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## Combatting Lake Invaders: A Proposal for Ballast Water Standards to Save the Great Lakes from Invasive Species

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# Combatting Lake Invaders: A Proposal for Ballast Water Standards to Save the Great Lakes from Invasive Species

## INTRODUCTION

Since 1972, the Clean Water Act has been a powerful tool for regulating waterborne pollutants.<sup>1</sup> Despite the success of the Clean Water Act in mitigating water pollution, unforeseen challenges arise when regulators use the Clean Water Act to regulate nonconventional pollutants, including invasive species.<sup>2</sup> Invasive species continue to wreak havoc on North American ecosystems, notably the Great Lakes.<sup>3</sup> Discharge of ballast water from ships is one of the major ways that invasive species get introduced into aquatic ecosystems.<sup>4</sup> Following the Environmental Protection Agency's unsuccessful attempts to set appropriate standards for the concentration of invasive species present in ballast water, the court in *Natural Resources Defense Council v. EPA* found that the current standards for regulating ballast water discharges in the Great Lakes were arbitrary and capricious and directed the Environmental Protection Agency to revise them.<sup>5</sup>

This In Brief will focus on one standard for ballast water discharge, the “technology-based effluent limits,” which adopted criteria from the *International Convention for the Control and Management of Ships' Ballast Water and Sediment* (IMO Standard),<sup>6</sup> approved in 2004.<sup>7</sup> The Second Circuit correctly ruled that the use of these criteria as the basis for technology-based effluent limits was arbitrary and capricious, but did not address the fact that the use of a water-quality based effluent limit of zero invasive species per ballast water discharge could be a more effective standard to combat the introduction of invasive species.

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1. See William L. Aldreen, *Water Quality Today—Has the Clean Water Act Been a Success?* 55 ALA. L. REV. 537, 538 (2004).

2. See Dan Egan, *The Great Takeover*, DISCOVER MAGAZINE (Sept. 7, 2017), <http://discovermagazine.com/2017/oct/the-great-takeover>.

3. See *id.*

4. *Nw. Env'tl. Advocates v. EPA*, 537 F.3d 1006, 1012–13 (9th Cir. 2008).

5. *Nat. Res. Def. Council v. EPA* (NRDC), 808 F.3d 556, 574–80 (2d Cir. 2015).

6. *Id.* at 567.

7. Ballast Water Management, INTERNATIONAL MARITIME ORGANIZATION, <http://www.imo.org/en/OurWork/Environment/BallastWaterManagement/Pages/Default.aspx> (last visited Apr. 9, 2018).

## I. LEGAL BACKGROUND

A. *Ballast Water Discharges and the Spread of Invasive Species*

Ballast water is the tens of thousands to millions of gallons of water drawn into the ballast-tanks of ships to offset the weight of their cargo.<sup>8</sup> At the ship's next port of call, the ship discharges the ballast water, along with any invasive species that may have hitched a ride.<sup>9</sup> Of the discovered 186 nonnative species found in the Great Lakes,<sup>10</sup> shippers introduced an estimated 30 percent via ballast water discharges.<sup>11</sup> Since ships introduced the first invasive species to the Great Lakes in the 1830s, invasive species have decimated the Great Lakes ecosystems and have caused more than \$100 million in annual economic losses.<sup>12</sup> While the United States has recognized since the early 1990s that invasive species pose an environmental and economic threat, attempts to implement regulations addressing invasive species have come in fits and starts.<sup>13</sup>

B. *The Clean Water Act and Ballast Water Exemption*

First passed by Congress in 1972, the Clean Water Act (CWA) regulated water pollutants with the goal to “restore and maintain the chemical, physical, and biological integrity of the Nation’s waters.”<sup>14</sup> The challenges with addressing nonconventional pollutants under the CWA were apparent almost from its inception—the CWA moved towards technology-based standards limiting pollutants in discharges after it became clear that other regulations, such as health-based regulations, were not feasible.<sup>15</sup> Congress phased in additional standards for nonconventional nontoxic pollutants in 1977.<sup>16</sup> Invasive species are textbook examples of a nonconventional pollutant—unlike conventional pollutants, whose harm increases with concentration, the ratio between concentration of invasive species in ballast water and the threat of an invasion is unclear.<sup>17</sup>

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8. Sara E. Richard, *Boats, Ballast, & The Big Battle: The Feds vs. The States in the War against AIS Invasions*, 5 *LSU J. ENERGY L. & RESOURCES* 153, 153–54 (2017).

