

Environmental Monitoring and Ecosystem Management in the Oil Sands: Spaceship Earth or Escort Tugboat?

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Spurred on by mounting international concern about the environmental impacts of the oil sands and determined to secure Canada's status as a global energy superpower, Canada and Alberta recently announced the establishment of a 'world class' monitoring plan for the Lower Athabasca Region of Alberta. Relying on recent scholarship but also Canadian experience with monitoring, this paper sets out some of the challenges to (and features of) effective environmental monitoring programs. It also situates monitoring in its proper context as a prerequisite to the successful implementation of ecosystem management

("EM"), an emerging if still not fully understood environmental policy model, the effective implementation of which presents its own set of challenges. The Joint Oil Sands Monitoring Plan ("JOSMP") and one of the existing EM regimes in the region, the Lower Athabasca River Water Management Framework ("LAR Framework"), are then assessed against frameworks constructed around the challenges and features previously identified. The implications of an environmental law increasingly reliant on monitoring and EM are discussed in the final part.

Sous le poids de préoccupations environnementales internationales croissantes concernant les sables bitumineux et déterminés à conserver le titre de superpuissance énergétique, le Canada et l'Alberta ont récemment annoncé la mise en place d'un plan conjoint de « calibre mondial » de surveillance pour la région du cours inférieur de la rivière Athabasca en Alberta. Basé sur de récentes études ainsi que sur l'expérience canadienne en matière de surveillance environnementale, cet article présente les défis auxquels sont confrontés les programmes de surveillance environnementale et détaille les caractéristiques d'un programme efficace. Il établit la surveillance environnementale comme condition essentielle à

l'édification fructueuse d'un régime de gestion de l'écosystème, un modèle émergent de politique environnementale dont la mise en place effective présente son lot de défis. Le Plan conjoint de surveillance visant les sables bitumineux et l'un des régimes de gestion de l'écosystème de la région, le Cadre de gestion de l'eau dans le cours inférieur de la rivière Athabasca, seront évalués par rapport aux défis et caractéristiques identifiés précédemment. Les conséquences d'un droit environnemental de plus en plus tributaire des programmes de surveillance et de gestion de l'environnement seront examinées dans la partie finale.

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1. INTRODUCTION	1
2. ENVIRONMENTAL MONITORING AND ECOSYSTEM MANAGEMENT	1
2.1 ENVIRONMENTAL MONITORING	1
2.1.1 <i>A DIFFERENT KIND OF ENVIRONMENTAL MONITORING</i>	1
2.1.2 <i>CHALLENGES TO EFFECTIVE PUBLIC ENVIRONMENTAL MONITORING</i>	1
2.1.3 <i>SOME POTENTIAL SOLUTIONS</i>	1
2.2 ECOSYSTEM MANAGEMENT	1
2.2.1 <i>WHAT IS ECOSYSTEM MANAGEMENT?</i>	1
2.2.2 <i>EVALUATING EM: LESSONS FROM THE PARDY-RUHL DIALOGUE</i>	1
2.2.3 <i>ADAPTIVE WHEN NECESSARY BUT NOT NECESSARILY ADAPTIVE</i>	1
3. ASSESSING ENVIRONMENTAL MONITORING AND ECOSYSTEM MANAGEMENT IN THE OIL SANDS	1
3.1 THE FEDERAL AND PROVINCIAL MONITORING REPORTS	1
3.2 THE JOINT OIL SANDS MONITORING PROGRAM (JOSMP)	1
3.2.1 <i>TECHNICALLY ADEQUATE?</i>	1
3.2.2 <i>SIMPLEMENTED THROUGH APPROPRIATE INSTITUTIONAL STRUCTURES?</i>	1
3.2.3 <i>SUPPORTED THROUGH APPROPRIATE LEGAL STRUCTURES?</i>	1
3.3 CURRENT EM INITIATIVE: THE LAR FRAMEWORK	1
3.3.1 <i>SCIENCE-BASED, INCLUDING THE APPLICATION OF AM WHERE APPROPRIATE?</i>	1
3.3.2 <i>SUPPORTED THROUGH APPROPRIATE LEGAL STRUCTURES?</i>	1
4. CONCLUSION AND IMPLICATIONS	1
4.1 NEITHER SPACESHIP NOR TUGBOAT?	1
4.2 ENVIRONMENTAL LAW FOR SPACESHIP EARTH	1

1. INTRODUCTION

It has been almost half a century since the term “spaceship earth” was first coined and then popularized by such renowned thinkers as economist Kenneth E. Boulding and theorist Buckminster Fuller.¹ In “The Economics of the Coming Spaceship Earth,”² Boulding contrasted the then (and arguably still now) existing economy, which he called the “cowboy economy”³ with the future “‘spaceman’ economy, in which the earth has become a single spaceship, without unlimited reservoirs of anything, either for extraction or for pollution, and in which, therefore, man must find his place in a cyclical ecological system.”⁴ In his book, *Operating Manual for Spaceship Earth*, Fuller took the analogy even further, comparing spaceship earth to an automobile, “an integrally-designed machine which to be persistently successful must be comprehended and serviced in total.”⁵

¹ The first reference is often attributed to Adlai E Stevenson, then United States Ambassador to the United Nations, in his last major speech to the Economic and Social Council, Geneva, Switzerland, July 9, 1965: “We travel together, passengers on a little space ship, dependent on its vulnerable reserves of air and soil” (cited in Albert Roland, Richard Wilson & Michael Rahill, eds, *Adlai Stevenson of the United Nations* (Manila: Free Asia Press, 1965) at 224.

² Kenneth E Boulding, “The Economics of the Coming Spaceship Earth” in Henry Jarrett, ed, *Environmental Quality in a Growing Economy* (Baltimore: Johns Hopkins University Press, 1966) at 7.

³ *Ibid* (being “symbolic of the illimitable plains and also associated with reckless, exploitative, romantic... behaviour”).

⁴ *Ibid*.

⁵ Buckminster Fuller, *Operating Manual for Spaceship Earth* (New York: Pocket Books, 1972) at 16.

Given that the basic premises behind the analogy (e.g., that the earth is finite, that some of its resources are renewable but others are not,⁶ and that life on it depends on the proper functioning of a complex “chemical energy-interchanging system”⁷) are relatively uncontroversial,⁸ it is remarkable—if not baffling—how very few efforts have been made to actually take stock of the earth’s various inventories and to understand how its systems work.⁹ Of these, perhaps the leading effort is the United Nations’ relatively recent Millennium Ecosystem Assessment (“MEA”) in 2005, widely celebrated for having advanced the ecosystem services paradigm as

⁶ Building on his analogy to a vehicle, Fuller explained the difference between these in the following manner: “We have thus discovered also that we can make all of humanity successful through science’s world-engulfing industrial evolution provided that we are not so foolish as to continue to exhaust in a split second of astronomical history the orderly energy savings of billions of years’ energy conservation aboard our Spaceship Earth. These energy savings have been put into our Spaceship’s life-regeneration-guaranteeing bank account for use only in self-starter functions ... Thereafter, our ‘main engine,’ the life regenerating processes, must operate exclusively on our vast daily energy income from the powers of wind, tide, water, and the direct Sun radiation energy” (*ibid.*).

⁷ *Ibid* at 16.

⁸ One possible explanation is that while the basic premises in those books were very much the same, both Boulding and Fuller accompanied their own with optimism that such challenges could be overcome with human ingenuity (see e.g. Fuller, *supra* note 5; *C.f.* Paul Ehrlich, *The Population Bomb* (Ballantine Books, 1968) and *Limits to Growth* (New York: Universe Books, 1972).

⁹ Boulding, would likely respond that this reality is not baffling at all, but rather a reflection of the pervasiveness of the idea of a perpetual frontier: “over a very large part of the time that man has been on earth, there has been something like a frontier. That is, there was always someplace else to go when things got too difficult, either by reason of the deterioration of the natural environment or a deterioration of the social structure in places where people happened to live. The image of the frontier is probably one of the oldest images of mankind, and it is not surprising that we find it hard to get rid of” (*supra* note 2 at 1). The idea of a perpetual frontier being embedded in current environmental and natural resources law is further discussed in Part II.B.1. Another reasonable explanation is the absence until recently of adequate technologies, with advances in information technology and remote sensing being particular relevant. There is actually a growing scholarship about the potential for such technologies to dramatically alter environmental law (see e.g. Robert Puterski, “The Global Positioning System: Just Another Tool?” (1997-1998) 6 NYU *Envtl LJ* 93; Kenneth J Markowitz, “Legal Challenges and Market Rewards to the Use and Acceptance of Remote Sensing and Digital Information as Evidence” (2001-2002) 12 *Duke Env’tl L & Pol’y F* 219; Ray Purdy, “Satellites: A New Era for Environmental Compliance?” (2006) 3 *JEEPL* 406; Ray Purdy, “Using Earth Observation Technologies For Better Regulatory Compliance And Enforcement of Environmental Laws” (2010) 22:1 *J Env’tl L* 59).

a framework for environmental valuation and decision making but also grimly reporting that two thirds of the earth's systems (i.e., ecosystems) are in decline.¹⁰

Even the MEA, however, was mostly a synthesis of the patchwork of existing data and research.¹¹ With respect to the Canadian portion of spaceship earth specifically, there have been few serious and certainly no comprehensive efforts to assess the state of our natural environment,¹² notwithstanding calls for such efforts.¹³ As noted recently by the Canadian Council of Resource Ministers in their internationally mandated report, *Canadian Biodiversity: Ecosystem Status and Trends 2010*:

Long-term, standardized, spatially complete, and readily accessible monitoring information, complemented by ecosystem research, provides the most useful findings for policy-relevant assessments of status and trends. *The lack of this type of information in many areas has hindered development of this assessment ...* Current ecosystem monitoring is conducted at different spatial and time scales, measures different parameters, and uses different protocols for data collection and analysis. *The result is a mosaic of information, reflected in the gaps in this assessment and in the mid to low confidence assigned to many key findings.*¹⁴

¹⁰ “Guide to the Millennium Assessment Reports” (2005) online: *Millennium Ecosystem Assessment*, <<http://www.maweb.org>> [“Millennium Assessment Reports”]. In addition to the *Millennium Ecosystem Assessment*, readers interested in the ecosystems services paradigm are referred to Gretchen Daily, ed, *Nature's Services: Societal Dependence on Natural Ecosystems* (Washington: Island Press, 1997); JB Ruhl, Steven E Kraft & Christopher L Lant, *The Law and Policy of Ecosystem Services* (Washington: Island Press, 2007); Bruce Pardy, “Goods, Services, and Systems” (2008) 46:2 Osgoode Hall LJ 445; Martin ZP Olszynski, “Environmental Damages after the Federal Environmental Enforcement Act: Bringing Ecosystem Services to Canadian Environmental Law?” (2012) 50:1 Osgoode Hall LJ 129.

¹¹ “Millennium Assessment Reports”, *supra* note 10 at 20-22.

¹² Exceptions include the Great Lakes Water Quality Program and Parks Canada's monitoring efforts with respect to Canada's national parks (the latter being the subject of some criticism lately by the federal Commissioner of Environment and Sustainable Development, see *infra* note 118). Some inventorying is also carried out for the purposes of project-specific environmental assessment EA under federal and provincial legislation. Such inventories could be useful especially in areas of concentrated resource activity, but the author is not aware of any efforts to collect, collate and make publicly available such data on a regional basis, nor to keep it current (see *Canadian Environmental Assessment Act*, SC 2012, c 19 ss 73-74, which specifically authorizes “regional assessments”). However, such assessments have yet to be carried out. On the desirability of regional (also known as “strategic”) assessments, see Robert B Gibson et al, “Strengthening Strategic Environmental Assessment in Canada: An Evaluation of Three Basic Options” (2010) 20 J Envtl L & Prac 175.

¹³ See e.g. Nancy Olewiler, *The Value of Natural Capital in Settled Areas of Canada* (Ducks Unlimited Canada & Nature Conservancy of Canada) at 26.

¹⁴ Federal, Provincial and Territorial Governments of Canada, *Canadian Biodiversity: Ecosystem Status and Trends 2010* (Ottawa: Canadian Councils of Resource Ministers, 2010) at 104-05 [emphasis added]. The report notes that this “is a long-standing problem ... and can only be resolved through attention to setting policy-relevant monitoring priorities and to design and consistent operation of long-term monitoring systems” at 105. These findings are generally consistent with the discussion in Part II.

Thanks in large part to a now (in)famous 2010 study by University of Alberta professor David Schindler, however, this reality may soon change, at least for the Lower Athabasca Region of north-eastern Alberta. Casting doubt on industry and government claims, Schindler's study suggested that oil sands mining may be responsible for increased concentrations of thirteen toxic metals (including lead and mercury) in the Lower Athabasca River.¹⁵ Three months later, the Royal Society of Canada confirmed concerns about the quality of water monitoring carried out by the industry-led Regional Aquatic Monitoring Program ("RAMP") and further concluded that the "environmental regulatory capacity of the Alberta and Canadian Governments does not appear to have kept pace with the rapid expansion of the oil sands industry over the past decade."¹⁶

Schindler's study and the attention that it generated both domestically and internationally set off a whirlwind of government activity that culminated in the appointment of not one but two expert advisory panels on effective environmental monitoring for the oil sands region: one federal (whose report was released in December 2010)¹⁷ and one provincial (whose report was released in June of the following year).¹⁸

Not waiting even for the ink to dry on the federal monitoring report—let alone for the release of the provincial report—the federal government initiated a two-phase process to develop a "world class" environmental monitoring plan for the oil sands.¹⁹ Phase 1, which set out the conceptual framework for a monitoring plan and detailed water quality monitoring

¹⁵ See Erin N Kelly et al, "Oil sands development contributes elements toxic at low concentrations to the Athabasca River and its tributaries" (2010) 107:37 *Proc Natl Acad Sci U SA* 16178. The findings of the study received considerable media coverage. See e.g. Josh Wingrove, "Elevated levels of toxins found in Athabasca River", *The Globe and Mail* (30 August 2010) online: The Globe and Mail <<http://www.globeandmail.com>>. See also D Schindler, "Tar sands need solid science" (2010) 468 *Nature* 499.

¹⁶ Pierre Gosselin et al, *The Royal Society of Canada Expert Panel: Environmental and Health Impacts of Canada's Oil Sands Industry* (Ottawa: Royal Society of Canada, 2010) at 7, online: The Royal Society of Canada <<https://rsc-src.ca>>.

¹⁷ Liz Dowdeswell et al, *A Foundation for the Future: Building an Environmental Monitoring System for the Oil Sands* (Oilsands Advisory Panel, 2010), online: Christian Aboriginal Infrastructure Developments <<http://www.caidd.ca>>. Interestingly, considerable thinking on effective monitoring for the oil sands had already been carried out as recently as 2010 (see e.g. DR James & T Vold, *Establishing a World Class Public Information and Reporting System for Ecosystems in the Oil Sands Region* (Edmonton: University of Alberta Oil Sands Research and Information Network, 2010), online: Oil Sands Research and Information Network <<http://www.osrin.ualberta.ca>>).

¹⁸ Alberta Environmental Monitoring Panel, *A World Class Environmental Monitoring, Evaluation and Reporting System for Alberta* (Edmonton: Alberta Environmental Monitoring Panel, 2011), online: Environment and Sustainable Resource Development (Alberta) <<http://environment.gov.ab.ca>> (as will be seen, both reports make very similar recommendations, including the need for transparency, scientific rigour and adaptability in monitoring, although the provincial advisory report went so far as to recommend the creation of an independent monitoring commission for Alberta).

¹⁹ "Mr. Baird has directed senior federal officials to work with their Alberta colleagues to design a water-monitoring system within 90 days ("Ottawa told to establish oil-sands monitor", *National Post*, (22 December 2010) online: Canada.com <http://www.canada.com/story_print.html?id=e5bd394d-6e14-4861-91c9-a461d081b8a1&sponsor=>>).

scheme for the Lower Athabasca River, was released in March 2011.²⁰ Phase 2, *An Integrated Oil Sands Environment Monitoring Plan*, released in July 2011, expanded the geographic scope of aquatic monitoring and also introduced air quality and terrestrial biodiversity monitoring.²¹ Implementation details were set out in the *Joint Canada-Alberta Implementation Plan for Oil Sands Monitoring*,²² released in February 2012 (all three documents are collectively referred to here as the Joint Oil Sands Monitoring Plan or JOSMP). Finally, on April 22, 2013—recognized internationally as “Earth Day”—the respective federal and provincial ministers of environment launched an online oil sands monitoring portal and released the first set of monitoring data.²³

Although the details are discussed later in this paper, it is sufficient to note here that the JOSMP calls for the near-term gathering of significant baseline data throughout the Lower Athabasca Region against which to measure future environmental changes. With respect to accumulated aerial deposition, for example, “waters and accumulated snowpack in the [region] and downwind acid sensitive lakes will be sampled in order to determine baseline conditions to which changes in atmospheric deposition as well as chemical and biological changes can be detected and explained.”²⁴ With respect to aquatic ecosystem health, “monitoring is intended to establish the current status of fish population health and benthic communities’ structure and function ... against which future change can be assessed.”²⁵ In other words—and assuming all goes according to plan—Canadians should eventually have a reasonably good inventory of at least this relatively small but important segment of spaceship earth, as well as some understanding of its systems and processes.

