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Hydraulic Fracturing and Water Management in the Great Lakes

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HYDRAULIC FRACTURING AND WATER MANAGEMENT IN THE GREAT LAKES

Nicholas Schroeck[†] & Stephanie Karisny[‡]

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INTRODUCTION

The Great Lakes are a truly astounding natural resource. The Lakes are the largest freshwater system on earth, bordering eight American states and two Canadian provinces, and holding approximately 21 percent of the world's freshwater supply.¹ About 10 percent of the United States population and 30 percent of the Canadian population live in the Great Lakes Basin, and millions of people depend upon the Lakes for drinking water supply.² The Great Lakes also support a world-class fishery, with over 250 species of fish, as well as robust tourism, transportation, and agriculture industries within

† © 2013, Nicholas J. Schroeck, Executive Director, Great Lakes Environmental Law Center, Adjunct Professor, Wayne State University Law School. Thanks to Noah D. Hall, Associate Professor, Wayne State University Law School, for his extremely helpful comments and suggestions, and to the *Case Western Reserve Law Review* for planning and putting on this excellent hydraulic fracturing symposium.

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1. *Great Lakes: Basic Information*, EPA, <http://www.epa.gov/glnpo/basicinfo.html> (last updated July 5, 2012).

2. *Id.*

the Great Lakes region.³ Many endangered and threatened animal species make their homes in the unique ecological environment the Great Lakes provide.⁴

In order to better protect and manage this massive and vastly important water resource, the eight American states⁵ and two Canadian provinces⁶ with jurisdiction over the Great Lakes entered into the Great Lakes–St. Lawrence River Basin Sustainable Water Resources Agreement in 2005.⁷ The Agreement is between the eight Great Lakes States and Ontario and Québec, and it was implemented in Ontario and Québec through Provincial laws.⁸ In the United States, the companion Great Lakes–St. Lawrence River Basin Water Resources Compact passed through the legislatures of each state, then the United States Congress, and was signed into law by President Bush in 2008.⁹ The Agreement and the Compact protect the Great Lakes in three important ways. First, all member parties must manage their Great Lakes water withdrawals under a common “Decision-Making Standard,” which establishes baseline practices for conservation and sustainable use.¹⁰ Second, the Agreement and Compact ban most new and increased diversions of water out of the

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3. *About Our Great Lakes: Great Lakes Basin Facts*, NAT’L OCEANIC & ATMOSPHERIC ADMIN., <http://www.glerl.noaa.gov/pr/ourlakes/facts.html> (last visited Apr. 13, 2013).
 4. *See Endangered, Threatened, Proposed, and Candidate Species*, U.S. FISH & WILDLIFE SERV. (Oct. 2012), <http://www.fws.gov/midwest/endangered/lists/pdf/r3telist.pdf> (listing endangered and threatened species in the upper Midwest).
 5. Illinois, Indiana, Michigan, Minnesota, New York, Ohio, Pennsylvania, and Wisconsin.
 6. Ontario and Québec.
 7. Great Lakes–St. Lawrence River Basin Sustainable Water Resources Agreement, Sept. 13, 2005, *available at* http://www.cglg.org/projects/water/docs/12-13-05/great_lakes-st_lawrence_river_basin_sustainable_water_resources_agreement.pdf [hereinafter Great Lakes Agreement].
 8. *Id.* art. 100; *see also* Implementation of the Great Lakes Agreement, GREAT LAKES – ST. LAWRENCE RIVER WATER RESOURCES REGIONAL BODY, <http://www.glsregionalbody.org/agreementimplementationstatus.aspx> (last visited Apr. 13, 2013) (collecting the parties’ legislation that enacted the Agreement).
 9. Great Lakes–St. Lawrence River Basin Water Resources Compact, Pub. L. No. 110-342, § 1, 122 Stat. 3739, 3739 (2008). For more background and analysis of the Compact, see Noah D. Hall, *Toward a New Horizontal Federalism: Interstate Water Management in the Great Lakes Region*, 77 U. COLO. L. REV. 405, 435–48 (2006) (explaining how the Compact could be a model for future environmental policy).
 10. Great Lakes Agreement, *supra* note 7, art. 203; Great Lakes–St. Lawrence River Basin Water Resources Compact § 4.10.

Great Lakes basin.¹¹ Finally, the Agreement and Compact require that member parties create and implement water efficiency and conservation programs and report data on these programs by specific deadlines.¹²

But despite the extensive ecological and economic importance of the Great Lakes, and the formidable protection provided by the Agreement and the Compact, the integrity of this vast water resource is threatened by the practice of high-volume, slick-water hydraulic fracturing (or fracking) in the Great Lakes basin. This technique, used to “stimulate” oil and natural gas wells, allowing for increased production, requires the use of millions of gallons of water and has the potential to cause significant water depletion and aquifer contamination.¹³ This Article will look at new ways of utilizing the Agreement and the Compact to protect the Great Lakes Basin from the environmental hazards posed by fracking.

Part I provides a brief overview of hydraulic fracturing regulation in United States and Canada, with a focus on the state of Michigan and the province of Ontario. Part II focuses on the ban on new and increased diversions of Great Lakes water in the Agreement and the Compact, and how this ban might be used to protect the Great Lakes from the potentially hazardous practice of fracking. Part II also proposes the promulgation and implementation of new rules and regulations under the Compact by the Great Lakes–St. Lawrence River Basin Water Resources Council, which would promote sustainable energy development in the Great Lakes Region by giving special attention to the protection and conservation of Great Lakes water resources. Finally, this Article concludes that while both the Great Lakes states and the Canadian provinces have made a start at regulating hydraulic fracturing, more work needs to be done in order to create a region-wide, comprehensive regulatory system that will ensure the environmental integrity of Great Lakes water for years to come.