9. *Id.*

10. DAN EGAN, *THE DEATH AND LIFE OF THE GREAT LAKES* 134–35 (2017).

11. *Invasive Species*, E.P.A., <https://www.epa.gov/greatlakes/invasive-species> (last visited Feb. 2, 2018).

12. Alex L. Rosaen et al., *The Costs of Aquatic Invasive Species to Great Lakes States* 1–2 (Anderson Economic Group, 2012), <https://www.nature.org/ourinitiatives/regions/northamerica/areas/greatlakes/ais-economic-report.pdf>.

13. Sam H. Wiest, *Protecting U.S. Waters from Nonindigenous Species Invasion: A Case for Federalism and Strong State Regulation*, 18 *PENN ST. ENVTL. L. REV.* 71, 73 (2009).

14. 33 U.S.C. § 1251(a) (2012).

15. Patricia Ross McCubbin, *The Risk in Technology-Based Standards*, 16 *DUKE ENVTL. L. & POL'Y F.* 1, 6 (2005).

16. *Id.* at 9–10.

17. See Zdravka Tzankova, *The Political Consequences of Legal Victories: Ballast Regulation and the Clean Water Act*, 40 *ENVTL. L. REP. NEWS & ANALYSIS* 10154, 10163 (2010). (“[O]ur understanding of the dose-response relationships in the invasion process is manifestly indeterminate. That is, beyond

The CWA prohibits any “point-source” discharge of pollutants unless prospective dischargers acquire a National Pollutant Discharge Elimination System Permit (NPDES).<sup>18</sup> In 1973, the EPA exempted vessels discharging sewage, effluent from properly functioning marine engines, laundry, shower, and galley and sink wasters, or “any other discharge incidental to the normal operation of a vessel” from requiring an NPDES permit.<sup>19</sup> For the first twenty-five years of the CWA, “any other discharge” encompassed ballast water.<sup>20</sup>

### C. Northwest Environmental Advocates v. EPA

In *Northwest Environmental Advocates v. EPA*, environmental groups sued the Environmental Protection Agency (EPA), claiming that the exclusion of ships’ discharges from requiring an NPDES permit violated the CWA.<sup>21</sup> It was settled law that invasive species were considered pollutants under the CWA;<sup>22</sup> the issue was whether the EPA acted outside the bounds of its authority by exempting ships’ discharges from the NPDES permit.<sup>23</sup> The Ninth Circuit found that the text of the CWA clearly encompassed *all* water discharged at sea, including ballast water, and held that the EPA overstepped its authority in exempting discharges from vessels from NPDES requirements.<sup>24</sup> Presciently, the Ninth Circuit anticipated the difficulty of regulating discharges from vessels under the CWA, stating “[n]either the district court nor this court underestimates the magnitude of the task.”<sup>25</sup>

## II. REGULATION OF BALLAST WATER AFTER *NORTHWEST*

After *Northwest*, any ship discharging ballast water required a NPDES permit.<sup>26</sup> In 2008, the EPA promulgated a Vessel General Permit (VGP), which established certain regulations that ships must follow when discharging ballast water in the Great Lakes.<sup>27</sup> NPDES permits can either be individual, authorizing a specific entity to discharge a pollutant in a specific place, or general,

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suggesting that higher frequency of exposure . . . [is] associated with higher probability and higher incidence of new invasions, ecological knowledge is currently unable to give us specifics about threshold numbers and/or concentrations below which [invasive species] releases from ballast are safe and/or unlikely to result in invasion.”).

18. 33 U.S.C. §§ 1311(a), 1362 (2012).

19. 40 C.F.R. § 122.3(a) (emphasis added) (2018) (held invalid by *Nw. Env'tl. Advocates v. U.S. E.P.A.*, 573 F.3d 1006, 1007 (9th Cir. 2008)).

20. *Nw. Env'tl. Advocates v. EPA*, 537 F.3d 1006, 1012 (9th Cir. 2008).