Of course, the Canadian and Albertan governments have gone to such lengths not because of a sudden appreciation for benthic community structure but rather, as almost all of the reports referred to above point out, because the “establishment and implementation of an effective oil sands monitoring program is fundamental to the long-term environmental sustainability and economic viability of a rapidly growing oil sands industry.”²⁶ Thus, the JOSMP is as much if not more about assisting oil sands producers in navigating an increasingly enlightened international market and securing Canada’s status as an energy super-power as it is about better envi-

²⁰ FJ Wrona & P di Cenzo, eds, *Lower Athabasca Water Quality Monitoring Plan Phase 1*, (Ottawa: Environment Canada, 2011) online: Environment Canada <<http://www.ec.gc.ca>>.

²¹ F Wrona, P di Cenzo & K Schaefer, eds, *Integrated Monitoring Plan for the Oil Sands: Expanded Geographic Extent for Water Quality and Quantity, Aquatic Biodiversity and Effects, and Acid Sensitive Lake Component* (Ottawa: Environment Canada, 2011) online: Environment Canada <<http://www.ec.gc.ca>>.

²² Government of Canada & Government of Alberta, *Joint Canada-Alberta Implementation Plan for Oil Sands Monitoring* (Ottawa: Environment Canada, 2012) online: Environment and Sustainable Resource Development (Alberta) <<http://environment.alberta.ca>> [*Joint Implementation Plan*].

²³ CBC News, “Oilsands monitoring portal launched by Ottawa, Alberta”, *Canadian Broadcasting Corporation* (22 April 2013) online: CBC News <<http://www.cbc.ca/news>>. The oil sands monitoring portal can be found online (*Canada-Alberta Oil Sands: Environmental Monitoring Information Portal*, online: Canada-Alberta Oil Sands: Environmental Monitoring Information Portal <<http://www.jointoilsandsmonitoring.ca/>> [JOSM Portal]). A similar website previously established by Alberta can be found at <<http://environment.alberta.ca/apps/osip/>>. But see *infra* note 160 for a recent controversy with respect to a study indicating increased mercury levels in bird eggs in the Lower Athabasca Region that was not initially available on the JOSM Portal.

²⁴ *Joint Implementation Plan*, *supra* note 22 at 10.

²⁵ *Ibid* at 14.

²⁶ Dowdeswell et al, *supra* note 17 at 45 [emphasis added].

ronmental management.²⁷ Viewed this way, a more appropriate analogy may be to the escort tugboats that would navigate super-tankers carrying Alberta bitumen out of Kitimat, British Columbia, through Douglas Channel and out to Asian markets under the recently proposed and highly controversial Northern Gateway project.²⁸

Although the question of motives is not entirely without significance,²⁹ the analysis that follows assumes that for the most part motivation matters less than design and implementation, as the JOSMP will serve neither to inventory this part of spaceship earth nor as escort tugboat to the oil sands industry if it fails to produce results. Therefore, the primary purpose of this paper is to assess whether or not it should be expected to do so. Relying on recent environmental law scholarship and various Canadian experiences with monitoring, Part II begins by setting out the challenges of environmental monitoring and some of the features of effective environmental monitoring programs. It then takes a step back and situates monitoring in its proper context as a prerequisite to the larger policy experiment being carried out in the Lower Athabasca Region and increasingly throughout Canada—that of ecosystem management (“EM”). EM is an approach to environmental issues that eschews sectorial and jurisdictional lines and focuses instead on activity at the ecosystem level. Relying on both Canadian and American scholarship on this latter topic, additional challenges and features are considered for the purposes of assessing the prospects for success of this larger endeavour. A preliminary assessment of the JOSMP and one of the existing EM initiatives in the Lower Athabasca Region, the Lower Athabasca River Water Management Framework (“the LAR Framework”), is included in Part III. Part IV concludes that, while technically sufficient and largely science-based, both the JOSMP and the LAR Framework presently lack many of the features, both institutional and legal, that are the hallmarks of effective monitoring and EM regimes. This part also discusses some of the broader implications of an environmental law that increasingly relies on monitoring and EM.

²⁷ See e.g. CBC News, “EU at stalemate on Canada’s oilsands ranking”, *Canadian Broadcasting Corporation* (23 February 2012) online: CBC News <<http://www.cbc.ca/news>>. According to the most recent media reports, the federal government has agreed to spend \$24 million in an advertising campaign to enhance the reputation of the oil sands abroad: “The two-year ad campaign will target political and business leaders, as well as media organizations and domestic political advocates in the United States, Europe and Asia ... The document specifically references California’s Low Carbon Fuel Standard, Section 526 of the U.S. Energy Independence and Security Act, and Europe’s Fuel Quality Directive as proposals based on ‘preconceived notions about the oil sands that are not supported by science.’” See Alex Boutilier, “Federal government prepares \$24-million oil sands advertising blitz”, *Financial Post* (11 October 2013) online: *Financial Post* <<http://business.financialpost.com>>.

²⁸ Enbridge proposes to construct two pipelines running from Alberta to Kitimat, British Columbia, where it would also build a new marine terminal (see *Northern Gateway*, online: Gateway Facts <<http://www.gatewayfacts.ca>>).

²⁹ I return to this issue in the conclusion of the paper (Part IV.B).

2. ENVIRONMENTAL MONITORING AND ECOSYSTEM MANAGEMENT

2.1 ENVIRONMENTAL MONITORING

2.1.1 A DIFFERENT KIND OF ENVIRONMENTAL MONITORING

There is a plethora of literature exploring the various purposes, principles, and methodologies of environmental monitoring.³⁰ Among Canada's contributions to this large body of work is its early experience experimenting with monitoring governance,³¹ experience that has trickled its way into an environmental law scholarship³² that is otherwise primarily focused on the role of monitoring in ensuring compliance with regulatory standards (at least historically).³³ In

³⁰ An online search of bibliographies with respect to environmental monitoring yields documents that are over seventy pages long. Some of the earlier works include R Clarke, ed, *The Handbook of Ecological Monitoring* (Oxford: Clarendon Press, 1986); FB Goldsmith, ed, *Monitoring for Conservation and Ecology* (London: Chapman & Hall, 1991); IF Spellerberg, *Monitoring Ecological Change* (Cambridge: University Press, 1991); WA Maher, PW Cullen & RH Norris, "Framework for Designing Sampling Programmes" (1994) 30 *Environmental Monitoring and Assessment* 139. More recent works include G Bruce Wiersma, ed, *Environmental Monitoring* (Boca Raton: CRC Press, 2004); Caroline Stem et al, "Monitoring and Evaluation in Conservation: A Review of Trends and Approaches" (2005) 19 *Conservation Biology* 295; Young J Kim, Ulrich Platt, eds, *Advanced Environmental Monitoring* (Dordrecht: Springer, 2008); Gary M Lovett et al, "Who Needs Environmental Monitoring?" (2007) 5:5 *Frontiers in Ecology and the Environment* 253; David B Lindenmayer & Gene E Likens, "The Science and Application of Ecological Monitoring" (2010) 143 *Biological Conservation* 1317.

³¹ William A Ross, "The Independent Environmental Watchdog: A Canadian Experiment in EIA Follow-Up" in Angus Morrison-Saunders & Jos Arts, eds, *Assessing Impact: Handbook of EIA and SEA Follow-up* (London: Earthscan, 2004) 178; Macleod Institute, *Independent Environmental Monitoring Agency: Evaluation Report* (Calgary: Macleod Institute, 2000) online: Monitoring Agency <<http://www.monitoringagency.net>>.

³² See Sara L Seck, "Strengthening Environmental Assessment of Canadian Supported Mining Ventures in Developing Countries" (2001) 11 *J Envtl L & Prac* 1 at 67-69 (highlighting the independent monitoring agency that grew out of the EA for the Ekati Diamond Mine in the Northwest Territories); Ciaran O'Faircheallaigh, *Environmental Agreements in Canada: Aboriginal Participation, EIA Follow-up and Environmental Management of Major Projects* (Calgary: Canadian Institute of Resources Law, 2006); Natasha Affolder, "Rethinking Environmental Contracting" (2010) 21 *J Env L & Prac* 155 at 162-169 (pointing to the Independent Monitoring Agency as an example of the benefits of using contracts or agreements in the environmental management context) [Affolder, "Rethinking Environmental Contracting"]; Natasha Affolder, "Why Study Large Projects? Environmental Regulation's Neglected Frontier" (2011) 44:3 *UBC L Rev* 521 at 549 [Affolder, "Why Study Large Projects?"] (pointing out the benefits of studying major resource projects for the advancement of environmental law and policy).

³³ See e.g. M Cohen, "Empirical Research on the Deterrent Effect of Environmental Monitoring and Enforcement" (2000) 30 *Envtl L Rep News & Analysis* 10245; CS Russell, "Monitoring, Enforcement, and the Choice of Environmental Policy Instruments" (2001) 2 *Regulatory & Environmental Change* 73. More recently, however, the role of monitoring is increasingly being examined in the context of the literature on adaptive management. See *infra* notes 132, 133, 141. See also Ryan P Kelly & Margaret R Caldwell, "'Not Supported by Current Science': The National Forest Management Act and the Lessons of Environmental Monitoring for the Future of Public Resources Management" (2013) 32 *Stan Envtl LJ* 151.

“The Problem of Environmental Monitoring,” however, American law professor Eric Biber makes the case that “ambient environmental monitoring,” the very kind that is contemplated by the JOSMP, is fundamentally different from conventional “compliance monitoring”:

The monitoring of “ambient environmental conditions” *i.e.*, the state of the environment at the local, regional, national, or global scale, contrasts with “compliance monitoring,” which focuses on compliance with a legal standard or regulation. Ambient monitoring usually requires measurements over a larger temporal and geographic scale than compliance monitoring: compare the annual measurement of whether a particular end-of-the-smokestack pollution control device is functioning with the daily measurement of pollution levels across the entire Los Angeles Basin.³⁴

According to Biber, the large temporal and geographic scales, the presence of both anthropogenic and naturally caused variations, and the unique characteristics of monitoring result in several features of effective ambient monitoring that have largely been ignored by the academic and policy community but that merit careful consideration.³⁵

First, because of the geographic scales involved, ambient environmental monitoring is essentially public.³⁶ In part, this is because these scales usually transcend any one unit of private property, or the area in question is public.³⁷ Another reason why ambient monitoring is essentially public that is particularly relevant in the oil sands context is that industry may have strong incentives not to conduct ambient monitoring, including concerns about cumulative effects from other facilities and the complexity of the interactions between naturally occurring and anthropogenic sources of hydrocarbons within the Lower Athabasca Region.³⁸ Second, “a key part of monitoring ... is measuring variables over an extended period of time.”³⁹ This requires both continuity (in terms of taking measurements and in collection protocols)⁴⁰ and longevity (in order to “separate year-to-year variations from long-term trends” and for understanding causal linkages).⁴¹ Furthermore, “[e]ffective monitoring requires collecting enough of the right kind of data to answer effectively the questions the monitoring program

³⁴ Eric Biber, “The Problem of Environmental Monitoring” (2011) 83 U Colo L Rev 1 at 9-10.

³⁵ *Ibid* at 7-8.

³⁶ *Ibid* at 8, 11-14.

³⁷ *Ibid* at 12.

³⁸ *Ibid* at 13. Admittedly, there is research that suggests that, as a relatively homogenous group, oil sands companies *should* be motivated by potential market, social, and political benefits to go beyond minimal regulatory requirements, including with respect to monitoring (see e.g. Neil Gunningham et al, “Social License and Environmental Protection: Why Businesses Go Beyond Compliance” (2004) 29 Law & Soc Inquiry 307). One example of such collaboration may be with respect to airshed monitoring, as exemplified by the Wood Buffalo Environmental Association (see *Wood Buffalo Environmental Association*, online: Wood Buffalo Environmental Association <<http://www.wbea.org/>>). See *infra* note 54 and associated text. That being said, the literature acknowledges several limitations on such motivation, including the extent of knowledge about any given environmental problem or harm: the less widely known the harm is, the less likely it is to motivate measures that go beyond strict compliance. This may explain the relative success of the WBEA, focused as it is on the more readily apparent problem of air pollution, in contrast to the RAMP, which was focused on the less direct question of water quality.

³⁹ Biber, *supra* note 34 at 23.

⁴⁰ *Ibid*.

⁴¹ *Ibid* at 25.

was established to address.”⁴² This third feature requires considerable technical expertise in choosing appropriate indicators (i.e., the environmental features, such as population levels of a given species, which can act as proxies for ecosystem status and change), geographic scales, and the frequency of monitoring (to ensure statistically significant results).⁴³ A fourth feature, which is really a reflection of the second and third, is that ambient environmental monitoring programs are generally very costly to implement.⁴⁴ At the most basic and practical level, continuity and longevity require safe and secure data storage facilities and systems and personnel to analyze and identify trends. A fifth and final feature relevant here is that, due to their relative complexity, “monitoring programs are extremely opaque for outsiders to assess.”⁴⁵

In addition to providing a blueprint for effective monitoring programs, the foregoing list of features can also be used to explain the failure of existing monitoring programs in the oil sands, such as the RAMP:

- Notwithstanding the scale of potential environmental effects (i.e., beyond not just the boundaries of any single lease area but indeed well downstream of the entire minable area, including the Peace-Athabasca Delta), RAMP was an industry-driven initiative;⁴⁶
- There was inconsistency in sampling protocols;⁴⁷
- There was insufficient spatial and temporal sampling coverage;⁴⁸
- The relative opacity of monitoring programs allowed industry and governments to claim “for a decade that monitoring was fully under control”⁴⁹ until individuals with

⁴² *Ibid* at 27.

⁴³ *Ibid* at 27-31.

⁴⁴ *Ibid* at 31.

⁴⁵ *Ibid* at 33 (note that Biber does not explicitly consider this a feature of ambient monitoring so much as a consequence that has bearing on the “inherently political question” of how much monitoring is enough).

⁴⁶ See Schindler, *supra* note 15 at 500 (“RAMP is an industry-funded group designed to involve stakeholders from a wide range of groups ... [T]he group currently counts only 1 aboriginal community and no NGOs among its members, along with 8 government bodies, 12 energy companies and a gravel-mining company. The fox has been left in charge of the henhouse.”). Since Schindler’s study, however, there have been some changes to RAMP’s membership (see “RAMP Steering Committee Membership”, online: Regional Aquatics Monitoring Program <<http://www.ramp-alberta.org>>).

⁴⁷ Wrona and di Cenzo synthesized the concerns raised in most of the previous reports and studies, with the following being particularly relevant to the second and third features: “Key criticisms of the RAMP monitoring design are that it: often does not adequately measure change relative to a defined background or baseline state; does not measure change cumulatively over space or time; lacks consistency and integration; changed its design questions resulting in changed data collection and loss of discriminating power; has not had sufficient spatial and temporal sampling coverage to allow discrimination of anthropogenic impacts from natural heterogeneity; has not adequately accounted for variability and changing environmental conditions (e.g., climate variability, mixed land use).” (Wrona & di Cenzo, *supra* note 20 at 4).

⁴⁸ *Ibid*.