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11. Great Lakes Agreement, *supra* note 7, art. 200; Great Lakes–St. Lawrence River Basin Water Resources Compact § 4.8.
 12. Great Lakes Agreement, *supra* note 7, art. 304; Great Lakes–St. Lawrence River Basin Water Resources Compact § 4.2.
 13. See *The Process of Hydraulic Fracturing*, EPA, <http://www2.epa.gov/hydraulicfracturing/process-hydraulic-fracturing> (last updated Feb. 7, 2013) (noting that “flowback” containing chemicals may reach surface water).

I. REGULATION OF HYDRAULIC FRACTURING IN THE
GREAT LAKES BASIN

A. *Regulation of Hydraulic Fracturing in the United States*

1. Federal Regulation

In the United States, the process of hydraulic fracturing is not subject to federal oversight. In fact, hydraulic fracturing has so far managed to evade the strictures of one of the country's most rigorous and comprehensive water protection laws—the Safe Drinking Water Act (SDWA).

The United States Congress passed the SDWA in 1974 to ensure safe drinking water for the American public.¹⁴ Part C of the SDWA requires that the Administrator of the United States Environmental Protection Agency establish underground injection control regulations in order to protect underground sources of drinking water from contamination by underground injection of wastes.¹⁵ Individual states may acquire primary enforcement responsibility for these regulations by adopting and implementing an underground injection control program in compliance with EPA requirements.¹⁶ In the absence of an approved state program, the EPA will implement a program for that state.¹⁷

Hydraulic fracturing is conspicuously excluded from regulation under the SDWA.¹⁸ This exclusion was the product of almost a decade of debate between environmental advocacy groups, the oil and gas industries, and the EPA,¹⁹ and is embodied in the Energy and Policy Act of 2005 (EPAAct).²⁰ The EPAAct amended the SDWA to exclude hydraulic fracturing from the definition of “underground injection” as provided in § 300h by stating that, “underground injection” means *only* “the subsurface emplacement of fluids by well injection,” excluding “(i) the underground injection of natural gas for purposes of

14. Safe Drinking Water Act of 1974, 42 U.S.C. §§ 300f–300i (2006).

15. *Id.* § 300h-1(a), (d).

16. *Id.* § 300h-1(b)(1)(A)(i).

17. *Id.* § 300h-1(c).

18. *Id.* §§ 300h(b)(2)(A)–(B), (d)(1)(A)–(B), 300h-1(c)(1)–(2), 300h-2(c)(1)(A)–(B).

19. See Hannah Wiseman, *Untested Waters: The Rise of Hydraulic Fracturing in Oil and Gas Production and the Need to Revisit Regulation*, 20 *FORDHAM ENVTL. L. REV.* 115, 142–46 (2009) (discussing this debate and the lack of federal regulation).

20. *Hydraulic Fracturing Background Information*, EPA, http://water.epa.gov/type/groundwater/uic/class2/hydraulicfracturing/wells_hydrowhat.cfm (last updated May 9, 2012).

storage; and (ii) the underground injection of fluids or propping agents . . . pursuant to hydraulic fracturing operations.”²¹

Subsequent attempts by members of Congress to remove this “loophole” for fracking created by the EPAct have been unsuccessful,²² and today the United States is still without any federal directive regarding the hydraulic fracturing process. Government administration of fracking has thus been left to each individual state and has resulted in a widely varying patchwork of regulatory programs across the country.

2. State Regulation: Michigan

In 2010, use of hydraulic fracturing in the natural gas recovery process began to garner much attention in Michigan due to the discovery of significant gas reserves in the Utica and Collingwood shales in the northern Lower Peninsula. Since then, this discovery has led to the sale-at-auction of approximately 147,000 acres²³ of state land for oil and gas development and the permitting and construction of approximately 209 new natural gas wells.²⁴ Besides motivating industry and investment, this natural gas “boom” has also triggered a strong opposition movement made up of Michigan citizens and lawmakers who are concerned about the health and environmental consequences associated with fracking.²⁵ Tension between the natural gas industry and these various advocacy groups has made the

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21. 42 U.S.C. § 300h(d)(1)(A)–(B) (2006).
 22. See Fracturing Responsibility and Awareness of Chemicals Act of 2011, H.R. 1084, 112th Cong. § 2 (2011); Fracturing Responsibility and Awareness of Chemicals Act of 2009, H.R. 2766, 111th Cong. § 2 (2009).
 23. See MICH. DEP’T NAT. RES., STATE OF MICHIGAN OIL AND GAS LEASE AUCTION (Oct. 24, 2012), *available at* http://www.michigan.gov/documents/dnr/OCT2012_oilgasleaseauctionsummary_405907_7.pdf (detailing the auction results).
 24. E-mail from Mark Snow, Mich. Dep’t. of Env’tl. Quality, to Stephanie Karisny (Oct. 31, 2012, 5:11 PM) (on file with author).
 25. Because the hydraulic fracturing process requires so much water (two to four million gallons), there is significant risk of water resource depletion. GROUND WATER PROT. COUNCIL & ALL CONSULTING, MODERN SHALE GAS DEVELOPMENT IN THE UNITED STATES: A PRIMER 64 (2009), *available at* http://www.netl.doe.gov/technologies/oil-gas/publications/EPreports/Shale_Gas_Primer_2009.pdf [hereinafter MODERN SHALE GAS]. Many fracking opponents also have concerns regarding the potential migration of the chemical-laden fracturing fluids, which could contaminate drinking water supplies. See *id.* at 61–64 (providing a summary of fluid additives, their main components, and purposes). Other worries include land subsidence and increased emission of the greenhouse gas methane. *Id.* at 74; *Land Subsidence*, U.S. GEOLOGICAL SURV., <http://ga.water.usgs.gov/edu/earthgwlandsubside.html> (last modified Mar. 6, 2013, 1:30 PM).

utilization of hydraulic fracturing a hot-button issue in Michigan, leading to much discussion about the adequacy of the state's existing oil and gas regulations.

