- Exemption for highway resurfacing or reconditioning, from post-construction performance standards.
- Option to use water quality designed swale to meet the standards.
- Different requirements for total suspended solids control.
- Education of Department of Transportation staff on prevention of runoff pollution.

3.2.1.2. The Priority Watershed and Lake Program (NR 120)

Under NR 120, the DNR administers the NPS Water Pollution Abatement Program. Changes include new cost-sharing arrangements, and greater emphasis on NPS pollution sites identified as “critical”. Provisions dealing with rural grants have been shifted to ATCP Rule 50.⁴⁸

⁴⁸ See section 3.2.1.9. below.

3.2.1.3. Model Ordinances for Construction Site Erosion Control and Post-Construction Storm Water Management (NR 152)

The new model ordinances for construction site erosion control and post-construction storm water management (NR 152) are intended to “bring about voluntary uniformity of municipal regulations” through the use of storm water management and erosion control sites (other than associated with building construction). The performance standards are those found in NR 151. Although voluntary, it is anticipated that the forthcoming requirements of “authorized local programs” of the EPA’s Phase II storm water rules will be more easily met by adopting the model ordinances in NR 152.

3.2.1.4. Targeted Runoff Management Grants (NR 153)

Grants may be awarded to local governmental units and state agencies, including the DNR itself, to reduce NPS pollution, implement BMPs, and support administrative and planning functions. Funds may be used on municipal or private lands (the latter with cost-sharing). Funds may be awarded to the agency directly if the project is located in a priority watershed or priority lake area; otherwise the local governmental unit must submit the application.

The Wisconsin Land and Water Conservation Board plays an advisory role in funding decisions. Project proposals must be consistent with county land and water resources management plans prepared under ATCP 50, and with DNR priority areas. Eligibility is not tied strictly to performance standards in NR 151, “but it is expected that many projects will focus on compliance with these standards.” Presumably, this is intended to ensure optimum flexibility to meet local needs. As implementation proceeds, “targeted runoff grants” under this rule will replace the priority lakes and watersheds rule as the “primary vehicle by which the DNR focuses limited resources into areas where control of urban and rural non-point pollution sources is a high priority.” Under NR 153, projects will be of shorter duration, lower cost and more widely distributed across the state than in the former program.

3.2.1.5. Best Management Practices, and Cost-Share Conditions (NR 154)

This rule describes the BMPs, technical standards and cost-sharing conditions applicable to Targeted Runoff Management and Urban NPS Grants. Of 40 technical standards in this rule, 27 are identical to those in ATCP 50, and ten others are similar to standards in that rule. Three other non-agricultural standards appear in this rule but not in ATCP 50. BMPs included in this rule concern manure storage systems; livestock fencing, water facilities and cattle crossings; riparian buffers; roofs and runoff systems for roofs; sediment basins and underground outlets; shoreline habitat restoration for developed areas; and wetland development and restoration BMPs.

3.2.1.6. Urban NPS Water Pollution Abatement and Storm Water Management Grant Program (NR 155)

Under this rule, grants may be awarded to local governments for runoff control in existing areas, or for storm water runoff management plans for developing urban areas or those that are to be redeveloped. Recipients of a construction grant must assure adequate implementation of a comprehensive storm water management plan. Cost-share rates are generally 50 percent of eligible construction costs, 70 percent of eligible planning costs, and 50 percent for urban easements and property acquisitions.

3.2.1.7. Storm Water Discharge Permits (NR 216)

This rule is not new but merely revised, and establishes the criteria for issuance of storm water discharge permits intended to limit discharge into state waters.

Permits require storm water management plans and programs, pollutant loading assessments, storm water pollution prevention plans, and erosion plans for construction. These components must meet the non-agricultural performance standards in NR 151.

3.2.1.8. The Animal Feeding Operations Rule (NR 243)

The Animal Feeding Operations Rule (NR 243) was amended to include the agricultural performance standards and prohibitions in NR 151 for animal feeding operations with 1,000 “animal units” or more. (As in other jurisdictions, animal units are rated according to animal size; for example, 710 dairy cows or 200,000 broiler chickens are equivalent to 1,000 animal units). Such operations require Wisconsin Pollutant Discharge Elimination System (WPDES) permits. Operations with fewer than 1,000 animal units, but discharging a “significant amount of pollutants” to state waters, also require permits.

3.2.1.9. The Soil and Water Resource Management Program

The Soil and Water Resource Management Program (ATCP 50), referred to as the “companion rule” to NR 151, is intended to allow DATCP to implement nutrient management plans, county land and water resource management plans (and allocate departmental funds for this purpose), and other cost-sharing arrangements for which it is responsible. The jurisdictional analogy to Ontario may be that Wisconsin DATCP has responsibilities similar to that of both Ontario’s agricultural and municipal ministries.