⁴⁹ Jennifer Grant, “The path to improved oilsands monitoring: Pembina’s role” (12 February 2012) online: Pembina Institute <<http://www.pembina.org>>.

sufficient expertise (most notably Schindler but including others) raised the profile of concerns about RAMP's deficiencies;

With respect to the last element, Schindler's role in RAMP's near demise and his subsequent role in the development of the JOSMP⁵⁰ illustrate the importance of trust in environmental regulation.⁵¹ In the environmental monitoring context specifically, Biber suggests that trust can be used to get around the opacity that hinders non-expert parties, including members of the public, from assessing monitoring programs:

One shortcut is to ignore the “technical” questions of the statistical power, scale, and frequency on monitoring data collection, and instead focus on the institutional and legal structures that implement a monitoring program. If we trust those structures to create positive incentives for effective monitoring, then we might have much more confidence that the outputs of our monitoring programs are indeed effective.⁵²

The creation of several independent monitoring agencies throughout Canada in the late 1990s provides a powerful example of this approach at work. As noted by Natasha Affolder, the emergence of these effective agencies in the Northwest Territories, in conjunction with the approval of several diamond mines was driven by “a *lack of trust* on the part of the local, predominantly First Nations communities, that either government or the project proponent would live up to [its] commitments.”⁵³ Similarly, and in the oil sands region specifically, concerns raised by the Fort McKay First Nation in 1997 led to the creation of the Wood Buffalo Environmental Association (“WBEA”),⁵⁴ an independent, non-profit organization that collaborates with communities, industry, government, and aboriginal stakeholders to monitor the largest airshed in Canada in what the Federal Monitoring Panel praised as “a sound, transparent science approach”⁵⁵

The relevant questions, then, are what kinds of institutions and legal structures permit non-expert parties to trust that monitoring programs are now—and will remain—effective. The experience with the monitoring agencies in the Northwest Territories and the WBEA suggest that independence is one such institutional feature but does not fully explain why. To answer this and other questions, Biber identifies some of the external and internal constraints that might prevent public agencies with multiple mandates from implementing effective monitoring.

2.1.2 CHALLENGES TO EFFECTIVE PUBLIC ENVIRONMENTAL MONITORING

On the external side, political and budgetary constraints are the most relevant here. Biber begins with an example of one proposed monitoring program, the National Biological Survey. Industry groups concerned about its potential to interfere with their property rights success-

⁵⁰ Schindler was an expert reviewer for the Integrated Monitoring Plan (see Wrona, di Cenzo & Schaefer, *supra* note 21).

⁵¹ Rebecca M Bratspies, “Regulatory Trust” (2009) 51 *Ariz L Rev* 575.

⁵² Biber, *supra* note 34 at 33.

⁵³ Affolder, “Why Study Large Projects?”, *supra* note 32 at 549 [emphasis added].

⁵⁴ Kevin E Percy, “Ambient Air Quality and Linkage to Ecosystems in the Athabasca Oil Sands, Alberta” (2013) 40 *Geoscience Canada* 182 at 186. The independence of the WBEA would seem to be one of the critical factors distinguishing it from RAMP (see Wood Buffalo Environmental Association, *supra* note 38).

⁵⁵ Dowdeswell et al, *supra* note 17 at 30.

fully opposed the survey.⁵⁶ In this context, where “information is political,”⁵⁷ the high cost of environmental monitoring coupled with its generally “low profile” makes it “particularly vulnerable to public choice failures: no rallies ... are held to demand that [governments] provide more funding for monitoring environmental conditions.”⁵⁸

Admittedly, the opposite is true in the case of the oil sands right now. Hardly a month seems to go by without an announcement or media report about some aspect of the JOSMP.⁵⁹ But the highly technical and even tedious nature of monitoring suggests that this may not always be the case, bearing in mind especially the long time frames involved. In the meantime, affected industries can be expected to lobby to weaken any program, whether to reduce their financial burden or to stem the flow of bad news.⁶⁰ Bearing in mind the difficulty in assessing

⁵⁶ Biber, *supra* note 34 at 35-36. Most recently in Alberta, the Wildrose Party’s election platform expressed strong disapproval of the government’s proposed land use and regional planning legislation along such lines: “the *Alberta Land Stewardship Act (2009)* divides the province into seven land use regions and authorizes Cabinet to implement ‘regional plans’ for each area of the province. This means that central planners at the Legislature ... will specify what types of activities are going to be permitted or prohibited on Crown or private land. This Act also allows Cabinet to ‘extinguish’ existing rights held under licenses ... with limited or no compensation, and without the right of appeal.” See Wildrose Party of Alberta, “Property Rights”, online: Wildrose Party of Alberta, <<http://www.wildrose.ca>>. The *ALSA* is briefly considered in Part II.B.2, as a statutory framework that could support an effective EM regime.

⁵⁷ Biber, *supra* note 34 at 36.

⁵⁸ *Ibid* at 8. Generally defined as the application of economics to political science, public choice theory can be understood more simply as the study of how governments supply “public goods” such as national defence or environmental protection, including an examination of the role that special interests play in influencing public policy and law (see D Farber & A O’Connell, eds, *Research Handbook On Public Choice And Public Law* (Northampton, MA: Edward Elgar, 2010) at 6).

⁵⁹ See e.g. *supra* notes 19, 23, 27, 49, and *infra* notes 83, 152, 159, 160, 178, 182 and 192. In fact, immediately prior to this article going to print, Alberta announced that former Progressive Conservative MLA and former Minister of the Environment, Lorne Taylor, would be the Chair of Alberta’ newly formed independent monitoring agency (AEMERA, see *infra* 158 and 192 and text associated therewith), with Dr. Greg Taylor, a University of Alberta biologist who also served on the Alberta Monitoring Panel, as vice-chair; see Sheila Pratt, “Questions raised about independence of oilsands monitoring agency”, *Edmonton Journal* (20 March 2014) online: <<http://www.edmontonjournal.com/Questions+raised+about+independence+oilsands+monitoring+agency/9641678/story.html>>

⁶⁰ This is the other side of the “public choice failure” referred to by Biber (*supra* note 34), the general dynamics of which were well captured by Kathryn Harrison. See Kathryn Harrison, *Passing the Buck: Federalism and Canadian Environmental Policy* (Vancouver: UBC Press, 1996) at 14 (“[e]nvironmental regulations presents a classic case of diffuse benefits and concentrated costs. In general, the public at large benefits from improvements in environmental quality, while the costs are borne by a smaller number of regulated firms or individuals ... [These] are likely to be better organized and better informed than the beneficiaries. Moreover, those most directly harmed by environmental regulation tend to hold privileged positions in society. Regulated industries can offer politicians more than just votes or even campaign contributions. They create jobs and thus offer extremely valuable indirect benefits. As a result, one would expect governments generally to be more responsive to the concentrated interests, that is, to the polluters. The logic of collective action is heavily weighted against strong environmental policy.”). Arguably, many of the recent changes to federal environmental and policy, discussed in the conclusion of this paper, can be explained by this dynamic.

the effectiveness of monitoring programs, industries might conversely invoke more monitoring, to either lessen their regulatory burden⁶¹ or at least maintain the *status quo* and postpone more stringent environmental measures. This strategy has arguably already been employed in the oil sands context as evidenced in several joint review panel reports.⁶²

Internal constraints include conflicts with other agency goals and missions,⁶³ and impingement on an agency's autonomy or discretion.⁶⁴ With respect to the former, and aside from the obvious challenge of having to distribute limited funds to several programs (in other words, *internal* budgetary constraints), one of the main issues is accountability. Good monitoring may not only embarrass an agency (to the extent that it reveals deficiencies in its performance), but may also make it easier for stakeholders to challenge its decisions and hold it to account.⁶⁵ With respect to the latter, the constraint is essentially the same except that it is prospective. Effective monitoring and its results may reduce an agency's flexibility in setting its own agenda.⁶⁶

The Federal Department of Fisheries and Oceans' ("DFO") current role in natural resource development (including the oil sands) provides a good illustration of both of these constraints. For several decades, DFO has conceived its mandate as the protection of fish habitat while enabling economic development.⁶⁷ It has attempted to reconcile these oft-competing interests through its No Net Loss (NNL) policy,⁶⁸ authorizing the destruction of fish habitat on the critical assumption that it can be offset through the creation of new habitat elsewhere. In his 2009 audit of the department, however, the federal Commissioner for the

⁶¹ Biber, *supra* note 34 at 38.

⁶² See *Pembina Institute for Appropriate Development v Canada (AG)*, 2008 FC 302 at para 47, Tremblay-Lamer J (the Court noted with approval the Joint Review Panel's reliance on "a comprehensive monitoring plan" with respect to water quality issues associated with Imperial Oil's proposed Kearl Lake Oil Sands Project in order to conclude non-likelihood of significant adverse environmental effects). See Biber, *supra* note 34 at 39 (in the United States, "observers of the adaptive management program for Glen Canyon Dam have noted that powerful water and power interests have repeatedly called for more monitoring in order to avoid major changes to the operations of the dam to protect endangered species").

⁶³ Biber, *supra* note 34 at 43-48.

⁶⁴ *Ibid* at 48-51.

⁶⁵ *Ibid* at 45.

⁶⁶ *Ibid* at 48, 51.

⁶⁷ The 1986 *Policy for the Management of Fish Habitat* states that DFO "recognizes the potential impact of fish habitat decisions on regional development, industrial development, other resource sectors, and public projects. The Department will consider the interests of other resource users and will strive under this policy to take reasonable, timely and consistent decisions to maintain and improve the productive capacity of fish habitats." (see Canada, Department of Fisheries and Oceans, *Policy for the Management of Fish Habitat* (Ottawa: Communications Directorate, 1986) at 3). Beginning on November 25, 2013, this policy will presumably no longer be applicable, as several important changes to the *Fisheries Act* are brought into force (see *infra* notes 205-208 and associated text).

⁶⁸ *Ibid*.

Environment and Sustainable Development (“CESD”)⁶⁹ found that DFO “does not have a systematic approach to monitoring proponents’ compliance ... Nor does it evaluate whether its decisions on mitigating measures and compensation are effective in meeting the [NNL] principle.”⁷⁰ Two years later, in response to a question about DFO’s progress in meeting the CESD’s various recommendations on this front, the deputy minister responsible replied that “[NNL] is only a ‘guiding principle’ and it does not require DFO ‘to measure centimetre by centimetre’ how much fish habitat is being lost or created.”⁷¹ Thus, by potentially exposing deficiencies in DFO’s approach to the protection of fish habitat (i.e., through unverified reliance on compensation habitat), effective monitoring may have undermined DFO’s mandate to foster economic development to such an extent that senior officials at the department were to disavow the NNL policy.

2.1.3 SOME POTENTIAL SOLUTIONS

In the final part of his paper, Biber explores various solutions to the above-noted constraints, similarly divided into internal and external ones. On the internal side, adequate and appropriately structured funding (e.g., “dedicated funding streams that are more resistant to political whims”⁷²) is clearly a necessary part of the solution, as experience with the independent monitoring agencies in the Northwest Territories and the WBEA has also borne out.⁷³ Funding itself, however, will not ensure that monitoring is effective. Where monitoring results are relevant not just to multiple departments and agencies but also at least two levels of government, as is the case in the oil sands, better coordination and collaboration will also be necessary.⁷⁴

⁶⁹ The CESD is situated within the Office of the Auditor General, an independent Officer of Parliament. For more details on the CESD’s role and work, see Office of the Auditor General, *Commissioner of Environment and Sustainable Development*, online: Office of the Auditor General of Canada <<http://www.oag-bvg.gc.ca>>.

⁷⁰ Office of the Auditor General of Canada, *Report of the Commissioner of the Environment and Sustainable Development* ch 1 (Ottawa: Office of the Auditor General of Canada, 2009) at 23-24.

⁷¹ Mark Hume, “Bureaucrats questioned on principle of Fisheries Act at Cohen Commission”, *The Globe and Mail* (22 September 2011) online: *The Globe and Mail* <<http://www.theglobeandmail.com>>. Where follow-up with respect to habitat compensation has been carried out, the results have generally been poor (see DJ Harper & JT Quigley, “No Net Loss of Habitat: A Review and Analysis of Habitat Compensation in Canada” (2005) 36:3 *Environmental Management* 343).

⁷² Biber, *supra* note 34 at 55.

⁷³ Affolder, “Rethinking Environmental Contracting”, *supra* note 32 at 167; Percy, *supra* note 54 at 198 (on the importance of maintaining resource commitments to prevent gaps in monitoring data).

⁷⁴ Dowdeswell et al, *supra* note 17 at 18. Exhibit E divides existing monitoring agencies and groups them into (1) long-term and (2) surveillance monitoring and research. The former included RAMP, Cumulative Environmental Management Association (CEMA), Wood Buffalo Environmental Association (WBEA), Alberta Biodiversity Monitoring Institute (ABMI), Alberta Environment, Government of Canada, and Industry, while the latter included the Alberta Water Research Institute (AWRI), Canadian Water Network (CWN), Carbon Dynamics, Food Web Structure, and Reclamation Strategies in Athabasca Oil Sands Wetlands (CFRAW), Environment Canada - Oil Sands Monitoring and Research, Natural Sciences and Engineering Research Council of Canada (NSERC), University of Alberta: D. Schindler Laboratory, University of Alberta: Centre for Oil Sands Innovation (COSI), University of Saskatchewan - Toxicology Centre and Canada Research Chair in Environmental Toxicology, University of Waterloo.

Collaboration addresses “the compatibility of monitoring data and protocols across multiple agencies conducting similar monitoring programs.”⁷⁵

Recognizing that internal solutions do not adequately address “the reluctance ... of agency officials to pursue effective monitoring programs,”⁷⁶ two potential external solutions are judicial and—in Canada—parliamentary oversight. Judicial oversight is essentially a legislative issue. Subject to certain caveats and limitations, legislating a requirement to monitor could assist its effectiveness by enabling stakeholders to hold agencies accountable through judicial review.⁷⁷ Acknowledging that monitoring requirements are not included in *most* major American environmental laws, Biber identifies two rationales for “judicial reluctance to compel monitoring” in those instances where such a duty exists that seem equally applicable in the Canadian context: “the level of compliance by an agency with a mandatory duty is not for the court to review, as long as at least some compliance exists [or] the apparently mandatory language in the statute, regulation, or plan is in fact only hortatory.”⁷⁸ Even where the statutory language is as precise as possible, “it is very difficult for courts to analyze whether an agency truly has done all it can in developing an effective monitoring program.”⁷⁹

Any or all of these limitations may explain the absence in Canada of any litigation with respect to environmental monitoring, notwithstanding that several statutes and regulatory schemes require some kind of monitoring that is either being inadequately performed or not performed at all.⁸⁰ A recent and particularly troubling example of the latter is the Ontario Ministry of Natural Resources’ (“MNR”) total failure to implement its Provincial Wildlife Population Monitoring Program (“PWPMP”), notwithstanding that this program has been a legal requirement of MNR’s class environmental assessment approval for forest management in Ontario since 1994.⁸¹

⁷⁵ Biber, *supra* note 34 at 56.

⁷⁶ *Ibid.*

⁷⁷ *Ibid* at 60.

⁷⁸ *Ibid* at 61-62. With respect to the first issue, see the Federal Court of Appeal’s decision in *Distribution Canada Inc v MNR*, [1993] 2 FC 26, Desjardins JA, where the issue was the then Minister of National Revenue’s policy to not collect duties on certain non-exempt groceries and other purchases made by Canadians in the United States: “Only he who is charged with a public duty can determine how to utilize his resources. *This is not a case where the Minister has turned his back on his duties, or where negligence or bad faith has been demonstrated.* It is a case where the Minister has established difficulties in implementation and where *he enjoys a discretion with which the law will not interfere*” [emphasis added].

⁷⁹ Biber, *supra* note 34 at 64.

⁸⁰ Under the former *Canadian Environmental Assessment Act*, SC 1992, c 37, for example, where a project was reviewed at the comprehensive study or panel review level, “follow-up programs,” which include monitoring, were mandatory and yet there is general agreement that this is the “weakest stage” of the EA process (see Affolder, “Why Study Large Projects”, *supra* note 32 at 547). Monitoring is also required under several of the regulatory schemes that authorize the deposit of deleterious substances in waters frequented by fish that would otherwise be prohibited pursuant to *Fisheries Act*, RSC 1985, c F-14, s 36(3) (see e.g. the requirements for environmental effects monitoring pursuant to the *Metal Mining Effluent Regulations*, SOR/2002-222).

⁸¹ Stacey O’Malley, Christopher Wilkinson & Gord Miller, “‘Nothing to Report’: The Failure of Ontario’s Provincial Wildlife Population Monitoring Program for Commercial Timber Harvesting” (2013) 24 J Envtl L & Prac 125.