In Michigan, the hotly contested regulation of natural gas wells is the responsibility of two administrative agencies: the Department of Environmental Quality (DEQ), which primarily oversees the well permitting and construction processes under part 615 of the Michigan Natural Resources and Environmental Protection Act (NREPA),²⁶ and the Public Service Commission (PSC), which controls well production under chapter 460 of the Michigan Compiled Laws.²⁷ The natural gas recovery process begins with an application for a permit to drill filed with the DEQ. The DEQ has a sixty-day period in which to review and either grant or deny the application.²⁸ If the application is granted, well construction may begin, according to DEQ regulations on spacing and location of wells, and drilling and well construction.²⁹ After construction is complete, the newly drilled natural gas well must undergo extensive testing by the DEQ, and the well owner must obtain a Standard Well Connection Permit and Allowable Withdrawal Order from the PSC.³⁰ When all three of these requirements have been met, the new well may finally begin production.

Importantly, recent amendments to the above-mentioned DEQ fracking rules promulgated under part 615 have changed the regulatory requirements for “all . . . gas wells that utilize high volume hydraulic fracture completion technology.”³¹ Specifically, the new

26. MICH. COMP. LAWS ANN. §§ 324.61505–.61506 (West 2009).

27. MICH. COMP. LAWS ANN. § 460.6 (West Supp. 2012).

28. Public notice of these permit applications is limited. The DEQ is only required to disclose permit application information to “the county in which an oil or gas well is proposed to be located and to the city, village, or township in which the oil or gas well is proposed to be located *if* that city, village, or township has a population of 70,000 or more.” MICH. COMP. LAWS ANN. § 324.61525(4) (West Supp. 2012) (emphasis added). Once the DEQ has disclosed this information, the relevant governmental subdivision may then “provide written comments and recommendations to the supervisor pertaining to applications for permits to drill and operate. The supervisor shall consider all such comments and recommendations in reviewing the application.” *Id.*

29. *See* MICH. ADMIN. CODE rr. 324.301–.302, 324.401–.422 (2013) (providing these requirements).

30. MICH. ADMIN. CODE r. 460.864 (2013).

31. Harold R. Fitch, Mich. Dep’t of Env’tl. Quality, High Volume Hydraulic Fracturing Well Completions, Supervisor of Wells Instruction No. 1-2011, at 1 (May 23, 2011) [hereinafter Well Instruction 1-2011], *available at* http://www.michigan.gov/documents/deq/SI_1-2011_353936_7.pdf. “High volume hydraulic fracture completion technology” is defined by the DEQ as “a well completion operation that is intended to use a total of more than 100,000 gallons of hydraulic fracturing fluid.” *Id.* A well

regulations impose additional reporting,³² completion,³³ and permitting³⁴ requirements for these select natural gas wells. While these

completion operation is work performed in an oil or gas well, “after the well has been drilled to its permitted depth and the production string of casing has been set, including perforating, artificial stimulation, and production testing.” MICH. ADMIN. CODE r. 324.103(s) (2013).

32. In the record of well completion operations, well operators must now provide (1) “Material Safety Data Sheets . . . for the chemical additives used and volume of each chemical additive used,” (2) “fracturing records and associated charts showing fracturing volumes, rates, and pressures,” (3) “[a]nnulus pressures recorded during fracturing operations,” and (4) “[t]he total volume of flowback water (formation and/or treatment water) to date at the time of record submittal.” Well Instruction 1-2011, *supra* note 31, at 3.
33. The DEQ imposed three new well completion requirements in the May 25, 2011 order:
 1. If one or more freshwater wells are present within 1,320 feet of a proposed large volume water withdrawal, then the operator shall install a monitor well between the water withdrawal well(s) and the nearest freshwater well. The operator shall measure and record the water level in the monitor well daily during water withdrawal and weekly thereafter until the water level stabilizes. The operator shall report the water level data weekly to the OGS District Supervisor.
 2. Freshwater pits should not create a site hazard and shall not remain on-site after well completion operations. Depending upon site conditions freshwater pits will be subject to soil erosion protective measures and may require fencing.
 3. During hydraulic fracturing operations, the operator shall monitor and record the injection pressure at the surface and the annulus pressure between the injection string and the next string of casing unless the annulus is cemented to surface.

Id. at 2–3.

34. The changes to natural gas well permitting requirements were the most extensive and required that well operators submit a number of new items with their application for a permit to drill or “at least 14 days before the water withdrawal begins.” *Id.* at 2. Operators must now submit:
 1. A water withdrawal evaluation utilizing the assessment tool accessed at <http://www.miwwat.org/>. . . .
 2. The following data and records:
 - a. Proposed total volume of water needed for hydraulic fracturing well completion operations.
 - b. Proposed number of water withdrawal wells.
 - c. Aquifer type (drift or bedrock).
 - d. Proposed depth of water withdrawal wells (feet below ground surface).

amendments have made significant strides toward a more comprehensive hydraulic fracturing regulatory system for Michigan, further change is still needed.

