

## **\*219 RESTORATION MEASURES, COOLING WATER INTAKE STRUCTURES, AND THE PROTECTION OF ECOSYSTEMS: THE REGULATORY SCHEME OF CLEAN WATER ACT SECTION 316(B)**

### **I. INTRODUCTION**

The objective of the Clean Water Act is to restore and maintain the “chemical, physical, and biological integrity of the Nation’s waters.”<sup>1</sup> In 1972, Congress enacted sections 316(a) and 316(b) of the Clean Water Act because power plants that draw cooling water<sup>2</sup> through water intake structures<sup>3</sup> and later discharge the water at elevated temperatures have the potential to affect the maintenance of the chemical, physical, and biological integrity of the Nation’s waters.

Power plants draw cooling water from a source, such as a river or reservoir, to cool plant equipment or to condense the steam that turns their turbines. As plants draw water for these processes, adult fish and larger organisms are sometimes drawn into the plants’ intake structures and can become entrapped (“impinged”<sup>4</sup>) against intake screens.<sup>5</sup> These screens \*220 are designed to filter out debris that would interfere with the operation of, or cause damage to, condenser systems.<sup>6</sup> Organisms that are not removed from the cooling water by the intake screens--typically small benthic, planktonic and nektonic organisms--are “entrained,” meaning they are carried through the power plant’s condenser systems.<sup>7</sup>

Environmental groups take the position that because cooling water systems may endanger the maintenance of optimum yields of sport and commercial fish or disrupt sensitive ecosystems, § 316(b) regulation is necessary.<sup>8</sup> Section 316(b) requires that the “location, design, construction, and capacity of cooling water intake structures reflect the best technology available for minimizing adverse environmental impact.”<sup>9</sup>

The Environmental Protection Agency’s (EPA) various attempts to enact regulations implementing § 316(b), and particularly any attempts to include restoration measures--such as the removal of barriers to fish migration, reclamation of degraded aquatic organism habitat, or stocking of aquatic organisms<sup>10</sup>--as a means of complying with the “best technology available” (BTA) standard required by § 316(b) have been met with resistance from both environmental groups and the courts. Central to understanding the future of § 316(b) is an appreciation of the rationale behind § 316(b) regulation, the technologies available for meeting § 316(b)’s BTA standard, and most importantly, the litigation surrounding EPA’s 2004 attempt at enacting § 316(b) regulations for existing power plants. In that litigation, the Second Circuit rejected and remanded EPA’s § 316(b) rules that allowed power plants to meet the BTA standard through the use of restoration measures and compliance with a performance standard incorporating a range of values for compliance.<sup>11</sup> The court’s remand pushed EPA to develop new § 316(b) regulations applicable to existing facilities, which EPA signed for publication on March 28, 2011, and formally published on April 20, 2011.<sup>12</sup> The proposed regulations will ultimately affect 559 power plants.<sup>13</sup>

\*221 For a myriad of reasons, the courts should have deferred to EPA’s decision to approve the use of restoration measures in its previous enactment of § 316(b) regulations. This Paper argues that permitting authorities implementing EPA’s § 316(b)

rules should be allowed to grant permits to power plants on an individualized basis, allowing plants to use restoration measures to comply with § 316(b).

This Paper is divided into five parts. Part II of this Paper examines the background and history of § 316(b) regulation, including EPA's remanded Phase II rules that applied the provisions of § 316(b) to existing power plants. Part III explains why those rules should have been accorded deference. Part IV explains the meaning of "adverse environmental impact" in the context of restoration measures, and presents policy reasons why the Second Circuit should have upheld EPA's decision to include restoration measures in its remanded Phase II rules. Part V is a brief conclusion.

## II. EPA'S HISTORY OF ATTEMPTED 316(B) REGULATION

In 2004, EPA promulgated rules pertaining to cooling water intake structures, implementing § 316(b) of the Clean Water Act.<sup>14</sup> Phase II of these rules pertained to *existing* facilities.<sup>15</sup> The rules were controversial for two reasons: (1) they did not define BTA; and (2) they allowed for the use of compliance alternatives, including restoration measures, for purposes of establishing compliance with BTA.