3.2.2. Milwaukee Metropolitan Sewerage District Land Conservation Purchases

Another initiative in Wisconsin illustrates more local approaches, apparently quite separate from the statewide initiatives. The Milwaukee Metropolitan Sewerage District (MMSD) provides waste water treatment and flood management services to 1.2 million people in 28 southeastern Wisconsin communities. To complement its traditional storm water management functions, MMSD contracted a group of NGOs and private consulting firms to prepare a conservation plan to

- identify undeveloped private properties that could provide future flood-reduction benefits, but that are at risk for development.
- assess opportunities for MMSD to join in partnerships with others to acquire, manage and maintain the identified properties.
- assess mechanisms and strategies for leveraging MMSD funding for this effort.
- provide recommendations for the acquisition of specific parcels at risk of development, or to acquire easements on them.
- consider ways that ecological restoration of the identified parcels could reduce future flooding.⁴⁹

The plan is interesting, among other reasons, because a large US NGO and private sector contractors were used to develop it. One of the contractors, the Conservation Fund, has particular expertise in negotiating and obtaining conservation easements and purchases.

3.2.3. Conclusions

According to an EPA newsletter, “a few years ago, the Wisconsin Legislature and the Governor were faced with bad news — urban and rural sources of polluted runoff were the leading cause of surface and groundwater quality problems in Wisconsin and posed a long term risk to the state’s water resources.” It is not clear that monitoring required by the CWA led to this realization, but it is likely that it did. Even if the state conducted monitoring of its own accord, the CWA monitoring requirements would have existed as a federal regulatory backstop.

Wisconsin is noted as one of the states that had introduced NPS programs before the federal program was introduced, but the federal presence is still relevant. Declining water quality was a key driver for new standards and strengthened state regulatory responsibilities in Wisconsin. This, in turn, was driven by a renewed “federal push for action in terms of the TMDL framework.”⁵⁰ In addition, the achievement of federally defined WQS was an important consideration in the Wisconsin performance standards and prohibitions.⁵¹

⁴⁹ From “Conservation Plan” (Executive Summary) Submitted to MMSD, October 31, 2001.

⁵⁰ Carolyn M. Johns, “Policy Instruments to Manage Non-Point Source Water Pollution: Comparing the United States and Ontario” (Walkerton Inquiry Commissioned Paper 11) (2002), pp.18-19.

⁵¹ Wisconsin Department of Natural Resources, Runoff Management Section, Wisconsin’s Runoff Rules (November 2002), pg.2.

In developing the new runoff management rules, Wisconsin documented both supportive and critical comments received from the public. This is an important element of transparency in rule-making.

In terms of funding, Wisconsin appears to have dedicated significant grant funds to landowners and local governments for BMP implementation; federal funds were applied as a supplement rather than as a main source.⁵²

The new cost-sharing rules make it clear that the state is exercising a “carrot” (incentive) approach combined with the possible “stick” of standards enforcement. In fact, in some if not all cases the standards cannot be enforced unless 70 percent or more (in case of economic hardship) of the costs are provided in the case of agricultural standards.

3.3. Oregon: Nonpoint Source Measures and the Oregon Plan for Salmon and Watersheds

The case of Oregon exemplifies the central role of NPS measures in watershed management, and the function of TMDLs and section 319 within the larger context of NPS programs. While there is a perception in some states of conflicts between TMDLs and watershed planning, in states like Washington and Oregon there is a sense that TMDLs provide an appropriate focus for watershed-based planning.⁵³

In Oregon, the Department of Environmental Quality (DEQ) is responsible for water quality standards, administers the state’s section 319 program, and is at the centre of a myriad other agencies performing related functions.

Oregon lists a number of NPS pollution initiatives at both the state and federal levels. Most explicitly reflect their watershed orientation, and reflect both a legislative and program component. Here are some examples:

- Areas where TMDL calculations indicate water quality problems exist are a high priority for investment.
- The Oregon Groundwater Protection Act establishes advisory groups and criteria for identifying priorities for section 319 fund allocations.
- DEQ works with other state departments in evaluating the Oregon Forest Practices rules that affect water quality. Problems identified through this approach have resulted in further section 319 funds for the state.
- The Oregon Agriculture NPS Control Act will recommend or require agricultural BMPs in high priority areas such as TMDL basins, designated groundwater management areas, and areas designated as coastal zone management areas.

⁵² Johns, “Policy Instruments to Manage Non-Point Source Water Pollution,” p. 17.

⁵³ US EPA Office of Water, A Review of Statewide Watershed Management Approaches: Final Report (Washington: USEPA, April 2002), pp. 33 and 38.