Parliamentary oversight, through parliamentary committees for example, could arguably improve monitoring efforts, but this seems unlikely given the dynamics of the Canadian parliamentary system and the contentious nature of the oil sands.⁸² More promising—indeed, already tried and tested—is the role of Officers of Parliament and the CESD in particular. With respect to the oil sands specifically, in Chapter 2 of its *2011 October Report to Parliament*, the CESD's report further challenged industry and governments—who by then had already initiated an international campaign to improve the image of the oil sands⁸³—by finding that cumulative effects analysis of oil sands projects has been hindered by “[i]ncomplete environmental baselines and environmental data monitoring systems.”⁸⁴ Even the CESD's potential role is limited, however, because, while that office may shed important light on an issue and identify program deficiencies and solutions with remarkable simplicity, it has no power to force the implementation of measures that it might deem necessary.

In light of all of these lingering limitations, Biber suggests that agencies focused primarily on monitoring could be the solution, whether they carry it out themselves or provide an independent expert review function for other agencies' monitoring efforts. An example of the former, also singled out as a model by the Federal Monitoring Panel,⁸⁵ is the United States Geological Survey (“USGS”), which does a significant amount of monitoring. Its other tasks (scientific research in the domain of natural resources) do not directly conflict with that monitoring role.⁸⁶ An example of an independent review model is the United States Fish and Wildlife Service's (FWS) role in consultation under the United States *Endangered Species Act*.⁸⁷ With a separate agency, Biber notes,

[W]e have the advantages of continuity (because we have a public institution, which is usually fairly long-lived); we have the advantages of expertise (because the agency primarily focuses on monitoring); and we have an institution with an incentive to conduct effective monitoring (because of administrative separation from other potentially conflicting activities).

There are also potential political benefits ... A large organization that combines monitoring with other tasks might, if budget cuts come, cut monitoring budgets disproportionately in order to protect other, higher-profile or preferred jobs. And, of course, cuts may be worse to the extent that monitoring is disfavored within an agency.

Finally, there is one additional potential political benefit from the creation of a separate monitoring agency—it might be able to develop a reputation as an “unbiased”

⁸² Biber, *supra* note 34 at 65–66 (it is worth recalling here that there was once a parliamentary committee that took on the task of investigating the oil sands, but this effort was eventually abandoned).

⁸³ Mike De Souza, “Governments working with oil execs to curb oilsands criticism, documents show”, *Postmedia News* (15 March 2011) online: <<http://mikejdesouza.wordpress.com/2014/02/20/governments-working-with-oil-execs-to-curb-oilsands-criticism-documents-show/>>.

⁸⁴ Officer of the Auditor General, *2011 October Report of the Commissioner of the Environment and Sustainable Development* ch 2 (Ottawa: Office of the Auditor General, Spring 2009) at 62, online: Office of the Auditor General of Canada <<http://www.oag-bvg.gc.ca>>.

⁸⁵ Dowdeswell et al, *supra* note 17 at 41.

⁸⁶ Biber, *supra* note 34 at 67.

⁸⁷ *Ibid* (“[i]n the consultation process, other federal agencies have to develop an analysis of proposed federal actions to ensure that those actions will not seriously harm endangered species. FWS reviews that analysis and then produces a biological opinion that agrees or disagrees with the acting agency's analysis ... FWS's separate analysis plus judicial enforcement create strong incentives for the action agency to produce substantial data to ensure that consultation will reach a positive result”).

provider of information that is untainted by institutional connections to a regulatory or management agency.⁸⁸

There would, however, be trade-offs. For example, a loss of coordination may result since “[m]onitoring is often more effective and efficient if it is closely coordinated with the decisions that monitoring is supposed to inform”,⁸⁹ At least one company has complained that the monitoring agencies in the Northwest Territories add “complexity and confusion to the environmental management regime.”⁹⁰ Biber looks at existing monitoring programs in the United States and concludes that “[a]t least tentative evidence from some large ecological restoration projects ... indicates that more independence improves monitoring as long as minimal coordination exists,”⁹¹ a conclusion that appears consistent with most assessments of the northern monitoring agencies and the WBEA as well.⁹²

Of course, even a “world class” monitoring system will not, in and of itself, prevent ecosystem decline. Monitoring cannot protect critical habitat for woodland caribou, nor can it ensure sufficient instream flows to protect fish and their habitat. Rather, monitoring is critical to the new paradigm of environmental law, which is to say ecosystem management, widely embraced—if not fully understood or implemented—in the oil sands context.

2.2 ECOSYSTEM MANAGEMENT

2.2.1 WHAT IS ECOSYSTEM MANAGEMENT?

Like many other terms and concepts in environmental law and policy, ecosystem management does not have one settled definition.⁹³ The following description by American biologist Edward Grumbine, however, is still widely considered authoritative: “It integrates scientific knowledge of ecological relationships within a complex socio-political and values framework toward the general goal of protecting native ecosystem integrity over the long term.”⁹⁴

EM can be considered as having two aspects: the “ecosystem” part and the “management” part. The ecosystem part of the equation recognizes that sectoral or jurisdictional approaches to environmental problems are generally inadequate, because “under an ecosystem approach,

⁸⁸ *Ibid* at 68-69.

⁸⁹ *Ibid* at 69.

⁹⁰ Affolder, “Rethinking Environmental Contracting”, *supra* note 32 at 167.

⁹¹ Biber, *supra* note 34 at 72.

⁹² Ross, *supra* note 31; Percy, *supra* note 54.

⁹³ Indeed, even the term is subject to variation, including “ecosystem-based management”, or simply “the ecosystem approach”. Under Alberta’s Land-use Framework and the *Alberta Land Stewardship Act*, *infra* note 96, the term “cumulative effects management” is used to mean the “combined effects of past, present and reasonably foreseeable land-use activities, over time, on the environment” (Alberta, Environment and Sustainable Resource Development, *Land-use Framework*, (2008) at 51). For a broad outline of Canadian experiences with ecosystem management, its general principles and challenges, see Michael Wenig, “Ecosystem Management: It’s Imperative... Whatever It Is” (Paper delivered at the Symposium on Environment in the Courtroom: Key Environmental Concepts and the Unique Nature of Environmental Damage, Canadian Institute of Resources Law, Faculty of Law, University of Calgary, 23-24 March 2012), (2012) Environmental Education for Judges & Court Practitioners.

⁹⁴ R Edward Grumbine, “What Is Ecosystem Management?” (1994) 8 *Conservation Biology* 27.

decisions are made by measuring effects on systems rather than their constituent parts.”⁹⁵ It also reflects the slow but gradual acceptance of ecological limits and a corresponding rejection of the idea of a perpetual frontier that is still pervasive in much of environmental and natural resources law and policy.⁹⁶ The management aspect has more or less the same connotation as when it is used in other contexts, such as “business management”. It is about iterative control.

Another way to understand EM is to contrast it with conventional, or frontier, environmental schemes. These schemes may impose a general rule (e.g., a prohibition against the release of a pollutant or causing harm to specified wildlife, such as fish or migratory birds) accompanied by an exemption (e.g., a certain amount or concentration of the pollutant, or harm authorized by permit). The rule and the exemption operate in the abstract—they are not informed by the conditions in which they are applied, such as the state of the ecosystem or the other activities exerting pressure on that system (i.e., the cumulative effects). Over time, these schemes tend to lead toward gradual ecosystem decline—the so-called death by a thousand cuts. In contrast, EM can be understood as an alternative approach that eschews abstract rules and, through monitoring, seeks to inform decision making on the state of the ecosystem being affected while bearing in mind also other activities, with a view towards maintaining overall ecosystem function.

One of the more established examples of EM in the oil sands context⁹⁷ that also serves to illustrate the important role of environmental monitoring (further explained below) is the Lower Athabasca River Water Management Framework. The LAR Framework is intended to guide decision making with respect to water withdrawals from the Lower Athabasca River and, consistent with Grumbine’s basic description, is “designed to *protect the ecological integrity* of the [river] *during oil sands development*.”⁹⁸

⁹⁵ Bruce Parry, “Changing Nature: The Myth of the Inevitability of Ecosystem Management” (2003) 20 Pace Envtl L Rev 675 at 678 [Parry, “Changing Nature”].

⁹⁶ See text of *supra* note 9.

⁹⁷ Alberta has recently finalized three environmental management frameworks—for air, surface water, and groundwater quality—as integral parts of the *LARP*. See Government of Alberta, *Lower Athabasca Regional Plan 2012-2022* (Edmonton: Government of Alberta, 2012) [*LARP*]. The *LARP* is the first of seven regional plans developed under the Alberta Land Stewardship Act, SA 2009, c A-26.8 [*ALSA*], while a draft of the South Saskatchewan Regional Plan (“SSRP”) was released in October 2013. The province has also created an online portal to help Albertans navigate what appears to be the most sophisticated land-use framework in Canada. See “Landuse”, online: Environment and Sustainable Resource Development (Alberta) <<https://landuse.alberta.ca>> [“Online Portal”]. While the *LARP* and *ALSA* are mentioned throughout this paper, a comprehensive assessment of their provisions is beyond its scope (see Jennette Poschwatta-Yearsley & Adam Zelmer, “The *Alberta Land Stewardship Act*: Certainty or Uncertainty?” (2009) Resources 1, online: Canadian Institute of Resources Law <<http://dspace.ucalgary.ca>>).

⁹⁸ Alberta Environment & Fisheries and Oceans Canada, *Water Management Framework: Instream Flow Needs and Water Management System for the Lower Athabasca River* (February 2007) at 4 [*LAR Framework*]. Admittedly, even the LAR Framework does not reflect an optimum application of EM, focusing as it does only on the aquatic environment. See Nigel Bankes, “Water management planning under the Water Act and regional planning under the Alberta Land Stewardship Act” (Paper delivered at the Alberta Land Stewardship Act – A Practical and Critical Colloquium, Faculty of Law, University of Calgary, 20 May 2010), [unpublished] (“[t]he separation between [water and land] follows tradition. It is socially constructed and at odds with our scientific understanding of the relationship between land, water and the hydrologic cycle. If science governed we would have one [regime] and not two”).

The LAR Framework has its origins in the Joint Review Panel (“JRP”) reports for Shell’s Jackpine I and Canadian Natural Resources Limited’s (“CNRL”) Horizon oil sands projects.⁹⁹ In the course of the hearings for those projects, various participants first raised concerns about the cumulative impact of numerous and otherwise perfectly legal water withdrawals on the Lower Athabasca River’s aquatic ecosystem—a classic example of a death by a thousand authorized cuts. Consequently, the JRPs directed the Cumulative Environmental Management Association (“CEMA”) to recommend by 2005 a management system for maintaining instream flow needs (“IFN”), defined as the amount, flow, and quality of water required in the river “to sustain a healthy aquatic ecosystem”.¹⁰⁰ Failing such a management system, Alberta Environment (now Alberta Environment and Sustainable Resource Development or AESRD) and DFO were to step in and integrate an IFN as a condition in their respective approvals.¹⁰¹ CEMA failed to deliver an IFN, which led government regulators to release an initial phase of the Framework in 2007.¹⁰² A second phase was intended to deal with long term management and to establish an ecosystem base flow (“EBF”), defined as “the minimum streamflow value below which a component of the aquatic ecosystem is believed to be under increased stress”.¹⁰³ However, the Phase 2 Framework Committee (“P2FC”) has not been able to reach consensus on certain exemptions to the EBF, and Phase 1 continues to guide decision making to this day.

Under Phase 1, naturally occurring flows are divided into green, yellow, and red conditions. The green condition implies no restrictions on withdrawals, while the red condition means that water levels are unusually low and withdrawals need to be restricted in order to minimize the loss of fish habitat. Thus, the Lower Athabasca River aquatic ecosystem is being managed to try to suit both human and ecological needs rather than being subject to prohibitions and authorizations in the abstract with the importance of environmental monitoring made plain by the LAR Framework. Managers need to know flow conditions in order to take the right management actions under the Framework.

⁹⁹ Both reports are available online on the Canadian Environmental Assessment Registry. For Jackpine I, see Joint Review Panel, *Applications for an Oil Sands Mine, Bitumen Extraction Plant, Cogeneration Plant, and Water Pipeline in the Fort McMurray Area*, (Calgary: Alberta Energy and Utilities Board & Gatineau: Canadian Environmental Assessment Agency, 2004) at 1, 30 [Jackpine I]. For Horizon, see Joint Review Panel, *Application for an Oil Sands Mine, Bitumen Extraction Plant, and Bitumen Upgrading Plant in the Fort McMurray Area*, (Calgary: Alberta Energy and Utilities Board & Gatineau: Canadian Environmental Assessment Agency, 2004) at 1, 41. See also Monique Passelac-Ross & Karen Buss, “Water Stewardship in the Lower Athabasca River: Is the Alberta Government Paying Attention to Aboriginal Rights to Water” (2012) 23 J Envtl L & Prac 70 at 79-82.

¹⁰⁰ *LAR Framework*, *supra* note 98 at 22.

¹⁰¹ See e.g. *Jackpine I*, *supra* note 99 at 30 (“[w]ith respect to IFN, the Panel agrees that there is a need for CEMA and AENV to implement a management system prior to water withdrawals by Shell for the project. The Panel expects CEMA to make its recommendation for an IFN management system to AENV by the end of 2005. The Panel recommends that AENV establish IFN for the Athabasca River in collaboration with DFO in the event that CEMA fails to meet its timelines. The Panel supports AENV amending existing *Water Act* licences for IFN management, if that becomes necessary.”)

¹⁰² *LAR Framework*, *supra* note 98.

¹⁰³ *Ibid* at 21.

2.2.1 EVALUATING EM: LESSONS FROM THE PARDY-RUHL DIALOGUE

In a 2004 paper surveying the implementation of EM in the Great Lakes and the Mediterranean Sea,¹⁰⁴ Jamie Benidickson observed that “controversy over the meaning and measurement of ecosystem management” was ongoing, citing as one “pithy” example a then-recent article by Bruce Pardy. In “Changing Nature”, Pardy took a decidedly negative view of EM, charging that its mandate “is to measure, control, and change ecosystems to produce the most desirable environment in human terms,” something that occasionally meant preserving ecosystems, but more often did not.¹⁰⁵

American law professor JB Ruhl, a self-professed advocate of EM, subsequently challenged Pardy’s characterization. In the second article of a series eventually referred to as the Pardy-Ruhl Dialogue on Ecosystem Management,¹⁰⁶ Ruhl grounded his defence of EM in Grumbine’s description, while acknowledging that “debate remains strong ... over how much to emphasize maintenance of native ecosystems versus accommodation of human use and occupancy.”¹⁰⁷ It is this “room for debate” that Pardy seized on in his subsequent reply and which seems to lie at the core of his concerns with respect to EM¹⁰⁸:

On a particular occasion, [a] decision maker may indeed agree with Ruhl (and me) about the desirability of protecting native ecosystems, or alternatively may believe that priority should be given to meeting human values and aesthetic needs. EM is a process, not a substantive set of directives [meaning enforceable rules]. Therefore, Grumbine is not in a position to declare its goals. And because it is merely a process, it is subject to the political, economic, and social winds of the time and place in which any particular decision occurs. Such winds usually favour business as usual.¹⁰⁹

Simply put, if Canadian environmental law is vulnerable to the criticism that it is unduly discretionary generally,¹¹⁰ then EM is doubly so. The discretionary and *ad-hoc* nature of the exercise, coupled with the generally prevailing imperatives of economic development, means that EM functions to minimize, not prevent, ecological decline.¹¹¹

¹⁰⁴ Jamie Benidickson, “The Great Lakes and the Mediterranean Sea: Ecosystem-Management and Sustainability in the Context of Economic Integration” (2004) 14 J Envtl L & Prac 107 at 108; Dowdeswell et al, *supra* note 17 at 43 (the Great Lakes Water Quality Program is another example of a successful monitoring program cited by the Federal Monitoring Panel).

¹⁰⁵ Pardy, “Changing Nature”, *supra* note 93 at 675.

¹⁰⁶ *C.f.* Pardy, “Changing Nature”, *supra* note 93. See JB Ruhl, “The Myth of What is Inevitable Under Ecosystem Management: A Response to Pardy” (2004) 21 Pace Envtl L Rev 315 [Ruhl, “Response to Pardy”]; Bruce Pardy, “Ecosystem Management in Question: A Reply to Ruhl” (2005-2006) 23 Pace Envtl L Rev 209 [Pardy, “A Reply to Ruhl”]; JB Ruhl, “The Pardy-Ruhl Dialogue on Ecosystem Management, Part IV: Narrowing and Sharpening the Questions” (2007) 24 Pace Envtl L Rev 25 [Ruhl, “Part IV”]; Bruce Pardy, “The Pardy-Ruhl Dialogue on Ecosystem Management Part V: Discretion, Complex Adaptive Problem Solving and the Rule of Law,” (2008) 25 Pace Envtl L Rev 341.