21. *Id.* at 1006.

22. *See Nat'l Wildlife Fed'n v. Consumers Power Co.*, 862 F.2d 580, 583 (6th Cir. 1988) (stating that “[m]illions of pounds of live fish, dead fish and fish remains annually discharged into Lake Michigan by the Ludington facility are pollutants within the meaning of the CWA, since they are ‘biological materials.’”).

23. *Nw. Env'tl. Advocates*, 537 F.3d at 1021.

24. *Id.*

25. *Id.* at 1025.

26. *Nat. Res. Def. Council v. EPA*, 808 F.3d 556, 563 (2d Cir. 2015).

27. *Id.* at 566.

authorizing discharges in a geographic region.<sup>28</sup> NPDES permits have two different standards for water-quality: technology-based effluent limits (TBELs) or water-quality based effluent limits (WQBELs).<sup>29</sup> The EPA uses WQBELs when TBELs would not be sufficient to meet water quality standards, which under the CWA are set by individual states.<sup>30</sup> Narrative WQBELs can be used when it is not feasible to set a numeric standard.<sup>31</sup>

The 2008 VGP used a narrative WQBEL that looked solely at water quality.<sup>32</sup> After subsequent legal challenges, the EPA agreed to modify the 2008 VGP, adding TBEL standards in a new VGP, issued in 2013 after the 2008 VGP expired.<sup>33</sup> Adapted from the IMO standard, the TBELs set specific concentration limits for organisms based on their size and put limits on pathogen and pathogen indicators.<sup>34</sup> Because invasive species are “nonconventional” pollutants that do not fit in the EPA’s existing categories for conventional pollutants, the EPA used a “best available technology” (BAT) standard.<sup>35</sup> A BAT standard does not require technology currently used by the regulated industry, only that the technology will result in “reasonable further progress toward the national goal of eliminating the discharge of all pollutants.”<sup>36</sup> The 2013 VGP also set new WQBELs requiring oceangoing vessels entering the Great Lakes to perform ballast water exchanges and “control discharges ‘as necessary to meet applicable water quality standards.’”<sup>37</sup> The EPA claimed that a narrative standard would have to be sufficient, as there was not enough research available to set definitive limits for an “acceptable” level of invasive species.<sup>38</sup>

In 2013, environmental groups challenged the 2013 VGP as arbitrary and capricious under the Administrative Procedure Act.<sup>39</sup> The plaintiffs argued that the EPA did not justify why adopting the IMO standard—at this point nearly ten years out of date—would be sufficient in mitigating the threat of invasive species.<sup>40</sup> Additionally, plaintiffs noted that the TBELs failed to consider any

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28. *Id.* at 563.

29. *Id.* at 563–65 (citing 33 U.S.C. §§ 1311(b)(1)(C), (b)(2)(A), 1313, 1342(a)).

30. E.P.A., NPDES PERMIT WRITERS’ MANUAL 6-1 (2010), <https://nepis.epa.gov/Exe/ZyPDF.cgi/P1009L35.PDF?Dockey=P1009L35.PDF>.

31. 40 C.F.R. § 122.44(d) (2018).

32. *NRDC*, 808 F.3d at 566.

33. *Id.* at 566–67, 567 n.9.

34. *Id.* at 567.

35. *Id.* at 564.

36. 33 U.S.C. § 1311(b)(2)(A); *NRDC*, 808 F.3d at 564 (citing 33 U.S.C. § 1314(b)(2)(B) “EPA considers a number of factors in assessing whether a technology is BAT, including: the cost of achieving the effluent reductions; the age of equipment and facilities involved; the process employed; the engineering aspects of various control techniques; potential process changes; non-water-quality environmental impacts including energy requirements; and other factors as EPA ‘deems appropriate.’”).

37. *NRDC*, 808 F.3d at 568.

38. *Id.* at 582–83.

39. *Id.* at 569–70.

