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Message from the Chair

By Anna Maiuri, Miller Canfield

Greetings and welcome to our spring issue of the *Michigan Environmental Law Journal*. This issue is a real treat in that it combines an update on the MDEQ's Collaborative Stakeholders Initiative (CSI) that many of us participated in, with some insight on the latest issues facing our fine state.

I was delighted to see so many fellow section members participating in the MDEQ's CSI in February at the Kellogg Biological Station at Gull Lake. We are fortunate to have articles from 2 participants in this issue. Troy Cumings and James Clift give their perspectives and updates on the Environmental Policy Reforms Recommendations from the ORR and CSI. In addition, we have Brad Sysol's article, "Supreme Court Holds EPA Administrative Compliance Order under the Clean Water Act Subject to Pre-Enforcement Judicial Review." Jim Enright briefs us on the wetland case *Just Us Four LLC v. Villa Environmental Consultants, Inc.* Chris Dunsky, our MELJ editor, has written a follow-up article on the Michigan Court of Appeals upholding a Department of Natural Resources and Environment order that declares wild swine to be a prohibited species under the Michigan Invasive Species Act. Matthew Dobbins writes on the latest hot topic, "Fracking the Great Lakes: Is Michigan a Model Shale State?" Our final article is written by student Megan J. Rechberg, Pepperdine University School of Law, on an evaluation of salmon farming in North America.

I want to thank and recognize Chris Dunsky for all his time and attention in bringing this issue to publication. Many thanks as well to all the authors for helping us stay current.

Please mark your calendars for our summer program on June 22. More information on other events is provided below. Enjoy the warmer weather!!

Anna M. Maiuri, Chair
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Upcoming Events

- The State Bar of Michigan Environmental Law Section Air Quality Committee and the Michigan Manufacturers Association hosted a third annual conference: "The Evolving Environmental Regulatory Landscape," Wednesday, May 16, at MMA in Lansing. Presentations from the event will be on our website in the next few days.

- A webinar is planned for Monday, May 21, on the updates and progress of the CSI.

- New—**Mold: Law, Medicine, and Science**
  Dr. Ernest Chiodo will hold a roundtable discussion on Monday, May 21, 2012, from Noon to 1:30 p.m., Clinton Township, MI, in the office of Ernest Chiodo P.C. RSVP to (586) 746-1761.

  The presentation will also be held in Chicago, Friday, May 25, 2012, at Noon CST in the offices of Ernest Chiodo P.C., 221 N LaSalle St, Suite 854, Chicago, IL 60601. RSVP to (312) 351-0717.

- Summer Program will be in Detroit on Friday, June 22.

- The Annual Business Meeting & Program will be held Thursday, September 20, 1:30–6 p.m., at DeVos Place, Grand Rapids, in conjunction with the State Bar's Annual Meeting. Registration is requested for proper facilities planning. Visit the Bar's Annual Meeting pages.

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Environmental Policy Reforms

Recommendations from the ORR and Collaborative Stakeholder Initiative

By Troy M. Cumings[1]

On February 23, 2011, Governor Snyder signed Executive Order 2011-5. This order created the Office of Regulatory Reinvention (ORR) and tasked that department with completing a systematic review of all existing and proposed rules and regulatory processes. To assist with

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that review, the order authorized the ORR to form Advisory Rules Committees for different regulatory areas, including environmental.

On May 26, 2011, the ORR formed the Environmental Advisory Rules Committee to review the more than 6,000 environmental rules and associated regulatory programs. The committee was comprised of 12 individuals representing local units of government, trade associations, environmental practitioners, and the environmental and regulated communities. From June through November, the committee had 33 meetings.

In December, 2011, the Environmental Advisory Rules Committee issued 77 recommendations to the ORR[2]. And the ORR released the recommendations in a report to the Governor on February 21, 2012. The 77 recommendations contained in the report cover all four regulatory programs within the Department of Environmental Quality (DEQ): air, water, remediation, and resource management. In addition, a few of the recommendations address general regulatory issues that would also have an impact outside the environmental context.

Following the release of the ORR recommendations, in an effort to create collaboration between the regulated community and DEQ staff on implementing improvements to the cleanup programs, the DEQ organized the Collaborative Stakeholder Initiative (CSI). CSI involved experts from across the State who met to develop further recommendations on the issues of brownfield redevelopment, cleanup criteria, due care obligations, free product/source removal, groundwater surface water interface, Part 201 rules, and vapor intrusion. Although the CSI process included some issues that ORR did not address (such as brownfield redevelopment and due care), the process otherwise provided further detail on many ORR recommendations with an eye toward implementation. On March 14, 2012, the CSI issued its final report and recommendations.

With the recommendations made, the focus is now on implementation. The ORR and CSI recommendations involve one or a combination of the following types of actions: process changes, rule changes, and statutory amendments. As a result, implementation efforts will be recommendation specific. Indeed, the DEQ has already begun implementing some of the process related recommendations, such as eliminating the Quality Review Team process under the Part 201 program and ceasing to rely on criteria contained in an operational memo relative to effective solubility.

As to other implementation efforts, the DEQ has created an implementation plan that will be available on the DEQ's website by the end of May. Under the plan, for the recommendations involving process changes, the DEQ will begin to make changes immediately. For more complex process changes or those that require a guidance document, changes will continue throughout this year. On the other hand, for rule changes, the process will begin for most issues yet this year or in 2013. It is anticipated that most of these rule processes will conclude in 2013 or 2014, depending on the rule set. Finally, the effort to pursue statutory amendments will begin

[2] Office of Regulatory Reinvention Recommendations

immediately. Legislative issues will be prioritized and begin to move this year on a timeline developed by the Governor's office, the DEQ, and the legislature. The DEQ will document its implementation efforts in reports to the public on June 15, 2012, September 15, 2012, and March 15, 2013.

In addition to the DEQ's implementation plan, the DEQ has developed a comprehensive vision incorporating goals developed by Director Wyant that will foster implementation of the ORR and CSI recommendations. The Director's goals for the DEQ are threefold:

- Serve as stewards of the resource.
- Deliver excellent customer service.
- Be partners in economic development.

Consistent with these goals, the DEQ will continue to make changes in the way it operates. For example, for the remediation program, the DEQ will create a district peer review process whereby decision-making will be delegated to district staff with the district supervisors having final decision-making authority. Under this process, district staff will apply best professional judgment to proposals from a technical, regulatory, and policy perspective. The process will involve knowledge transfer within and among DEQ staff, continuous training, consistency, stakeholder participation, team building, and transparency. Further, Technical and Program Support Teams will be created to assist district staff in this process and to address broader programmatic issues.

Undoubtedly, the ORR and CSI processes along with the DEQ's comprehensive vision will lead to significant changes. Ultimately, the goals of these changes stem from the Governor's priorities, which include reinventing government, creating jobs, restoring our cities, enhancing our image, and protecting our environment. And if the work completed so far is any indication, the implementation over the next few years will continue to exemplify one of the Governor's favorite sayings: "Relentless Positive Action.

More About the ORR Report: Let's Be Positive, But Not Necessarily Relentless

By James Clift, Policy Director, Michigan Environmental Council

If you have read the report of the ORR Environmental Advisory Rules Committee, you may be familiar with my name—it is the name that precedes the words "did not concur" below many of the recommendations. I objected to about a third of the recommendations. This dubious distinction was driven primarily because I was the only representative of the environmental community or the general public appointed to the committee.

I applied to be included on the ORR Environmental Advisory Rules Committee. And, to the administration's credit, they accepted my application and allowed me to fully participate in the proceedings. I have worked in this field for twenty years, and I think the other members appreciated having someone with a different point of view at the table. To the credit of the other committee members, many of the recommendations were modified based on our

discussions so that we could all concur and give the administration full support moving forward on many reforms.

The challenge facing the committee and the Department of Environmental Quality was daunting. Not only were there more than 2,500 administrative rules to review, but thousands of other policy and guidance documents that needed review at the department level. It is a healthy process for the state to examine the entire body of laws, rules, and regulations and make sure they fit together and make sense to both the regulated entities and the public.

One of promising efforts that is now underway as a result of the ORR process is an internal review of the Department of Environmental Quality website. The department has committed to standardize the format between divisions, remove dated and unnecessary information, and set forth a process for developing new guidance documents in the future.

An ongoing challenge will be to manage the expectations of the public. In today's world the public is growing more and more accustomed to immediate results via the Internet. However, in these lean economic times our state government has to balance committing resources to upgrading its aged computer infrastructure with providing services to the Michigan public on a day-to-day basis. The good news is that progress is being made. Moving forward, patience will be critical as the department completes it reviews and decides its schedule for upgrading various facets of its operations (such as the submission of electronic permit applications.)

Many of my objections were to recommendations that, in my opinion, put public health, the Great Lakes, or Michigan's other spectacular natural assets unnecessarily at risk for the sake of marginal or nonexistent improvements in the regulatory structure.

As citizens of the only place in the world nestled in the epicenter of the world's greatest freshwater ecosystem, we have stewardship responsibilities to the lakes and their surrounding waters—wetlands, creeks, ponds, and streams—that we ignore at our own peril. These Great Lakes assets are our identity. They are the source of Michiganders' drinking water, provide water for industrial operations, contribute to public health, support a vibrant recreation and tourism industry, and are the linchpin of a quality of life highlighted so perfectly in the "Pure Michigan" advertising campaign.

Some of the ORR recommendations would chip away at those foundations for negligible gain, and those are the ones I objected to. My concerns with the recommendations generally fall into three categories:

1. I voiced concern over attempts to limit public access to information, especially as they relate to hazardous substances released into communities. I readily admit that risk assessment is not an easy subject to convey to the public. However, the public's right to know about the emission of hazardous substances in their vicinity outweighs any confusion that may arise from having that information available.

2. I also objected to recommendations that failed to recognize that in many cases Michigan should be going beyond minimum federal standards especially standards that relate to protection of fresh water. Michigan has been a leader in a number of areas in implementing the Clean Water Act, the Clean Air Act, and other statutes in a manner that protects both public health and serves the needs of the manufacturing community. I did not concur in recommendations that were based on the faulty premise that lowering environmental standards would encourage economic development in Michigan.

3. Lastly, I was skeptical of recommendations that tried to take authority away from the department and made it more difficult for it to fulfill its mission of protecting the health of Michigan families.

Michigan's future economic development will be influenced by many factors, including whether our environmental regulations are clear, concise, and predictable. It will also be impacted by whether the quality of life offered in our communities is appealing to young professionals. They increasingly are drawn more to a place than a job. They are looking for vibrant urban communities and recreational opportunities. The path to a better Michigan is not lowering our expectations and standards but encouraging innovation that keeps us one step ahead of our competitors.

Supreme Court Holds EPA Administrative Compliance Order Under the Clean Water Act Subject to Pre-Enforcement Judicial Review

By Brad H. Sysol[1]

By unanimous decision in *Sackett v. Environmental Protection Agency*, 132 S.Ct. 1367 (March 21, 2012), the U.S. Supreme Court held that an EPA administrative-compliance order (ACO) is a "final agency action" ripe for judicial review under the Administrative Procedure Act (APA), and that the Clean Water Act (CWA) does not preclude pre-enforcement judicial review of the ACO. As expressed in Justice Alito's concurring opinion, the Supreme Court rejected a "position taken . . . by the Federal Government . . . [that] would have put the property rights of ordinary Americans entirely at the mercy of [EPA] employees."

In this case, the EPA issued an ACO to Michael and Chantell Sackett alleging they had filled a federally-protected wetland without a permit under Section 402 or 404 of the CWA, and ordered them to immediately restore their property in accordance with a Restoration Work Plan or face civil penalties—up to $75,000 per day—for each day they failed to comply with the ACO. The property at issue is a 2/3 acre residential lot in Idaho located north of a navigable-in-fact lake, but separated from the lake by several developed lots. To prepare for the construction of a house, the Sacketts used dirt and rock to fill a portion of their lot. Contending that the Sacketts' property contained wetlands within the meaning of 33 C.F.R. §328.4(8)(b)—

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and thus was subject to federal jurisdiction under the CWA—EPA issued the above-mentioned ACO. Believing the opposite, the Sacketts requested an agency hearing to challenge EPA's jurisdictional determination. When EPA declined, the Sacketts filed suit. A federal district court, affirmed by the U.S. Court of Appeals for the Ninth Circuit, dismissed the case on the grounds that judicial review was barred unless and until EPA filed a civil enforcement action, precluding the Sacketts from building their home and subjecting them to enormous civil penalties.

The Supreme Court reversed. Writing for the Court, Justice Scalia lamented the lack of clear guidance as to the jurisdictional reach of the CWA, recounting recent decisions that leave great uncertainty as to the meaning of "navigable waters" under the CWA—its jurisdiction linchpin—but made it clear, however, that the Court would not consider that question in this case. Rather, the Court limited its review to whether the ACO was a "final agency action" subject to judicial review under the APA, and whether the CWA precluded such review.

On the first question, the Court held that the ACO was subject to judicial review under the APA, which provides for review of "final agency action for which there is no other adequate remedy in a court." See 5 U.S.C. §704. The Court concluded that the ACO had all "the hallmarks of APA finality" because, among other things, it determined the Sacketts' rights and obligations (i.e., restoration of the property) and exposed them to certain "legal consequences" (i.e., penalties and fines). The Court also found that the Sacketts had "no other adequate remedy in a court" because under the CWA, "judicial review ordinarily comes by way of a civil action brought by EPA under 33 U.S.C. §1319" (an enforcement action). In EPA's view, however the Sacketts could not initiate such an action "and each day they wait for the agency to drop the hammer, they accrue . . . an additional $75,000 in potential liability."

On the second question, the Court held that the CWA did not preclude judicial review under the APA, thus allowing the Sacketts to challenge EPA's jurisdictional determination before the filing of an enforcement action. The Court found no express bar in the CWA to judicial review of an EPA AOC, and found no bar by implication. Dismissing the EPA's warning "that [it] is less likely to use [ACOs] if they are subject to judicial review"—and would lose the ability to "obtain quick remediation [of water pollution problems] through voluntary compliance"—the Court rejected the notion that "efficiency of regulation conquers all." The Court found that "there is no reason to think that the [CWA] was uniquely designed to enable the strong-arming of regulated parties into 'voluntary compliance' without the opportunity for judicial review . . . ."