- Under the agricultural water quality management program, the Department of Agriculture has legislative powers to require landowners within a planning area to take certain measures, and to assess penalties for non-compliance.
- Coastal zone measures are administered by the Department of Land Conservation and Development; and the Department of Forestry oversees the Forest Practices Program, with water and wildlife monitoring conducted by DEQ.⁵⁴

Oregon's section 319 reporting to the EPA further reflects integration of activities among many agencies at all levels of government.⁵⁵ It also reflects the role of ecosystem management revolving around salmon and trout: the Oregon Plan for Salmon and Watersheds is a broadly based program initiated in 1997 and coordinated by the Governor's Office. Its aim is both salmon recovery and water quality efforts by every sector of society. Based on the realization of the critical importance of salmon to the Oregon economy, as anadromous fish populations reached critically low levels in the Pacific Northwest,⁵⁶ the Oregon Plan developed into an umbrella program to address all watershed health matters. This umbrella approach seems to reflect increased political commitment to integration, because, while the agricultural, estuary and water quality initiatives largely existed independently of the Plan, the accountability of agencies to make progress appears to be heightened as a result of gubernatorial oversight.

Another aspect of Oregon's approach is the coordination of combined state and federal fund disbursements of "watershed restoration grants" by one administrative body: the Oregon Watershed Enhancement Board. As in other states, funds are distributed to local watershed councils and others for a wide range of purposes. Recipients must secure at least 25 percent in matching funds. Voting members of the Board include one representative each of the Oregon Environmental Quality, Water Resources, Fish and Wildlife Commissions, the Boards of Agriculture and Forestry; and six members representing local watershed councils, citizens and First Nations.⁵⁷

Other initiatives include a NPS pollution tax credit, effective in January 2001. Eligible project expenses must be incurred as a result of an EPA or Oregon DEQ requirement, or must exclusively function to control, prevent or reduce NPS pollution and be effective in that respect, and be authorized by DEQ, Departments of Agriculture or Forestry, or the Watershed Enhancement Board.⁵⁸ An indirect tax credit approach complements direct grant programs, giving a further incentive to initiate projects not selected for federal or state funds.

The DEQ signed an MOA with the EPA in February 2000 allowing the determination of TMDLs on a sub-basin (rather than a segment-by-segment) basis. As the majority of water quality problems in the state arise from nonpoint sources (many of which are temperature impairments affecting fish habitat),⁵⁹ a sub-basin or watershed approach was determined to be most efficient for determining loadings.

⁵⁴ From <http://www.deq.state.or.us/wq/nonpoint/other.htm>; accessed 3 April 2003.

⁵⁵ See Oregon Nonpoint Source Control Program Plan (October 2000), Executive Summary.

⁵⁶ See http://www.oregon-plan.org/newcomers/ops_w_infosheet.pdf.

⁵⁷ Oregon DEQ, Water Quality Division, 2001 Nonpoint Source Pollution Program Annual Report, at p. 17.

⁵⁸ Oregon DEQ, 2001 Nonpoint Source Pollution Program Annual Report, at pp. 9-10.

⁵⁹ Oregon DEQ, 2001 Nonpoint Source Pollution Program Annual Report, at p. 10.

There is a danger that too elaborate a system for watershed approaches can result in confusion over which initiative performs what role. The EPA cites overlapping watershed and salmon recovery programs in both Oregon and Washington as having this problem:

The sheer number of state watershed initiatives can make it difficult for [local people] to determine which ones serve what purpose. As a result, multiple agency programs and state-sponsored watershed approaches too often result in piecemeal rather than holistic approaches.⁶⁰

Similarly, enthusiasm for watershed initiatives in Oregon has kept state officials busy in dealing with “more than ninety watershed councils and dozens of other local groups focused on mostly local issues.”⁶¹ This underscores the need for a clear government program focus that facilitates local work and prevents time unduly spent on peripheral issues.

The centralization of Oregon programs described above may respond to this concern. It can probably be said for most jurisdictions, however, that too little of a watershed approach is more of a problem than too much.

3.4. Other US examples

There are almost countless examples of integrated watershed management efforts in the US, although the dominant model among the states has been state government-led five-year watershed planning and management cycles. Under these programs, for each individual watershed, data collection and monitoring occurs in year one, assessment/prioritization in year two, strategy development in year three, basin plan review and approval in year four, and implementation in year five. Different watersheds will be at different stages of this cycle in any given year.⁶²

The resources available for this study did not allow for a survey or evaluation of the effectiveness of a wider range of these initiatives. Rather, this study has focussed on examples that have been consistently identified as leading jurisdictions in the integration of their watershed management activities. Other state initiatives may also have features worth considering in the Canadian context.⁶³

⁶⁰ US EPA, A Review of Statewide Watershed Management Approaches: Final Report, p. 23.

⁶¹ US EPA, A Review of Statewide Watershed Management Approaches: Final Report, p. 25.