40. Brief for Petitioners at 36–38, *NRDC*, 808 F.3d 556 (2d Cir. 2015) (Nos. 13-1745, 13-2393, 13-2757).

potential onshore treatment of ballast water.<sup>41</sup> Although the shipping industry did not currently use onshore treatment options for ballast water, the environmental groups argued that technologies used by sewage and water treatment plants could be adapted for ballast water treatment.<sup>42</sup>

In *Natural Resources Defense Council*, the Second Circuit held that both the WQBELs and TBELs in the 2013 VGP were arbitrary and capricious.<sup>43</sup> The court stated that EPA had “worked backwards” to find justification for adopting the IMO standard, even though evidence existed that current technology could result in concentrations of invasive species ten to one hundred times lower than the concentrations currently allowed in the IMO standard adopted by the 2013 VGP.<sup>44</sup> The Second Circuit also faulted the EPA for refusing to consider the potential of onshore ballast water treatment,<sup>45</sup> since BAT does not require technologies to be currently in use by that industry.<sup>46</sup> The Second Circuit remanded the case back to the EPA with instructions to implement new TBELs and WBELs, allowing the current 2013 VGP to remain in place.<sup>47</sup> As of June 2018, the EPA has yet to issue a new VGP incorporating updated TBELs.<sup>48</sup> In 2017, Republican members of Congress introduced bills in both the U.S. House and Senate that would roll-back the EPA’s ability to regulate ballast water discharge and put regulating ballast water discharges under the authority of the U.S. Coast Guard.<sup>49</sup> As of June 2018, neither bill had passed.

### III. ANALYSIS

In *Natural Resources Defense Council*, the Second Circuit correctly held that the EPA acted arbitrarily and capriciously by basing the 2013 VGP TBELs on the IMO standard. In requiring the EPA to review the TBEL set forth in the 2013 VGP,<sup>50</sup> the court failed to take an opportunity to consider whether a WQBEL standard is a better way to regulate invasive species. The EPA’s reluctance to create comprehensive, practical technology-based standards for invasive species may not be due to a failure of imagination. Rather, technology

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41. *NRDC*, 808 F.3d at 572.

42. *Id.*

43. *Id.* at 571, 580.

44. *Id.* at 570.

45. *Id.* at 572. EPA relied on a Science Advisory Board (SAB) to set the TBELs for the 2013 VGP. *Id.* EPA directed the SAB to dedicate its “limited time and resources” on researching shipboard ballast water treatment systems, since those were currently “in existence or in the development process” while no onshore treatment system of ballast water had been developed. *Id.*

46. *Id.*

47. *Id.* at 584.

48. *National Pollutant Discharge Elimination System (NPDES)*, E.P.A., <https://www.epa.gov/npdes/vessels-vgp> (last visited March 13, 2018); LAURA GATZ, CONG. RESEARCH SERV., R45050, VESSEL INCIDENTAL DISCHARGE LEGISLATION IN THE 115TH CONGRESS: BACKGROUND AND ISSUES 11 (2018).

49. Commercial Vessel Incidental Discharge Act, H.R. 1154, 115th Cong. (2017); Commercial Vessel Incidental Discharge Act, S. 168, 115th Cong. (2017).

50. *See NRDC*, 808 F.3d at 584.

that can effectively eliminate the threat of invasive species introduced through ballast water is not currently in use and may not be feasible. Abandoning TBELs and adapting a WQBEL standard of zero invasive species per ballast water discharge could provide shippers incentives to develop new technology to combat invasive species.

*A. Use of IMO Standard was Arbitrary and Capricious*

The Second Circuit's ruling that the EPA's use of the IMO standard was arbitrary and capricious is appropriate, as the EPA put forth no justification as to why adopting the laxer IMO standard would sufficiently reduce the introduction of invasive species. The court correctly identified that the IMO standard was laxer than what current shipboard ballast-water treatment technology could obtain.<sup>51</sup> The use of the lower IMO standard in the 2013 VGP was a dereliction of the EPA's duty to embrace the technology-forcing nature of the CWA.<sup>52</sup>

A key reason why the IMO standard was inappropriate is that the EPA put forth no evidence that adopting the laxer IMO standard would be sufficient to reduce the threat of invasion. There is no scientifically proven concentration of organisms that is low enough to prevent invasions—for example, a single asexually producing organism in a ballast water discharge could trigger a new invasion.<sup>53</sup> Because there is no concentration of invasive species in ballast water other than zero that can guarantee no invasions, the EPA's only rationale for choosing the IMO standard was that the IMO had already conveniently settled on them nearly ten years earlier.<sup>54</sup> The court correctly found that the IMO standard, based on out-of-date technology, was arbitrary and capricious because there was no evidence that allowing those specific concentrations of organisms in ballast water would successfully prevent new introductions of invasive species.