B. Regulation of Hydraulic Fracturing in Canada

1. Federal Regulation

In Canada, the federal government has very little control over hydraulic fracturing regulation. In fact, most of the power to regulate oil and gas activities is explicitly delegated to the individual Canadian provinces by the country's Constitution, which prohibits the Canadian parliament from regulating "subjects by this Act assigned exclusively to the Legislatures of the Provinces."³⁵ One such subject is the regulation of "non-renewable natural resources," which includes oil and gas resources.³⁶ But this broad grant of authority to the provincial governments does not entirely preclude federal involvement in the regulation of oil and gas activities. The Canadian federal government³⁷ retains jurisdictional control over interprovincial and international oil and gas projects, like the construction of major pipelines, and also has some authority over exploration and drilling for oil or gas on federally

e. Proposed pumping rate and pumping frequency (continuous or intermittent) of the water withdrawal wells.

3. A supplemental plat of the well site showing the following:

a. Proposed location of water withdrawal wells (latitude/longitude).

b. Location of all recorded fresh water wells and reasonably identifiable freshwater wells within 1,320 feet of water withdrawal location (latitude/longitude).

c. Proposed freshwater pit location and dimensions.

Id.

35. Constitution Act, 1867, 30 & 31 Vict., c. 3 (U.K.), *reprinted in* R.S.C. 1985, app. II, no. 91 (Can.).

36. *Id.* no. 92A.

37. To be more specific, these federal oil and gas projects are the responsibility of the National Energy Board (NEB), an independent federal regulatory agency. *Who We Are & Our Governance*, NAT'L ENERGY BD., <http://www.neb-one.gc.ca/clf-nsi/rthnb/whwrndrgvrnnc/whwrndrgvrnnc-eng.html> (last modified Nov. 22, 2012). As part of the approval process for these federal oil and gas projects, the NEB requires that each project undergo a specialized environmental assessment following the standards set by the Canadian Environmental Assessment Act (CEAA). *Our Responsibilities*, NAT'L ENERGY BD., <http://www.neb-one.gc.ca/clf-nsi/rthnb/whwrndrgvrnnc/rrspnsblt-eng.html> (last modified July 17, 2012). This process is similar to the environmental impact assessment requirement for "major federal actions" in the American National Environmental Policy Act (NEPA). 42 U.S.C. § 4332(C) (2006).

owned lands.³⁸ The Canadian Fisheries Act may also provide federal oversight of oil and gas development to protect against impacts to fish populations and fish habitat, including Great Lakes fisheries.³⁹

2. Provincial Regulation: Ontario

Similar to the United States, and as described above, a lack of federal hydraulic fracturing regulation in Canada has left supervision of the fracturing process to smaller, more localized units of government—in this case, to the Canadian provinces. Each Canadian province is very independent in its governance, even more so than the American states.⁴⁰ In fact, Canadian provinces seem to exercise a nearly autonomous authority within their jurisdictional bounds.⁴¹ This means that like the different American states, each province has its own approach to hydraulic fracturing regulation.

In Ontario, all oil and gas activities, including hydraulic fracturing, are regulated by the Ministry of Natural Resources (MNR)⁴² and the Ontario Energy Board (OEB).⁴³ These provincial agencies are the equivalent of the DEQ and PSC in the state of Michigan. The MNR, like the DEQ, regulates the permitting, construction, and inspection of natural gas wells,⁴⁴ and the OEB, like the PSC, controls natural gas production and price setting.⁴⁵

In order to drill a natural gas well in Ontario, a well owner must first apply for a well licence⁴⁶ with MNR under the Oil, Gas, and Salt

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38. Also called “crown” lands. *See Mineral Rights on Crown Land*, ONT. MINISTRY NATURAL RES., http://www.mnr.gov.on.ca/en/business/ogsr/2columnsubpage/STEL02_167102.html (last visited Apr. 13, 2013) (discussing the Crown lands leased and licensed for oil and gas drilling).
39. *See Fisheries Act*, R.S.C. 1985, c. F-14, § 35 (“No person shall carry on any work, undertaking or activity that results in the harmful alteration or disruption, or the destruction, of fish habitat.”).
40. *See EUGENE A. FORSEY, HOW CANADIANS GOVERN THEMSELVES* 28–29 (8th ed. 2012) (describing how the United States is more highly centralized federation than Canada).
41. *See id.* at 20–21 (discussing the wide range of provincial powers).
42. *MNR’s Role*, ONT. MINISTRY NATURAL RES., http://www.mnr.gov.on.ca/en/Business/ogsr/2columnsubpage/STEL02_167114.html (last visited Apr. 13, 2013).
43. *About the OEB*, ONT. ENERGY BD., <http://www.ontarioenergyboard.ca/oeb/consumers/oeb+and+you/about+the+oeb> (last updated Jan. 18, 2013).
44. *MNR’s Role*, *supra* note 42.
45. *About the OEB*, *supra* note 43.
46. This is the conventional British/Canadian English spelling of this term as it appears in the statute.