The critical jurisdictional question under the CWA that provides the legal context for this case, but not decided by the Court, magnified the Sacketts' dilemma and the need for immediate judicial review in this matter. Facing significant doubt and uncertainty as to the reach of the CWA, the Sacketts were left in a position—absent judicial review—of either having to do exactly as EPA demanded at significant cost, despite their objections to EPA's jurisdiction, or face the threat of stiff penalties and fines. As Justice Alito states in his concurring opinion, "[r]eal relief requires Congress to do what it should have done in the first place: provide a reasonably clear rule regarding the reach of the CWA." Perhaps this case will serve as a call to Congress, through

legislation, or the EPA, through rulemaking, to make clear what waters are federal waters for purposes of CWA regulation.

A Wetland, Not a Wonderland: The Michigan Court of Appeals Interprets an Environmental Consulting Agreement in Just Us Four LLC v. Villa Environmental Consultants, Inc.

By Jim Enright, Enright Law Firm PLLC

In Lewis Carroll's *Through the Looking Glass*, following Humpty Dumpty's famous remark about words meaning what he chooses, his conversation with Alice went:

> "The question is," said Alice, "whether you can make words mean so many different things."
>
> "The question is," said Humpty Dumpty, "which is to be master—that's all."

Who shall be master? In interpreting an undefined specialized term in an environmental consulting contract, the Michigan Court of Appeals chose the meaning given by the environmental consultant over that urged by the dissatisfied client, in *Just Us Four, LLC v. Villa Environmental Consultants, Inc.*, No. 300215, Mich Ct App Dec 20, 2011. However, there's much more to this story.

Just Us Four, LLC (the Buyers), consisted of two pairs of spouses who claimed expertise in developing residential property. The Buyers entered the commercial arena by buying a 29 acre undeveloped wooded tract in Berrien County as an investment in connection with the anticipated construction of a nearby casino. Acting on advice of their Illinois lawyer, the Buyers hired a local environmental consulting firm to do a Phase I environmental site assessment of the property. The written contract consisted of the consultant's written proposal and a "Phase I Environmental Site Assessment Questionnaire" asking, among other things, whether additional reviews were desired such as asbestos, lead-based paint, or wetland review, to which the Buyers responded, "Wetland Review Please."

The consultant's report stated that (i) a creek intercepted the property, (ii) a wetland inventory map indicated potential wetlands near the creek, (iii) wetlands by definition have to be wet at the surface only 5 to 7 days during the growing season, and (iv) a wetland delineation should be completed if any filling of a water feature or depression was to occur. The report also provided an aerial photo depicting the creek. The consultant also told one of the Buyers' principals that "you're good to go" and that he thought that the Buyers would "be fine." So off they went, buying the property for $280,000. A hotel developer subsequently became interested in the property for a purchase price of approximately $2.2 million and in the course of its environmental due diligence found that 15.2 acres of regulated wetlands were located on the property. The hotel developer fled for higher ground, and the Buyers sued the consultant for breach of contract and negligence.

Summary disposition of the contract claim in the trial court turned on whether a "wetland review" was delivered. Because that term was not defined in the contract, parol evidence was considered, consisting of testimony by the defendant's principal and an environmental consultant hired by plaintiffs as an expert. Both described the differences between a "wetland review" and a "wetland delineation," with the former consisting of a review of government records for indications of the presence of wetland and the latter being a determination of the *actual existence* and size of wetlands through a site visit. The trial court found for the consulting firm on the contract claim and, as to the negligence claim, also granted summary disposition to the defendant because plaintiff did not allege a non-contractual duty that had been breached.

The Court of Appeals affirmed, finding there was no question of fact that the parties contracted for, and plaintiff received, a "wetland review." Although the plaintiff asserted that its subjective understanding of a "wetland review" essentially meant what the consultants called a "wetland delineation," which the consultant did not perform, the Court of Appeals explained that, considering the testimony of the consultant and plaintiff's expert:

> there is no question of fact that plaintiff contracted for, and received, a "wetland review." . . .
> Plaintiff asserts that Weck's subjective understanding of the scope of a "wetland review," as meaning essentially a "wetland delineation," created at least a question of fact as to the scope of the parties' agreement; however, parties are presumed to understand the plain language of the contracts they sign and "the unilateral subjective intent of one party cannot control the terms of a contract." . . . Instead, "'[i]t is beyond doubt that the actual mental processes of the contracting parties are wholly irrelevant to the construction of contractual terms. Rather, the law presumes that the parties understand the import of a written contract and had the intention manifested by its terms.'" . . . The terms of the parties' agreement manifested the intent that defendant perform a "Wetland Review Please," and not a "wetland delineation." There is nothing in the contract to suggest that the parties' agreement was anything other than for a "wetland review" as defined by [the testimony]. (Court's citations omitted.)

On the surface, the lessons of the Court of Appeals' opinion are that specialized terms not defined in consulting contracts can be interpreted through use of parol evidence, which can include testimony of the consultant and an expert practitioner about the meaning of the term within their field, and that their testimony trumps the differing view of the client; indeed, the client's testimony about its subjective view can be disregarded, with the result that there is no dispute of material fact standing in the way of granting summary disposition. And so that is how, when words may have different meanings, the Court of Appeals determined who is master.

But it gets "curiouser and curiouser'" as Alice said in Carroll's *Alice in Wonderland*. If "wetland review" was plain language, was it necessary to consider deposition testimony of the consultant and an expert about what it meant? Was such testimony relevant, in light of the court's own

precedent that usage or custom of trade does not define a contract term unless the other party knew of and assented to that meaning, or that an ordinary person would have known of it?[2] When parol evidence was considered, did precedent preclude summary disposition?[3]

It may be that the decision is really based on facts asserted in the defendant's brief but not in the court's opinion. According to the brief, the deposition transcript of one of plaintiff's principals included:

> Q: You would agree with me that that sentence tells you there are potential wetlands on the site?
> A: Yes.

And plaintiff's expert testified:

> Q: . . . My question is: that sentence also alerts the reader to potential wetlands through the site?
> A: Yes.
> Q: It also suggests that if the property is going to be developed that a wetland delineation should be done; correct?
> A: Correct.

Deposition testimony of plaintiff's appraiser and real estate agent was similar. With one of plaintiff's principals, two of its advisors, and its expert all agreeing that the report provided notice of possible wetlands on the property, the court may have decided that, whatever the exact meaning of the contract or how it was determined, the plaintiff had obtained the information it sought, had no claim for breach of contract, and the case could end with summary disposition.

As to the negligence claim, the Court of Appeals stated that there is a threshold inquiry of whether a violation of a legal duty was alleged that was distinct from the contractual obligation. The plaintiff alleged that the consultant was negligent in communicating the results of the wetland review and in answering inquiries about the property, specifically, by assuring one of plaintiff's principals that they were "good to go" and would "be fine." The court concluded that

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[2] "A general principle of contract law is that, even where such usage or custom is well established, it is not controlling if only one party meant the usage or custom to be operative and the other party had no reason to know of this interpretation. . . . Before a usage or custom of trade, otherwise affirmatively proved to exist, can be invoked to construe a contract, it first must be shown that the party against whom it is asserted knew of the usage and had reason to know that the other party assented to the words of the contract in accordance with it, or that, if the party against whom it is asserted did not know of the usage, an ordinary person in that party's position would have known of it." *Schroeder v. Terra Energy, Ltd.*, 223 Mich App 176, 183 (1997), lv den 458 Mich 863 (1998) (court's citations omitted).

[3] "Where a contract is to be construed by its terms alone, it is the duty of the court to interpret it; but where its meaning is obscure and its construction depends upon other and extrinsic facts in connection with what is written, the question of interpretation should be submitted to the jury, under proper instructions." *Klapp v. United Insurance Group Agency, Inc.* 468 Mich 459, 468 (2003) (court's citation omitted).

all of the plaintiff's claims arose from the contract, and defendant had no separate duty to assess the property or communicate the condition of the property other than as imposed by the contract. As to the consultant's assurances, the court found that they arose from the contractual duty of the consultant to communicate the results of its assessment and wetland review, including opining as to whether there were potential wetlands on the property, therefore, the assurances did not arise from a duty separate from the contract that could support a negligence claim.

> "Everything's got a moral, if only you can find it."—The Duchess, in Carroll's *Alice in Wonderland.*

The morals to this story not only cover contract interpretation but go beyond it, specifically:

- Facts matter—this case may really have been won through the deposition testimony, more than through the arguments of the advocates and the legal reasoning applied by the judges.
- Environmental lawyers really are needed—in a negative way, this case illustrates the value of retaining environmental counsel in a significant transaction, and especially of retaining counsel early, before contracting for environmental due diligence.
- Environmental consultants, and their lawyers, take heart—this case shows that courts may interpret contractual uncertainties in favor of consultants, determining and applying the terminology used in the practice, even when the client does not have the business sophistication of a full-time commercial developer.

> "Begin at the beginning and go on till you come to the end: then stop."—the King, in Carroll's *Alice in Wonderland*.

Thanks to those who provided background documents from this case.

Michigan Court of Appeals Upholds DNRE Listing of Wild Hogs as a Prohibited Species

By Christopher J. Dunsky, Christopher J. Dunsky PLLC

On March 1, 2012, the Michigan Court of Appeals upheld a Department of Natural Resources and Environment (DNRE) order that declares wild swine to be a prohibited species under the Michigan Invasive Species Act (ISA), MCL 324.41301 et seq., and requires wild game ranches and others who possess such animals to dispose of them. Michigan Animal Farmers Ass'n v. Dep't of Natural Resources and Environment, Mich Ct App No. 305302 (unpublished). Although this is the first time an appellate court has interpreted key provisions of the ISA, the Court of Appeals denied the Department of Attorney General's request for publication of the decision.

The ISA, which was enacted in 2003, identifies by name a large number of plants, birds, crustaceans, fish, mollusks, and insects as prohibited species. MCL 324.41301(1)(c). The ISA declares it illegal to possess a live plant, animal, or insect that is a member of a prohibited

species. The ISA was amended in 2009 to authorize the Natural Resources Commission (NRC) to add to the lists of prohibited species if the species to be added satisfies certain requirements, as discussed below. Also in 2009, Governor Jennifer Granholm transferred the NRC to the Department of Natural Resources, which was later merged with the Department of Environmental Quality to form the DNRE. The two departments were again separated by an Executive Order issued by Governor Rick Snyder in 2011.

On December 9, 2010, the Director of the DNRE issued an administrative order that added wild swine to the list of prohibited species under the ISA. Although the order was originally effective July 10, 2011, a second order was issued delaying the effective date until October 8, 2011. The DNRE also declared that it would defer enforcement of the order until March 31, 2012, to allow those who possessed now-prohibited wild swine to get rid of them.

In May 2011, the Michigan Animal Farmers Association (MAFA), whose members own wild game ranches in Michigan, filed a complaint in Ingham Circuit Court seeking declaratory and injunctive relief regarding the order. The complaint asserted three theories: 1) the DNRE director had no authority to issue the order; 2) wild swine do not meet the statutory requirements to be a prohibited species under the ISA; and 3) the order unconstitutionally deprived MAFA's members of property without compensation. After considering cross-motions for summary disposition, the circuit judge ruled in favor of DNRE; MAFA appealed.

The Court of Appeals first considered whether the DNRE Director had authority to add to the list of species that are prohibited by the ISA. MAFA argued that the NRC retained listing authority because Executive Order 2009-45 did not explicitly include that authority among those transferred to the DNRE. After extended discussion, the court concluded that Executive Order 2009-45 had effectively transferred the NRC's authority to add species to the ISA list, even though the order did not explicitly identify that authority, because the transfer of the NRC to the DNRE was a "type II transfer" under the Executive Organization Act, MCL 16.101 et seq. By statute, type II transfers transfer all authorities of the unit being transferred to the department or unit that receives the transferred unit.

The court then considered whether wild swine satisfy the statutory criteria for listing as a prohibited species. The ISA provides criteria for both mandatory and discretionary listing of a species. The Court of Appeals addressed whether wild swine meet the criteria for mandatory listing, which are as follows:

1. the species is "not native" to Michigan;

2. the species "is not naturalized" in Michigan, or, if naturalized, "is not widely distributed" in Michigan; and

3. the species either "has potential to harm" human health or the environment, or effective techniques to manage or control the species are not available. MCL 324.41302(3).

The ISA does not define either "native" or "naturalized." MAFA argued that "native" should be interpreted as having the same meaning given in the Animal Industry Act (AIA) at MCL 287.705(5). The court rejected that argument, reasoning that those statutes should not be construed in *pari materia* because although the ISA and the AIA both deal with animals, they do not share the same general purpose and do not relate to the same subject matter. After deciding that it should interpret "native" and "naturalized" according to traditional rules of statutory construction, the court spent relatively little time on the issue. Relying heavily on a definition in a general-use dictionary, the court held that wild swine are not "native" to Michigan because they do not naturally originate here, but were imported from abroad.

Whether wild swine meet the second criterion for listing (not naturalized in Michigan, or if naturalized, not widely distributed) is a more difficult question. The court again relied on a general-use dictionary that defines "naturalize" as "to introduce [a plant or animal] into a region and cause them to flourish as if native." In deciding whether wild swine are "naturalized" in Michigan, the court focused on animals that are kept on game ranches or farms rather than those that have escaped to the wild, and concluded that the former, at least, are not "naturalized" because "they cannot properly be said to be flourishing as if native to the state." The court also noted that even if swine on ranches or farms were considered to be "naturalized," they would nonetheless satisfy the second listing criterion because they are not "widely distributed" in Michigan. Unfortunately, the court did not provide record citations or other support for these conclusions, nor did it discuss whether swine that have already escaped (in contrast with swine that remain confined on ranches) can be considered "naturalized." DNRE's website states that between 1,000 and 3,000 feral swine are now present in 72 of Michigan's 83 counties. The court does not appear to have considered whether these numbers show that escaped swine are now "flourishing as if native" or are "widely distributed."

The court then briefly discussed the third statutory criterion, whether either 1) swine have the potential cause harm or 2) effective techniques for managing or controlling swine are available. The court concluded without detailed discussion that the trial record supported the circuit court's conclusion that swine have the potential to cause harm; the court, therefore, did not decide whether effective management/control techniques are available. The Court of Appeals decision does not explain whether the conclusion that swine have potential to cause harm applies only to escaped swine or also to swine that remain confined on ranches or farms.

Because swine meet all three statutory requirements for mandatory listing, the Court of Appeals affirmed the trial court's upholding of the DNRE order listing wild swine as a prohibited species under the ISA.

With regard to MAFA's claim for unconstitutional taking of property without compensation, the Court of Appeals held that the trial court did not abuse its discretion when it declined to enjoin DNRE's order, noting that the order would not cause MAFA's members to immediately lose their property, and that they may seek monetary relief in the Michigan Court of Claims.