*B. Potential for More Stringent TBELs*

While the 2013 VGP's use of the IMO standard for TBELs was correctly found to be arbitrary and capricious, a requirement to use more advanced ballast water treatment technology could potentially reduce the threat of invasive species. Current shipboard ballast water treatment methods are substantially lacking in their ability to curtail the threat of invasive species. Ballast-water

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51. *Id.* at 570.

52. *Id.* at 571 (stating that “seeking to find systems that are capable of doing better than the current standard is in keeping with the technology-forcing aspect of the CWA.”); *Nat. Res. Def. Council v. EPA*, 822 F.2d 104, 123 (D.C. Cir. 1987) (“the most salient characteristic of [the CWA's TBEL standards], articulated time and again by its architects and embedded in the statutory language, is that it is technology-forcing.”).

53. See Tzankova, *supra* note 17, at 10163 (explaining that current ecological knowledge would put a reliable limit at zero-discharge).

54. See *NRDC*, 808 F.3d at 571 (“EPA should not have adhered to the IMO Standard *without explanation* when technologies could have exceeded IMO.”) (emphasis added).

exchanges, where ships flush their ballast-tanks with saltwater to kill any freshwater organisms, cannot successfully eradicate all potential invaders.<sup>55</sup> One study found that even if a ship successfully flushed 99 percent of its invasive species load, potentially three million viable cells of an invasive dinoflagellate could survive.<sup>56</sup> Ballast water exchanges also have no effect when a ship is empty of ballast, but still carrying organism-tainted sludge.<sup>57</sup> As stated in the case, the EPA failed to consider the potential for onshore treatment options, which could more thoroughly treat ballast water than offshore treatment.<sup>58</sup> By relying solely on onboard treatment options for ballast water, the EPA missed a valuable opportunity to explore better technology.

While onshore ballast water treatment could be more effective in reducing concentrations of invasive species, the implementation of more advanced shipboard technologies is also an option. As an illustrative example, within two weeks of a deadly fish virus outbreak, the crewmembers of a small ferry in the Great Lakes successfully installed and operated a shipboard ballast water treatment system that used chlorine, vitamin C, and UV light to kill invasive species and stop the spread of the disease.<sup>59</sup>

The benefits of using TBELs that incorporate BAT should not be overlooked. With BAT, the EPA has flexibility in setting standards and can determine whether pilot technologies, or technologies used in other industries could potentially be adapted to reduce pollutants.<sup>60</sup> The forward-thinking nature of BAT means foot-dragging industries unwilling to develop new pollution control measures will not prevent the implementation of effective pollution control standards.<sup>61</sup>

### C. Limitations of Technology-Based Standards for Regulating Invasive Species

The court's ruling that the EPA "working backwards" to reach the IMO standard was arbitrary and capricious is appropriate; however, this case highlights the inherent difficulties of regulating invasive species with a TBEL standard, which may make a numerical QBEL of zero invasive species per ballast water discharge necessary to combat the introduction of new invasive species into the Great Lakes. While BAT is designed to be a "technology-forcing" standard,<sup>62</sup> BAT only works when there is some technology deemed "available." Although more advanced shipboard or onshore treatments could reduce the concentrations of invasive species to lower than allowed in the current

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55. Suzanne Bostrom, *Halting the Hitchhikers: Challenges and Opportunities for Controlling Ballast Water Discharges and Aquatic Invasive Species*, 39 ENVTL. L. 867, 874–75 (2009).