⁶² US EPA, A Review of Statewide Watershed Management Approaches, pg.10.

⁶³ Some of the available on-line sources include:

US EPA Office of Water, Protecting Sources of Drinking Water: Selected Case Studies in Watershed Management (April 1999), 38 pages. Available at epa.gov/safewater.; US EPA, “Non-point Source News-Notes” (periodical available on-line); The EPA lists state reports of section 319 grants and their implementation, examples of BMP “success stories”, etc. at epa.gov/owow/nps/cwact.html.

3.5. Summary and Conclusions on US State Initiatives

The approaches taken by US states to bring land-use, point and nonpoint source contamination, and water use considerations into an integrated watershed model vary widely from state to state.

The dominant model among the states has been state government-led five-year watershed planning and management cycles. Under these programs, for each individual watershed, data collection and monitoring occurs in year one, assessment/prioritization in year two, strategy development in year three, basin plan review and approval in year four, and implementation in year five. Different watersheds will be at different stages of this cycle in any given year. Results, among other things, are that the process tends to be very top-down driven by state governments, and that implementation activities only occur one year in five.

Despite the EPA's recent focus on the promotion of integrated watershed management, the actual role of federal legislation and programs in the adoption of such approaches also varies widely from state to state. In some cases, such as the New York City example, federal legislation has been a key driver of state and local action. In other cases, such as in Wisconsin, Oregon and Washington, the federal role has been more facilitative, through a combination of the impact of CWA section 319 grants, monitoring programs and TMDLs.⁶⁴

The state-level responses prompted by the different federal drivers of watershed-related activities generally remain "siloe" among agencies. A 2002 EPA review of state initiatives on watershed management, for example, highlights the lack of linkages either between efforts at watershed planning and CWA section 319 NPS initiatives,⁶⁵ SDWA source water protection programs,⁶⁶ and local land-use planning activities,⁶⁷ or among these different types of initiatives. In New Jersey, for instance, the lack of linkages between the state's Drinking Water Bureau and Water Resource Agency has been highlighted.

In this context, many reviews of state-level efforts at integrated watershed management stress the importance of institutional focal points for watershed-based efforts to tie together NPS, TMDL, SDWA source water protection, and local land-use planning.⁶⁸ Progress in this regard is, however, still limited. Washington State appears to be among the most advanced jurisdictions in this regard, having established both Water Quality Management Areas, and a Watershed Planning Act. The Act is primarily focused on the role of county and regional government authorities related to water quantity, but support on a voluntary basis is also provided for planning efforts that include water quality and habitat considerations.⁶⁹

⁶⁴ In some states, there are perception of conflicts between TMDLs and watershed planning, and that TMDLs are too narrow in their focus. US EPA A Review of Statewide Watershed Management Approaches,pg.33 and 38

⁶⁵ US EPA, A Review of Statewide Watershed Management Approaches pg.37

⁶⁶ US EPA, A Review of Statewide Watershed Management Approaches pg.39.

⁶⁷ US EPA, A Review of Statewide Watershed Management Approaches pg.27.

⁶⁸ US EPA, A Review of Statewide Watershed Management Approaches pgs 23 and 42.

⁶⁹ US EPA A Review of Statewide Watershed Management Approaches, pg.64.

The Oregon Plan for Salmon Watershed is focused on establishing local watershed councils, with financial and institutional support from the state's Watershed Enhancement Board, to work with local governments on land-use issues, as well as with Oregon State agencies to implement their programs, such as TMDLs.⁷⁰ The NYC DEQ and Catskill Watershed Management Corporation provide key focal points in the New York City case.

⁷⁰ US EPA [A Review of Statewide Watershed Management Approaches](#), pg.59.

4. Integrated Watershed Management in Ontario

The recent and current activities of the major federal and provincial agencies that would potentially play a role in integrated watershed management are discussed below.

4.1. Federal

4.1.1. Environment Canada

Environment Canada has traditionally focussed efforts related to NPS pollution in Areas of Concern (AOCs) identified under the Great Lakes Water Quality Agreement (GLWQA) and Canada–Ontario Agreements on the Great Lakes Basin Ecosystem (COA). The focus of AOC NPS efforts has been on the funding of pilot/demonstration projects, often in conjunction with the relevant conservation authorities with respect to agricultural sources.

The AOC Annex to the current COA, signed in June 2002, includes commitments on the part of Canada and Ontario to reduce loadings of nutrients, pathogens and trace contaminants from urban storm water and agricultural sources. The focus of the agreement with respect to agricultural NPS is on the provision of financial assistance to community-based land-owner contact programs and environmental stewardship projects, technical support and outreach materials, and the transfer of technologies and information on BMPs.