The Court of Appeals decision may not be the last word on the validity of DNRE's effort to prohibit possession of wild swine in Michigan. Although MAFA did not apply for Michigan Supreme Court review of the Court of Appeals decision, legal challenges similar to those raised by MAFA remain pending in four circuit courts. Finally, the Attorney General has received several notices of intent to sue the state in the Court of Claims for damages resulting from alleged uncompensated takings of property.

Fracking the Great Lakes: Is Michigan a Model Shale State?

By Matthew T. Dobbins[1]

Across the country, states are coping with a rapid expansion in natural gas drilling.[2] Hydraulic fracturing, or "fracking," has become an increasingly popular method of extracting natural gas, allowing operators to reach previously un-extractable deposits by drilling deep into the ground and injecting fluids to fracture shale formations and release gas deposits from within.[3] Because this process relies on millions of gallons of water, serious concerns are being raised as to what the effects will be when the process is not performed properly, and whether that could pose a threat of contamination to local water resources. While Michigan has a long history with vertical fracking, these horizontal fracking methods are newer, and their long-term effects unknown.[4] The recent and unprecedented rise in such drilling has many of the state's residents skeptical of the technique's safety,[5] and environmental groups are calling for stricter regulations to ensure the protection of Michigan's irreplaceable water resources.[6] Recently, the Obama Administration issued an Executive Order coordinating federal efforts to regulate fracking in a manner that ensures "safe and responsible unconventional oil and gas development."[7]

This article explores the potential impacts of fracking in Michigan and offers a regulatory framework for environmental protection that incorporates lessons learned from other states. The first section reviews and analyzes Michigan's oil and gas regulations generally, and looks at

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[2] See generally Wiseman, *Untested Waters: The Rise of Hydraulic Fracturing in Oil and Gas Production and the Need to Revisit Regulation*, 20 Fordham Envtl L Rev 115 (2009) (finding that most states where fracking occurs experienced some environmental impact from drilling).

[3] Arthur *et al.*, *Evaluating the Environmental Implications of Hydraulic Fracturing in Shale Gas Reservoirs*, ALL Consulting 2-3 (2008).

[4] Clean Water Action Michigan, *Natural Gas Drilling: The Facts on Fracking* 1 (2010), *[hereinafter Clean Water Action].*

[5] Lynch, *Gas Drilling Technique Sparks Fears in Michigan*, Detroit News (Oct. 4, 2010).

[6] McWhirther, *'Fracking' in Focus: Environmental Groups Petition State for Tighter Drilling Regulations Following Oil & Gas Discovery*, Morning Star Publishing (Nov. 24, 2010).

[7] Restuccia, *Obama Order Coordinates Federal Oversight of 'Fracking,' Gas Development*, E2 Wire (Apr. 13, 2011).

some of the recent changes the State has made in response to initial concerns that have been expressed. The second section provides a brief history of fracking in Michigan, noting the shift from vertical to horizontal fracking. Third, the article reviews some of the potential concerns with fracking related to risks involving water contamination, public disclosure of chemical additives, and the ultimate disposal of drilling waste. The fourth section suggests certain changes to Michigan's laws and regulations that could help ensure safe and responsible natural gas development that serves the interests of industry and the people of Michigan. Finally, the conclusion of this piece argues that improved regulations on fracking could allow Michigan to retain control of its regulatory program with respect to hydraulic fracturing in the event that the federal Environmental Protection Agency (EPA) chooses to regulate hydraulic fracturing.

I. CURRENT LAWS & REGULATIONS

Part 615 of Michigan's Natural Resources and Environmental Protection Act[8] (NREPA) covers oil and gas wells, while the Office of Geological Survey (OGS) of the Michigan Department of Environmental Quality (DEQ) promulgates and enforces rules relating to oil and gas exploration and production in Michigan. Generally, Michigan law prohibits waste in the development of oil and gas resources.[9] The act defines "waste" broadly to include unnecessary damage to underground freshwaters, soils, animals, or aquatic life."[10] NREPA directs regulators to safeguard the state's environmental resources in the course of energy development. Michigan's legislature has imposed an outright ban on oil or natural gas drilling beneath the Great Lakes, their connected bays or harbors, or connected waterways.[11] Additionally, Michigan is part of the Great Lakes Compact (the Compact),[12] which is a binding agreement among Illinois, Indiana, Michigan, Minnesota, New York, Ohio, Pennsylvania, and Wisconsin that serves to limit large water withdrawals.[13] Michigan law requires that all water withdrawals of greater than 100,000 gallons a day, including those from groundwater sources, utilize an online water withdrawal assessment tool[14] and determine if the use will cause an adverse impact on aquatic resources.[15] However, when the Michigan Legislature ratified the Compact, it exempted oil and gas operators from the Compact's requirements.[16] Thus, a legislative loophole exists in one of the state's primary water protection measures.

A. Application of Statutes & Regulations to Fracking

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[8] 1994 PA 451, as amended, MCL 324.6501 *et seq.*

[9] MCL 324.61504.

[10] *Id.* at 324.61501(q)(i)-(ii).

[11] MCL 324.6150 (2011).

[12] Pub L No 110-342, 122 Stat. 3739 (2008).

[13] *Id.*

[14] The state's Water Withdrawal Assessment Tool is designed to estimate water withdrawal impacts on nearby streams and rivers. Use of the tool is required for any withdrawal of over 70 gallons per minute from the waters of the state, including all groundwater and surface water sources. *See* *Michigan's Water Withdrawal Assessment Tool*, MIWATT, (accessed Jan. 11, 2012).

[15] See MCL 324.32701 *et seq*. (2011). The tool also addresses cumulative impacts based on water accounting files the state must maintain under the law. *Id.* at 324.32706e (2011).

[16] *Id.* at 324.32727(1)(a) (exempting withdrawals undertaken pursuant to activities under Part 615, oil and gas regulations).

Although not referenced directly, portions of Michigan's current laws and regulations cover fracking. Fracking introduces water and other chemicals into shale formations, and Michigan law applies to methods that introduce water and other substances into a producing formation.[17] Therefore, any operator fracking a well in Michigan must comply with the general requirements of NREPA and its accompanying regulations.

1. Public Disclosure

At first glance, Michigan's rules show promise with providing information on the variety of hazardous ingredients in fracking fluid. Prior to fracking a well an operator must submit a permit application including: (i) contact information for the applicant; (ii) the well name and number; (iii) the location of the proposed well; (iv) the proposed depth of the well; and (v) the location of the proposed target formation.[18] Operators must also prepare and submit a chemical analysis for each type of fluid injected into the well.[19]

However, the current rules raise several concerns, the first of which is public access to this information. For example, Michigan's regulations do not require disclosure of the applicant's chemical analysis to the public or the local unit of government. Although the federal Emergency Planning and Community Right to Know Act[20] requires companies to post Material Safety Data Sheets (MSDS) for hazardous chemicals stored onsite, an exemption exists for quantities of chemicals below 10,000 lbs.[21] As a result, operators that store chemicals below this threshold face no reporting requirement. Furthermore, the MSDS is not a detailed analysis of the specific chemical concentration used, and the public generally has no right to access a MSDS.[22] This lack of information only serves to exacerbate the public's fear of the fluids operators inject into the ground,[23] harming both the industry and the public by way of the increased anxiety related to potentially hazardous drilling fluids.

NREPA also requires that the DEQ provide application information to the county and directly to any municipality with a population of 70,000 or more located in the area of a proposed well.[24] The local government may provide comments to the application, which the DEQ must consider in its review.[25] However, at the same time, the law requires that OGS keep all "well data and samples" confidential upon the request of the well owner.[26]

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[17] *Id.* at 324.61506(i) (2011).
[18] *Id.* at 324.61525(3)(a)-(g) (2011). The name of the surface owner and whether or not hydrogen sulfide gas will be used in drilling must also be addressed in a permit application. *Id.*
[19] R 324.201(j)(iv)(C) (2011).
[20] 42 USC 1101 *et seq.* (2011).
[21] 42 USC 1123(f)(1)(A) (listing threshold reporting requirements).
[22] See Zoback *et al.*, *Addressing the Environmental Risks from Shale Gas Development*, World Watch Institute 10 (July 2010), [*hereinafter World Watch Report*].
[23] *Murky Waters: Corporate Reporting on Water Risk*, Ceres Oil & Gas Sector (2009), *(accessed Jan. 11, 2012) [hereinafter Ceres Oil & Gas].*
[24] MCL 324.61525(4) (2011).
[25] *Id.*
[26] *Id.* at 324.61506(d) (2011).

Although this limited information is shared with local governments, the OGS sometimes allows operators to avoid information sharing requirements.[27] For example, operators may start test drilling without a permit under one section of the statutes and OGS will not require notification of drilling to the public.[28] If the operator decides the well warrants full production, OGS converts the mineral well permit to a permit for completion of the well.[29]

Public citizens cannot appeal these decisions.[30] Despite the administrative rules allowing an interested party to contest MDEQ's orders and actions, the agency takes the view that these permits do not fall under those provisions.[31] The owner of a well may also keep fracking fluid information confidential from the public, because the DEQ has adopted the position that the confidentiality provisions of Michigan's Freedom of Information Act (FOIA) prevent the disclosure of well information to members of the general public.[32] These administrative games prevent public involvement, and likely contribute to the public's fears, apprehension, and even outright opposition to fracking. Neither the public interest nor the industry's goals are furthered by restricting access to this information. Indeed, many operators support fluid disclosure in an effort to calm public concerns over fracking fluid.[33]

2. Drilling Wastewater Storage

Before an operator can construct any surface facilities, such as fluid injection pumps, piping and storage tanks, at a drill site, it must first obtain OGS approval.[34] Operators must keep complete records covering injection pressures, the volume of fluids injected, and the volume of produced water, or "flowback," that returns to the surface during all stages of operation.[35] This information provides baseline data to support leak detection systems and ensures that the same amount of flowback that returns to the surface ultimately leaves the site for disposal.

In order to protect drinking water from drilling activities, the state's rules mandate that operators place all surface facilities at least 300 feet from existing and reasonably identifiable freshwater wells,[36] as well as existing structures for public and private occupancy, and areas of public recreation.[37] The state regulations also require that operators prepare a hydrological

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[27] See Topp, *Deep Shale Natural Gas in Michigan: Opportunities, Problems, and a Shot in the Dark*, 90 Mich Bar J 32, 33-34 (2011) (finding that MDEQ and OGS cover fracking wells with a "cloak of bureaucratic confidentiality).
[28] *Id*. at 33 (citing MCL 324.62509(5) (2011); R 299.2367 (2011); R 324.416(3) (2011)).
[29] *Id*. (citing R 299.2323 (2011)).
[30] *Id*. (citing *Star Township v. Michigan Dep't of Envtl. Quality*, Case No. 08-1054-AA, (Ingham Co Cir Ct 2009)). Another option for operators is to apply for a permit to drill the vertical portion of the well first and request that MDEQ keep this information confidential. *Id.* If the operator decides to continue with the horizontal drilling phase of the well, MDEQ will grant the permit as an administrative matter, offering no opportunity for notice or public comment. *Id.*
[31] *Id.* (citing *Star Township v. Michigan Dep't of Envtl. Quality*, Case No. 08-1054-AA, (Ingham Co Cir Ct 2009)).
[32] *Id.* at 34 (citing MCL 324.62509(5) (2011); R 299.2367 (2011); R 324.416(3) (2011)).
[33] Casselman, *'Fracking' Disclosure to Rise, Gas Drillers Begin Supporting Laws Requiring Them to List Chemicals They Use*, The Wall St. J. (June 20, 2011).
[34] R 324.504(4) (2011).
[35] *Id.* at 324.416 (2011).
[36] *Id.* at 324.504(2)(a) (2011).
[37] *Id.* at 324.503(2)(b)-(d) (2011).

investigation of the drill area in order to establish the local background water quality.[38] OGS receives a report based on that investigation from the operator on a semiannual basis.[39] Operators must also submit a report to OGS detailing the various leak detection and containment measurements at a well site.[40] Regulations prohibit storing fracking fluid in earthen pits or open impoundments,[41] so operators store flowback fluid from the well in steel tanks,[42] and provide for secondary containment in the event of spills.[43] Storage tanks and treatment equipment must be placed 800 to 2,000 feet away from public water wells, depending on the type of well.[44] The rules also require that the capacity of the secondary containment system is sufficient to hold at least one and a half times the capacity of the enclosed tank.[45] Tertiary containment, complete with its own leak detection system, can be utilized to supplement secondary measures.[46] If any of the storage tanks are more than 300 feet from the well, regulations require that the operator prepare an environmental impact assessment.[47] Additionally, all operators must take reasonable measures to protect existing land use through methods such as berming, screening and protecting road access.[48]

Many of these rules place Michigan ahead of the pack when it comes to flowback storage. The setback requirements for surface facilities from public wells parallel the aggressive setback proposals advocated by environmental groups.[49] The containment measures also appear strong. By prohibiting the construction of centralized impoundments (one of the riskier methods of flowback storage), and requiring the use of steel tanks to protect against local weather and other environmental conditions that could result in spills, these OGS rules demonstrate a proactive approach to onsite pollution prevention. Reducing the threat of spills lowers the threat of surface and groundwater contamination and ensures sustainable development of a drill site.