56. EGAN, *supra* note 10, at 136.

57. *Id.*

58. NRDC, 808 F.3d at 570.

59. EGAN, *supra* note 10, at 143.

60. See Tzankova, *supra* note 17, at 10162.

61. See NRDC, 808 F.3d at 571.

62. See Richard, *supra* note 8, at 165.

IMO standard,<sup>63</sup> it is likely that no technology currently in use would result in the zero concentration of invasive species that is necessary to guarantee no invasions. If no technology—in any industry—exists that can reliably mitigate the catastrophic impact of invasive species then, regardless of TBELs, introduction of invasive species through ballast water discharges may be inevitable.<sup>64</sup> Additionally, it is cost and time intensive to analyze whether a technology is “economically achievable.”<sup>65</sup>

The substantial lag-time between when an invasive species is introduced and when its impacts are fully realized means that it can be difficult to appropriately evaluate the effectiveness of existing technologies and regulations.<sup>66</sup> Because it is practically impossible to accurately pinpoint when an invasive species was first introduced and which individual polluter was responsible for the introduction, it is likely that any violator of a TBEL-based standard would not be held responsible until irreparable ecosystem damage had already occurred.<sup>67</sup> The difficulties in identifying, implementing, and monitoring shippers’ use of BAT is a major drawback with using TBEL standards to regulate ballast water discharges.

#### D. *WQBELs as a Superior Standard for Regulating Invasive Species*

While the inclusion of ballast water under point source pollution in *Northwest* was an important step in potentially regulating the threat of invasive species, *Natural Resources Defense Council* shows that using traditional TBELs, as specified by the CWA, may not be sufficient in combatting the threat of invasive species. TBELs set standards based on what technology can be used to achieve these standards. With invasive species, it is likely that *no* existing technology can achieve a level of zero invasive species per ballast water discharge—the only level that can guarantee that no chance of introducing invasive species.<sup>68</sup>

Regulation of invasive species should not focus on “how” ballast water is treated but take a results-oriented approach. The WQBEL standard is one way to achieve this. While the court was correct in *Natural Resources Defense Council* in recognizing that the WQBEL standard set forth in the 2013 VGP was arbitrary

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63. *NRDC*, 808 F.3d at 570.

64. *See Egan*, *supra* note 2.

65. *See NRDC*, 808 F.3d at 572 (quoting EPA’s decision to “focus its limited time and resources on the status of shipboard treatment systems because such systems were either ‘in existence or in the development process’”).

66. *See* Marc L. Miller & Lance Gunderson, *Biological and Cultural Camouflage: The Challenges of Seeing the Harmful Invasive Species Problem and Doing Something About it*, HARMFUL INVASIVE SPECIES: LEGAL RESPONSES 1, 4. (Marc L. Miller & Robert N. Fabian eds., 2004).

67. *See Tzankova*, *supra* note 17, at 10163 (stating, “[a]t the same time, ecological knowledge is unable to offer any reliable and exhaustive predictions about which of the many species constantly transported in, and released with, ballast will invade where, and to what effect”).

68. *See NRDC*, 808 F.3d at 567 (describing EPA’s report as “unable to establish a reliable numeric limit on discharges that would guarantee protection against invasive species, other than zero”).

and capricious,<sup>69</sup> the court missed an opportunity to highlight some of the advantages of a WQBEL standard. After all, “WQBELs are set without regard to cost or technology availability.”<sup>70</sup> The court was correct to note that EPA’s formulation of the WQBEL standard in the 2013 VGP was unhelpfully vague, but the EPA’s first instinct of using a WQBEL standard to regulate invasive species may not have been that far off the mark.<sup>71</sup>

A WQBEL that mandates a concentration of zero invasive species per ballast water discharge would potentially circumvent the current “chicken and the egg” problem of technology-based standards. Industries, wary of potential newer, stricter regulations, hesitate to implement expensive pollution-control technologies that could become obsolete, and regulatory bodies, with no clear idea of the technology available, have little guidance to set an appropriately clear and practical standard.<sup>72</sup> A WQBEL limit set to zero invasive species per ballast water discharge would at least provide a clear standard. In *Natural Resources Defense Council*, the court faulted the EPA from working “backwards” from the existing IMO standard to determine BAT.<sup>73</sup> However, this “backwards” approach could be acceptable with a higher standard. Setting the acceptable limit for invasive species to zero and then working back from there could provide the impetus for commercial shippers to develop new technology, if that were the cost of allowing shippers to access the Great Lakes.<sup>74</sup>