Resources Act.⁴⁷ Without a licence, a well owner cannot “drill, operate, deepen, alter, . . . or engage in any other activity on or in a well.”⁴⁸ Upon approval of the well-owner’s licence,⁴⁹ construction of the natural gas well may commence, following strict spacing and blowout prevention requirements.⁵⁰

After well construction is complete, gas production may begin and the producing well comes under the jurisdictional authority of the OEB. The OEB requires that all gas marketers who sell gas to low volume consumers (usually residential or small commercial consumers) apply for a gas marketer license.⁵¹ This license helps to ensure that all entities selling natural gas conform to an OEB established code of conduct for gas marketers, which in turn ensures that gas customers have some level of consumer protection from things like utility price gouging and interruptions in service.⁵²

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47. Oil, Gas and Salt Resources Act, R.S.O. 1990, c.P12, § 10 (Can.). This license application must include: the exact location of the well, the type of well to be drilled, the proposed depth of the well, contact information of the overlying landowner and the drilling contractor, information about the proposed casing and cementing measures to be employed for the well, information on the type of blowout prevention equipment to be installed, and information relating to the well security. Ont. Ministry Natural Res., Application for a Well Licence, (Apr. 26, 2011), *available at* http://www.ogsrlibrary.com/documents/gov_form_1_application.pdf. Along with this completed application, the well owner must also submit \$100, plus tax, to satisfy the well license fee. *Government Forms, ONT. OIL, GAS & SALT RESOURCES LIBR.*, http://www.ogsrlibrary.com/government_forms_ontario_oil_gas (last visited Apr. 13, 2013).
 48. Oil, Gas and Salt Resources Act § 10. An additional permit is necessary in order to be able to hydraulically fracture a natural gas well. *Id.* § 11. The fee for this permit is \$500 plus applicable taxes. *Government Forms, supra* note 47.
 49. Approval of a well licence is entirely within the discretion of the Minister. *See* Oil, Gas and Salt Resources Act § 13. The Minister also has the power to impose additional terms and conditions on the well licence applicant. *Id.*
 50. Exploration, Drilling and Production, O. Reg. 245/97, §§ 8–13, 17 (Can.). Blowout prevention equipment prevents uncontrolled releases of natural gas in the event that the well’s pressure regulating equipment fails. *Oil and Gas Well Drilling and Servicing eTool Illustrated Glossary: Blowout Preventer*, U.S. DEP’T. LAB., http://www.osha.gov/SLTC/etools/oilandgas/illustrated_glossary/blowout_preventer.html (last visited Apr. 13, 2013).
 51. *See What We Do*, ONT. ENERGY BD., <http://www.ontarioenergyboard.ca/oeb/industry/about+the+oeb/what+we+do> (last updated May 3, 2012) (“The OEB licenses all marketers who sell natural gas to residential and small commercial consumers.”).
 52. *See id.* (listing the OEB’s guiding objectives).

Though in many ways similar to Michigan's fracking regulations, Ontario's hydraulic fracturing regulatory system differs in an important way. Unlike the state of Michigan, which banned oil and gas drilling under the Great Lakes in 2002,⁵³ Ontario permits such practices beneath the Great Lakes bottomlands and currently has over 500 (onshore and offshore) wells producing natural gas from "under the bed of Lake Erie."⁵⁴ The U.S. federal government has also adopted a permanent ban on drilling across all U.S. Great Lakes waters.⁵⁵ Great Lakes drilling is an especially problematic practice because the potential for environmental harm is so much greater—if a fracking accident, like a fluid spill or well blowout was to happen at a Lake Erie well, it is possible that not only the Lake Erie watershed, but other, major hydrologically connected watersheds (like the Lake Ontario watershed) could be irreparably damaged.

The Great Lakes are an undeniably enormous, vital resource. Though both the United States and Canada have developed some relatively piecemeal regulations at varying levels of government for the practice of hydraulic fracturing, neither has instituted what could be considered a comprehensive fracking regulatory system. The overall result of this patchy administrative scheme is that the Lakes remain unprotected and vulnerable to the adverse water resource effects posed by the fracking process.

II. REGIONAL PROTECTION OF GREAT LAKES FRESHWATER

A. *The Regulation of Water Withdrawals in the Agreement and the Compact*

The Great Lakes Compact and Agreement ban most new and increased diversions of water.⁵⁶ A diversion is defined in both documents as

53. MICH. COMP. LAWS ANN. § 324.502(4) (West 2009).

54. *Crude Oil & Natural Gas Resources*, ONT. MINISTRY NATURAL RES., http://www.mnr.gov.on.ca/en/business/ogsr/2columnsubpage/STEL02_167105.html (last updated Aug. 2, 2012).

55. See Noah D. Hall, *Oil and Freshwater Don't Mix: Transnational Regulation of Drilling in the Great Lakes*, 38 B.C. ENVTL. AFF. L. REV. 305, 311 (2011) (describing federal intervention in oil and gas drilling in the Great Lakes, culminating in a permanent ban in 2005).

56. Great Lakes Agreement, *supra* note 7, art. 200 ("The Parties shall adopt and implement Measures to prohibit New or Increased Diversions, except as provided for in this Agreement."); Great Lakes–St. Lawrence River Basin Water Resources Compact, Pub. L. No. 110-342, § 4.8, 122 Stat. 3739, 3752 (2008) ("All New or Increased Diversions are prohibited, except as provided for in this Article.").

a transfer of Water from the Basin into another watershed, or from the watershed of one of the Great Lakes into that of another by any means of transfer, including but not limited to a pipeline, canal, tunnel, aqueduct, channel, modification of the direction of a watercourse, a tanker ship, tanker truck or rail tanker but does not apply to Water that is used in the Basin or Great Lakes watershed to manufacture or produce a Product that is then transferred out of the Basin or watershed.⁵⁷

The Compact and Agreement also require that party states develop programs to regulate all “New or Increased Withdrawals and Consumptive Uses” permitted as exceptions to this general ban.⁵⁸ As an illustrative example, this Article will take a close look at Michigan’s implementation of such a program.