3. Flowback Disposal

Michigan provides two options for flowback disposal. Generally, the regulations direct the disposal of oil and gas fluid waste into Class II injection wells,[50] and permittees have the responsibility to arrange for such disposal. However, an operator may also transfer waste

[38] *Id.* at 324.1002(3)(a) (2011).
[39] *Id.* at 324.1002(8) (2011).
[40] *Id.* at 324.1002(2) (2011).
[41] *Id.* at 324.501 (2011); see also *id.* at 324.702 (2011) (same).
[42] Clean Water Action, *supra* note 4 at 2.
[43] R 324.504(7) (2011). Secondary containment involves placing a liner, berm, dike, or other measure around the tank in order to contain any possible spills from the tank.
[44] *Id.* at 324.301(vi) (2011).
[45] *Id.* at 324.1002(1) (2011).
[46] *Id.* at 324.1002(3)(b)(ii) (2011).
[47] *Id.* at 324.504(4)(a) (2011).
[48] *Id.* at 324.504(4)(d) (2011).
[49] See Otsego Co Conserv Assoc, *Gas Drilling, Hydraulic Fracturing, and Water Quality* 4 (Mar. 2010), [*hereinafter OCCA Report*] (providing setback proposals for storage from streams, ponds, lakes, reservoirs, as well as public and private wells).
[50] R 324.703 (2011). Class II Injection Wells are permitted under the Safe Drinking Water Act's Underground Injection Control program. See 40 CFR 144-148 (2011).

brines if the brine meets the chemical concentration limits set forth in the rules.[51] Regardless of the method chosen for disposal, operators must maintain records for two years detailing the dates, volumes, recipients, transporters, destinations and proof of delivery. These measures are intended to ensure that operators account for all waste from a drill site.[52]

Presently, no requirement exists for analyzing flowback when it returns to the surface. Additionally, limiting disposal of oil and gas waste to deep injection wells actively discourages recycling and other innovative techniques for addressing flowback fluid disposal. There are only 1,519 Class II waste disposal injection wells in Michigan.[53] This number sounds less impressive when one considers the decades of fracking in the Antrim shale, discussed below, and other oil and gas projects in the state. These wells represent a finite method for disposal, and also come with potential problems. Upward or lateral migration of waste fluids from injection wells can contaminate water supplies as well as deposits of other subsurface minerals, or the surface property itself.[54] One Michigan environmental group has reported the existence of thousands of such leaks from current oil and gas injection wells.[55]

There is some evidence of increased seismic activity, including earthquakes, due to the increased subsurface pressures caused by deep injection wells for oil and gas waste.[56] For example, states such as Ohio have documented recent seismic activity tied to disposal injection wells.[57] Michigan's underlying geology contains numerous fault lines, many of which run through the northern part of Michigan where fracking operations have increased in prevalence.[58] Requiring the disposal of flowback in these wells poses a major risk to the environment, and poses a long-term challenge to the viability and sustainability of natural gas development in Michigan. It also denies operators the flexibility to use innovative techniques to handle fracking waste.

B. DEQ's Recent Response to Fracking

On May 25, 2011, the DEQ issued new instructions in response to the public's growing concerns over fracking.[59] Operators must now send their MSDSs directly to the state, which will post the information on the DEQ website.[60] However, as noted above, a MSDS simply lists the characteristics of the chemical additives and their potential health and environmental effects, not actual chemical concentrations in use at any particular well location. The DEQ also took action with respect to water withdrawals. Although OGS already prohibits surface water

[51] *Id.* at 324.705 (2011).
[52] *Id.* at 324.705(4) (2011).
[53] See U.S. Envtl. Prot. Agency, *Underground Injection Wells Region 5*, (last visited Jan. 16, 2012).
[54] See Grobbel, *Deep Well Injection: A Position Paper*, Friends of the Jordan River Watershed 17 (Sept. 16, 2010).
[55] *Id.* at 16.
[56] *Id.* at 26.
[57] McCalllister, *Avoiding Fracking Earthquakes: Expensive Venture*, Reuters (Jan. 3, 2012).
[58] *Id*. at 17-18.
[59] Mich Dep't Envtl. Quality, Instruction No 1-2011, *High Volume Hydraulic Fracturing Well Completions* (May 25, 2011).
[60] *Id.*

withdrawals for oil and gas drilling,[61] the exemption for oil and gas operations in the Great Lakes Compact from Michigan's Water Withdrawal Assessment Tool (MWWAT) tempered the effectiveness of the surface water withdrawal prohibition. The new permit conditions cover water withdrawals of a total of 100,000 gallons of water per day when averaged over a consecutive 30 day period.[62] Any operation meeting this trigger must utilize MWWAT and report the results to OGS.[63] If the assessment shows an adverse impact, the operator cannot not withdraw the water except as specifically approved by the OGS.[64]

These new permit requirements further the state's preference for water resource protection, and take a small step towards increasing communication with and disclosure to the public. Requiring utilization of MWWAT ensures that the DEQ knows the cumulative impacts of multiple withdrawals for fracking operations. However, room for improvement remains. MWWAT places the burden on the state to address withdrawals that have adverse impacts but it does not provide incentives to think about smarter, more sustainable water choices for drilling operations. Moreover, an MSDS, while helpful, does not provide the public with specific information on chemical concentrations.

II. FRACKING IN THE GREAT LAKES: MICHIGAN

The Great Lakes Basin is one of the largest fresh water systems in the world.65 Only about 1% of the Great Lakes Water is replenished annually via the natural hydrologic cycle,[66] and it is groundwater sources that supply 48% to 79% of the water in the Great Lakes tributaries in a given year.[67] Millions of people in the region rely on these waters for drinking water supplies,[68] and the Great Lakes provide nearly endless opportunities for recreation and commercial activities, all of which contributes billions to local economies.[69]

While shale gas is an important resource that Michigan needs to develop, it must do so in a responsible manner. Unless regulated properly, increased natural gas drilling could conflict with the continued livelihood of Michigan's water-based economy. Indeed, some find it odd that the state exalts the benefits of its waters via the "Pure Michigan" tourism campaign while simultaneously encouraging a drilling technique that some say threatens those same waters.[70]

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[61] R 324.404 (2011).
[62] Mich Dep't Envtl. Quality, *Michigan Imposes Special Permit Conditions for Wells that are to be Hydraulically Fractured (2010)*.
[63] *Id.*
[64] *Id.*
[65] Int'l Joint Comm, *Protection of the Waters of the Great Lakes: Final Report to the Governments of Canada and the United States* 1 (2000).
[66] *Id.*
[67] Great Lakes Science Advisory Board Report to the Int'l Joint Comm, *Groundwater in the Great Lakes Basin* 8 (Feb. 2010).
[68] *Id.*
[69] *Great Lakes Concerns*, Mich In Brief (Apr. 1998), (last visited Mar. 17, 2011).
[70] Sachteleben, *Hydraulic Fracturing Gas Leaks and 'Pure Michigan' Make Strange Bedfellows*, Yahoo News (Feb. 11, 2011). The Pure Michigan campaign is a tourism-driven ad campaign released by the state. It focuses on

Although fracking a natural gas well requires roughly the same amount of water used to grow 7.5 acres of corn,[71] allowing the additional water withdrawals of millions of gallons from the state's available groundwater sources for fracking activities could result in greater declines in water levels than normal. This could result in adverse impacts on the economy of the Great Lakes region and its ecosystems.[72]

A. Fracking in Michigan—Antrim Shale

The Antrim shale formation covers portions of the northern Lower Peninsula,[73] and is one of the most active natural gas extraction locations in the lower 48 states.[74] Since the 1980s, Michigan has fracked over 12,000 wells in the Antrim shale.[75] Production from the Antrim shale reached its height in 1998, but has declined significantly in recent years.[76] Fracking an Antrim well requires an average of 50,000 gallons of water.[77] Unlike most other shale formations, the depth of the Antrim ranges from 600 feet to barely 2,000 feet.[78]

Importantly, development in the Antrim shale utilized *vertical* fracking. If you were to imagine a series of isolated pockets of natural gas running roughly parallel to the surface, these vertical drilling techniques involve drilling straight down to reach a one such pocket; a single target formation. Unfortunately, these more traditional, vertical wells are limited in their ability to access remote gas deposits.[79] Contrast this with the newer, drilling techniques, where a well is drilled vertically and then changes directions to continue horizontally through the rock to a maximum depth of 10,000 ft., reaching the other pockets of natural gas deposits in the shale formation.[80]

B. Fracking in Michigan—Collingwood Shale

The new focus on fracking in Michigan is the Collingwood shale formation. This formation covers almost 10 counties across Michigan's northern Lower Peninsula,[81] and the depth of the

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Michigan's lakes, beaches, and aquatic recreation activities. See Mich Econ Dev Corp, *Pure Michigan Travel and Tourism Site*, (2011), (last visited Mar. 29, 2011).

[71] Harding, *Hydraulic Fracturing Technology is Key to Michigan's Energy Future*, Times-Herald Newspaper, (Dec. 3, 2010).

[72] See Bielecki, *Managing Resources with Interstate Compacts: A Perspective from the Great Lakes*, 14 Buff Envtl L J 173, 173 (2007) (stating the need for a create a management system capable balancing between resource conservation and human needs)

[73] *Antrim Shale*, OilShaleGas.com, (accessed Apr. 12, 2012). The Antrim shale is concentrated in Ostego and Montmorency Counties, with smaller areas covering Kalkaska, Crawford and Oscoda Counties. *Id.*

[74] Pless, *Regulating Hydraulic Fracturing: States Take Action*, Nat'l Conf State Legislatures 1 (Dec. 2010).

[75] Mich Dep't of Envtl. Quality, Office of Geological Survey, *Hydraulic Fracturing of Natural Gas Wells in Michigan* (Sep. 23 2010).

[76] Brathwaite, *Shale-Deposited Natural Gas: A Review of Potential*, Cal Energy Comm 12 (May 14, 2009).

[77] *Id.*

[78] Arthur *et al.*, *supra* note 3, at 5 exh 3. Cf. *id.* (citing the Barnett shale's depths range of 6,500 to 8,500 feet).

[79] *Hydraulic Fracturing of Oil & Gas Wells Drilled in Shale*, Geology.com, (accessed Apr. 12, 2012).

[80] See Zoback, *supra* note 22, at 3.

[81] See Kellman, *Michigan Says It's Ready for Next Drilling Boom*, Circle of Blue (Aug. 3, 2010).

formation ranges from 3,000-10,000 feet.[82] Currently, there are at least 7 permitted horizontal wells, and two more applications are pending.[83] The original test well in the Collingwood formation produced an average of 2.5 million cubic feet of gas a day for its first 30 days of operation.[84] This high production rate drew the interest of drilling companies, but many Michigan residents remain skeptical about the safety of fracking.[85]

C. Differences Between the Formations

Based on its history of handling drilling operations in the Antrim shale formation, Michigan may appear to be experienced with hydraulic fracturing generally. However, the characteristics of that shallower formation leave the state unprepared for fracking the deeper wells of the Collingwood shale. In fact, one former administrator for Michigan's oil and gas agency recently commented that he does not believe state regulations can handle expanded fracking operations in the Collingwood.[86]

Both the Collingwood and Antrim formations are primarily concentrated in the northern Lower Peninsula, but historically, operators only used vertical fracking in Antrim wells due to the shallow depth of that formation.[87] As stated above, more than 12,000 such wells have been drilled, so there are now large volumes of produced water from these Antrim wells which limit the availability of Class II wells for injection of flowback from newer wells.[88] Furthermore, one township in northern Michigan with an Antrim well has already reported a small gas leak, believed to be caused by the utilization of these new fracking techniques.[89] Although sufficient in many respects, Michigan's current laws and regulations may need further updating in order to ensure safe development of these shale formations.

III. POTENTIAL ENVIRONMENTAL CONCERNS RELATED TO FRACKING

A. Fracking Fluid—What is Going into the Pipe

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[82] Jones, *Geologists' Mission in Kalamazoo and Northern Michigan is Still a Bit Below the Surface*, Kalamazoo Gazette (Oct. 1, 2010).

[83] Mich Dep't Envtl. Quality, *Utica-Collingwood Permit and Application Activity* (as of 1/10/2012). The Pioneer well, the first well drilled in the Collingwood, is located in Missaukee county; its auction generated a record-shattering $178 million sale. *See* Clean Water Action, *supra* note 3, at 1. Missaukee county is in northern central Michigan and is home to several lakes and wildlife habitats. *Missauke County, Michigan*, Missaukee County (last visited Jan. 9, 2012).

[84] See Schneider and Ramsey, *Michigan's New Natural Gas Rush: Energy and Water in Play*, Circle of Blue (Jul. 27, 2010).

[85] Lynch, *supra* note 5.

[86] See Kellman, *supra* note 81 (quoting Chris Grobbel, former MDEQ administrator stating that the differences between the Collingwood and Antrim shale warrant extra attention from the state).

[87] Tip of the Mitt Watershed Council, *Natural Gas Drilling & Water, An Overview of Hydraulic Fracturing for Natural Gas in Northern Michigan* 1 (2010).

[88] Michigan regulations require that disposal of oil and gas wastes occur in Class II deep injection wells. See R 324.703. Increased flowback from the Collingwood shale could potentially exhaust these wells as a source for disposal.

[89] See Sachteleben, *supra* note 70.

Fracking fluid is over 98% water and sand,[90] and depending on the rock formation, fracking can require from 1 to 8 million gallons of water.[91] The remaining 2% of the fracking fluid varies in chemical composition depending on the shale characteristics.[92] The nature and quantity of the chemicals used in fracking warrants disclosure so that residents near fracking wells are well informed of the risks to local water supplies.

Operators use chemical additives to counteract the presence of iron and natural bacteria in the shale that corrode drill equipment.[93] Of the nearly 300 useful additives, a typical fracking "cocktail" incorporates between three and twelve different chemicals.[94] For example, an operator may add gels for increased viscosity; acids for removing cement clogs in the drill; corrosive inhibitors (which can include possible carcinogens)[95] for the steel pipes; and biocides to kill natural bacteria in the shale.[96] Operators tailor each cocktail to the needs of a well, so there is no set formula for fracking fluid. While many companies conceal the content of their fracking fluid as a proprietary trade secret, studies of fracking waste show that the most commonly utilized fluids contain formaldehyde, acetic acids, citric acids, and boric acids, among other chemicals.[97] Although these chemicals make up roughly 1% of the total fracking fluid, over the life of a single well, anywhere from 672 to 2,672 tons of each additive is injected into the ground.[98]

B. Flowback—What is Coming Back Out of the Pipe

Anywhere from 10% to 40% of the fracking fluid returns to the surface as flowback during the production life a well,[99] generating up to two million gallons of flowback.[100] While in the ground, fracking fluid combines with salts, heavy metals and other naturally occurring materials.[101] Dissolved hydrocarbons, such as benzene, and radioactive materials like radium-226 can return to the surface at toxic levels.[102] Total Dissolved Solids (TDS) levels in the flowback ranges from 30,000 mg/L to 200,000 mg/L.[103] Additionally, the geological characteristics that support the formation of natural gas deposits also support the natural

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[90] Arthur *et al.*, *supra* note 3, at 16.
[91] Vidic, *Sustainable Water Management for Marcellus Shale Development*, Univ of Pittsburgh, 5 (2010).
[92] American Petroleum Inst, *Water Management Associated with Hydraulic Fracturing* 11 (Jun. 2010), *[hereinafter API 2010].*
[93] *Id.* (citing the need for compounds in Fayetteville shale to ensure that iron does not reduce shale permeability).
[94] Pless, *supra* note 74, at 3.
[95] U.S. Envtl. Prot Agency, *N,N—Dimethylformamide*, (accessed Jan. 26, 2012). Side effects of acute exposure in humans include abdominal pain, nausea, and vomiting. *Id.*
[96] Arthur *et al.*, *supra* note 3, at 17-18.
[97] *Fracking: The Process*, Clean Water Action, (accessed Mar. 27, 2011).
[98] OCCA Report, *supra* note 49, at 3.
[99] See Vidic, *supra* note 91, at 9.
[100] NY State Dep't of Envtl. Conserv, *Supplemental Generic Environmental Impact Statement Chapter 5: Natural Gas Development and High-Volume Hydraulic Fracturing 5-97* (2009), (stating average flowback in Marcellus shale wells).
[101] Pless, *supra* note 74, at 3.
[102] See Kellman, *supra* note 81.
[103] *See* Vidic, *supra* note 91, at 9.