There are several challenges with this proposal, particularly regarding enforcement. The current monitoring protocol for TBELs for ballast water treatment systems relies on taking small samples of water in search of indicators that a ballast water treatment system is working.<sup>75</sup> Because there is currently no way to test an entire ship’s ballast water discharge for the presence of invasive species, it is impossible to verify that no invasive species are present in a ship’s ballast water.<sup>76</sup> Additionally, the uncertainty of whether an invasive species would survive and reproduce in a new environment and the lag-time between when a species is introduced and when it becomes a nuisance makes it challenging to identify offending vessels.<sup>77</sup> However, this may be an opportunity

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69. See *id.* at 578 (stating the current WQBEL standard “is insufficient to give a shipowner guidance as to what is expected or to allow any permitting authority to determine whether a shipowner is violating water quality standards”).

70. *Id.* at 565.

71. See *id.* at 566–67. The first VGP issued after *Northwest* contained just a narrative WQBEL. *Id.* at 566. While the WQBEL in the 2008 VGP did not adequately regulate invasive species, EPA’s choice of a stricter numeric WQBEL could be a powerful tool in regulating invasive species.

72. Bostrom, *supra* note 55, at 876 n.71.

73. *NRDC*, 808 F.3d at 570.

74. Tzankova, *supra* note 17, at 10163.

75. *NRDC*, 808 F.3d at 581–82.

76. See *id.* at 582–83 (“In the face of the severe technological limitations on monitoring, it was reasonable for EPA to decline to require monitoring for parameters for which it is currently impractical to collect and analyze samples. Functionality monitoring and biological indirect monitoring are the only feasible options at present to assure compliance with the permit.”).

77. See *Miller & Gunderson*, *supra* note 66, at 4.

to embrace the technology-forcing ethos behind the TBELs standards: just because current technology that can monitor ballast-water for invasive species is not in use, such use could still be deemed “achievable.”

Assuming that future technology could identify the presence of invasive species in ballast water,<sup>78</sup> the difficulty in meeting such an ambitious standard could result in shippers intentionally ignoring the standard. Even shippers who do try to meet a standard of zero invasive species per ballast water discharge could still miss the mark, as the escape of one single reproducing cell could trigger a new invasion. Distinguishing intentional violators from shippers who try but fail to implement new technology could prove impossible. A real risk of a QBEL standard set to zero invasive species per ballast water discharge is that, if properly implemented and aggressively monitored, the cost could be so high as to put Great Lakes shippers out of business. However, the majority of ships on the Great Lakes are “Lakers”—vessels that travel solely between the Great Lakes, and thus do not have the potential to harbor new invasive species from overseas.<sup>79</sup> Because overseas freighters only carry 5 percent of the total tonnage transported on the Great Lakes, it could be more economically feasible to transport overseas cargo by rail. If the result of a QBEL standard set to zero is that overseas ships no longer traverse the Great Lakes, it may still produce a desirable outcome, particularly compared to the astronomical economic and ecological toll that invasive species take on the Great Lakes.<sup>80</sup>

#### CONCLUSION

Invasive species remain one of the great ecological disasters to hit the Great Lakes. While some progress has been made in closing the gaps in regulating ballast-water discharges, the EPA has yet to release a new VGP that could meaningfully reduce the threat of invasive species. While the ruling in *Natural Resources Defense Council* is a step in the right direction, it merely highlights the gaps between what is required to mitigate the threat of invasive species and what current ballast water treatment technology can achieve. The challenge in creating standards around BAT may be insurmountable; the gap between what is technologically feasible and what is necessary to preserve fragile ecosystems from the threat of invasive species may thwart complete success. However, by focusing primarily on what standards should be in place to mitigate the threat of invasive species regardless of existing (or “economically achievable”)

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78. The use of DNA fingerprinting to identify invasive carp in the Chicago River shows how emerging technology can be used by scientists to identify the presence of single species in large volumes of water. See EGAN, *supra* note 10, at 169–71.

79. EGAN, *supra* note 10, at 146.

80. See *id.* at 146–47.

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technology, courts can incentivize the development of new technologies that eradicate the scourge of invasive species once and for all.

*Katie Sinclair*