Recently Environment Canada has increased its compliance promotion activities with respect to livestock operations in Southern Ontario watersheds in relation to the pollution prevention provisions of the federal Fisheries Act.⁷¹

4.1.2. Agriculture and Agri-Food Canada

Although a signatory to the 1994 and 2002 COAs, Agriculture and Agri-Food Canada (AAFC) has played a very limited role in Ontario with respect to NPS pollution or watershed management more generally. The department's primary role has been to provide financial support to the Ontario Environmental Farm Coalition's Environmental Farm Plan program.⁷²

The voluntary farm plan program has been criticized by the Commission for Environment and Sustainable Development for reaching a limited number of farms, and for low participation

⁷¹ See for example, Environment Canada, "Environmental Compliance Promotion for Livestock Farms in Selected Southern Ontario Watersheds," Press Release, August 23, 2002.

⁷² See Commissioner for the Environment and Sustainable Development (CESD), 2001 Report to the House of Commons, Chapter 1, para 4.5.15.

rates in areas of the province with some of the most severe environmental problems associated with agriculture.⁷³

The Federal–Provincial Agricultural Policy Framework, signed by the federal and provincial Ministers of Agriculture (except Québec) in June 2002, includes a chapter on environmental issues. The goals of the agreement include the reduction of agricultural risks to water from nutrients, pathogens, and pesticides, and water conservation.⁷⁴ Specific actions under the agreement are to include

- the completion of a basic agri-environmental scan on all farms to identify farms and regions requiring corrective action; and
- the completion of an agri-environmental farm plan or participation in an equivalent program for farms requiring corrective action; and the implementation of agri-environmental farm plans through the adoption of environmentally beneficial practices in the areas of
 - nutrient management (beneficial manure management, fertilizer management, and nutrient management plans)
 - pest management
 - land and water management (defined as decreasing the number of bare-soil days on farmland, increasing no-till or conservation tillage and improving management of riparian areas, grazing lands and water conservation and use)
 - nuisance management (odours and particulate emissions)
 - biodiversity management.

The agreement specifies that these goals and activities may be achieved on a voluntary basis.⁷⁵ The agreement also includes provisions related to making available decision tools and environmental information to support and inform local and regional agricultural land-use planning and management.⁷⁶

The agreement commits the parties to establish cost-shared programs to provide incentives to address environmental risks and enhance environmental benefits from agriculture. Payments under these programs are to be guided by an agri-environmental farm plan or any other acceptable means of ranking expected environmental benefits of the actions proposed for funding.⁷⁷

The parties are also committed to conduct a study of the way in which jurisdictions regulate agriculture as it affects the environment with a view to sharing best practices.⁷⁸

⁷³ CESD, 2001 Report, Chapter 1, para.4.5.25.

⁷⁴ Federal Provincial Territorial Framework Agreement on Agriculture and Agri-Food Policy for the Twenty-First Century (Halifax, 2002), Art.24.1.1. Other provisions deal with risks to soil organic matter and erosion, air pollution (particulates, odours and GHGs) and biodiversity (species at risk, habitat, and economic damage from wildlife).

⁷⁵ Framework Agreement on Agriculture and Agri-Food Policy, Art. 24.3.

⁷⁶ Framework Agreement on Agriculture and Agri-Food Policy, Art.26.5

⁷⁷ Framework Agreement on Agriculture and Agri-Food Policy, Art.26.8 and 26.9.

⁷⁸ Framework Agreement on Agriculture and Agri-Food Policy, Art.26.10.

The framework agreement is to be implemented through implementation agreements between the federal government and individual provincial and territorial governments, with each province and territory agreeing to provide funding equivalent to two-thirds of that provided by the government of Canada.⁷⁹ An implementation agreement under the framework agreement has yet to be completed between Canada and Ontario.

4.1.3. Department of Fisheries and Oceans

The role of the Department of Fisheries and Oceans (DFO) in Ontario has traditionally been limited, and focussed on fisheries and aquatic sciences, particularly in relation to AOCs identified under the GLWQA and COAs. The department's role in the region was significantly reduced following the 1995 program review budget.

Since then, the department has significantly strengthened its capacity with respect to fish habitat protection in Ontario, following the withdrawal of the Ontario Ministry of Natural Resources (MNR) from an agreement to enforce the habitat protection provisions of the federal Fisheries Act in September 1997.⁸⁰ DFO has also entered into a series of agreements with conservation authorities to screen the impacts of proposed developments on fish habitat for the purposes of the Canadian Environmental Assessment Act.⁸¹

4.2. Ontario

4.2.1. Ministry of the Environment

The Ontario Ministry of the Environment (MOE) recognized the growing significance of agricultural NPS pollution in early 1990s.⁸² However, the context of the post-1995 reductions to the ministry's budget, NPS pollution, and agricultural source pollution in particular were given a very low priority by the ministry.⁸³ The ministry's role in linking land-use and water was also downgraded as it narrowed its focus to dealing with regulated point sources of pollution.