According to the remanded Phase II rules, power plants must implement BTA in order to prevent entrainment and impingement of aquatic organisms.<sup>16</sup> EPA, however, did \*222 not specify in the Phase II rules what constituted BTA for minimizing adverse environmental impact, the standard explicitly required by the text of § 316(b).<sup>17</sup> Of the universe of BTA options, there are three basic kinds of cooling-water systems that EPA could have selected: dry cooling, closed-cycle (closed-loop), and once-through systems.

Dry cooling systems use air drafts to transfer heat and thus virtually eliminate the need for water.<sup>18</sup> Closed-cycle cooling systems recirculate water, adding water to the cooling system only to replace what is lost through evaporation and other processes.<sup>19</sup> Once-through systems take water in, use it to cool power plant equipment, and return the water to its source at a higher temperature.<sup>20</sup>

There have been calls for EPA to select closed-cycle cooling as BTA. Closed-cycle systems, unlike once-through systems, re-circulate and reuse cooling water.<sup>21</sup> Cooling water in closed-cycle systems is passed through a condenser system where it is heated in the process of converting steam back to water.<sup>22</sup> After passing through the condenser system, the water is cooled in evaporating ponds or towers. Once cooled, the water is returned to the condenser system and used again in the cooling process.<sup>23</sup> Although the cooling water used in a closed-cycle system is constantly being recycled, some of the water is lost through evaporation and other processes.<sup>24</sup> As a result, closed-cycle systems must make additional withdrawals of water from the source waterbody in order to replace such losses.<sup>25</sup> The amount of replacement water withdrawn from the source in a closed-cycle system varies, but it is generally significantly less than a comparable once-through system, using 72 to 98% less water.<sup>26</sup> As a result, the environmental impacts from impingement and entrainment on \*223 aquatic ecosystems from closed-cycle systems are much less than the impacts created by once-through systems.<sup>27</sup>

However, in its 1976 § 316(b) regulations, EPA responded to utility remonstrations that BTA should be determined on the basis of a detailed cost-benefit analysis by concluding that the application of BTA "should not impose an impracticable and unbearable economic burden on the operation of any plant subject to § 316(b)."<sup>28</sup> As a result, EPA declined to choose closed-cycle systems as the best technology *per se* for any affected ecosystem.<sup>29</sup> The Supreme Court has since held that EPA can employ cost-benefit analysis when formulating § 316(b) rules, recognizing that cost-benefit analysis and BTA are not mutually exclusive.<sup>30</sup>

Not only did the Phase II existing facility rules fail to define BTA, the rules were also controversial because they allowed for the implementation of "compliance alternatives," including restoration measures, for minimizing adverse environmental impacts.<sup>31</sup> Permissible restoration measures consisted of actions which would "produce and result in increases of fish and shellfish in the facility's watershed."<sup>32</sup> Examples of restoration measures include, but are not limited to, stocking water-bodies with hatchery-raised fish and restoration of aquatic habitat.<sup>33</sup> If a facility used restoration measures to comply with § 316(b), however, the facility also had to meet a performance standard.

The Phase II rules were remanded and suspended in 2007 after the Second Circuit, in *Riverkeeper v. EPA (Riverkeeper II)*, held that allowing power plants to use restoration measures for purposes of complying with § 316(b) violated the intent of the

Clean Water Act.<sup>34</sup> Pursuant to the remand, EPA proposed new § 316(b) rules applicable to existing facilities on March 28, 2011. In accordance with *Riverkeeper II*, the proposed rules do not contain provisions allowing for the use of restoration measures, but--to the surprise of many--do allow for site-specific characteristics to be taken into account in the determination of BTA at a particular facility as opposed to mandating the use of closed-cycle cooling. The proposed rules are in the midst of the public comment period, and are expected to be finalized by July 27, 2011.