¹⁰⁷ Ruhl, “A Response to Pardy”, *supra* note 104 at 316.

¹⁰⁸ *C.f.* Ruhl, “Part IV”, *supra* note 106 (“I detect throughout Pardy’s [reply] that what really motivates his assault on EM is a deep fear of discretion” at 31).

¹⁰⁹ Pardy, “A Reply to Ruhl”, *supra* note 106 at 216.

¹¹⁰ David Boyd, *Unnatural Law: Rethinking Canadian Environmental Law and Policy* (Vancouver: UBC Press, 2003) at 231-233.

¹¹¹ Pardy, “A Reply to Ruhl”, *supra* note 106 at 216.

In his subsequent reply, Ruhl conceded that EM involves discretionary decision making, but questioned whether it is any more discretionary than other legislative or common law schemes.¹¹² Arguing that “discretion is inherent in any ecosystem-based decision-making regime,” and that neither he nor Pardy “have solved the puzzle of how to ... ensure that it is never exercised arbitrarily,”¹¹³ Ruhl nevertheless made clear that not all legislative provisions are created equal in this respect, stating “EM is to be practiced within a set of criteria established through authorizing statutes and regulations, such as requirements to ‘maintain and enhance wetland functions within a watershed’ or to ‘promote recovery of endangered species.’”¹¹⁴

In Canada, perhaps the best statutory candidate for effective EM from the federal perspective is the *Canada National Parks Act* (“*CNPA*”)¹¹⁵ and its requirement that national parks be managed first and foremost with a view toward “ecological integrity.”¹¹⁶ While this provision has not lived up to some observers’ expectations,¹¹⁷ it at least provides some objective criteria against which to measure—and challenge—management decisions.¹¹⁸ In contrast, the previous version of the recently amended subsection 35(2) of the federal *Fisheries Act* allowed the Minister of Fisheries and Oceans to authorize harm to fish habitat pursuant to whatever terms

¹¹² Indeed, some argue that environmental law is *necessarily* discretionary and *ad hoc* because of the complexity of ecosystems and the uncertainties of science. See e.g. Dan Tarlock, “Is There a There There in Environmental Law?” (2003) 19:2 *Journal of Land Use* 213.

¹¹³ Ruhl, “Part IV”, *supra* note 106 at 33-34.

¹¹⁴ *Ibid* at 28.

¹¹⁵ SC 2000, c 32 [*CNPA*].

¹¹⁶ *Ibid* (“[m]aintenance or restoration of ecological integrity, through the protection of natural resources and natural processes, shall be the first priority of the Minister when considering all aspects of the management of parks” at s 8(2)).

¹¹⁷ See e.g. Shaun Fluker, “Ecological Integrity in Canada’s National Parks: The False Promise of Law” (2010) 29 *Windsor Rev of Legal Soc Issues* 89; Benjamin Richardson, Stepan Wood & Georgia Tanner, “What Ever Happened to Canadian Environmental Law?” (2010) 37 *Ecology LQ* 981 at 1011. Most of the critical academic commentary is directed at Federal Court of Appeal’s decision in *Canadian Parks and Wilderness Society v Canada (Minister of Canadian Heritage)*, 2003 FCA 197 at para 89, 90 [*CPAWS*]. The Court held that a failure to maintain “ecological integrity” as referred to in the *CNPA* was merely a subset of “significant adverse environmental effects” under the then federal EA regime, albeit one “to which first priority must be given in the making of decisions”. Importantly, the court pointed out that counsel for *CPAWS* could not explain “in what respects, or how much,” restoration or maintenance of ecological integrity was a higher standard than significant adverse environmental effects.

¹¹⁸ Parks Canada has recognized the importance of monitoring in carrying out its mandate. See e.g. Parks Canada, *Ecosystem Management Inventory and Monitoring*, (Ottawa: Office of the Auditor General, 2013), online: Parks Canada <<http://www.pc.gc.ca>>. However, it has recently been criticized by the CESD on the basis that “implementation of systems for monitoring and reporting on ecological integrity has been slow, and the Agency is challenged to meet many of its deadlines and targets”. See Office of the Auditor General of Canada, *Report of the Report of the Commissioner of the Environment and Sustainable Development*, ch 7 (Ottawa: Office of the Auditor General, Fall 2013), online: Office of the Auditor General of Canada, <<http://www.oag-bvg.gc.ca>> (“key elements for a scientifically credible system for monitoring ecological integrity are either missing or only partly developed”).

and conditions he or she saw fit, in an entirely discretionary manner¹¹⁹ While this could theoretically include a rigorous application of EM with a view towards ecological integrity (and to some extent has, as discussed in Part III), the breadth of the Minister's discretion was such that it is particularly vulnerable to political, economic, and social winds. These two schemes can thus be viewed as falling along a spectrum, from most to least likely to support effective EM over the long term. In between would fall what Stewart Elgie has described as "constrained discretion" schemes (e.g., a requirement to give reasons for doing or not doing something), examples of which can be found in Canada's *Species at Risk Act*.¹²⁰ Looking forward, the recently passed *Alberta Land Stewardship Act* ("ALSA"),¹²¹ which divides that province into regions and calls for the creation of regional plans to guide resource development, clearly has potential to foster effective EM, although it too is laden with discretionary provisions.¹²²

Finally, argued Ruhl, EM's roots in science and resource management theory mean that it may actually be even less discretionary than other decision-making frameworks. The general rules applicable to EM "are the rules of science—the scientific method and its protocols of hypothesis generation, experimentation, data analysis, peer review, publication and verification."¹²³ Of these, perhaps none is more important to successful EM than "adaptive management ... techniques."¹²⁴

2.2.3. ADAPTIVE WHEN NECESSARY BUT NOT NECESSARILY ADAPTIVE

Adaptive management ("AM"), the brainchild of University of British Columbia ecologist CS "Buzz" Holling, has been described as "a process-based and experimental approach to environmental management that enables the continuous improvement of management practices by

¹¹⁹ *Fisheries Act*, *supra* note 80 at s 35(2). As of November 25, 2013, the prohibition against the "harmful alteration, disruption or destruction of fish habitat" has been changed to a prohibition against "serious harm to fish", defined in subsection 2(2) as "the death of fish or the permanent alteration to, or destruction of fish habitat". This and other changes and their implications for the *LAR Framework* are further discussed in Part III. See also M Howlett & J Craft, "Application of Federal Legislation to Alberta's Mineable Oil Sands" (Edmonton: University of Alberta Oil Sands Research and Information Network, 2013), online: Oil Sands Research and Information Network <<http://www.osrin.ualberta.ca>>.

¹²⁰ SC 2002, c 29 [SARA]. See Stewart Elgie, "Statutory Structure and Species Survival: How constraints on Cabinet discretion affect Endangered Species Listing Outcomes" (2008) 19 J Envtl L & Prac 1.

¹²¹ *ALSA*, *supra* note 97. The purposes of the legislation, consistent with much of the discussion about EM above, are to enable the provincial government to "give direction and provide leadership in identifying ... economic, environmental and social objectives," to "provide a means to plan for the future," recognizing the needs of both current and future generations, to "provide for the co-ordination of decisions by decision makers," and to "create legislation and policy that [takes into account] the cumulative effect of human endeavour and other events" at s 2. While binding on the Crown, local governments and all other persons, ss 15 and 18 operate to restrict any claim that might be brought for non-compliance to the Stewardship Commissioner.

¹²² See e.g. *ibid*, ss 3(1), 3(2) (discretionary power to establish regional plans), ss 7, 8(2), 9 (describing what regional plans may contain), s 10 (discretionary power to create sub regional and other plans). As a rough estimate of its discretionary nature, the term "may" appears in the statute over 60 times.

¹²³ Ruhl, "Part IV", *supra* note 106 at 27.

¹²⁴ *Ibid* at 28.

learning about their outcomes.”¹²⁵ Like EM, AM has been variously defined over the years but it is now generally considered to consist of the following elements:

- Explicitly stated goals and measurable indicators of progress toward those goals;
- An iterative approach to decision making, providing the opportunity to adjust decisions in light of subsequent learning;
- Systematic monitoring of outcomes and impacts;
- Feedback loops so that monitoring and assessment produce continuous and systematic learning that in turn is incorporated into subsequent rounds of decision making;
- Explicit acknowledgement and characterization of risks and uncertainties, identification of key uncertainties for management purposes;
- An overarching goal to reduce uncertainty over time.¹²⁶

In short, if EM is about managing human activity at the ecosystem level and not along isolated sectoral or jurisdictional lines,¹²⁷ then AM is a tool that can be applied in the EM context in those circumstances where there is considerable uncertainty, either about the management actions being contemplated or the system being managed.¹²⁸ Importantly, reliance on AM does not guarantee positive environmental outcomes. Rigorously implemented, it will always reduce *uncertainty* because it provides managers with information (whether about the system or the outcome of a given management action). This is distinct from reducing or mitigating negative environmental *effects*.

In a previous article, I observed that while its basic premises seemed understood, AM was at risk of being both oversold and under delivered.¹²⁹ In particular, two different approaches to AM appeared to be making their way through both the environmental assessment (“EA”) world and the courts,¹³⁰ which I referred to as rigorous and loose AM, respectively:

a rigorous approach to AM ... is one which meets the basic scientific and management conditions necessary for actually reducing uncertainty. Conversely, loose AM is intended to convey management “on the fly,” where little (if any) attention is

¹²⁵ Martin Olszynski, “Adaptive Management in Canadian Environmental Assessment Law: Exploring Uses and Limitations” (2010) 21 J Env’t L & Prac 1 at 1.

¹²⁶ Holly Doremus et al, *Making Good Use of Adaptive Management* (Washington, DC: Center for Progressive Reform, White Paper #1104, 2011) at 2 [Doremus, “Making Good Use”].

¹²⁷ See also Susan Leech, Alan Wiensczyk & Jennifer Turner, “Ecosystem Management: A Practitioner’s Guide” (2009) 10:2 BC Journal of Ecosystems and Management 1 at 3.

¹²⁸ Although the terms share the word “management,” readers should note that AM is not restricted to EM, and was actually initially applied primarily in the resource management context (e.g. fisheries, forestry). In Canada, the term is also ubiquitous in the context of major resource project environmental assessment and mitigation (see Olszynski, *supra* note 125).

¹²⁹ Olszynski, *ibid* at 30.

¹³⁰ The relevant cases include *Environmental Resource Centre v Canada (Minister of Environment)*, 2001 FCT 1423, 40 Admin LR (3d) 217, 214 FTR 94 [*Environmental Resource Centre*]; *CPAWS*, *supra* note 117; *Grant*, *supra* note 49. For a more recent case, see *Sierra Club Canada v Ontario (Natural Resources & Transportation)*, 2011 ONSC 4655.

given to experimental design and there are only vague commitments to adapt should “problems” arise.¹³¹

Although AM is increasingly written about and understood in Canada (in the EA context, at least),¹³² the American legal scholarship on the challenges associated with AM is still more developed¹³³ and highly relevant. A 2010 paper confirms that poor AM practice—what the authors describe as “a/m-lite”—is a similar problem on both sides of the border.¹³⁴ These challenges were succinctly stated in a white paper specifically intended for legislators and agency personnel prepared by many of that country’s leading scholars:

Resource users and the regulated community sometimes argue that [AM] does not provide sufficient regulatory certainty, exposing them to the risk of costly unanticipated changes and making long-term planning difficult or impossible. For their part, many environmentalists argue that [AM] places too much open-ended discretion in the hands of agency managers, reducing accountability and exposing environmental values to the risks of agency capture and bureaucratic inertia.¹³⁵

If there is one difference between the United States and Canada with respect to AM, it is that Canadian industry has yet to sound any alarms about its use. On the contrary, the oil sands

¹³¹ Olszynski, *supra* note 125 at 8. See also JB Ruhl & Robert Fischman, “Adaptive Management in the Courts” (2010) 95 Minn L Rev 424. Ruhl & Fischman make a very similar observation regarding the United States experience with AM: “agencies in practice have employed what we call ‘a/m-lite,’ a stripped-down version of adaptive management that almost always neglects to develop testable hypotheses as the basis for management actions ... This a/m-lite approach, in its most extreme form, is open-ended contingency planning or ‘on-the fly’ management that promises some loosely described response to whatever circumstances arise.” at 441.

¹³² See e.g. Arlene Kwasniak, “Use and Abuse of Adaptive Management in Environmental Assessment Law and Practice: A Canadian Example and General Lessons” (2010) 12:4 Journal of Environmental Assessment Policy and Management 425; Patricia Hania, “Climate Change and the Protection of Drinking Water in Ontario: An Opportunity to Adopt Adaptive Management?” (2011) 22 J Envtl L & Prac 167. For examples of EA, see Joint Review Panel, *Foundation for a Sustainable Northern Future: Report of the Joint Review Panel for the MacKenzie Gas Project*, (Ottawa: Canadian Environmental Assessment Agency, 2009); Joint Review Panel, *Lower Churchill Hydroelectric Generation Project Nalcor Energy Newfoundland and Labrador: Report of the Joint Review Panel* (Ottawa: Canadian Environmental Assessment Agency, 2011) [Lower Churchill Report].

¹³³ See e.g. Holly Doremus, “Adaptive Management as an Information Problem” (2011) 89 NCL Rev 1455 [Doremus, “Information Problem”]; Holly Doremus, “Precaution, Science, and Learning While Doing in Natural Resource Management” (2007) 82 Wash L Rev 547; Holly Doremus, “Adaptive Management, the Endangered Species Act, and the Institutional Challenges of New Age Environmental Protection” (2001) 41 Washburn LJ 50; JB Ruhl, “Regulation by Adaptive Management—Is It Possible?” (2005) 7:1 Minnesota Journal of Law, Science and Technology 21; JB Ruhl, “Taking Adaptive Management Seriously: A Case Study of the *Endangered Species Act*” (2004) 52 U Kan L Rev 1249; Bradley C Karkkainen, “Adaptive Ecosystem Management and Regulatory Penalty Defaults: Toward a Bounded Pragmatism” (2002-2003) 87 Minn L Rev 943; A Dan Tarlock, “The Nonequilibrium Paradigm in Ecology and the Partial Unraveling of Environmental Law” (1994) 27 Loyola of Los Angeles Law Review 1121 at 1139-1141.

¹³⁴ Ruhl & Fischman, *supra* note 131 at 441.

¹³⁵ Doremus et al, “Making Good Use”, *supra* note 125 at 3. The white paper is based in large part on Doremus, “Information Problem”, *supra* note 133.

industry appears to have been one of its earliest and most enthusiastic promoters.¹³⁶ This suggests that either regulatory certainty does not matter in this context—a doubtful conclusion—or that what is actually being contemplated by industry and government departments is the loosest conception of AM, “a smokescreen for unbounded agency discretion and a wobbly commitment to program objectives.”¹³⁷

In order to address these concerns, the white paper makes several recommendations about when AM is appropriate and, just as importantly, when it is not, bearing in mind that genuine AM is generally more costly for regulators and regulatees to implement:

- There must be an information gap that is important to management choices (e.g., what amount of water is required to protect aquatic ecosystem health, how much land is necessary to ensure the passage of wildlife, etc...)
- It must seem possible to fill that gap on a management relevant time scale (i.e., can we learn about the system in time to implement appropriate measures?)
- It must seem possible to adjust the initial decision over time in response to new information.¹³⁸

With respect to the third point (the ability to adjust initial decisions), AM is not useful when “the legal framework or institutional structure calls for a single decision not subject to later reconsideration.”¹³⁹ Although the issue was ultimately not considered, at least one oil sands company has argued in federal court that a *Fisheries Act* subsection 35(2) authorization is precisely such a decision and cannot be reconsidered.¹⁴⁰ A related element relevant here is to ensure accountability and enforceability. Thresholds, or “triggers”, for adaptation in response to monitoring information should not only be clearly set out,¹⁴¹ but they should be adopted so that they are “binding on the management agency [and] enforceable by interested citizens.”¹⁴² As recently noted by American law professors Courtney Schultz and Martin Nie,

Without enforceability, [AM] will appear to be a lot of hand waving to disguise open-ended, discretionary processes devoid of accountability ... There is little point

¹³⁶ See e.g. *Environmental Resource Centre*, *supra* note 130. A more recent example is Imperial Oil’s Kearl Lake Oil Sands Project, where AM is contemplated for the eventual creation of end-pit lakes and the restoration of peatlands (see Olszynski, *supra* note 125 at 16-18).