⁷⁹ Framework Agreement on Agriculture and Agri-Food Policy, Art.4.3.2. and Art.5.

⁸⁰ This has included efforts to hire 78 fisheries biologists and 25 fisheries officers. See CESD, 2001 Report to the House of Commons, Chapter 1, Para 6.3.1.14-6.3.1.15.

⁸¹ CESD, 2001 Report, Chapter 1, Para 6.3.17.

⁸² This was reflected in a draft "State of the Environment Report" prepared by the Ministry in 1992, but not released to the public until 1997, which identified agricultural operations as the leading source of nutrient and bacteriological pollution in some regions of southern and southwestern Ontario.

⁸³ This was reflected in the Ministry's April 1998 "Delivery Strategy" for its operations division, which, among other things, directed staff not to respond to complaints regarding agricultural waste disposal.

4.2.2. Ministry of Natural Resources

The MNR's role has traditionally been limited in the areas of southern Ontario affected by NPS pollution. The ministry has played a major role in water resources management (i.e., quantity and flow) in some regions of the province, but has not developed wider watershed management approaches (i.e., linkages to water quality and land-use).

The ministry's orientation was reinforced by the post-1995 budget reductions, limitations placed on the ministry's role in land-use planning as a result of the 1996 amendments to the Planning Act and the 1997 decision to withdraw from administration and enforcement of the habitat provisions of the federal Fisheries Act.

The ministry is the provincial oversight agent for conservation authorities, whose original mandates focussed on water quantity management and flood control, but whose activities later expanded to include a wider range of watershed management work, including land acquisition and NPS reduction initiatives. However, major reductions to provincial funding to the authorities were implemented post-1995, which has significantly limited their capacity. Amendments to the Conservation Authorities Act also limited the scope of their authority and activities.⁸⁴

MNR is also involved, in partnership with the MOE, Conservation Ontario⁸⁵ and a number of conservation authorities, in six pilot projects related to watershed management initiated in December 2001. These involve the development of a series of guides and handbooks related to the maintenance of groundwater and surface water levels, reporting, decision making, evaluating management practices, and discharge trading systems, and a Web site for communications and information sharing.⁸⁶

4.2.3. Ministry of Agriculture, Food, and Rural Affairs

The Ontario Ministry of Agriculture, Food and Rural Affairs has traditionally focussed on its economic development support role for the agriculture and food sector, and did not make significant efforts to address agricultural NPS or COA implementation prior to the Walkerton tragedy. The ministry's focus on the promotion of economic development within the agricultural sector was reflected in the 1998 Farming and Food Production Protection Act, which provides mechanisms through which farmers can have set aside municipal by-laws that attempt to control the environmental impacts of "normal" farm operations.

⁸⁴ See M. Winfield and G. Jenish, Ontario's Environment and the Common Sense Revolution: A Four-Year Report (Toronto: CIELAP, 1999), pg.3-26.

⁸⁵ Formerly the Association of Ontario Conservation Authorities

⁸⁶ EBR Registry Number PB02E6014, July 7, 2002.

4.3. Post-Walkerton Initiatives

4.3.1. The Recommendations of Part II of the Walkerton Inquiry

Part II of the inquiry into the Walkerton water tragedy highlighted the importance of source water protection in ensuring the protection of drinking water. In its recommendations, the inquiry proposed what amounted to an integrated watershed management approach. This included a strong emphasis on watershed-based source water protection plans, including water budgets and the identification of land uses and major point and NPS sources of contaminants,⁸⁷ and the integration of source water protection into official plans and other decisions by local governments.⁸⁸ The commission recommended the establishment of a watershed management branch within the MOE to oversee the development and implementation of the proposed watershed plans.⁸⁹

The commission envisioned a major role for conservation authorities in the management of the development of the watershed-based source protection plans,⁹⁰ and the implementation of local initiatives to educate landowners, industry and the public about the requirements and importance of drinking water source protection.⁹¹

The commission also recommended the development of farm water protection plans dealing with manure, chemical fertilizers, biosolids, pesticides, and fuels for all large or intensive farms, and all farms in areas designated as sensitive or high-risk in the applicable source water protection plans.⁹²

4.3.2. The State of Implementation of the Walkerton Inquiry's Recommendations

The province's efforts to implement the inquiry's recommendations for source water protection through watershed-based planning remain a work in progress. The Nutrient Management Act, enacted in June 2002, provided a framework for the regulation of NPS pollution related to nutrients from agricultural, industrial and municipal sources. However, the implementation of the regulations that specify the application and content of nutrient management planning requirements has been delayed until July 1, 2003, and the requirements will not come into force for existing large livestock farms until 2005. Other farms will not be covered until 2008 "at the earliest."⁹³ The Act is to be administered by the Ministry of Agriculture and Food rather than the MOE, as recommended by the Walkerton Inquiry.⁹⁴ The Act also limits the ability of local

⁸⁷ A Strategy for Safe Drinking Water, Recommendation 1

⁸⁸ A Strategy for Safe Drinking Water, Recommendation 5

⁸⁹ A Strategy for Safe Drinking Water, Recommendation 70.