accumulation of uranium, which can also return to the surface with flowback.[104] Prior to disposal, operators generally store flowback water in lined pits, aboveground impoundments, or tanks located at the well site.[105] Every million gallons of flowback requires around 200 trucks to transport the waste for disposal.[106] In other states, one option for disposal is land application.[107] The high salinity of flowback fluid makes flowback a potential source for ice and dust control on surface roads.[108] Re-injecting the flowback water into nearby Class II deep injection waste disposal wells represents another option.[109] The regulations of the Safe Drinking Water Act pertaining to the Underground Injection Control program apply to these wells,[110] but this is not an available option for every state, due to differences in local geologies.[111] Furthermore, there are a limited number of these wells in each state, so the large volume of flowback water from the recent increase in fracking may quickly exhaust the availability of Class II wells as a viable disposal method.[112]

Another option for operators is to transport flowback to a Publicly Owned Treatment Works (POTW) for treatment and discharge.[113] However, this is a problematic solution because not every POTW retains the capability to treat the high TDS levels in flowback water.[114] Recycling and reusing the fluids would appear to be the best option, but that technique still requires further development. One company in Texas reported a recycling process that allowed reuse of approximately 80% of the flowback water from a well.[115] Other results are less promising, showing less than 50% of flowback recycled at a cost-prohibitive level.[116] Moreover, even recycling leaves behind salts and sludge that could contain contaminants.[117]

C. Other State's Experience with Fracking

[104] Arthur *et al.*, *supra* note 3, at 20.
[105] Wiseman, *Regulatory Adaptation in Fractured Appalachia*, 21 Vill Envtl L J 229, 260-265 (2010).
[106] Vidic, *supra* note 91, at 5.
[107] Arthur *et al.*, *supra* note 3, at 19. For example, Arkansas issued over 100 permits for one-time land applications across twelve commercial farms. *Id.*
[108] NY State Dep't of Envtl. Conserv., *supra* note 100, at 5-153 (citing Ohio for allowing land application of flowback after special state approval).
[109] API 2010, *supra* note 92, at 21.
[110] 42 USC 300h, *et seq.* (2011).
[111] See Reeder, *Creating a Legal Framework For Regulation of Natural Gas Extraction from the Marcellus Shale*, 34 Wm & Mary Envtl. L Pol'y Rev 999, 1012 (2010) (citing varying numbers of Class II wells in shale states).
[112] See Vidic, *supra* note 91, at 16 (citing a limited capacity of 1200 to 3000 barrels per day per well).
[113] *Id.* at 17.
[114] *Id.* POTW treatment methods cannot handle waters with high salinity; most studies show the max TDS level treatable to be 35,000mg/L. *Id.* Flowback waters will cause facilities to routinely exceed their TDS treatment capacity. See *id.* at 9 (citing flowback TDS levels of 30,000mg/L to 200,000mg/L).
[115] Fountain Quail Water Management successfully processed 5.7 million barrels of flowback water to recover over 4.5 million barrels of water for reuse. Arthur *et al.*, *supra* note 3, at 19.
[116] See Urbina, *Wastewater Recycling No Cure-All in Gas Process*, NY Times (Mar. 1, 2011), (showing that operators in the Marcellus shale only recycled 320 million gallons out of 680 million gallons).
[117] *Id.*

Fracking can be controversial, and its risks remain ill defined. For example, in Pennsylvania, residents reported their well water turning brown once fracking came to the area,[118] but the EPA recently determined that fracking did not contaminate their wells.[119] In 2009, a truck used in fracking operations turned over and spilled hundreds of gallons of diesel fuel.[120] In 2008, leaks from pipelines associated with drilling operations reached nearby wetlands and contributed to local fish kills.[121] And in August 2010, flowback stored onsite at a fracking well in a wastewater pit overflowed and contaminated a tributary for a high quality watershed in the local county.[122] Pennsylvania's numerous troubles with fracking ultimately led to a temporary moratorium on fracking.[123] In addition, in April of 2004, the state of Colorado fined Encana Oil and Gas over $300,000 for the company's contamination of West Divide Creek in Colorado.[124] State officials found benzene, toluene and other hazardous chemicals that were traced to improper cementing practices at a nearby well.[125]

A recent study released by the University of Texas challenges many of the assumptions that fracking is inherently unsafe and results in groundwater contamination.[126] The study found no evidence of aquifer contamination from hydraulic fracturing chemicals in the subsurface by fracturing operations, and observed no leakage from hydraulic fracturing at depth.[127] The study also concluded that many of reports of groundwater contamination are common in oil and gas development and are not unique to fracking.[128] Whether or not these effects are unique to fracking or endemic to energy development in general may remain open to debate, but in either case, it serves the interests of both the public and industry to ensure proper safeguards for the handling and disposal of flowback fluid. If anything, the University of Texas' study only reinforces the need for Michigan to take a hard look at its current regulatory framework for oil and gas development.

There are also potential concerns associated with flowback disposal. Disposing of flowback and associated brine via wastewater treatment plants can have cumulative impacts beyond the initial point of discharge.[129] One state's disposal methods for flowback can also have consequences for its neighbors, even when the water is treated. For example, in 2008, a wastewater treatment facility in West Virginia discharged diluted brine from flowback into the Monongahela River.[130] This discharge caused *Pennsylvania* to exceed water quality standards

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[118] Bateman, *A Colossal Fracking Mess*, Vanity Fair (Jun. 21, 2010).
[119] Banerjee, *EPA Finds Pennsylvania Well Water Safe After Drilling*, LA Times (Mar. 18, 2012).
[120] Bateman, *supra* note 118.
[121] *Id.*
[122] Robert Myers, *Environmental Dangers of Hydro-Fracturing the Marcellus Shale*, Lock Haven Univ (Feb. 22, 2011), (last visited Jan. 3 2012).
[123] Bateman, *supra* note 119.
[124] Myers, *supra* note 122.
[125] *Id.*
[126] See Separating Fact from Fiction in Shale Gas Development, Energy Inst, Univ of Texas (Feb. 29, 2012).
[127] *Id.*
[128] *Id.*
[129] Reeder, *supra* note 111, at 1013.
[130] Kasey, *Gas Drilling Brine Challenges Water Treatment Plants*, The State Journal (Dec. 15 2008).

for TDS.[131] These issues are not necessarily unique to fracking, but they do represent the risks that states with undeveloped regulatory programs will face unless steps are taken to address the impacts of increased natural gas drilling.

IV. REGULATORY PROPOSALS

A. Public Disclosure

The presence of hazardous chemicals in fracking fluid and public concerns should cut against a presumption of unrestricted confidentiality. In terms of public disclosure, Wyoming's rules provide an example of openness that still respects confidentiality concerns.[132] Operators in Wyoming must disclose the chemicals proposed for the fluid in their permit application.[133] Wyoming also requires confirmation of the chemicals actually used at a well.[134] Disclosure covers the chemical itself, its volume, concentration, and Chemical Abstracts Service (CAS) number.[135] Operators can seek trade secret protection for some chemicals, but must justify any claims to the Wyoming Oil and Gas Commission.[136] If operators in Michigan have proprietary information concerns, then they can apply for trade secret protection from the appropriate state agency. Opening up this process presents an opportunity to conduct baseline testing of drinking water sources near the well, and interested parties can use this information to either hold operators accountable if contamination occurs, or alternatively, to exonerate operators from false pollution claims. Wyoming's rules strike the balance Michigan needs to simultaneously reassure the public and encourage development.

Disclosure serves no purpose unless the public knows how to find the information, so a location-dependent notice method would help to ensure information goes to the right people, while also potentially reducing the regulatory burden on industry. For fracking operations in urban areas, OGS could require that operators publish notice in the local media, identifying the well location and the general information on the chemicals additives in the fluid. As one such example, Fort Worth, Texas, requires that operators publish basic notice of fracking activity in the local newspaper for 10 days.[137] As noted above, the OGS presently closes off the permit process from the public and stifles public comment by classifying potential fracking permits in different ways. If OGS is interested in improving public disclosure and potentially reducing opposition to fracking, the agency needs to adopt a more open public comment process.

As it stands, Michigan's citizens may already have other options if OGS continues to lag in this area, including resorting to the citizen-suit provisions of the Michigan Environmental Protection Act (MEPA).[138] MEPA allows any person to seek an injunction for "the protection of the air, water, and other natural resources and the public trust in these resources from pollution,

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[131] *Id.*
[132] See Letter from Tip of the Mitt Watershed Council to Office of Geological Survey 3 (2010).
[133] 055-003 Wyo Code R 45(d)(i).
[134] *Id.* at 45(h)(i)-(ii).
[135] *Id.* at 45(d)(ii).
[136] *Id.* at 45(f).
[137] Fort Worth, TX, Rev Ordinances ch 15, art II, 15-36(E)(2).
[138] MCL 324.1701-.1706.

impairment, or destruction."[139] Aggressive application of MEPA could serve as a vehicle for the public to force disclosure requirements on OGS and operators, but could also negatively impact the state by scaring away development.

MEPA contains a liberal standing requirement, allowing virtually any citizen to bring a MEPA claim[140] for the protection of the air, water or other natural resources from pollution, impairment or destruction.[141] It is reversible error for a trial court to defer to an administrative agency's conclusion that no pollution, impairment or destruction of a natural resource will occur.[142] If OGS remains unwilling to take public comment, a MEPA challenge could act as a vehicle for Michigan's citizens' concerns with fracking. The threat of MEPA may even cause OGS to change its approach to permit hearings, but could also negatively impact development by dragging out the permit process.

Michigan law also provides another option for public disclosure. As noted above, state law currently requires that the DEQ provide information regarding new wells to county governments and directly to any municipality with a certain population size and that the agency must respond to comments from that municipality.[143] Local governments can provide opportunities for backdoor public comment if they give public notice and hold local hearings on proposed fracking wells. Counties and municipalities could then pass comments on to regulators and the agency must reply to those comments. The city of Fort Worth already requires public notice and comment on all fracking permit applications.[144] There, the open process empowered the local community and forced a stronger oversight role over fracking projects.[145]

The inefficiency and uncertainty of the alternatives described above only reinforces the need for the state to step in and incorporate some new rules requiring more extensive public disclosure with respect to fracking activities. This information equips citizens, agencies and

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[139] *Id.* at 324.1701(1).

[140] See *Nemeth v. Abonmarche Dev, Inc*, 576 NW2d 641, 654 (Mich 1998) (Cavanaugh, J. concurring in part and dissenting in part) (noting that the Legislature granted standing to any individual to bring an action alleging undue harm to natural resources). In a 2005 decision, the Michigan Court of Appeals held that the standing doctrine limited the ability of a water conservation organization and plaintiffs residing along a stream and lake to sue under MEPA to prevent water pumping that would allegedly adversely impact a lake and wetlands. *Mich Citizens for Water Conserv v. Nestle Waters North Am., Inc.*, 709 NW2d 174, 211-13 (Mich Ct App 2005). However, in December of 2010 the Michigan Supreme Court explicitly overruled these limitations on MEPA standing. See *Anglers of the AuSable, Inc v. Dep't of Envtl. Quality*, 41 ELR 20056 (Mich 2010).

[141] MCL 324.1701(1).

[142] *West Michigan Environmental Action Council v. Natural Resources Comm*, 275 NW2d 538, 551-555 (Mich 1979). Merely because an agency witness testifies that issuance of a permit does not have MEPA implications does not make it so. See *Nemeth*, 576 NW2d at 655-657.

[143] MCL 324.61525(4).

[144] Fort Worth, Tex, Rev Ordinances ch 15, art II, 15-36(A)(I)-(2).

[145] In October of 2008, after local residents swarmed the meeting to protest a permit application for a well located within 300 feet of residential buildings, the council unanimously chose to reject an operator's fracking application. See Cady, II, *Drilling into the Issues: A Critical Analysis of Urban Drilling's Legal, Environmental and Regulatory Implications*, 16 Tex Wesleyan L Rev 127, 149 (2009).

public health officials with the knowledge they require to prevent and/or recognize environmental contamination, and to potentially limit its effects. Much of the public opposition from fracking seems to come from a lack of knowledge, so operators should support regulations that increase transparency and engage interested stakeholders because it could help to reduce local opposition to such projects.[146] Otherwise, fracking could face nonstop citizen suits and a patchwork of local requirements that could frustrate development. Indeed, there is growing support among industry for fracking fluid disclosure requirements.[147] Many operators now choose to voluntarily disclose the composition of their fracking fluids to the website Fracfocus.org. Michigan should recognize these efforts, and can direct interested persons to information on FracFocus.org, but it benefits both operators and the public to codify disclosure requirements in order to ensure that the public does not resort to burdensome citizen suits and/or permit challenges related to this issue. Open and effective communication will ensure safe drilling and continued economic development in Michigan.

B. Water Withdrawals

The new water withdrawal permit requirements follow Michigan's clear preference for water resource protection. Requiring the use of MWWAT, described above, ensures that the DEQ is aware of the cumulative impacts that multiple water withdrawals for fracking operations can be expected to have. However, room for improvement remains. Water plays a vital role in modern energy production, but competing uses and increasing scarcity will require states to develop a clear set of standards for water withdrawals.[148] While MWWAT may force operators to address the cumulative impact of their water withdrawals and regulations may prohibit surface water withdrawals, 80% of the water in Michigan's streams, many of which feed the Great Lakes, comes from groundwater.[149] Regulations that establish a clear preference of water withdrawal sources will help protect Michigan's water resources. Michigan should favor non-potable sources of groundwater when available and prohibit operators from appropriating withdrawals from potable water sources already subject to high demand.[150] Non-potable water is an appropriate source of water for fracking wells. For example, operators in Texas successfully utilized high saline groundwater sources for fracking due to a lack of available freshwater.[151] While operators should typically be able to access the most practicable water source, Michigan should establish preferred sources and require an explanation if the operator's choice deviates from preferred sources. Although this may create an additional administrative burden, seeking out non-potable sources reduces the risk of conflict between industry and citizen groups over water resources.