#### **\*224 A. EPA's Repeated Attempts at Section 316(b) Regulation**

EPA has attempted to construct regulations implementing § 316(b) in the past, but its efforts have proven unsuccessful.<sup>35</sup> EPA's first attempt was rejected in 1977, when the Fourth Circuit struck down EPA's § 316(b) regulations on procedural grounds.<sup>36</sup> The court found that EPA failed to comply with the Administrative Procedure Act by relying on a development plan that was not published in the Federal Register as part of the regulations and by not complying with the procedural requisites for incorporation by reference.<sup>37</sup>

Eighteen years later, EPA had yet to make a second attempt at promulgating § 316(b) regulations.<sup>38</sup> However, EPA did release a draft guidance document in that eighteen-year period describing studies necessary to evaluate adverse environmental effects from cooling water intake structures in order to make permit-specific determinations of BTA on a case-by-case basis.<sup>39</sup> EPA also issued decisions that discussed how cost could be considered, allowing for site-specific variances.<sup>40</sup> The agency concluded that variances were appropriate when the cost of the specified technology was found wholly disproportionate to the environmental benefit.<sup>41</sup>

As a result of the EPA's failure to formally promulgate regulations governing cooling water intake structures, environmental organizations initiated a citizen suit in 1995, demanding that the EPA promulgate regulations to reduce impingement and entrainment in intake structures.<sup>42</sup> The EPA and the environmental organizations eventually settled the case by entering into a consent decree; this was done without input from electric utility companies, the industry most heavily targeted by § 316(b).<sup>43</sup> Following a series of extensions to the timeline set out in the consent decree, the district court ordered that EPA propose § 316(b) regulations for new sources by July 20, 2000, and for existing sources by July 20, 2001.<sup>44</sup>

The regulations that were developed as a result of the consent decree were divided into three phases. Phase I regulated new source intake structures, while Phases II & III \*225 regulated existing source intake structures. The Phase II regulations provided five compliance alternatives that a facility could select and implement to satisfy the "best technology available" standard<sup>45</sup>--three of which, if chosen, triggered a requirement to comply with national performance standards.<sup>46</sup>

Restoration measures were included in the list of compliance alternatives. For example, in order for an existing facility to comply with § 316(b) rules, a facility could demonstrate that it would install, properly operate, and maintain restoration measures, operational measures, and design and construction technologies that would allow the facility to meet specified performance standards and restoration requirements.<sup>47</sup>

Facilities using restoration measures had to "jump through a hoop" in order to use them. First, facilities had to demonstrate to the EPA that it had evaluated the use of mitigation technologies and operational measures<sup>48</sup> and that they would be less feasible, less cost-effective, or less environmentally desirable than meeting the standards or requirements through the use of restoration measures.<sup>49</sup> Second, facilities had to demonstrate that the restoration measures implemented, alone or in conjunction with operational measures and design technologies, would produce ecological benefits at a level substantially similar to the level the facility would have achieved by meeting the performance standard. Again, the performance standard involves reducing impingement mortality for all lifestages of fish and \*226 shellfish by 80 to 95%, and entrainment mortality by 60 to 90% from the calculation baseline.<sup>50</sup>

As a result, the Phase II existing facilities rule provided for a permitting process that allowed site-specific characteristics to be accommodated through the use of restoration measures, subject to pervasive performance standards.

#### **B. The Riverkeeper Litigation**

Before the Phase II rules were considered by the Second Circuit, the use of restoration measures as an option for compliance

under Phase I (applicable to *new* facilities), became a focal point of the 2004 *Riverkeeper I* litigation in the Second Circuit.

In *Riverkeeper I*, environmental petitioners argued that allowing *new* facilities to employ restoration measures rather than demanding compliance with the BTA standard was beyond the scope of EPA's § 316(b) authority.<sup>51</sup> The court agreed with the petitioners, finding determinative the incoherence between the effects of restoration measures and the language of the Clean Water Act. The court reasoned that "[r]estoration measures correct for the adverse environmental impacts of impingement and entrainment; they do not minimize those impacts in the first place."<sup>52</sup> The court also highlighted the fact that power plants employed restoration measures prior to the enactment of the Clean Water Act, and it was the dissatisfaction with their effectiveness that resulted in technology-based preventative measures.<sup>53</sup> Furthermore, the court considered that in 1982, Congress entertained proposed changes by EPA that "would allow [existing] dischargers to use measures equal in effect to the best technology available--e.g. restoration measures, such as a fish hatchery-- to mitigate adverse effects,"<sup>54</sup> and concluded that because the proposed change failed to survive congressional review, EPA therefore lacked the authority to authorize the use of restoration measures for § 316(b) compliance.<sup>55</sup>