¹³⁷ Doremus et al, *supra* note 125 at 3.

¹³⁸ *Ibid* at 7.

¹³⁹ *Ibid*. J Benidickson et al, *Practicing Precaution and Adaptive Management: Legal, Institutional, and Procedural Dimensions of Scientific Uncertainty*, Report to the SHHRC and Law Commission of Canada (Ottawa: UOIE, 2005) (for a thorough examination of the administrative law principles implicated in AM).

¹⁴⁰ *Imperial Oil Resources Ventures Ltd v Canada (Minister of Fisheries and Oceans)*, 2008 FC 382 at para 18.

¹⁴¹ Doremus et al, “Making Good Use” *supra* note 125 at 13. Courtney Schultz & Martin Nie, “Decision-making Triggers, Adaptive Management, and Natural Resources Law and Planning” (2012) 52 Nat Resources J 443 (“a trigger specifies what actions will be taken by an agency if monitoring information shows x or y. In other words, some predetermined decisions, or more general courses of action, are built into the adaptive framework from the beginning of the process (i.e., if this, then what)” at 444).

¹⁴² *Ibid* at 14.

in going through the process of using triggers if, in the end, they provide no additional degree of certainty and accountability.¹⁴³

The foregoing is by no means an exhaustive list of the challenges facing effective EM, nor of the features of effective AM plans. As one example, and like environmental monitoring, EM regimes require stable and long-term funding.¹⁴⁴ Indeed, it is *because* EM is long-term that monitoring must also be long-term: monitoring informs decision making under an EM framework. Benidickson's survey of EM in the Great Lakes and the Mediterranean also suggests several features which may increase effectiveness, including not only scientific and advisory networks but also public participation mechanisms.¹⁴⁵ Nevertheless, the preceding discussion—and the focus on statutory context and the appropriate use of AM in particular—is sufficient in order to make some predictions about the potential effectiveness of any given EM regime, such as the LAR Framework.

3. ASSESSING ENVIRONMENTAL MONITORING AND ECOSYSTEM MANAGEMENT IN THE OIL SANDS

3.1 THE FEDERAL AND PROVINCIAL MONITORING REPORTS

While space does not permit a comprehensive summary of the federal and provincial monitoring reports that preceded the JOSMP, it is useful to summarize here both panels' key recommendations. Both panels' recommendations are broadly consistent with the analysis in Part II. Both recognized the regional nature of environmental monitoring, and the need for intra- and inter-jurisdictional collaboration.¹⁴⁶ They also both recognized that the various current multi-stakeholder approaches lacked defined and accepted leadership.¹⁴⁷ Both stressed the need for scientific rigour in the design and implementation of any monitoring program¹⁴⁸ (bearing in mind additionally the heightened need in the oil sands context to distinguish between natural occurring hydrocarbon-associated contaminants and those resulting from processing¹⁴⁹) and both recommended transparency and a peer review mechanism to ensure such rigour over time.¹⁵⁰ Both also recognized the need for stable and dedicated funding, which the panels felt

¹⁴³ Schultz & Nie, *supra* note 141 at 519.

¹⁴⁴ Leech, *supra* note 127 at 9.

¹⁴⁵ Benidickson, *supra* note 104 at 128.

¹⁴⁶ Dowdeswell et al, *supra* note 17 at 37; Alberta Environmental Monitoring Panel, *supra* note 18 at 19. Not surprisingly, the federal panel stressed the national role while the provincial panel elevated the provincial role.

¹⁴⁷ See e.g. Dowdeswell et al, *supra* note 17 (“[a]lthough we are confident [RAMP] was conceived and currently implemented by people with the best of intentions it is not designed to be systemic, holistic, or adaptive” at 33).

¹⁴⁸ *Ibid* at 14; Alberta Environmental Monitoring Panel, *supra* note 18 at 14 (“[w]orld class monitoring requires world class science”), 33 (Recommendation 7).

¹⁴⁹ Dowdeswell et al, *supra* note 17.

¹⁵⁰ *Ibid* at 42; Alberta Environmental Monitoring Panel, *supra* note 18 at 15.

should be provided by industry, although the Alberta Monitoring Panel also recognized the need for legislative amendments to ensure such funding.¹⁵¹

One of the greatest differences between the two reports, which may perhaps be explained by their respective jurisdictional perspectives, is that the Alberta Monitoring Panel recommended the creation of an independent, province-wide monitoring agency, the Alberta Environmental Monitoring Commission, to be responsible for all environmental monitoring activities.¹⁵² The Federal Monitoring Panel recommended the creation of a board to oversee monitoring, but ultimately envisioned a monitoring program implemented through existing departments.¹⁵³

A final recommendation worth noting, from both monitoring panels, is that any future monitoring program be “adaptive.”¹⁵⁴ Bearing in mind the nearly ubiquitous need for AM in the context of most EM regimes in the Lower Athabasca Region, the use of this term for describing a monitoring program is unfortunate and bound to create some confusion. What appears to have been intended here is simply that the monitoring program be responsive, capable of being “evaluated and revised as new knowledge, needs and circumstances change.”¹⁵⁵ As will be seen, the JOSMP ultimately reflects two uses of the term.

3.2 THE JOINT OIL SANDS MONITORING PROGRAM (JOSMP)

The following section assesses the JOSMP against a framework loosely based on the discussion in Part II:

- Is the JOSMP technically adequate (i.e., continuous and long term monitoring of the right indicators, at the right scales, and with sufficient frequency)?
- Will it be implemented through appropriate institutional structures (i.e., publicly administered (preferably by a dedicated monitoring agency) and adequately funded)?
- Will it be supported through appropriate legal structures (i.e., legislative requirements to monitor and a legislated role for expert peer review)?

As will be seen, the lack of appropriate institutional and legal structures suggests that, in its *current* incarnation at least, the JOSMP is unlikely to be an effective—let alone world class—monitoring program. Opportunities remain, however, for making it more robust. Indeed, both governments have committed to further engagement with industry, independent scientists, Aboriginal peoples, and other stakeholders.¹⁵⁶ Alberta, in particular, has taken several important steps on the legislative front, including amending its *Environmental Protection and*

¹⁵¹ Dowdeswell et al, *supra* note 17; Alberta Environmental Monitoring Panel, *ibid* at 49 (Recommendation 18). Alberta has since introduced and passed such legislation in the form of amendments to its *Environmental Protection and Enhancement Act*, RSA 2000 c E-12 [EPEA]. See *Environmental Protection and Enhancement Amendment Act*, SA 2013, c E- 7 (adding s 36.1 “Ministerial regulations respecting environmental monitoring programs”).

¹⁵² Alberta Environmental Monitoring Panel, *supra* note 18 at 37 (Recommendation 9). This recommendation has also since been acted on. See Government of Alberta, News Release, “Bill creates environmental monitoring agency” (28 October 2013) online: Government of Alberta <<http://alberta.ca>>. See *Protecting Alberta’s Environment Act*, SA 2013, c P-26.8. Both of these developments are further discussed later in this part.

¹⁵³ Dowdeswell et al, *supra* note 17 at 41.

¹⁵⁴ *Ibid* at 39; Alberta Environmental Monitoring Panel, *supra* note 18 at 33 (Recommendation 7).

¹⁵⁵ Dowdeswell et al, *supra* note 17.

¹⁵⁶ *Joint Implementation Plan*, *supra* note 22 at 2.

Enhancement Act (“EPEA”)¹⁵⁷ to authorize participant funding for environmental monitoring (not yet in force). Most recently, the province has passed legislation to establish the Alberta Environmental Monitoring, Evaluation and Reporting Agency (“AEMERA”).¹⁵⁸ That being said, recent media reports indicate that a key First Nation recently dropped out of monitoring discussions, citing a “frustrating and futile process” and the “evolving and unco-ordinated” efforts by the Alberta and Canadian governments.”¹⁵⁹ As for transparency—a much vaunted term throughout the JOSMP documents—another media report stated that “one study already produced by the program—which found mercury levels rising in bird eggs—wasn’t immediately released on the online JOSM Portal, despite being published academically.”¹⁶⁰

3.2.1 TECHNICALLY ADEQUATE?

Although assessing this aspect of the monitoring program is best left to experts, the JOSMP documents demonstrate an awareness of the relevant challenges and solutions that is apparent even to a lay person. As a starting point, and like the preceding advisory reports, the JOSMP outlines the key deficiencies of previous monitoring efforts, ostensibly as a foil to the proposed monitoring plan.¹⁶¹ Furthermore, consistent with the literature discussed in Part II and the Federal Monitoring Panel’s instructions (that any monitoring system “must be designed to answer specific questions”¹⁶²), the JOSMP lists a series of questions that the monitoring program will be able to answer,¹⁶³ and also includes as a primary goal the production of three “core results”:

1. Assessment of accumulated environmental condition or state;
2. Improved understanding of the relationships between system drivers and environmental response; and

¹⁵⁷ *Supra* note 151.

¹⁵⁸ *EPEA*, *supra* note 150. Plans for the agency were first announced a year ago. See Government of Alberta, News Release, “Alberta to establish arm’s-length environmental monitoring agency” (17 October 2012) online: <<http://alberta.ca>>.

¹⁵⁹ Josh Wingrove, “First Nation drops out of ‘frustrating’ oil-sands monitoring talks”, *The Globe and Mail* (15 October 2013) online: [The Globe and Mail](http://www.theglobeandmail.com) <<http://www.theglobeandmail.com>>.

¹⁶⁰ Josh Wingrove, “Files show how Ottawa and Alberta haggled over oil-sands monitoring”, *The Globe and Mail* (15 October 2013) online: [Globe and Mail](http://www.theglobeandmail.com) <<http://www.theglobeandmail.com>>. The study by Craig E Hebert et al, “Mercury Trends in Colonial Waterbird Eggs Downstream of the Oil Sands Region of Alberta, Canada” (2013) 47:20 *Environ Sci Technol* 11785, was subsequently posted on the JOSM Portal (*supra* note 23) with the qualifier that “our expert assessment is that the observed levels of mercury are not likely to pose a risk to these bird populations.”

¹⁶¹ Wrona & di Cenzo, *supra* note 20 at 5, 15.

¹⁶² Dowdeswell et al, *supra* note 17 (“[m]onitoring systems must be designed to answer specific questions. Question definition and sound experimental designs are what separate effective monitoring systems that can advance knowledge and provide a basis for environmental management, from uninterpretable data collection.” at 14).

¹⁶³ Wrona & di Cenzo, *supra* note 20 (examples include: “What is the current state of the water quality of the Athabasca River basin? ... What is the distribution of contaminants in the aquatic ecosystem with particular reference to water and sediments? ... Are toxic substances such as mercury, naphthenic acids, PACs increasing or decreasing and what is their rate of change? What are the cumulative effects of land use alterations and man-made discharges on the water and aquatic environment?” at 2).

3. Cumulative effects assessment.¹⁶⁴

As another example, the JOSMP documents not only acknowledge the need for sufficient sampling coverage and propose a significant increase in the number of sampling sites,¹⁶⁵ but they also recognize the different design considerations for detecting short- and long-term environmental changes.¹⁶⁶

The JOSMP also describes what are referred to as “triggers for decision making”. These appear to be the mechanisms by which the program can be said to be “adaptive” in the sense recommended by the monitoring panels and discussed above: “Within each monitoring activity, a ‘decision-framework’ will be developed and incorporated so monitoring efforts and intensities (tiers) can be adjusted or triggered ‘on or off’ ... Triggers will be used to both increase and decrease monitoring intensity.”¹⁶⁷ However, the *Monitoring Plan Phase 1* document also provides the following table as an example of such a decision-framework:

4. LEVEL	5. TRIGGER	6. CONSEQUENCE
7. EFFECT	8. SIGNIFICANT STATISTICAL CHANGE	9. SEEK CONFIRMATION
10. WARNING SIGN	11. EXCEEDS CRITICAL EFFECT SIZE, AND IS CONFIRMED	12. INCREASE MONITORING FREQUENCY TO DEFINE EXTENT AND MAGNITUDE OF CHANGE
13. RESPONSE SIGN	14. EXCEEDS CRITICAL THRESHOLD EFFECT SIZE AND IS GETTING WORSE	15. INVESTIGATE CAUSE
16. ACTION LEVEL	17. PASSES PROBABLE EFFECTS LEVEL OR WATER QUALITY CRITERION	18. CHANGE IN MANAGEMENT STRATEGY WARRANTED

Viewed this way, it seems that the JOSMP will be “adaptive” in two senses. First, as just described, it will establish on/off switches for more or less monitoring. This is not adap-

¹⁶⁴ *Ibid* at 9.

¹⁶⁵ Wrona, di Cenzo & Schaefer, *supra* note 21 at 12.

¹⁶⁶ Wrona & di Cenzo, *supra* note 20 (“[w]ithin the Lower Athabasca Basin, and in particular in the oil sands region, both “pulse” and “press” environmental stressors, and related impacts, are occurring ... These affect the temporal variability in observed responses and will influence the spatial and temporal replication necessary to detect impacts with sufficient statistical power ... Detecting “press” related environmental impacts (e.g., a regime shift in parameters such as climate, flow or sediment loads) requires a large number of spatially distributed “baseline” or reference sites, while, shorter-term “pulse” impacts (e.g., detection of enhanced contaminant loadings from point source discharges) are best detected when the number of periods sampled is maximized.” at 17).

¹⁶⁷ *Ibid*.

tive management (notwithstanding its description as such under the heading “Adaptive Management” in the *Implementation Plan*¹⁶⁸) but rather responsive monitoring.¹⁶⁹ There are no environmental or resource objectives stated, nor any hypotheses developed against which to test monitoring data.

Second, and more importantly, this part of the JOSMP appears to standardize the interpretation of monitoring results for the purposes of *informing* any given AM regime and triggering alternative management actions (what the above table refers to as a “change in management strategy warranted”). Though complex and unfortunately marred by the governments’ ambiguous use of the relevant terminology throughout these documents, this standardization would be a welcome development in that it sets out relatively objective and transparent rules for triggering alternative management actions.¹⁷⁰

There are other aspects that suggest a technically sufficient program but, as should be expected in light of the discussion in Part II, the JOSMP technical documents are just that: highly technical documents. In the final analysis, it may be both more simple and relevant to note that Schindler, as well as members from both the federal and Alberta monitoring reports, were expert reviewers for the *Integrated Monitoring Plan* document and trust that it is indeed sufficient from this perspective.¹⁷¹

3.2.2 IMPLEMENTED THROUGH APPROPRIATE INSTITUTIONAL STRUCTURES?

According to the *Implementation Plan*, existing monitoring efforts will be combined into a single, government-led program under the joint management of the two governments. The federal lead will be the Assistant Deputy Minister (“ADM”) of Science and Technology at Environment Canada, while the provincial lead—for now at least—will be the ADM of Science and Monitoring at AESRD. These government leads will consolidate the monitoring activities of the multiple independent programs carried out by scientists and industry, and work with other government departments responsible for terrestrial and aquatic biodiversity, lands, forests, and fish habitat.¹⁷²

In sum, for the time being, the governments have opted for monitoring by existing departments with all of the potential pitfalls discussed in Part II: inconsistency in monitoring and sampling protocols, and competition or conflict with other goals and mandates. With respect to inconsistencies in sampling, the *Implementation Plan* at least stipulates the development of “standardized quality assurance and quality control (QA/QC) procedures and standard operating protocols (SOPs).”¹⁷³ However, the potential for conflict (e.g., with other departmental goals and/or mandates) remains.

On the federal side—bearing in mind Alberta’s commitment to establish AEMERA—Environment Canada has historically not played much of a regulatory role in the oil sands

¹⁶⁸ *Joint Implementation Plan*, *supra* note 22 at 4-5.

¹⁶⁹ In fact, it is this latter term that is used—correctly—by the Alberta Environmental Monitoring Panel, *supra* note 18 at 51.

¹⁷⁰ See Schultz & Nie, *supra* note 141 at 512-518 (discussing on the importance of triggers and the issues that arise in their use).

¹⁷¹ Elizabeth Dowdeswell was Chair of the Federal Monitoring Panel, while Ron Wallace was a member of the Alberta Monitoring Panel (see Wrona, di Cenzo & Schaefer, *supra* note 21 at iii).

¹⁷² *Joint Implementation Plan*, *supra* note 22 at 3.