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[146] *Ceres Oil & Gas, supra note 21, at* 82-88.

[147] Casselman, *supra* note 33.

[148] Beck, *Current Water Issues in Oil and Gas Development and Production: Will Water Control What Energy We have?*, 49 Washburn L J 423, 454 (2010). Lower quality groundwater sources, such as water with greater than 10,000 ppm TDS has been found acceptable for use in fracking fluid. API 2010, *supra* note 89, at 16.

[149] Mich Econ Dev Corp, *Water Resource Facts* (2011), (last visited Mar. 27, 2011).

[150] Beck, *supra* note 148, at 454.

[151] API 2010, *supra* note 92, at 16.

If securing non-potable water is cost prohibitive, regulations could alternatively encourage operators to search for industrial wastewater as sources for fracking fluid. For example, cooling water from power plants represents an attractive option depending on the target shale's characteristics.[152] Industrial sources of water for fracking operations may provide collateral benefits as well. Scientists in Pennsylvania found acid mine drainage (AMD) water compatible with fracking needs.[153] The location of many AMD sites also correlated with the location of fracking wells.[154] The pursuit of similar studies for parallel industrial waste sources by OGS could solve multiple environmental problems if the agency finds a wastewater source similar to AMD.

Michigan should also establish a preference that operators select treated wastewater from municipal and industrial treatment facilities for use in fracking wells.[155] These facilities sometimes fail to completely remove pollutants from wastewater and even treated wastewater can lead to pollution as discharges from the treatment plant.[156] Operators can use this treated wastewater and avoid withdrawals from more pristine drinking water sources. Again, depending on the target shale's characteristics, industry studies show that treated wastewater is suitable for fracking projects.[157] Encouraging this practice will incentivize smarter choices for water withdrawals in fracking operations.

No silver bullet exists. Some of these sources may require transportation to the drill site, which will lead to increased traffic and arguably a larger land use impact. Unfortunately, large land impacts often go hand-in-hand with energy and industrial activities. Additionally, low-quality water sources threaten contamination of fresh water zones above the shale after injection if migration of flowback fluid occurs.[158] Requiring pre-injection analysis of fracking fluids, dissemination of this information and baseline water quality testing enables regulators and concerned parties to discover any cases of pollution. If operators properly construct the well, such threats remain small.[159] Michigan's OGS can mitigate the dangers of these proposed preferences for water withdrawals with relatively minimal effort. The benefits of such added protection for Michigan's water resources would outweigh the potential costs.

C. Flowback Disposal

Inevitably, Michigan's Class II injection wells will lack the capacity to handle the millions of gallons of water expected from Collingwood shale operations. These wells are a finite resource and once the disposal wells are full, Michigan will face a flowback waste problem. The growing concerns over the use of injection wells for disposal and the increased prevalence of man-made

[152] *Id.* at 17.
[153] Vidic, *supra* note 91, at 21-23.
[154] *Id.* at 23.
[155] See API 2010, *supra* note 92, at 13 (identifying treated wastewater as a potential source of water for fracking operations).
[156] *Inadequate Sewage Treatment Pollutes Alabama's Cleanest Lake*, U.S. Water News Online (August 1995).
[157] API, 2010, *supra* note 92, at 17.
[158] *Id.* at 16.
[159] *Id.*

earthquakes also contribute to the need for caution going forward, as well as consideration of further regulatory changes. As described above, current regulations leave no other option for waste disposal. Similar to water withdrawal issues, Michigan regulations should specify preferred disposal methods and require operators to justify why the preferred disposal method is impracticable if a different method is selected.

As an initial matter, Michigan should adopt a clear preference for recycling flowback. Several companies already use this technique. In Texas, one company utilized mobile evaporators to recover 4.5 million barrels of water out of 5.7 million barrels of flowback.[160] Brines will remain after recycling and will still require disposal,[161] but this option still provides benefits. Recycling lowers the volume of waste for further disposal and serves to lower a well's water needs, providing double benefits. Water conservation also provides reputational benefits for operators.[162] Recycling fails to cure the problem of flowback disposal, but it does reduce some of the related concerns. Michigan should make recycling the number one option for flowback disposal and require that operators request permission and justify the selection of any other disposal method in their state filings if recycling is not practical.

When recycling is not practical, Michigan should favor flowback disposal at industrial waste treatment facilities. This option may require purpose-built facilities to handle the high level of TDS and radioactive materials found in certain types of flowback, but a variety of other treatment methods exist.[163] In some areas, operators have set up temporary treatment facilities at the drill site.[164] Michigan should allow flexibility when it comes to how operators pursue flowback treatment. Smart planning will minimize any increased impacts to land. Even if current industrial wastewater treatment facilities near the Collingwood shale lack the capacity to properly treat flowback, a preference in state regulations could incentivize industry cooperatives or environmental service companies to step in and fill this need.[165] Encouraging development in this area could even create a new industry and provide new jobs to areas with fracking wells.

POTWs represent another option for flowback management; however, additional safeguards should be required before OGS allows this method of disposal. Lessons from West Virginia demonstrate that some POTWs lack the capability to handle the high TDS levels and hazardous chemicals associated with flowback,[166] while only five POTWs in Pennsylvania claim the ability to properly treat flowback.[167] Michigan should only allow disposal at POTWs when operators

[160] Arthur *et al.*, *supra* note 3, at 19.
[161] See Urbina, *supra* note 116.
[162] See Ceres Oil & Gas, *supra* note 23, at 86.
[163] API 2010, *supra* note 92, at 21. Additional methods for recycling include filtration, aeration and sedimentation, biological treatment, demineralization, thermal distillation, condensation, reverse osmosis, ionization, freezing/thawing, crystallization and ozonation. *Id.* at 22.
[164] *Id.*
[165] *Id.*
[166] Reeder, *supra* note 111, at 1013-14.
[167] *Id.* But see Vidic, *supra* note 91, at 17 (noting the inability of most POTWs to treat water with extremely high TDS levels).

lack other options. In those cases, OGS should require the POTW to certify its capacity to both handle the volume of flowback water and its ability treat the fluid. POTWs have incentives to reject flowback that the facility cannot properly treat. The threat of fines from Clean Water Act violations should ensure compliance with the receiving water's water quality standards,[168] and should deter a POTW from improperly disposing of flowback fluid.

Prior to disposal, Michigan should require that owners/operators perform a full chemical analysis of a given well's flowback. This chemical analysis should focus on TDS levels and hazardous chemical concentrations, while regulations should make certain that the results of any chemical analysis of the fluid follow the flowback to each stage of disposal and to its final destination. Taken all together, these proposals would ensure safe disposal methods, while holding operators responsible for the waste they generate.

[168] 33 USC 1251 *et seq.* POTWs must comply with the National Pollutant Discharge Elimination System (NPDES) Program. This program prevents discharges of pollutants into navigable waterways without a permit. See *id.* at 1311. Additionally, any industrial facilities that discharge into the sewer systems of POTWs must comply with pretreatment programs. See *id.* at 1317(b).

Making a Killing: An Evaluation of Salmon Farming in North America and How "Precautionary Principles" Must be Applied to Promote a More Sustainable Food Source

By Megan J. Rechberg, Pepperdine University School of Law

I. A Glimpse Beneath the Surface

North America's Pacific Northwest is a picture of beauty and is one of the most diverse ecosystems on the planet. It takes but one visit to destinations like Puget Sound near Seattle and the Broughton Archipelago in British Columbia to understand the meaning of the phrase "purple mountain majesties." However, not everything is as it seems. A secret, whose past whisper is becoming a roar among scientific communities, is lurking beneath the murky depths of the water and has found its way to our dinner plates.

II. Impact of Salmon Farms on the Environment

A. Background of Salmon Aquaculture

The world's population continues to grow exponentially and persistent threats of famine, drought, and economic depression are causing countries around the world to seek new and innovative sources of food. The oceans continue to serve as a major food source, with seafood imports accounting for the second largest portion of the United States' trade deficit, after oil.[1] However, there is little doubt among scientists that the world's fisheries are in crisis.[2] While aquaculture may have the potential to become a sustainable means of supplementing the world's decreasing fisheries, unsustainable aquaculture could exacerbate the problem and even create new ones.[3]

The fastest growing sector of aquaculture worldwide is salmon farming.[4] Beyond its incredible production rate, salmon farming is arguably one of the most environmentally controversial aquaculture practices. While described as "farming," salmon farming differs radically from other agricultural operations because salmon farms operate in publicly owned water that has been leased by the government for aquacultural uses.[5] Unlike land-based agriculture, water-based salmon farming involves an open-net system that operates directly in the marine environment—where the water that surrounds the farm has the potential to carry the effects of the operation far beyond the licensed zone.[6] The four largest farmed salmon producing nations

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[1] Offshore Aquaculture: Hearing on S. 1195 Before Nat'l Ocean Policy Study Subcomm. of the S. Commerce Comm., 109th Cong. 1 (2006) (statement of Richard Langan, Dir., Open Ocean Acquaculture Program, Univ. of N.H.).
[2] Kathryn White, Brendan O'Neill, and Zdravka Tzankova, *At a Crossroads: Will Aquaculture Fulfill the Promise of the Blue Revolution?*, Sea Web Aquaculture Clearinghouse 1, 4 (2004).
[3] *Id.*
[4] Terry Glavin, *Introduction*, in A Stain Upon the Sea: West Coast Salmon Farming, Harbour Publishing, 13, 14 (Alexandra Morton, et. al 2004). By the 1990s, farmed salmon outgrew the global production of wild salmon. *Id.* In 2004, global farmed salmon production reached 1 million metric tons annually. *Id*.
[5] Betty C. Keller and Rosella M. Leslie, *Sea-Silver: A Brief History of British Columbia's Salmon Farming Industry*, *in* A Stain Upon the Sea: West Coast Salmon Farming, Harbour Publishing, 78, 79 (Alexandra Morton, et. al 2004).
[6] *Id.*

are Chile, Scotland, Canada, and Norway.[7] Together, these nations produce roughly one million metric tons of farmed salmon annually.[8] One of the largest consumers of this produce is the United States, which is Canada's and Chile's biggest customer.[9]

A typical salmon farm consists of sea cages called "net pens."[10] These pens are moored to the sea floor and allow the natural ocean current to flow through the open mesh of the nets.[11] Nearly all these farms contain genetically engineered Atlantic salmon, which scientists have proposed should be considered their own species known as *Salmo domesticus*.[12] The juvenile salmon are often "grown" in freshwater hatcheries and then transferred to the net-pen farm when they become smolts.[13] These salmon are then raised for eighteen to twenty-four months in the pens until they are harvested for market.[14] A single fish can fetch anywhere from $30-50 in U.S. markets and recent estimates claim that there are nearly 30 million salmon industry-wide, making it a multi-billion dollar global enterprise.[15]

Photo by Megan Rechberg
A salmon fillet for sale at Ralph's in Anaheim Hills, CA, on November 14, 2010. The label indicates that the meat is Atlantic Salmon from Canada and that it contains artifical coloring.

As the global movement toward "sustainable" industries and farming gains momentum, salmon farms are arriving at a critical juncture where current practices must be reanalyzed in order to better protect the environment and consumers. According to Rachel Carson's *Silent Spring*, a book documenting the detrimental effects of manmade chemicals on the environment:

> We stand now where two roads diverge. But unlike the roads in Robert Frost's familiar poem, they are not equally fair. The road we have long been traveling is deceptively easy, a smooth superhighway on which we progress with great speed, but at its end lies disaster. The other fork of the road, the one less traveled by, offers our last, our only chance to reach a destination that assures the preservation of the earth.[16]

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[7] Stephen Hume, *Fishing for Answers*, *in* A Stain Upon the Sea: West Coast Salmon Farming, Harbour Publishing, 17, 63 (Alexandra Morton, et. al 2004).
[8] *Id.*
[9] *Id.*
[10] *See* USPIRG. v. Atl. Salmon of Me., LLC., 215 F. Supp. 2d 239, 242 (D. Me. 2002).
[11] *Id.*
[12] Glavin, *supra* note 4 at 15.
[13] *See* USPIRG, 215 F. Supp. 2d at 243.
[14] *Id.*
[15] Hume, *supra* note 7 at 56.
[16] Rachel Carson, Silent Spring, Houghton Mifflin Company, 379 (1962).

This article will examine the main environmental and human impacts of salmon aquaculture in order to determine which fork in the road to take when developing future effective and sustainable salmon-farming policies.