⁹⁰ A Strategy for Safe Drinking Water, pp.100-101.

⁹¹ A Strategy for Safe Drinking Water, Recommendation 8.

⁹² A Strategy for Safe Drinking Water, Recommendation 15

⁹³ Ministry of Agriculture and Food, "Eves government responds to public consultations with new direction on nutrient management," Press Release, March 21, 2003

⁹⁴ A Strategy for Safe Drinking Water, Recommendation 11.

government to establish nutrient management requirements beyond those established by the province.

The SDWA, adopted in December 2002, contained no provisions related to source water protection. An advisory committee was struck on the implementation of the Walkerton Inquiry's recommendations regarding source water protection, and specifically on watershed-based planning, in November 2002.⁹⁵ However, the committee's report has yet to be made available to the public.

The Sustainable Water and Sewerage Services Act, enacted at the same time, was amended at committee to permit municipalities to charge for costs of protecting source water as part of its overall framework for cost recovery for sewer and water services.⁹⁶ The purpose of this amendment was to provide a funding mechanism for the work of the conservation authorities, although it remains unclear to what degree municipalities will make use of this additional authority.

In the meantime, the MOE and MNR have initiated six pilot projects on watershed management. These are intended to provide guidance to local governments involved in watershed management planning activities

In summary, the province's efforts to address NPS pollution and move towards watershed-based planning are incomplete, and their fate remains uncertain. There has been no movement to establish an institutional focal point within the provincial government for these activities, as recommended by the Walkerton Inquiry. Nor have there been measures adopted to strengthen the capacity (financial and regulatory) of conservation authorities or municipalities to carry out these functions themselves, other than the provisions of the Sustainable Water and Sewerage Services Act permitting cost recovery by municipalities for source water protection activities.

The delays in the implementation of the Nutrient Management Act leave Ontario as one of only two Canadian provinces not to have adopted a regulatory and policy framework to deal with NPS pollution from intensive livestock operations, and the only province with a significant agricultural industry to have failed to do so.⁹⁷

⁹⁵ Ontario Ministry of the Environment, "Protecting Drinking Water at Source," Backgrounder, October 29, 2002.

⁹⁶ *Sustainable Water and Sewerage Services Act*, 2002, s.1(definitions), s.1(2), 1(3), s.3(7) and 4(7).

⁹⁷ See Speir, Bowden, Ervin, McElfish, and Espejo, Comparative Standards for Intensive Livestock Operations in Canada, Mexico and the US, pp.55-89. The other province without a regulatory framework is Newfoundland and Labrador, which has no significant agricultural industry.

5. Summary and Conclusions

There has been progress towards integrated approaches to watershed management, incorporating considerations of point and nonpoint sources of contamination, competing uses for water resources and linkages to land-use planning in both Ontario and the US. However, these efforts remain a work in progress in both cases, and progress has been made in different areas in each jurisdiction.

In the US, there have been a number of drivers for action on integrated watershed management at the federal level, including CWA section 319 and TMDLs, and the source water protection and other provisions of the SDWA. State responses to various local problems, such as nutrient loading in Wisconsin and salmon habitat protection in Oregon, have also been factors. However, institutional frameworks to draw these efforts together into an integrated approach and link them to land-use policies have generally been missing, or established on an ad hoc basis. The result has been a “siloed” approach, where different components/responsibilities fall under the jurisdiction of different agencies or even levels of government, with little or no contact occurring between them.

In Ontario, by contrast, there is an institutional framework with the potential to draw local and upper levels of government together in the management of watersheds to deal with issues of water supply and use, point and nonpoint contamination and land-use decisions in an integrated manner, namely the watershed-based conservation authorities. The problem, rather, has been a lack of drivers from the provincial or federal levels to make full use of this institutional potential.

Until recently, the province had taken a very weak approach to NPS, and has lacked an overall framework for integrating and managing point and NPS loadings of water bodies. It has also weakened or removed legislative and policy linkages between land-use and water quality and supply decision making, as reflected in 1996 amendments to the Planning Act and general narrowing of the mandate and role of conservation authorities. The federal government, for its part, has supported some pilot initiatives related to NPS pollution, particularly through its Great Lakes AOC initiatives, but has made very limited use of its potential regulatory authority under the Fisheries Act.