¹⁷³ *Ibid* at 5.

sector, which suggests less potential for such conflict.¹⁷⁴ This potential will undoubtedly increase, however, as its role in implementing the terrestrial aspect of the *Species at Risk Act* is increasingly implicated in oil sands project reviews.¹⁷⁵ Some such conflict has already manifested itself in EC's administration of the National Pollutant Release Inventory ("NPRI"), Canada's "legislated, publicly accessible inventory of pollutant releases (to air, water and land)."

¹⁷⁶ In *Great Lakes United v Canada (Minister of the Environment)*,¹⁷⁷ a coalition of environmental groups had to take Environment Canada to Federal Court in order to force it to collect and publish information on the relatively significant amount of tailings produced by mining companies each year, a sector regulated by Environment Canada pursuant to its administrative responsibility for section 36(3) of the *Fisheries Act*.

While no supervisory board is mentioned,¹⁷⁸ thus ignoring the relatively timid recommendation of the Federal Monitoring Panel, at least external peer review of the entire monitoring program is contemplated. Even this commitment, however, appears vague, is limited to five year intervals, and is accompanied by an additional, shadowy internal review:

¹⁷⁴ Two exceptions to this rule include its responsibility for enforcing the *Migratory Birds Convention Act*, SC 1994, c 22, which includes a prohibition against depositing deleterious substances in areas frequented by migratory birds (s 5.1), and its involvement in the administration of the *Fisheries Act*, *supra* note 79, s 36(3) prohibition against the deposit of substances deleterious to fish and the associated regulations. With respect to the former, Environment Canada's role has been relatively minor with the exception of the now famous prosecution of Canadian oil sands company Syncrude following the death of approximately 1,600 ducks in one of its tailings ponds. See *R v Syncrude Canada Ltd*, 2010 ABPC 229. With respect to the latter, because no regulations currently exist for the oil sands sector under the *Fisheries Act*, Environment Canada's role has been primarily as an expert on water quality for the purposes of environmental assessment under the federal environmental assessment regime. See Howlett & Craft, *supra* note 119 for a comprehensive overview of the federal environmental regime applicable to the oil sands.

¹⁷⁵ See *Adam v Canada (Environment)*, 2011 FC 962, where several Aboriginal and environmental groups successfully challenged the Minister of Environment's decision to not recommend application of the *Species at Risk Act*'s "safety net" provisions (s 80(2), Emergency Protection Orders, or EPOs) to woodland caribou in Alberta in light of alleged insufficiencies in that province's wildlife protection laws. The first such EPO is actually expected soon with respect to the Greater Sage-Grouse, a species found in both Alberta and Saskatchewan and also affected by oil and gas activity, after a similar round of litigation brought by Ecojustice. See *Alberta Wilderness Association v Canada (AG)*, 2013 FCA 190. See also Government of Canada, News Release, "Government of Canada taking action to protect the Greater Sage-Grouse" (17 September 2013) online: Environment Canada <<http://www.ec.gc.ca>>.

¹⁷⁶ See Environment Canada, *National Pollutant Release Inventory*, online: Environment Canada <<http://www.ec.gc.ca>>. Although the NPRI is not a monitoring program per se, its basic function—to provide Canadians with information about the state of their environment—is similar to monitoring and therefore can be expected to give rise to similar kinds of dynamics.

¹⁷⁷ 2009 FC 408, [2010] 2 FCR 515.

¹⁷⁸ Alberta has nevertheless gone ahead and established a six member management board to "focus on how the new science-based [AEMERA] will operate, long-term funding options and establishing a Science Advisory Board to provide input and advice on monitoring efforts". See Alberta, Environment and Sustainable Resource Development, News Release, "Alberta to establish arm's-length environmental monitoring agency" (17 October 2012) online: Government of Alberta <<http://alberta.ca>>.

To maximize transparency, an annual report on the status of implementation will be made public. In addition, the monitoring system will undergo external expert peer review after year three, and at five-year intervals thereafter, to ensure that scientific integrity is maintained. Each external peer review will be accompanied by an internal review of the scope, the operations and the cost of the monitoring program. This review, carried out jointly by the two governments, will ensure the monitoring program remains as cost effective and efficient as possible.¹⁷⁹

In an apparent bid to build public confidence, the term ‘transparency’ is found at least nine times in the *Implementation Plan* document. Setting aside the recent failure to ensure that a relevant study was posted to the JOSM Portal, the highly technical nature of monitoring programs means that transparency, in and of itself, is of limited value. One need only access the first data sets posted on the JOSM Portal to see that the information provided there is meaningless to a lay person.¹⁸⁰ While peer review is an obvious improvement, five-year intervals are arguably an eternity relative to the fast pace of oil sands development. Further, the *Implementation Plan* contains no commitment to rectify any identified deficiencies and casts additional doubt on the whole regime by saddling the peer review with what appears to be essentially an internal cost-benefit analysis—precisely the kind of exercise to which effective, long-term, and therefore costly monitoring programs would seem most vulnerable.

In light of this final element, it is probably not surprising that, with respect to adequate or at least adequately structured funding, the JOSMP also falls short. According to the *Implementation Plan*,

it is *anticipated* that additional costs would be funded by industry. The Governments of Canada and Alberta *will work with the oil sands industry to develop a sustainable, ongoing funding arrangement to support the Plan*. To ensure funding transparency, both governments will share full costing information with industry. In the first three years, as the program is being put in place, the total cost of enhanced monitoring beyond what the two governments currently spend would be up to \$50 million per year.¹⁸¹

Thus, as of 2012 at least, it was still not settled where the funding for the new monitoring program would come from, an uncertainty that according to media reports persisted throughout most of 2013.¹⁸² Nor is it clear on what basis the two governments settled on the conspicuously round \$50 million figure.

Unfortunately, secure, long-term, and adequate funding for environmental management is something that the current federal government has consistently refused to entertain. This was evidenced recently in responses to similar recommendations by the review panels for two other major resource projects, the Mackenzie Valley Gas Project (“MGP”) and the Lower Churchill

¹⁷⁹ *Joint Implementation Plan*, *supra* note 22 at 4.

¹⁸⁰ JOSM Portal, *supra* note 23.

¹⁸¹ *Joint Implementation Plan*, *supra* note 22 at 3 [emphasis added].

¹⁸² See Josh Wingrove, “Files show how Ottawa and Alberta haggled over oil-sands monitoring”, *The Globe and Mail* (15 October 2013) online: The Globe and Mail <<http://www.theglobeandmail.com>>.

Hydroelectrical Projects.¹⁸³ The only exception to this reluctance is the Environmental Damages Fund (“EDF”), created by a Treasury Board Decision back in 1995, which receives money from both civil judgments and regulatory sentences and expends those funds strictly on environmental restoration, either in the location where environmental damage has occurred or on other projects based on established criteria.¹⁸⁴ Although the source of funding would obviously be different, either level of government could similarly create an Environmental Monitoring Fund (“EMF”), with the sole purpose of funding monitoring over the long-term.

3.2.3 SUPPORTED THROUGH APPROPRIATE LEGAL STRUCTURES?

The *Monitoring Plan Phase 1* document summarizes the primary federal and provincial legislative authorities “that the water quality monitoring system *can* inform”¹⁸⁵ as follows:

19. CANADA: LEGISLATIVE AUTHORITIES	20. ALBERTA: LEGISLATIVE AUTHORITIES
21. CAN. ENVIRONMENTAL ASSESSMENT ACT	29. ALBERTA ENVIRONMENTAL PROTECTION AND ENHANCEMENT ACT
22. CAN. ENVIRONMENTAL PROTECTION ACT	30. ALBERTA WATER ACT
23. CANADA WATER ACT	31. ALBERTA LAND STEWARDSHIP ACT
24. FISHERIES ACT	32. LOWER ATHABASCA REGIONAL PLAN—
25. MIGRATORY BIRDS CONVENTION ACT	33. WATER QUALITY COMPONENT
26. SPECIES AT RISK ACT	34. OIL AND GAS CONSERVATION ACT
27. CANADA NATIONAL PARKS ACT	
28. FIRST NATIONS LAND MANAGEMENT ACT	

¹⁸³ In the Joint Review Panel Reports for both of those projects, the Panels made explicit recommendations that the implicated governments set aside funding for the purposes of ensuring long term capacity to implement the recommended environmental management measures. See Lower Churchill Report, *supra* note 132 at 292. Recommendation 15.4 of the report states that “[t]he Panel recommends that, if the Project is approved, the governments ... *make long-term commitments to support annual budget requests by the relevant departments...* The Panel further recommends that the governments make general commitments with a ten-year forecast, to be updated every five years, until such time as there is no longer evidence of ongoing environmental effects resulting from the Project” [emphasis added]. To this the federal government responded only that it agreed “with the intent of this recommendation” and that it would “work with the appropriate parties, as required.”

¹⁸⁴ See *EPEA*, *supra* note 151 at s 30 (establishing an Environmental Protection and Enhancement Fund with relatively broad and unrestricted sources of revenue and designated uses). For a history of the development of the EDF, see Harry J Wruck, “The Federal Environmental Damages Fund” (2004) 62:2 *The Advocate* 217.

¹⁸⁵ *Wrona & di Cenzo*, *supra* note 20 at 4 [emphasis added] [citations omitted in original].

For those familiar with the family of federal environmental laws currently in place, it is plain that, in addition to being limited to water quality, the above list is permissive only: these statutes do not *require* the full suite of monitoring contemplated by the JOSMP. And while such a result would perhaps not normally be vulnerable to criticism, bearing in mind the novelty of the monitoring program and the generally tepid pace of the legislative process, the current government has demonstrated a remarkable ability to alter environmental and natural resource laws both quickly and dramatically.¹⁸⁶

The situation is altogether different on the provincial side, where the legal landscape shifted considerably following the passage of *ALSA* and the implementation of the *Lower Athabasca Regional Plan (LARP)* in 2012.¹⁸⁷ Section 6 of the *LARP* provides that the “Regulatory Details Plan” (“RDP”) contained therein has the force of law.¹⁸⁸ As part of the RDP, the designated Minister is *required* to establish various monitoring programs to support the new air quality, surface quality, and groundwater quality “environmental management frameworks” (essentially analogs of the LAR Framework but for different aspects of the environment)¹⁸⁹ that have since been established as part of the *LARP* (section 24 for air quality monitoring, section 31 for surface water quality, and section 37 groundwater quality). More recently, and as already noted, the legal landscape shifted even further as the legal authority for such monitoring programs was added to Alberta’s *EPEA*. Amendments to the *Act* authorize the Minister of Environment to make regulations “respecting the establishment and operation of one or more environmental monitoring programs, including ... (a) the nature and scope of [such a] program; (b) ... the participation in [such a] program; [and] (c) ... the imposition of fees on participants.”¹⁹⁰ Finally, all such monitoring will eventually be coordinated by AEMERA, as provided in that agency’s enacting legislation introduced in October and passed in November 2013.¹⁹¹

It would be difficult to overstate the significance of these legislative developments, which are in many ways unprecedented. Certainly, no other jurisdiction in Canada is pursuing such an aggressive monitoring agenda. The concern is not the absence of any legal requirements but rather the discretionary nature of the Minister’s duties and several shortcomings in AEMERA’s

¹⁸⁶ Formerly known as Bill C-38, *An Act to implement certain provisions of the budget tabled in Parliament on March 29, 2012 and other measures*, 1st Sess, 41st Parl, 2012 (assented to 29 June 2012), SC 2012, c 19 and Bill C-45, *A second Act to implement certain provisions of the budget tabled in Parliament on March 29, 2012 and other measures*, 1st Sess, 41st Parl, 2012 (assented to 14 December 2012), SC 2012, c 19, these budget bills contained the repeal of the *Canadian Environmental Assessment Act, 1992* SC 1992, c-37 and its replacement with the *Canadian Environmental Assessment Act, 2012*, SC 2012, c-19, significant amendments to the *Fisheries Act*, *supra* note 79, and the *Navigable Waters Protection Act*, RSC 1985, c N-22, to be replaced at a date yet to be determined by the *Navigable Waters Protection Act*. Most of these changes were viewed negatively by various commentators. See e.g. Meinhard Doelle, “CEAA 2012: The End of Federal EA As We Know It?” (2012) 24 J Envtl L & Prac 1.

¹⁸⁷ The *LARP* was approved on August 22, 2012 (see “Online Portal”, *supra* note 97).

¹⁸⁸ *LARP*, *supra* note 97 at s 6, as provided for in *ALSA*, *supra* note 97 (“a regional plan may provide rules of application and interpretation, including specifying which parts of the regional plan are enforceable as law and which parts of the regional plan are statements of public policy or a direction of the Government that is not intended to have binding legal effect” at s 13(2.1)).

¹⁸⁹ These frameworks are analogous with the important distinction that they have a legislative basis (see “Environmental Management Frameworks”, online: Environment and Sustainable Resource Development (Alberta), <<https://landuse.alberta.ca>>).

¹⁹⁰ *EPEA*, *supra* note 151 at s 36.1.

¹⁹¹ *Protecting Alberta’s Environment Act*, *supra* note 150.

implementing legislation.¹⁹² For example, the relevant provisions of the *LARP* make clear that the designated Minister who determines not only the focus and metrics of the monitoring plan, but also whether and for how long an environmental parameter is being exceeded. Presumably, these aspects of the monitoring programs will be consistent with the elements set out in the JOSMP, but this is not a legal requirement per se. Coupled with the fact that direct judicial recourse for failure to implement an adequate monitoring system (or any other aspect of the *LARP*) appears to be barred by subsection 15(3) of the *ALSA*,¹⁹³ the provincial regime—while a vast improvement to the federal one—still falls short on the legal front.

3.3 CURRENT EM INITIATIVE: THE LAR FRAMEWORK

As with the JOSMP, the following discussion is divided into a loose framework based on the discussion in Part II with respect to EM:

1. Is the LAR Framework science-based, including the appropriate application of AM?
2. Is it supported through appropriate legal structures (i.e., ecosystem-based provisions and related duties, limited discretion, open (temporally) regulatory decisions, enforceable regulatory instruments)?

As noted in Part II, Phase 1 of the LAR Framework sets out three categories of naturally occurring flow conditions and specifies the cumulative withdrawal limits industry must meet in each flow category on a weekly basis. The green condition allows water withdrawals up to 15 percent of the flow in the river. Where monitoring indicates flows within the yellow category, the river is experiencing natural low flows that have occurred about 14 percent of the time. During this time, water withdrawals may increase the stress on the aquatic ecosystem. Further withdrawals must proceed with caution and may be limited. During red conditions, the river is experiencing natural low flows that have occurred about four percent of the time. Total water withdrawal is restricted to ensure fish habitat loss is minimal.¹⁹⁴

3.3.1 SCIENCE-BASED, INCLUDING THE APPLICATION OF AM WHERE APPROPRIATE?

Although Phase 1 was not subjected to peer review, Phase 2—which, as noted, is currently still on hold but which is intended as the long-term framework for managing instream flow needs—has been reviewed by DFO’s independent science advisory body, the Canadian Science Advisory Secretariat (“CSAS”).¹⁹⁵ In 2010, CSAS was asked to conduct a peer review of the scientific information used to develop the various reports and technical appendices of the P2FC Report.

¹⁹² See Andrew Read, “Alberta’s new monitoring bill mixes science with politics” *Pembina Institute* (15 November 2013), online: Pembina Institute <<http://www.pembina.org>> (critical assessment of Bill 31). See also Shaun Fluker, “Protecting Alberta’s Environment Act: A Keystone Kops Response to Environmental Monitoring and Reporting in Alberta”, *ABLawg* (2 January 2014), online: ABLawg <<http://ablawg.ca>>.

¹⁹³ *Supra* note 97 at s 15(3). Notwithstanding the fact that regional plans are binding on the Crown and local governments, subsection 15(3) provides that this “does not (a) create or provide any person with a cause of action or a right or ability to bring an application or proceeding in or before any court or in or before a decisionmaker, (b) create any claim exercisable by any person, or (c) confer jurisdiction on any court or decisionmaker to grant relief in respect of any claim.” Rather, recourse must be sought with the Stewardship Commissioner, as per section 62 (“Complaint Review”).

¹⁹⁴ *LAR Framework*, *supra* note 98.

¹⁹⁵ CSAS coordinates the peer review of scientific issues for DFO (see *Canadian Science Advisory Secretariat* (CSAS), online: Fisheries and Oceans Canada <<http://www.dfo-mpo.gc.ca>>).