In *Riverkeeper II*, the Second Circuit considered the use of restoration measures under Phase II of EPA's regulations, applicable to *existing* facilities.<sup>56</sup> Ultimately, the court rejected provisions in the Phase II rule that allowed compliance through the use of restoration measures and remanded EPA's § 316(b) rules.<sup>57</sup> The court relied on its earlier decision in *Riverkeeper I*, which held that a provision allowing power plants to undertake \*227 restoration measures as an alternative to implementing BTA was based on an impermissible construction of § 316(b).<sup>58</sup>

The *Riverkeeper II* court focused on EPA's Phase II performance standard that applied to plants electing to use restoration measures. In the rule's proposal, EPA determined that closed-cycle systems "generally reduce the water flow [required by the power plant] from 72 to 98%, thereby using only 2 to 28% of the water used by once-through cooling systems,"<sup>59</sup> and that it is generally assumed that this would result in a comparable reduction in impingement and entrainment.<sup>60</sup>

In a technical development document generated for the proposal, however, EPA disaggregated these data, stating that closed-cycle cooling systems use 96 to 98% less fresh water and 70 to 96% less salt water than once-through systems.<sup>61</sup> Additionally, EPA's analysis suggested that the disaggregated data indicated that closed-cycle cooling would reduce impingement mortality and entrainment by 96 to 98% at facilities that use salt water.<sup>62</sup>

Accordingly, these numbers differed from the performance standard the EPA set out in its Phase II rules that required reduction of impingement mortality by 80 to 95% and entrainment by 60 to 90%.<sup>63</sup> The court found that these differences could be potentially significant, "especially in determining whether this suit of best technology available technologies achieve essentially the same result as closed-cycle cooling, but are neither explained nor adequately compared ...."<sup>64</sup> While the court considered EPA's conclusion that the total social cost of mandating closed-cycle cooling would be "\$3.5 billion per year"<sup>65</sup> and that requiring closed-cycle cooling could close nine of the 539 existing power plants subject to the Phase II rule,<sup>66</sup> the court ultimately determined that EPA, under the cover of "practicability," impermissibly relied on cost-benefit analysis in its decisionmaking.<sup>67</sup> \*228 However, on appeal of this narrow issue, the U.S. Supreme Court later ruled that the costs of compliance could be considered by the EPA during the rulemaking process.<sup>68</sup>

EPA, taking the stance that § 316(b) should be interpreted to allow for site-specific characteristics to be taken into account, justified its performance standard "ranges" by asserting that § 316(b) does not require a single-numeric standard applicable to all Phase II existing facilities. It also argued that expressing the performance standards in ranges was necessary to account for the variables involved in reducing impingement and entrainment mortality under local conditions at particular facilities.<sup>69</sup> As the EPA explained, no single technology is most effective for all facilities subject to the rule because "the Phase II requirements are applied in a variety of settings and to existing facilities of different types and sizes."<sup>70</sup> EPA's argument was based on the fact that uniform technology standards do not provide a fixed level of performance at all facilities because their performance is affected by site-specific conditions, such as the nature of the waterbody, facility intake requirements, climatic conditions, and the waterbody's ecosystem.<sup>71</sup>

The Second Circuit agreed with EPA, observing that "[a] margin of error from a relatively precise benchmark that is tolerable given measurement difficulties is not at issue here. Instead the performance standards reflect the range of performance associated with various technologies identified as best technology available. That performance, in turn, depends in part on local conditions and natural fluctuations."<sup>72</sup>

Nevertheless, the court backpedaled, ultimately concluding that a rule that deems in compliance those facilities that could achieve the upper end of a range if they reach only the lower end is not permissible.<sup>73</sup> As a result, the performance standards required of those existing facilities employing restoration measures for § 316(b) compliance purposes were found to be impermissible by the court.<sup>74</sup>