In order to meet the water conservation and management requirements of the Compact, Michigan has passed the Michigan Water Withdrawal Act (MWWA). The MWWA helps manage and preserve the state’s water resources by monitoring and restricting all “large quantity withdrawals”⁵⁹ from the “waters of the State,”⁶⁰ and

57. Great Lakes Agreement, *supra* note 7, art. 103; Great Lakes–St. Lawrence River Basin Water Resources Compact § 1.2.

58. Great Lakes Agreement, *supra* note 7, art. 206; Great Lakes–St. Lawrence River Basin Water Resources Compact §§ 4.3, 4.9.

59. *See* MICH. COMP. LAWS ANN. §§ 324.32705, .32723 (West 2009) (requiring registration or a permit for large quantity water withdrawals). A large quantity withdrawal is a water withdrawal greater than 100,000 gallons per day over a consecutive thirty-day period. *Id.* § 324.32701. Every large quantity withdrawal greater than 100,000 gallons per day but less than 2,000,000 gallons per day must be registered with the DEQ. *See id.* § 324.32705. Without this registration no water withdrawal may begin. *Id.* § 324.32705. Large quantity withdrawals that exceed 2,000,000 gallons per day must apply for a withdrawal permit from the DEQ. *Id.* § 324.32723. In order to receive a permit, applicants must meet the following conditions:

- (a) All water withdrawn, less any consumptive use, is returned, either naturally or after use, to the source watershed.
- (b) The withdrawal will be implemented so as to ensure that the proposal will result in no individual or cumulative adverse resource impacts
- (c) . . . [T]he withdrawal will be implemented . . . in compliance with all applicable local, state, and federal laws as well as all legally binding regional interstate and international agreements
- (d) The proposed use is reasonable under common law principles of water law in Michigan.
- (e) For permit applications received on or after January 1, 2009, the applicant has self-certified that he or she is in compliance

by prohibiting those withdrawals that cause an “adverse resource impact.”⁶¹ In deciding whether a particular large quantity withdrawal will have an adverse resource impact, the MWWA uses a scientific, Internet-based, water withdrawal assessment tool (WWAT).⁶² Any water user wishing to make a large quantity withdrawal must access the Internet and utilize this tool by entering various data about the proposed withdrawal into the assessment tool.⁶³ After all required data has been entered, the tool will then calculate a particular classification for the withdrawal and decide whether or not the withdrawal will cause an adverse resource impact.⁶⁴

Troublingly, though water withdrawals for oil and gas drilling operations, like fracking, often require the use of millions of gallons of water, these massive withdrawals are exempt from oversight under the MWWA.⁶⁵ Recently, however (and perhaps in recognition of the devastating environmental effects that such large quantity withdrawals could produce), the Michigan DEQ has begun to require the

with environmentally sound and economically feasible water conservation measures

- (f) The department determines that the proposed withdrawal will not violate public or private rights and limitations imposed by Michigan water law or other Michigan common law duties.

Id. § 324.32723(6).

60. As defined in the MWWA, the term “waters of the State” includes all waters located within the boundaries of Michigan, including groundwater. *Id.* § 324.32701.

61. An adverse resource impact is defined by the statute as the impairment of a water body’s ability to support its characteristic fish population. *Id.*

62. *Id.* § 324.32706a.

63. *Id.* § 324.32706b. In using the assessment tool, a potential large quantity water user must enter data concerning:

- (a) The capacity of the equipment used for making the withdrawal.
- (b) The location of the withdrawal.
- (c) The withdrawal source, whether surface water or groundwater.
- (d) If the source of the withdrawal is groundwater, whether the source of the withdrawal is a glacial stratum or bedrock.
- (e) The depth of the withdrawal if from groundwater.
- (f) The amount and rate of water to be withdrawn.
- (g) Whether the withdrawal will be intermittent.

Id. § 324.32706a.

64. *Id.* § 324.32706b.

65. *Id.* § 324.32727(1)(a).

use of the WWAT in making natural gas well permitting decisions.⁶⁶ More specifically, all well owners seeking to make a large volume water withdrawal⁶⁷ for well completion operations must evaluate said withdrawal using the WWAT to assure that it will not “adversely affect surface waters or nearby freshwater wells.”⁶⁸

While this use of the WWAT is a significant step toward more comprehensive regulation of hydraulic fracturing in Michigan, it is important to note that oil and gas related water withdrawals remain exempt under the MWWA. This standing exemption runs contrary to the Compact’s water management and conservation objectives⁶⁹ and, like in many other Compact and Agreement states, leaves a lot of room for heightened implementation of these documents’ goals.

B. Applying the Great Lakes Compact to Protect the Great Lakes from the Adverse Environmental Effects of Fracking

The Compact and Agreement could potentially be implemented to combat the adverse water resource impacts associated with hydraulic fracturing in a few ways. The first and most obvious way to put the protections of these documents into action is through enforcement of the ban on diversions. As detailed above, most diversions of Great Lakes water are prohibited under the Compact and the Agreement. Therefore, if a hydraulic fracturing water withdrawal meets the definition of a diversion, such a withdrawal could be easily enjoined. For example, the Lake Michigan, Huron, and Erie watersheds all converge near Lansing, Michigan.⁷⁰ A well owner operating in this area could, very probably, withdraw water from one of these watersheds and transport it into another basin for use in the hydraulic fracturing process. This would be a straightforward, illegal diversion under the Compact and the Agreement and could be prohibited as such.

66. Brad Wurfel, *Michigan Issues New Orders for Fracking*, MICH. DEP’T ENVTL. QUALITY (May 25, 2011), <http://www.michigan.gov/deq/0,1607,7-135--256844--,00.html>; Well Instruction 1-2011, *supra* note 31, at 2.

67. *See supra* note 59 and accompanying text.