According to the CSAS report, “while the models used with the various P2FC technical reports are generally acceptable, they are based on a number of assumptions that cannot be validated with the presently available data on fish biology and habitat for the Lower Athabasca River.”¹⁹⁶ Other problems included the omission of tributaries and the climate change analysis in the main P2FC Report.¹⁹⁷ Consequently, CSAS recommended that “a monitoring and adaptive management program is essential given the various data deficiencies with in the Lower Athabasca River (information on life history, distribution, population size of different fish species, etc.).”¹⁹⁸ In other words, while Phase 2 is reasonably robust, AESRD and DFO should develop an AM plan to continuously assess whether the proposed flow regime, once implemented, is actually protective of instream flow needs.

At some point, then, it appears that the LAR Framework could be substantially rooted in science, though much depends on whether DFO and AESRD incorporate the suggestions from the CSAS review for Phase 2. With respect to AM and whether its use is appropriate, however, only the first of the three criteria identified in the Center for Progressive Reform white paper are clearly satisfied. Specifically, there are information gaps that are important to management choices (e.g., data on fish biology and habitat). The third criterion (i.e., the ability to adjust initial decisions over time in response to new information) is arguably met on the federal front because the framework has been implemented to date through broadly discretionary legislative provisions that neither compel nor bar such an approach. However, it runs up, at least partially, against the province’s legal regime for water allocation (as further discussed below). Least clear is whether the second criterion (being able to fill knowledge gaps on a management relevant time scale) is met. The issue here is the rapid pace of oil sands development and the potential for irreversible harm to the aquatic environment before information gaps are filled and learning can be applied to the Framework’s terms and conditions.

3.3.1 SUPPORTED THROUGH APPROPRIATE LEGAL STRUCTURES?

Presently, Phase 1 is implemented provincially through the *Water Act*¹⁹⁹ and federally through the *Fisheries Act*. On the provincial side, Arlene Kwasniak has observed that the framework “flies in the face” of Alberta’s legal water right system (based on “first in time, first in right”) and suggests that it may not be enforceable against pre-framework water licences (which account for a significant portion of total withdrawals).²⁰⁰ As for future ones, and bearing in mind that Phase 1 does not have the legal status of the air, surface water, and groundwater “management frameworks” presently incorporated into the *LARP*,²⁰¹ it can only be “expected that new licenses will contain reductions that reflect the [LAR Framework’s] reductions on

¹⁹⁶ Canada, Canadian Science Advisory Secretariat, *Science Evaluation of Instream Flow Needs (IFN) for the Lower Athabasca River*, Science Advisory Report 2010/055 (Ottawa: Department of Oceans and Fisheries, 2010) at 2.

¹⁹⁷ *Ibid.*

¹⁹⁸ *Ibid* at 3.

¹⁹⁹ RSA 2000, c W-3.

²⁰⁰ Arlene Kwasniak, “Instream Flow and Athabasca Oil Sands Development: Contracting Out/Waiver of Legal Water Rights to Protect Instream Flow—A Legal Analysis” (2010) 48 *Alta L Rev* 1 at 5 [Kwasniak, “Instream Flow”].

²⁰¹ See text of *supra* note 97 for a description of these frameworks.

withdrawals.”²⁰² In other words, there is nothing in the *Water Act* that could compel the province to ensure such reductions are indeed reflected in any new licenses.

The LAR Framework has been implemented federally through subsection 35(2) of the *Fisheries Act*, which until November 2013 granted DFO broad discretion to authorize the harmful alteration, disruption to, or destruction of fish habitat (“HADD”) pursuant to whatever terms and conditions deemed appropriate.²⁰³ In this context, this discretion appears to have cut both ways. On the one hand, it gave the department the flexibility to implement the Framework, including the application of AM, through the terms and conditions of any HADD authorization. This is something that DFO, to its credit, did. On the other hand, there was nothing in that version of subsection 35(2) nor elsewhere in the *Fisheries Act* that could have been used to compel the department to do so.

Both on the provincial and federal legislative front, therefore, the LAR Framework is not adequately supported, as it lacks a legislative basis.²⁰⁴ This conclusion is supported by the simple reality that Phase 1 of the Framework—which was intended to be temporary only—continues to guide decision making to this day while Phase 2 is approximately four years (and counting) overdue.

Going forward on the provincial front, the LAR Framework’s incorporation into the *LARP* (in the same way as the new environmental management frameworks for air, water quality, and groundwater mentioned above) would be an obvious and significant improvement. On the federal front, it is conceivable that the new section 35 prohibition (came into force November 2013)²⁰⁵ may no longer provide sufficient authority for implementing the LAR Framework, as it focuses on “permanent alterations to, or destruction of” fish habitat as opposed to the seemingly broader prohibition against HADD, which explicitly included “disruptions”. That being said, there have also been changes to the fish passage and flow provisions of the *Fisheries Act* (currently sections 20-22) that appear to have made those provisions much more appropriate for implementing the LAR Framework than section 35 ever was. Among other things, these provisions will allow the Minister of Fisheries and Oceans to request studies and evaluations related to obstructions or other things (presumably including water intakes for oil sands operations) that may be harming fish, to request modifications to obstructions or things that are harmful to fish or impede flow or fish passage, or to request that sufficient water flow be provided for fish passage.²⁰⁶ Furthermore, as with the new section 35, the exercise of these powers will trigger a requirement for DFO to consider a series of factors listed in section 6, as well as the new section 6.1 purpose clause:

6. ... (a) the contribution of the relevant fish to the ongoing productivity of commercial, recreational or Aboriginal fisheries;
- (b) fisheries management objectives;

²⁰² Kwasniak, “Instream Flow”, *supra* note 200 at 5.

²⁰³ *Fisheries Act*, *supra* note 80 at s 35.

²⁰⁴ Passelac-Ross & Buss, *supra* note 99 (“[t]he [*LAR Framework*] has been implemented by a voluntary agreement between government and oil sands operators, and has been criticized by environmental groups as lacking a legal basis” at 277).

²⁰⁵ DFO announced that the majority of the amendments introduced through Bills C-38 and 45 would become effective on November 25, 2013 (see “Fisheries Protection Policy Statement”, online: Fisheries and Oceans Canada <<http://www.dfo-mpo.gc.ca/>>).

²⁰⁶ *Ibid.*

(c) whether there are measures and standards to avoid, mitigate or offset serious harm to fish that are part of a commercial, recreational or Aboriginal fishery, or that support such a fishery; and

(d) the public interest.

6.1 The purpose of section 6, and of the provisions set out in that section [including the fish passage and flow provisions described above], is to provide for the *sustainability and ongoing productivity* of commercial, recreational and Aboriginal fisheries.²⁰⁷

The four factors do not mandate any particular result. Additionally, the fourth factor (the public interest) is exceedingly broad.²⁰⁸ However, the purpose for requiring the Minister to consider those factors—that is, to ensure that decision making “provide[s] for the *sustainability and ongoing productivity*” of fisheries (s. 6.1) (at least two of which, recreational and Aboriginal, are clearly applicable in the LAR)—seems similar to Ruhl’s examples of appropriate criteria for EM (e.g., “*maintain ... wetland functions*”). The stated purpose should provide at least some objective benchmark—like subsection 8(2) of the *CNPA* (priority to “*ecological integrity*” of parks)—, for challenging and assessing the Minister’s decisions.

In other words, while the LAR Framework is not currently adequately supported by legislation, there is considerable potential for improvement under both the *LARP* and, perhaps surprisingly, the new fisheries protection provisions of the *Fisheries Act*.

IV. CONCLUSION AND IMPLICATIONS

4.1 NEITHER SPACESHIP NOR TUGBOAT?

In light of recent announcements heralding the arrival of a “world class” monitoring system for the oil sands region against a background of increased Canadian efforts to secure export markets for the oil sands, the primary purpose of this paper was to explore the challenges associated with environmental monitoring and to identify some of the features of monitoring regimes that tend toward their effective implementation. Because monitoring itself does not actually address environmental problems, the paper also explored the challenges associated with ecosystem management, a cross-jurisdictional and cross-sectoral approach that depends on effective monitoring and that has been largely embraced—if poorly implemented—in the oil sands region.

Returning to the initial analogies of spaceships and tugboats, there is reason to doubt whether the JOSMP will serve either as an inventory of this portion of spaceship earth or as an escort tugboat to an oil sands industry navigating an increasingly activist international market. While technically sufficient, the JOSMP does not presently have the institutional and legal support that are the hallmarks of effective monitoring programs. In particular, it lacks a dedicated and independent agency, stable long-term funding, and clearly enforceable provisions. The same can be said about the LAR Framework. It remains largely a matter of policy without sufficient legal support. Proof of this includes the considerable delays in transitioning to the more rigorous Phase 2. The rapid pace of oil sands development also raises doubts about the appropriateness of reliance on AM as a tool for addressing the various uncertainties and information gaps associated with the Lower Athabasca River identified in DFO’s own CSAS Report.

Of course, only time will tell whether the JOSMP delivers on its promises or falls short. Bearing in mind the discussion in Part II, significant factors will be whether Alberta follows

²⁰⁷ *Fisheries Act*, *supra* note 80 at ss 6, 6.1.

²⁰⁸ See e.g. Jodie Hierlmeier, “The Public Interest’: Can It Provide Guidance for the ERCB and NRCB?”, *News Brief*, (2008) 23:1 *Environmental Law Centre* 1.

through on its commitment to create AEMERA in a timely manner, how that agency is structured and staffed, and how it will coordinate monitoring activities with its federal counterpart (Environment Canada). The first external peer review, scheduled for 2015, will provide an intuitive point for reassessment.

4.2 ENVIRONMENTAL LAW FOR SPACESHIP EARTH

Even though the JOSMP may not end up as a model for environmental monitoring, that Canadian environmental law and policy are headed in the direction of more monitoring and an increased adoption of EM seems clear. Michael Wenig explains:

Canadian legislation is jumping on the ecosystem management bandwagon ... Several statutes provide for ecosystem protection as a target or basis for government's use of specific regulatory tools and for the development of broad brush "strategies" And two federal statutes provide general endorsement for the "ecosystem approach" for achieving the acts' objectives.

Canadian environmental managers have likewise shared the enthusiasm for ecosystem management. For example, [Environment Canada] is currently involved in eight "ecosystem initiatives" ... Similarly, [DFO] has adopted the "ecosystem approach" as a basis for fisheries management. Canadian provinces and territories have likewise made numerous gestures toward embracing the ecosystem approach.²⁰⁹

Indeed, to varying extents some form of EM is already entrenched in the management of Canada's national parks, the Great Lakes,²¹⁰ and many provincial forestry regimes.²¹¹ It will also play a primary role in Alberta's regional planning regime under the *ALSA*. Effective environmental monitoring will be necessary to support all of these initiatives, as it will be for Canada to fulfill its international obligations with respect to biodiversity assessments under the *Convention on Biological Diversity*.²¹² Finally, effective monitoring will also be necessary as environmental law and policy begins to rely more on the concept of ecosystem services.²¹³

On the one hand, and assuming good faith on the part of politicians and government regulators, this can be seen as a positive development. If indeed we are "passengers on a little spaceship,"²¹⁴ then it seems reasonable, indeed high time, that environmental and natural resources laws eschew the frontier mentality and instead be designed to monitor and manage the impacts to our ship and its various systems—a kind of legal "operating manual for space-ship earth."²¹⁵ On the other hand, as illustrated by the various regimes discussed in this paper,

²⁰⁹ Wenig, *supra* note 93 at 1-3 [citations omitted].

²¹⁰ See Benidickson, *supra* note 104.

²¹¹ See generally Leech, *supra* note 127.

²¹² *Convention on Biological Diversity*, 5 June 1992, 1760 UNTS 79, 31 ILM 818.

²¹³ Biber, *supra* note 34 at 5.

²¹⁴ Roland, Wilson & Rahill, *supra* note 1.

²¹⁵ Fuller, *supra* note 5. Most recently, Canadian astronaut Chris Hadfield picked up the analogy in a piece for *Wired* magazine: "The space station, high above, is a microcosm—an international collection of people living in a finite area with finite resources, just like the planet below. Power comes from a blend of fossil fuels and renewable energy. Air, food, and water come in limited quantities... And in both locations, lives are in the balance. Make a small mistake and people are inconvenienced, capability is lost. Make a big one and people die" (Chris Hadfield, "We Should Treat Earth as Kindly as We Treat Spacecraft", *Wired Magazine* (11 November 2013) online: <<http://www.wired.com/wiredscience/2013/11/chris-hadfield-wired/>>).

such a legal regime will inevitably be more complex²¹⁶ and consequently, like monitoring programs, opaque. It will be more difficult for average citizens to assess whether or not good faith is in fact reflected in monitoring and EM regimes, or whether these regimes are being used to obscure environmental harm or delay concrete measures and limits. As discussed in this paper, indicators of good faith include dedicated and independent agencies with stable and sufficient funding, a role for peer review, and clear and enforceable legislative provisions. Presently, the monitoring and EM regimes discussed herein fall short on most of these fronts. Alberta is to be lauded for the steps it has taken, both with respect to *ALSA* and most recently the creation of AEMERA. However, while not determinately fatal (as DFO's willingness to implement the LAR Framework demonstrates), the discretionary nature of the relevant legislation and regulatory provisions threatens to undermine their potential as well.²¹⁷

It would also be naïve to assess such initiatives without regard to the broader legal and policy context. In Canada in recent years, this context has been marked by a weakening of federal environmental legislation generally,²¹⁸ deep cuts to the operating budgets of those departments responsible for environmental protection,²¹⁹ muzzling of government scientists,²²⁰ and the shuttering of established and highly respected research institutions including the National Roundtable on the Environment and the Economy ("NRTEE") and the internationally renowned Experimental Lakes Area.²²¹ The latter, in particular, give cause for pause when one considers that environmental monitoring and EM are necessarily long-term endeavours (spanning multiple electoral cycles). Their effectiveness fundamentally depends on continuity.

These developments, arguably the result of public choice failures in their own right,²²² speak to the question of motivation necessarily set aside at the outset of this article. It is not unreasonable to suggest that they point toward an "escort tugboat" motivation for the JOSMP. At the very least these developments are inconsistent with a broader appreciation of the need to adapt environmental laws and policies to the challenges posed by "spaceship earth." More concretely, they suggest that further mechanisms may be required if Canadians are to really trust that monitoring and EM regimes are now—and will remain—effective. One possible mechanism that has recently garnered considerable attention is a constitutional right to a healthy environment. In his latest book on the subject, David Boyd argues that such a right could be expected to strengthen Canadian environmental laws or at least prevent their further

²¹⁶ Some consider this not only an inevitable but necessary evolution in environmental law (see e.g. JB Ruhl, "Thinking of Environmental Law as a Complex Adaptive System: How to Clean Up the Environment by Making a Mess of Environmental Law" (1997) 34:4 Hous L Rev 935).

²¹⁷ It is acknowledged that discretion does not always lead to negative environmental outcomes; rather, it is that it *tends* to do so for the reasons discussed by Pardy and acknowledged by Ruhl (see Ruhl, *supra* note 106).

²¹⁸ See e.g. Doelle, *supra* note 186. See also David R Boyd, *The Right to a Healthy Environment: Revitalizing Canada's Constitution* (Vancouver: UBC Press: 2012) (describing recent federal changes as "environmental rollbacks" at 150-51) [Boyd, *Healthy Environment*].

²¹⁹ See e.g. Cindy E Harnett, "Another round of cuts planned for Fisheries and Oceans Canada", *Times Colonist* (21 March 2013) online: Times Colonist <<http://www.timescolonist.com>>.

²²⁰ See generally Chris Turner, *The War on Science: Muzzled Scientists and Wilful Blindness in Stephen Harper's Canada* (Vancouver: Greystone Books, 2013).

²²¹ *Ibid* at 28, 90 (regarding the NRTEE), 27, 54-56 (regarding the ELA).

²²² See text of *supra* note 60.

weakening.²²³ Although a detailed discussion of this option is obviously beyond the scope of this paper, it does seem that such a constitutional right could provide the legal “drag” necessary to prevent the future public choice failures that might otherwise undermine effective environmental monitoring and EM regimes.

Whatever the mechanism, it is entirely reasonable to suggest that, just as Boulding’s spaceship economy differed dramatically from the current one, so too spaceship environmental law will require a significant departure from the *status quo*.

²²³ Boyd, *Healthy Environment*, *supra* note 217 at 148 draws a comparison with the process that occurred in Canada after the *Charter of Rights and Freedoms* was enacted in 1982. Boyd suggests that “recognition of the constitutional right to a healthy environment in Canada would trigger a comprehensive review of existing laws, policies and standards. Given their relative weakness, many of these instruments would have to be strengthened.”