B. Environmental Impact Assessment

Scientists have identified four major environmental impacts of salmon farming: 1) the loss of biomass for feed; 2) the spread of diseases and parasites; 3) the use of chemicals to combat diseases and parasites; and 4) the risk of escapees becoming an invasive species.[17]

1. Net Loss of Biomass

Salmon are a carnivorous species that feed relatively high on the food chain.18 Farmed salmon are fed pellets that contain a mixture of feeder fish, vitamins, coloring, and antibiotics.[19] Because salmon are so voracious, it takes at least three pounds of wild fish from the ocean to produce every one pound of farmed salmon.[20] In a 1999 study, it took roughly 2,126,000 tons of feeder fish to produce only 871,200 tons of farmed salmon.[21]

According to some scientists, as long as carnivorous species like salmon and tuna are being farmed, there will be a net loss of protein in the world.[22] This net loss alone has inflamed controversy as to whether farming predatory fish is worth the cost.[23]

2. Diseases, Viruses, and Parasites

Another problem for salmon farms is the persistent spread of pests and diseases.[24] According to Alexandra Morton, a British Columbian scientist, farmed salmon are affected by a host of ailments including bacterial kidney disease, furunculosis, infectious hematopoietic necrosis (IHN), and sea lice.[25] While all these diseases and parasites occur naturally in the wild, their persistence has been exacerbated by stagnant, overpopulated fish farms and the farms' direct contact with the natural marine environment.[26]

In the wild, sick fish do not survive long because there are multiple predators that prey on the weak, ultimately reducing the spread of disease.[27] However, salmon farms create what Morton

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[17] *See* Glavin, *supra* note 4 at 13-16.
[18] *See* Hume, *supra* note 7 at 59.
[19] *Id.*
[20] Glavin, *supra* note 4 at 15.
[21] Hume, *supra* note 7 at 59.
[22] Alexandra Morton, *Dying of Salmon Farming*, *in* A Stain Upon the Sea: West Coast Salmon Farming, Harbour Publishing, 199, 239 (Alexandra Morton, et. al 2004).
[23] *See* Sergio Paone, *Farmed and Dangerous: Human Health Risks Associated with Salmon Farming*, Friends of Clayoquot Sound, 11-12 (2000).
[24] Morton, *supra* note 22 at 202.
[25] *Id*. at 202-234.
[26] *Id.*
[27] *Id.* at 223.

calls "disease amplification."[28] According to Morton's research, salmon farms keep "nature's cleanup crew" at bay, allowing fish to die slowly and shed massive loads of their infection into the marine environment.[29] The result? Morton claims the farms are "pathogen culturing facilities" that will eventually lead to the extinction of wild Pacific salmon stocks due to their close, continuous contact with one another.[30]

3. Chemicals and Waste

Salmon farmers' typical response to rampant diseases within their facilities has not been to "reduce stocking densities, scale back on production, or leave the sea bed fallow so it can recover."[31] Instead, they have resorted to a powerful arsenal of chemical treatments, many of which are derived from World War II's chemical weapons programs and the agricultural sector.[32] According to Scottish investigative reporter Don Staniford, the chemicals used by salmon farms can be divided into four main groups: artificial colorings, antibiotics, antiparasitics, and antifoulants.[33]

Consumers use color as an indicator of quality, so artificial coloring is used to give the farmed salmon's dull grey meat the appearance of a healthy wild salmon fillet.[34] To achieve this effect, coloring agents like canthaxanthin are administered through the salmon's daily feed and also by dye injected directly into the flesh.[35] The farmers then use the SalmoFan™ to grade the color level of the fish.[36] High grades are given to salmon meat with a deep reddish color and these grades directly correspond with high prices when the product goes to market even though the meat is technically the same.[37]

To keep the fish healthy enough to make it to the market, antibiotics are administered to the salmon individually via injection, or en masse through their feed.[38] This process has helped reduce the effect of bacterial diseases, thus increasing farm productivity.[39] According to the Norwegian government's Directorate for Nature Management, antibiotic use in salmon farming "may lead to an increasing number of resistant bacteria, and consequent treatment difficulties, in human medicine [as well]."[40] As bacteria change rapidly to resist the salmon farms' use of

[28] *Id.*
[29] *Id.*
[30] *Id.*
[31] Don Staniford, *Silent Spring of the Sea*, *in* A Stain Upon the Sea: West Coast Salmon Farming, Harbour Publishing, 144, 147 (Alexandra Morton, et. al 2004).
[32] *Id.*
[33] *Id.* at 149.
[34] *Id.* at 153.
[35] *Id.* at 150.
[36] *Id.* at 155.
[37] *Id.* at 155.
[38] Hume, *supra* note 7 at 57.
[39] Staniford, *supra* note 31 at 150.
[40] *Id.*

antibiotics, wild salmon are showing difficulty adapting to the quick development of "new and improved" bacterial strains leading to concerns about their future survival.[41]

As a result of continuous close contact with wild stocks, sea lice, a natural parasite, have made salmon farms their breeding ground.[42] This has caused farmers to employ dangerous chemicals in hopes of eradicating sea lice and increasing productivity.[43] These chemicals include dichlorvos (aka Nuvan or Aquagard), azamethiphos (called Salmosan), cypermethrin (or Excis), teflubenzuron (Calicide), and ivermectin (Ivomec).[44] These poisons and water pollutants are commonly administered through "bath treatments"—meaning they are dumped directly into the pens and ultimately the marine environment.[45]

The perpetual dumping of persistent chemicals has adversely affected the farmed fish themselves as well as the surrounding sediment and wildlife.[46] Despite numerous reports of the potential adverse effects on crustaceans and the surrounding ecosystem, Canadian officials began issuing permits for the use of toxic chemicals to control sea lice.[47] In 1996, the use of cypermethrin was alleged to have caused the death of 88,000 pounds of lobsters in Canada's Bay of Fundy after cypermetherin was discovered at record high levels throughout the sediment.[48] Another example is teflubenzuron, which is ingested with the feed.[49] According to the Scottish government's Marine Laboratory, "Once in the sediment, [teflubenzuron] could be available to the benthic community creating a possible passage into the food chain and . . . [eventual] bioaccumulation."[50]

Mike Romaine, the executive director of Public Service Employees for Environmental Ethics, believes that salmon farms have created a bad situation with parasites, and salmon farmers are looking for the "silver bullet" to be the cure-all for a persistent problem that cannot be solved through current practices.[51] Perhaps the sea is now experiencing a "Silent Spring," where salmon farms' relentless use of pesticides has effectively turned them into "biocides," killing an array of organisms as the chemicals work their way up the food chain and into the home.[52]

4. Escapees

Another environmental threat, which is unique to the Pacific Northwest, is the escape of Atlantic salmon into the Pacific ecosystem.[53] Despite this risk of escape and eventual

[41] Morton, *supra* note 22 at 202-234.
[42] Staniford, *supra* note 31 at 150.
[43] *Id.*
[44] *Id.* at 149.
[45] *Id.* at 151.
[46] *Id.* at 165.
[47] *Id.*
[48] *Id.* at 167.
[49] *Id.* at 173.
[50] *Id.* at 174.
[51] *Id.* at 186.
[52] *Id.* at 146.
[53] Morton, *supra* note 22 at 210.

colonization, Canada's Department of Fisheries and Oceans (DFO) told communities near the farms that salmon could not escape and survive.[54] According to Alexandra Morton:

> DFO Officials said farm[ed] salmon wouldn't escape. When fishermen began catching them, the officials said they couldn't eat wild food. Next they prophesized they would not spawn. Then when juvenile Atlantics were found in the rivers, they said, "Oh well none of this matters anyway. They won't establish."[55]

Morton predicts that Atlantic salmon's aggressive nature and speedy development will lead to competition for food and spawning grounds and eventually the extinction of wild Pacific salmon stocks.[56] Since the farms came to Canada, there have been reports of hundreds of thousands of fish escaping, which leads her to believe even more escapes have gone unreported.[57] She disagrees with Canada's DFO, stating that her studies have already found countless Atlantics with juvenile Pacifics in their stomachs.[58] She's also found female Atlantics swimming upriver with eggs in their bellies, demonstrating their imminent establishment.[59] According to Morton, finding food and being able to reproduce are the two most crucial tests for any animal invading a new ecosystem—and the Atlantics are passing these tests with flying colors.[60]

Photo courtesy of Alexandra Morton
Sockeye Salmon spawning up the Lower Shuswap River in British Columbia, Canada, on October 1, 2010.

C. Human Impact Assessment

When developing future policy, it is important to gauge the overall environmental impact of salmon farming. However, it is perhaps even more imperative to understand how these operations impact human health in order to create and enforce laws aimed not only at curbing the environmental impacts, but preserving human wellbeing. Wealth, community, and health are common indicators of wellbeing.[61] Therefore, policy makers should consider the economic, cultural, and health impacts associated with salmon farms when creating more sustainable aquaculture policies.

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[54] *Id.* at 211.
[55] *Id.* at 213.
[56] *Id.* at 215.
[57] *Id.*
[58] *Id.*
[59] *Id.*
[60] *Id.* at 212.
[61] *See* John Allen Paulos, *Who's Counting: Health, Wealth, and Happiness*, *ABC News* (Dec. 31, 2006).

1. Economic Impact of Salmon Farming

According to Salmon of the Americas, a salmon farm lobbying group, salmon farms substantially benefit local economies by accounting "for a large percentage of jobs in rural areas … [therefore aiding] rural economies by providing an answer to the common problems of economic development, stabilization of communities, and loss of population."[62] However, not everyone agrees that salmon farming has had a positive economic impact. Alexandra Morton noted that "no one among [her] community has a fish farm job, precious little fish farm dollars are spent [locally], and [the] postal service has dropped to one day a week during the reign of the salmon farmers."[63]

While the positive impact on small communities surrounding the farms is debatable, the impact on the overall economy is clear.[64] Salmon farming is a $600 million dollar industry in Canada alone and contributes fifteen percent of British Columbia's total agricultural output.[65] However, these profits are small when compared to the province's recreational fishing industry, which is worth a whopping $1.5 billion per year.[66] It is thus impossible to ignore eco-tourism and the potential implications for that industry if the environmental impacts of salmon farms are not curbed. Therefore, in order to develop a well-rounded and economically sustainable policy with respect to salmon farms, the environment must be a factor.

2. Cultural and International Impact of Salmon Farming

The environmental concerns have transcended the close-knit circles of research and economic wonks and have now entered into the world of mainstream politics and culture, igniting a heated debate between the aquaculture industry and Canadian First Nations groups.[67] According to Heiltsuk hereditary chief Edwin Newman, wild salmon are fundamental to the cultural, spiritual, and economic identities of his people.[68] He believes salmon farms are not only a threat to local village survival, but the survival of the entire aboriginal culture.[69] The farms have divided native communities by luring some groups with potential economic gains and disenfranchising others by refusing to address Native fears of environmental degradation.[70]

Not only has salmon farming in British Columbia created a provincial divide, it has also spurred international outcry from the state of Alaska.[71] By moving fish farms to the northern border of British Columbia, the Canadian government has created concern among Alaskan fishermen that escapees and the spread of disease could wipe out their catch.[72] Alaskan scientists fear that

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[62] Salmon of the Americas, *Benefits of Aquaculture: Local Economies*, Salmon of the Americas (2010).
[63] Morton, *supra* note 22 at 234.
[64] *See* Hume, *supra* note 7 at 63.
[65] *Id.*
[66] *Id.* at 68.
[67] *See Id*. at 34.
[68] *Id.* at 35.
[69] *Id.*
[70] *Id.*
[71] *Id.* at 43.
[72] *Id.* at 44.

"the unregulated prophylactic use of antibiotics may result in diseases mutated into more virulent or antibiotic resistant forms."[73]

Division of communities and international unrest are not the hallmarks of effective sustainable policy and indicate that current approaches toward salmon farming are in need of change.

3. Human Health Impacts of Salmon Farming

One of the final, and perhaps most alarming, impacts of salmon farming is the potential risk to human health. The World Health Organization has issued a warning about the elevated levels of pollution in farmed fish, saying "The risk of consuming contaminated fish must be weighed in view of the beneficial nutritive effects of fish."[74] It is not difficult to link the environmental health concerns to human health issues when investigating salmon farming practices. Salmon farms are not only a risk to their employees; people who eat farmed salmon are also at risk of a variety of health conditions.[75]

The most dangerous health risk to salmon farm employees occurs when they are treating the fish with chemical baths. One worker whose upper body was accidentally exposed to the chemicals used in the baths stated that his face instantly felt as if it was burning and he became disoriented.[76] Although the worker received medical treatment, he still suffers from the effects of the spill, which sometimes include a reduced IQ, mild autism, creeping paralysis, dementia, numerous potential cancers, rapid ageing of cells, depression, allergies, food intolerances, chronic pain, tremors, panic attacks, and reproductive sterilization.[77]

Many of the chemicals used in the fish farming process have been shown to have adverse impacts on the human body.[78] For example, the antibiotics used in the farms to fight bacterial kidney disease and furunculosis are difficult to administer to each individual fish in controlled doses, creating antibiotic resistant bacteria.[79] Another example is that the coloring used to make farmed salmon appear more appetizing has been linked to an unexplained phenomenon in humans called "glistening."[80] This symptom is essentially the "appearance of crystalline deposits in the inner layer of the retina of the eye."[81]

Ultimately, the use of the open-net system leads to an arms race against nature, and now, against humanity. Moreover, consumers are often unaware of the presence of potentially harmful chemicals in the salmon they purchase. For example, even though the United States requires labeling on fish containing the artificial coloring agent canthaxanthin, several large

[73] *Id.* at 57.
[74] Staniford, *supra* note 31 at 145.
[75] *Id.* at 149.
[76] *Id.*
[77] *Id.*
[78] Staniford, *supra* note 31 at 153.
[79] Morton, *supra* note 22 at 202.
[80] Staniford, *supra* note 31 at 154.
[81] *Id.*

supermarket chains have been accused of disregarding the law. The old adage "You are what you eat" presents the question: are we eating ourselves to death by ingesting poisons?

Perhaps the best weapon available to protect us from ourselves is the law. This requires an examination of how North American governments handle the inherent hazards attributed to salmon farming.

III. Salmon Farming and the Law

An effective and sustainable approach to aquaculture is essential to providing a healthy alternative to complete reliance on wild fisheries. However, there has not been a consistent or unified approach on the part of various governments to reach this objective. Statutes that regulate salmon farms do not clearly assign responsibility to a single regulatory body and fail to articulate an overarching sustainable policy. This section will examine the current regulatory and judicial regimes in the United States and Canada and will suggest a more sustainable approach for an industry that has so much potential but has created so much harm.

A. Regulation of Salmon Farm Operations

Article 9 of the International Food and Agriculture Organization's (FAO) Code of Conduct for Responsible Fisheries says that "[s]tates should establish, maintain, and develop an appropriate legal and administrative framework which facilitates the development of responsible aquaculture."[82] The 2000 Conference on Aquaculture in the Third Millennium adopted the Bangkok Declaration which provided that "[e]ffective national institutional arrangements and capacity, policy, planning, and regulatory frameworks in aquaculture … [are] essential to support aquaculture development."[83] Despite these broad policy statements, there has been no global convention on aquaculture development that establishes common industry standards and practices.[84] This has resulted in each country maintaining its individual aquaculture industries through statutes and then relying on enforcement by administrative agencies.[85]

A variety of laws and agencies regulate the production, upkeep, transport, and sale of farmed salmon in North America. In Canada the primary body that manages salmon farming is the Department of Fisheries and Oceans (DFO).[86] The DFO is responsible for the regulation and permitting of wild finfish fisheries under the Federal Fisheries Act, Navigable Waters Protection Act (NWPA), and Canadian Environmental Assessment Act (CEAA).[87] CEAA requires a proper environmental assessment of all projects in Canada that have an impact on federal lands or

[82] David VanderZwaag, Gloria Chao, & Mark Covan, *Canadian Aquaculture and the Principles of Sustainable Development: Gauging the Law and Policy Tides and Charting a Course*, 28 Queen's L.J. 279, 283 (2002).
[83] *Id.*
[84] *Id.* at 284.
[85] *See Id*.
[86] *See Morton v. B.C. Minister of Agric. and Lands*, [2009] 92 B.C.L.R. 4th 314, ¶ 16 (Can. B.C.S.C.).
[87] *Id.* at ¶ 14. Federal Fisheries Act, R.S.C., 1985, c. F-14 et seq.; Navigatable Waters Protection Act, R.S.C., 1985, c. N-22 et seq., which is similar to the United States' own Clean Water Act, 33 USC 1251 et seq.; Canadian Environmental Assessment Act, S.C. 1992, c. 37 et seq.

waters.[88] According to Otto Langer, a former DFO biologist, the DFO adopted a philosophy that "any fish is a good fish, and anyone who makes more fish is a friend of the government and DFO."[89] This stands in direct contrast to the DFO's environmental mission, which requires it to promote healthy and productive environmental systems through sustainable fisheries and aquaculture.[90] Langer noted that the Canadian hierarchy of regulating bodies allowed agencies to shift the burden of regulation to other agencies, resulting in the failure of any ministry to accept responsibility for closer management of the farms.[91] Not only have agencies like the DFO failed to recognize their burden; in some cases they have directly ignored independent, local scientists in favor of their own views.