68. Well Instruction 1-2011, *supra* note 31, at 2.

69. The exemption also presents an enforcement problem for the Michigan DEQ. Though the DEQ has validly promulgated the regulation requiring use of the WWAT, in reality, this regulation has no teeth because of the standing exemption for oil and gas related water withdrawals in the MWWA. Hypothetically, a well owner looking to make a water withdrawal could evaluate her withdrawal under the WWAT, find that withdrawal to be in contravention of the DEQ’s water regulation goals, and still go ahead with her withdrawal anyway.

70. *See Great Lakes Watershed*, OHIO DEP’T. NATURAL RES., <http://www.ohiodnr.com/linkclick.aspx?fileticket=r1061opdOd4%3D&tabid=9353> (last visited Apr. 13, 2013) (placing the convergence of these three watersheds in South Central Michigan).

Large-quantity water withdrawals for hydraulic fracturing might also be construed as an illegal diversion in what is arguably a more attenuated way. When water is employed in high-volume, slick-water hydraulic fracturing procedures, it is mixed with a number of chemical additives⁷¹ and a proppant.⁷² This mixture is then injected into natural gas wells at high pressure, which creates fissures in the gas-producing shale, allowing more gas to escape to the surface.⁷³ Once the fracturing process is over, the used fracturing fluid either returns to the surface and is disposed of in an injection well or remains “stranded” in the gas-producing shale.⁷⁴ In both cases, the water withdrawn is, in essence, removed from the water cycle—current water treatment technology is ill-equipped to remove all of the chemical additives in fracking fluid, leaving us with water that is permanently contaminated and unusable.⁷⁵ Though this water has not been taken out of any Great Lakes basin by conventional means (such as tanker truck or pipeline), it might still be asserted that such a withdrawal is a diversion because the water has, in fact, been “transferred” out of its source basin by the fracking process. If this argument were accepted, the Compact and Agreement could potentially be used to enjoin all hydraulic fracturing water withdrawals in the Great Lakes basin.

Finally, even if fracking water withdrawals cannot be banned as a diversion under the Compact and Agreement, they could still be regulated under the Decision-Making Standard set out in both documents. Mentioned above, this standard requires that all new or increased withdrawals and consumptive uses not banned as diversions meet the following criteria:

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71. This mixture can include dangerous and carcinogenic chemicals like benzene, arsenic, and formaldehyde. *The Hydraulic Fracturing Water Cycle*, EPA, <http://www2.epa.gov/hfstudy#ftn4> (last updated Apr. 8, 2013) [hereinafter *Water Cycle*]; EPA, STUDY OF THE POTENTIAL IMPACTS OF HYDRAULIC FRACTURING ON DRINKING WATER RESOURCES: PROGRESS REPORT 105-06 (Dec. 2012), available at <http://www2.epa.gov/sites/production/files/documents/hf-report20121214.pdf> [hereinafter EPA STUDY].
 72. Usually sand. EPA STUDY, *supra* note 71, at 259.
 73. See *The Process of Hydraulic Fracturing*, *supra* note 13 (providing a basic overview of hydraulic fracturing and natural gas production).
 74. See MODERN SHALE GAS, *supra* note 25, at 66–68 (describing the water management process for fracturing fluid).
 75. See EPA STUDY, *supra* note 71, at 101–11 (discussing current water treatment methods and the potential impact of inadequately treated hydraulic fracturing wastewater); NATURAL RES. DEF. COUNCIL, DOC. NO. D:12-05-A, IN FRACKING’S WAKE: NEW RULES ARE NEEDED TO PROTECT OUR HEALTH AND ENVIRONMENT FROM CONTAMINATED WASTEWATER 4 (2012), available at <http://www.nrdc.org/energy/files/fracking-wastewater-fullreport.pdf> (noting the shortcomings of publicly owned treatment plants).

1. All Water Withdrawn shall be returned, either naturally or after use, to the Source Watershed less an allowance for Consumptive Use;
2. The Withdrawal or Consumptive Use will be implemented so as to ensure that the Proposal will result in no significant individual or cumulative adverse impacts to the quantity or quality of the Waters and Water Dependent Natural Resources and the applicable Source Watershed;
3. The Withdrawal or Consumptive Use will be implemented so as to incorporate Environmentally Sound and Economically Feasible Water Conservation Measures;
4. The Withdrawal or Consumptive Use will be implemented so as to ensure that it is in compliance with all applicable . . . law . . . ;
5. The proposed use is reasonable⁷⁶

At a minimum, it seems this standard means that party states to the Compact and Agreement must require natural gas well owners to meet more stringent water conservation measures. Exercised to its utmost, the requirement that “all water withdrawn shall be returned . . . less an allowance for consumptive use,” might be applied to prohibit hydraulic fracturing water withdrawals where the water taken cannot be returned to the source watershed (because it has been permanently contaminated).

C. Is It Time to Promulgate New Rules Under the Agreement and Compact?

Though ramped-up enforcement of the water conservation and protection goals of the Agreement and the Compact could be effective in protecting the Great Lakes from the environmental hazards associated with the hydraulic fracturing process, it might be time to look at revising the Agreement and Compact to better manage water use and energy development in the basin. In the early 2000s, when the Agreement and Compact were drafted, fracking was not as common as it is today. Noted above, recent discoveries of large shale gas reserves in the Great Lakes region have led to a surge in shale gas energy development and in the use of high-volume, slick-water hydraulic fracturing. In other words, the Agreement and Compact are out of date, and despite the strategies for heightened implementation already suggested, they are in sore need of reexamination when it comes to Great Lakes sustainable energy development.