Several elements are now present that enhance the federal and provincial governments’ ability to provide incentives and resources for more integrated approaches to watershed management in the province. These include the following:

- The availability of financial resources for activities related to NPS pollution through the AOC provisions of the 2002 Canada–Ontario Agreement, particularly funding for community-based landowner contact programs.
- Environment Canada has indicated some willingness to take a more active approach to promoting compliance with the pollution prevention provisions of the Fisheries Act with respect to agricultural NPS pollution, particularly in relation to intensive livestock operations.

- The June 2002 Agricultural Policy Framework Agreement, for which a Canada–Ontario implementation agreement has yet to be completed, lays out key directions with respect to the control of agricultural NPS pollution and makes commitments to fund this work.
- The DFO has established a series of partnerships with conservation authorities regarding the administration of section 35 of the Fisheries Act and screening assessments for the purposes of the Canadian Environmental Assessment Act.
- The provincial Sustainable Water and Sewerage Services Act provides a potential funding source for the watershed planning and protection work of conservation authorities and municipalities as part of its cost-recovery framework.
- The provincial government has made commitments to act on the Walkerton Inquiry’s recommendations regarding source protection and watershed planning, although the province’s framework in this regard remains incomplete.

A key element in the promotion of integrated approaches to watershed management would be to employ aspects of these initiatives to strengthen the capacity and role of the province’s existing institutional focal points for watershed management — the conservation authorities. The US experience suggests that the federal government can provide important incentives in this regard.

The central theme of US federal approaches to both NPS control, and the promotion of watershed-based approaches more generally, has been the use of financial incentives to state and local governments, often tied to the achievement of specific outcomes, such as TMDLs. Financial incentives have also been central elements of the state programs examined in this study, such as the New York City MOA and Wisconsin initiatives, particularly in relation to agricultural NPS pollution, and Oregon’s watershed enhancement programs.

An aggressive use of federal spending authority for environmental purposes has been outside of the Canadian experience to date,⁹⁸ and expenditures on the scale seen at the federal level in the US in support of state and local programs are likely beyond the financial resources of Environment Canada’s Ontario Region. However, there may be specific points of influence where more limited federal expenditures could have a major impact.

The federal COA AOCs and other funds, for example, might be used to encourage municipalities to use the funding authority for source water protection provided to them by the Sustainable Water and Sewerage Services Act to support the work of the Ontario conservation authorities. In particular, federal contributions to the work of conservation authorities in this regard might be made conditional on matching municipal contributions. However, a long-term financial commitment to funding the work of the conservation authorities may be needed to encourage municipalities to make use of this authority.

⁹⁸ Kathryn Harrison notes “In striking contrast to the United States, the Canadian federal government has not subsidized provincial administration of environmental programs, either conditionally or unconditionally.” See K.Harrison, Passing the buck: federalism and Canadian environmental policy (Vancouver: UBC Press, 1996) pg.41.

The availability of federal funding might also encourage the province to provide stable, long-term funding to conservation authorities for watershed planning and management work, particularly in the context of the recommendations of Part II of the Walkerton Inquiry regarding the need for watershed-based source protection plans, and the role of conservation authorities in that process.

US experience also highlights the role of funding in farmer buy-in to NPS control initiatives. However, efforts need to be made to ensure that funding that might become available in Ontario through the Agricultural Policy Framework Agreement is targeted at agricultural NPS outreach work by conservation authorities, as well as the provision of direct payments to farmers. The authorities might also play a role in evaluating the effectiveness of the individual farm-focussed environmental farm plan initiatives that are the central components of the framework agreement's approach.

A system of standards for water quality can be used to provide incentives to local bodies to establish standards and goals for their watershed, and to report publicly on water quality status and progress towards its improvement. In the US, monitoring activities and the development of TMDLs are consistently identified as focal points for the integration of point and nonpoint source contamination and land-use considerations in watershed management among the leading US states in this area, such as Washington, Oregon, and Wisconsin. Part II of the Walkerton Inquiry also pointed to the importance of consideration of total loadings from point and nonpoint sources of contamination, and identification of information gaps in its proposed watershed-based source protection plans.

There is currently no comprehensive program in Canada comparable to the TMDL process for identifying total loading limits for surface waters. Such an exercise might be pursued on a pilot demonstration basis by Environment Canada in partnership with one or more conservation authorities, perhaps in one of the Great Lakes AOCs for which both point and nonpoint sources of pollutants are an issue.

Finally, the role currently being played by conservation authorities regarding the administration of the habitat protection provisions of the Fisheries Act might be strengthened in a number of ways that increase the influence of the authorities in project approvals and land-use planning decisions. In particular, the authorities' role in advising DFO on the implications of proposals that may harm, alter or destroy fish habitat for the purposes of the Canadian Environmental Assessment Act might be further formalized, and financial support provided to the authorities for this work.