For example, in *Morton v. British Columbia Minister of Agriculture and Lands*, DFO employee Ronald Genetz swore under oath that "there is no evidence to support the claim that farmed Atlantic salmon escapees into the coastal waters of British Columbia will impact the Pacific wild salmon resource by taking over habitat."[92] Despite its continued failure to recognize the potential harm in the face of direct, independent evidence, the DFO's findings are still considered the best available science for judicial purposes.[93]

The United States has also faced problems with regulating salmon farms, specifically with regulatory agencies that sometimes fail to fulfill their duties under the law. Salmon farms in the United States, primarily located in Maine and Washington State, are issued operating permits by the National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NMFS) and are overseen by the Environmental Protection Agency (EPA).[94] The NMFS is responsible for conducting research on the impacts of the farms on local fisheries, while the EPA is responsible for ensuring that the farms comply with the Clean Water Act (CWA), 33 USC 1251 et seq.[95]

The CWA prohibits the discharge of any pollutant by any person unless the person has a permit from the EPA or a state that authorizes the discharge.[96] The most common permit issued to the farms is the National Pollutant Discharge Elimination System (NPDES) permit, which allows the EPA to keep track of the chemicals being released into the water while monitoring their sources and impacts.[97] Salmon farming in the United States has created unique problems for

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[88] Otto Langer, *Introduction*, *in* A Stain Upon the Sea: West Coast Salmon Farming, Harbour Publishing, 123, 124 (Alexandra Morton, et. al 2004).
[89] *Id.*
[90] *Id.*
[91] *Id.* at 126.
[92] *Morton*, 92 B.C.L.R. 4th at ¶ 66.
[93] *See Id*.
[94] *Atlantic Salmon of Maine, LLC.*, 215 F. Supp. 2d at 245.
[95] *Id.*
[96] 33 U.S.C. §§ 1311(a) & 1342(a)(1).
[97] Environmental Protection Agency Office of Water, *Protecting the Nation's Waters Through Effective NPDES Permits: A Strategic Plan*, EPA, 12 (June 2001).

enforcement agencies like the EPA, because these agencies as well as the judicial branch have had trouble determining what category of discharge under the CWA applies to the farms.[98]

A discharge of a pollutant occurs under the CWA when "a pollutant [is] added to navigable waters from a point source."[99] The EPA had previously determined that fish farms are "aquatic animal production facilities" and are nonpoint sources.[100] Congress has encouraged individual states to develop waste management plans for these nonpoint sources, which has created confusion whether federal agencies or state governments have jurisdiction to regulate salmon farms.[101] Many salmon farmers have argued that they should be subject to state regulation alone because they do not involve a "discrete, confined, and direct conveyance" into the marine environment and therefore do not operate any "point source."[102] Their logic is that they are located in the aquatic system itself and are therefore not piping quantifiable pollutants from a specific source on land.[103] However, recent judicial decisions, with the support of the EPA, have decided that the EPA can determine that NPDES permits are required on a case-by-case basis.[104] Although this has allowed for closer monitoring of salmon farms in the United States by giving regulatory power to the EPA, critics claim that the EPA has failed to conduct adequate inspections and failed to recognize and act on new scientific evidence of harm when approving and creating regulatory standards for salmon aquaculture facilities.[105]

B. The "Precautionary" Approach

From a broader perspective, the judicial branches of both the United States and Canada have had difficulty deciding whether to approach issues involving salmon farming by deferring to legislative bodies and executive agencies or to apply a precautionary approach. Principle #15 of the Rio Declaration states, "In order to protect the environment, the precautionary approach shall be widely applied by States according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation."[106] This approach has direct application to salmon farming in North America across all branches of government. It should not be the burden of concerned citizens and environmental action groups to demonstrate harm. The burden should fall upon those seeking to use natural resources to prove that there are no practical alternatives for their industry to continue to operate safely. However, no North American salmon farm decision, whether analyzing native fishing rights, violations of the Clean Water Act, or violations of related regulations have considered

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[98] *See Atlantic Salmon of Maine, LLC*., 215 F. Supp. 2d at 239; *USPIRG v. Stolt Sea Farm, Inc.*, No. CIV.00-149-B-C, 2002 WL 240386, at *6 (D.Me. 2002).
[99] *Id.* at *5.
[100] *Id.* at *8.
[101] *Id.*
[102] *See Id*. at *10.
[103] *Id.*
[104] *Id.* at 17; *See also Atlantic Salmon of Maine, LLC*., 215 F. Supp. 2d at 261.
[105] *See Wild Fish Conservancy v. EPA*, No. C08-0156-JCC, 2010 WL 1734850 (W.D. Wash. 2010).
[106] United Nations Environment Programme, *Rio Declaration on Environment and Development: Principle #15*, The United Nations on Environment and Development (June 1992).

reasonable alternatives to salmon aquaculture under the precautionary principle. The judicial branch has confined its analysis strictly to applicable statutes and codes, which say nothing of precaution or reasonable alternatives.

Administrative agencies have apparently abandoned an in-depth assessment of the risks in favor of the economic benefits of salmon aquaculture. According to Otto Langer, the "precautionary principle is not the order of the day" for most governmental agencies.[107] He said that "if [Canada's Department of Fisheries and Oceans] did not come up with the data or a good argument to support fish habitat needs, industrial destruction of that habitat was usually allowed to proceed."[108] Unfortunately, with government agencies in both the United States and Canada being underfunded, understaffed, and unsure of their jurisdiction, it is easy for them to rubber stamp new industry in favor of an economically-focused approach rather than a sustainably-minded policy.[109]
Specifically in Canada, public interest groups often have trouble suing salmon farms for failure to comply with the Navigable Waters Protection Act, R.S.C., 1985, c. N-22 et seq., because the DFO has not kept adequate records of permitting and inspection data.[110] Lax regulation has led to suits on behalf of public interest and now First Nation Indian bands are seeking stricter enforcement in order to preserve their aboriginal fishing rights.[111] In perhaps one of the most deferential approaches to the salmon farms and the DFO, the British Columbia Supreme Court in *Homolco Indian Band v. British Columbia Minister of Agriculture and Lands* held that it would not issue an injunction to halt salmon farming in the area because there was not a high degree of probability that harm would occur.[112] The Canadian Supreme Court concluded that it could not halt economic expansion in favor of precaution where the scientific evidence was inconclusive.[113] Despite the Homolco's argument that this was an unacceptable outcome, the court agreed with the minister and co-defendant salmon farms that the precautionary principle only says the lack of scientific evidence is not an excuse to *fail to take action* as opposed to a requirement to *be proactive* in the face of scientific uncertainty.[114] Here, the Canadian Supreme Court seems to give deference to the legislature's decision to set standards for salmon farmers that adhere to the concepts of the precautionary principle, but then it does not analyze the notion any further. True precaution would suggest an analysis of better, more environmentally friendly alternatives by all branches of government, including the judicial branch.

Courts in the United States take a similar approach in regard to using the precautionary principle, saying "So long as the record demonstrates the agencies in question followed [required procedures to]…take a hard look at the environmental consequences of the proposed

[107] Langer, *supra* note 88 at 125.
[108] *Id.*
[109] *See Id*. at 126.
[110] *Id.* at 131.
[111] *See Homolco Indian Band v. B.C. Minister of Agric. & Lands*, [2005] 39 B.C.L.R. 4th 263, 315 (Can. B.C.S.C.).
[112] *Id.* at ¶ 147.
[113] *Id.* at ¶ 37.
[114] *Id.* at ¶ 41.

action, the court will not second-guess the wisdom of the ultimate decision."[115] While it is not the job of the judicial branch to rewrite statutes, nor is its job to fulfill the mandate of administrative agencies, it is the job of the judiciary to take some action on environmental matters.[116] According to the Supreme Court of Hawaii, it is the duty of the judiciary to ensure that administrative agencies meet their burdens when enforcing environmental laws.[117] Judicial analysis cannot cease until state agencies establish that no feasible practicable alternatives exist.[118]

In *Marine Environmental Consortium v. Washington Department of Ecology*, a Washington State appellate court declined to fully analyze the dangers of salmon farms because the farms were awaiting renewal of their permits and the plaintiffs no longer had standing to contest the old permit.[119] The court found that it could not consider new scientific evidence demonstrating that Atlantic salmon were spawning in essential Pacific salmon rivers because weighing scientific advances was the job of the Department of Ecology and not the judicial branch.[120] Although courts do appear willing to consider the impacts of salmon farms as background information, they end the analysis there and leave the final call up to administrative agencies to determine how to deal with the potential harm.

This is further demonstrated in the *USPIRG* cases, where the district courts held that salmon farms are clearly a source of pollution, and it is up to the EPA to determine how to classify and deal with them.[121] While these courts did discuss the chemicals used and the danger of escapes in both cases, they failed to discuss the potential impacts from a precautionary perspective by giving any sort of recommendation to the EPA or requiring an investigation of environmentally safer alternatives.[122] This indicates excessive deference to the EPA when considering new scientific evidence as well as the weight given to that evidence. The judiciary appears interested in being involved only when necessary to require administrative agencies to fulfill their duties under the law instead of acting as a fail-safe to ensure precaution.

The Supreme Court of Hawaii, in contrast, has recognized that it has a duty under the precautionary approach "where there are present or potential threats of serious damage."[123] The court held that "at a minimum, the absence of firm scientific proof should not tie the [judiciary's] hands in adopting reasonable measures designed to further public interest."[124] These underlying policies contributed to the determination that the Department of Hawaiian

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[115] *See Citizens for Alts. to Radioactive Dumping v. USDOE*, 485 F.3d 1091, 1092 (10th Cir. 2007).
[116] *See In re Kukui, Inc. Water Use Permit App.*, 174 P.3d 320, 334-335 (Haw. 2007). "[B]esides advocating the social and economic utility of [the practice in question] . . . [industries] must also demonstrate the absence of practicable mitigating measures." *Id.* at 335.
[117] *Id.* at 334-35.
[118] *Id.* at 335.
[119] *Marine Envtl. Consortium, Inc. v. Wash. Dept. of Ecology*, 2002 WL 1354244 (Wash. App. Div. 2 2002).
[120] *Id.* at *2.
[121] *See Atlantic Salmon of Maine, LLC.*, 215 F. Supp. 2d at 239; *Stolt Sea Farm, Inc.*, 2002 WL 240386, at *6.
[122] *Id.*
[123] *In re Kukui,* 174 P.3d at 337.
[124] *Id.*

Homelands (DHH) failed in its public trust duty to hold permit applicants to the burden of demonstrating practicable alternatives.[125] The Hawaii Supreme Court found that the DHH impermissibly shifted the burden of proof with respect to potential harm to Native Hawaiians and environmentalists instead of those seeking to develop the state's resources.[126] This application of precautionary policy leads to a more appropriate standard for investigating and weighing environmental harm to support more sustainable business practices in Hawaii. This line of thinking should be promoted within the judicial branch to ensure that the policies behind laws are environmentally sound and that regulatory agencies effectively fulfill their duties.

A more proactive application of a precautionary approach is necessary with the apparent jurisdictional confusion and inability of administrative agencies to fulfill their duties. The system of checks and balances was created for a purpose, and by refusing to fully consider the precautionary principle and its application to salmon farms, the judicial branch has been too passive in checking legislatures and administrative agencies.[127] To be effective, precautionary principles cannot be considered by the lawmaker alone, but must be applied in the enforcement and interpretation of laws. Therefore, a more precautionary and sustainable view must be taken toward salmon farming in North America in order to protect environmental and human health.

IV. A Feasible Alternative

Perhaps one of the biggest difficulties with analyzing sustainable policy is defining it. In fact, it seems much easier to define what is *not* sustainable than to define what *is*. The data seems to point to one conclusion: salmon farms are not sustainable and it is time for countries like the United States to enforce their own aquaculture policies and to begin demanding sustainable practices from imported food sources as well.

Thus, the best approach to future salmon aquaculture would be statutory prohibition of salmon farming in the ocean in favor of land-based practices where regulated filtration systems can be used to manage waste and contain disease.[128] While removing the net pens would be costly, closed containment technologies may be financially viable when measured against the actual environmental costs and cost to environmentally dependent industries.[129] The benefits of a closed-containment salmon-farming system include easy treatment and recyclability of waste; reduction of waste because feed can be more easily administered; less pollution introduced

[125] *Id.* at 348.
[126] *Id.*
[127] *See Id*. at 335.
[128] Morton, *supra* note 22 at 239. Not all farmed salmon is unsustainable. In fact, AquaSeed's farmed salmon have earned the backing of environmental and food watch groups. Claire Leschin-Hoar, *Sea Change: Environmental Group Gives First-Time Nod to Sustainable Salmon-Farming Method*, Scientific American (Jan. 14, 2010).
[129] A Canadian salmon farming study in published in 2000 stated that "Closed systems have considerable potential for waste removal and treatment, and reduced escape and predation problems; however, these systems are complex and expensive to buy and operate." Pure Salmon Campaign, *Solutions: Support for Change*, Pure Salmon Campaign.

into the marine environment; protection of wild fish from the exponential proliferation of disease; reduction of chemicals necessary to fight disease; and no possibility for escapes.[130]

V. Conclusion

The best policy for creating sustainable aquaculture should be a true application of the precautionary principle, which requires an in-depth consideration of reasonable alternatives.[131] This approach would help curb our nation's voracious consumption of resources and inspire a sustainable approach to the application of law around the world. Thus, it is increasingly important that the United States take a long term view toward sustainability rather than accept the four-year horizon of politicians and the quarterly perspective of businesses. William Ruckelshaus, both the first and fifth administrator of the Environmental Protection Agency, put it best when he said, "Nature provides a free lunch, but only if we control our appetites."[132]

[130] *Id.*
[131] Morton, *supra* note 22 at 239.
[132] William Ruckelshaus, Business Week, (June, 18 1990) (editorial).