76. Great Lakes Agreement, *supra* note 7, art. 203; Great Lakes–St. Lawrence River Basin Water Resources Compact, Pub. L. No. 110-342, § 4.11, 122 Stat. 3739, 3755 (2008).

To make matters worse, in recent years a number of factors like increasing populations and climate change have contributed to water scarcity problems around the globe. In fact, during the spring and summer of 2012, the United States experienced a drought more severe than any in at least the past twenty-five years.⁷⁷ In light of these increasingly prevalent water scarcity concerns, is it really wise to allow big industry to withdraw millions of gallons of water from the world's largest and most valuable freshwater resource in order to frack their natural gas wells? Shouldn't the Great Lakes region be encouraging a more sustainable use of water resources instead of supporting a practice that removes massive quantities of freshwater from the water cycle forever?

The Great Lakes–St. Lawrence River Basin Water Resources Council, created by the Compact⁷⁸ and composed of the governors of the party states,⁷⁹ has the power to promulgate new rules under the Compact that would bring the Compact up to date with recent regional energy development, and ensure that the conservative spirit of the Compact would be maintained. Specifically, the Compact states:

The Waters and Water Dependent Natural Resources of the Basin are subject to the sovereign right and responsibilities of the Parties, and it is the purpose of this Compact to provide for joint exercise of such powers of sovereignty by the Council in the common interests of the people of the region, in the manner and to the extent provided in this Compact. The Council and the Parties shall use the Standard of Review and Decision⁸⁰ and procedures contained in or adopted pursuant to this Compact as the means to exercise their authority under this Compact.

77. As a result of the drought, over 2,000 U.S. counties (which equates to about 80 percent of all agricultural land in the United States) were designated disaster areas by the U.S. Department of Agriculture in 2012. *U.S. Drought 2012: Farm and Food Impacts*, U.S. DEP'T. AGRIC., <http://www.ers.usda.gov/topics/in-the-news/us-drought-2012-farm-and-food-impacts.aspx> (last updated Mar. 5, 2013). The USDA estimates that due to widespread crop destruction, retail food prices are likely to increase significantly during the end of 2012 and into the beginning of 2013. *Id.* The drought's far-reaching effects also had similar consequences in the Canadian provinces of Ontario and Québec. *Drought in Central, Eastern Canada Baking Crops*, CBC NEWS (July 15, 2012, 12:01 PM), <http://www.cbc.ca/news/canada/story/2012/07/15/canada-hot-weather-lack-of-rain.html>.

78. Great Lakes–St. Lawrence River Basin Water Resources Compact § 2.1.

79. *Id.* § 2.2.

80. *Id.* § 4.11.

The Council may revise the Standard of Review and Decision, after consultation with the Provinces and upon unanimous vote of all Council members, by regulation. . . .

The Council shall identify priorities and develop plans and policies relating to Basin Water resources. It shall adopt and promote uniform and coordinated policies for Water resources conservation and management in the Basin.

*The Council may promulgate and enforce such rules and regulations as may be necessary for the implementation and enforcement of this Compact. . . . Any rule or regulation of the Council . . . shall be adopted only after public notice and hearing.*⁸¹

Under this authorization, the Council should take action to uphold the conservation, restoration, and efficiency objectives of the Compact by promulgating uniform baseline standards in relation to the practice of hydraulic fracturing in the region. These new standards would establish a regulatory “floor” that would ensure some negotiated level of aquifer and surface water protection. The Council could also issue more ambitious initiatives. For example, new rules and regulations could include a renewable energy target for the region (for example, 20 to 25 percent of energy from renewables by 2025), or could propose a complete ban on all oil and gas drilling under the Great Lakes. As written in the Compact, the Council even has the power to amend the Decision-Making Standard—by exercising this authority, the Council could make a specific finding that withdrawals for fracking equate to an illegal diversion (100 percent consumptive use) and are per se unreasonable. At bottom, the Council is broadly empowered to act within the conservative purpose of the Compact, and new regulatory strategies could encompass any of the above-enumerated sustainable energy schemes.⁸²

81. *Id.* §§ 3.1, 3.3 (emphasis added).

82. An entirely new interstate agreement between the Great Lakes states, Ontario, and Québec, with a focus on sustainable energy development in the region, might be another good way to regulate hydraulic fracturing water usage in the future. This kind of regulatory device (a binding agreement between autonomous states) would be especially appropriate in dealing with hydraulic fracturing because individual states have the most authority over the practice. Such an agreement would also be appropriate considering that a number of Great Lakes states are already a part of the Midwest Independent Transmission System Operator (MISO) energy grid, which would make energy conservation initiatives easier to coordinate and implement. See *Electric Power Markets: Midwest (MISO)*, FED. ENERGY REGULATORY COMM’N, <http://www.ferc.gov/market-oversight/mkt-electric/midwest.asp> (last updated Mar. 19, 2013) (listing the states covered by the MISO energy grid).

CONCLUSION

Patchwork management of the hydraulic fracturing process in the Great Lakes region has left huge regulatory gaps at the federal, state, and provincial levels. These gaps leave the Lakes vulnerable to the wide array of possible water resource harms posed by fracking, including aquifer contamination. Selective implementation of provisions in the Agreement and the Compact could fill these gaps and help curb fracking's impact on Great Lakes water, but in order to create a truly comprehensive regulatory system for fracking, more is needed. The Council should apply its powers, granted in the Compact, to promulgate new rules and regulations that will bring the Compact up to date with the Great Lakes Regions' recent shale gas "boom," and ensure that our valuable water resources are being managed according to the spirit of the Compact.



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