More specific to the permissibility of the use of restoration measures, EPA also contended in *Riverkeeper II* that its interpretation permitting restoration measures as a means \*229 for compliance was entitled to deference.<sup>75</sup> Disagreeing, the Second Circuit echoed its reasoning from *Riverkeeper I*, holding that EPA's decision to permit restoration measures was not based on a permissible construction of the statute,<sup>76</sup> focusing on the fact that restoration measures correct for adverse environmental impacts, but do not minimize the impacts in the first place, and, furthermore, that restoration measures contradict the unambiguous language of § 316(b) as they are not part of the location, design, construction, or capacity of cooling water intake structures.<sup>77</sup> For that reason, the Second Circuit remanded EPA's rules implementing § 316(b) back to the agency.

### **III. THE SECOND CIRCUIT SHOULD HAVE ACCORDED DEFERENCE TO EPA'S INTERPRETATION OF SECTION 316(B)**

The Second Circuit's *Riverkeeper II* decision is clear: facilities must apply the best technology available to achieve the minimum amount of impingement and entrainment possible and EPA may not allow facilities to use restoration measures to comply with § 316(b).<sup>78</sup>

The Second Circuit, however, erred in *Riverkeeper II* by not affording deference to EPA's interpretation. EPA's interpretations of its regulatory statutes are controlling under the *Chevron* principle of judicial deference to administrative agencies' statutory interpretations.<sup>79</sup> *Chevron* commands deference to an agency's interpretation of the statute that it administers where Congress has not spoken to the precise question at issue, and where the agency's interpretation is reasonable.<sup>80</sup> In applying *Chevron* deference, an agency's view governs "if it is a reasonable interpretation of the statute--not necessarily the only possible interpretation, nor even the interpretation deemed most reasonable by the courts."<sup>81</sup>

The Clean Water Act does not reflect a clear congressional intent to preclude use of restoration measures, and EPA's interpretation allowing its use is accordingly reasonable.<sup>82</sup> Indeed, regulators have historically taken the environmental benefits of actions, such as the implementation of restoration measures, into account in making § 316(b) regulatory determinations and have relied upon such benefits in declining to require additional \*230 technology-based source controls.<sup>83</sup> For example, restoration measures are routinely used under other sections of the Clean Water Act, as with § 404 "dredge and fill" permits.<sup>84</sup> In *Ohio Valley Environmental Coalition*, for example, the Fourth Circuit found adverse environmental impacts had been offset where restoration measures, specifically stream enhancement, stream restoration, and stream creation, were undertaken in the context of "dredge and fill" permits.<sup>85</sup> Also in the context of § 404 permits, EPA, by regulation, has provided that minimization of adverse effects on populations of plants and animals can be achieved by "[u]sing planning and construction practices to institute habitat development and restoration to produce a new or modified environmental state of higher ecological value ...."<sup>86</sup>

In addition, an examination of § 316(b)'s legislative history, along with other practical considerations, demonstrates the reasonableness of EPA's interpretation, further exemplifying why the Second Circuit should have deferred to EPA.

#### **A. Section 316(a)'s Legislative History Makes EPA's Interpretation of Section 316(b) Reasonable**

The legislative history of § 316 supports the conclusion that Congress intended for EPA to regulate power plants on an individualized basis--which would embrace the use of restoration measures--as opposed to regulation solely by one nationally uniform BTA standard.

Unlike the nationally uniform technology standards applied to most pollutant discharges under the Clean Water Act, "Congress elected to treat cooling water use, and thermal discharges in particular, on a more individualized basis. Section 316(a), for example, provides a variance from the discharge standards for heat, based on the site-specific effects of thermal discharges on aquatic life."<sup>87</sup>

While “the legislative record contains virtually no discussion concerning § 316(b), the substantial legislative history addressing § 316(a)’s thermal discharge provisions clarifies **\*231** § 316(b)’s role.”<sup>88</sup> In particular, the timing of § 316(b)’s appearance and its placement in a provision on thermal discharges suggests that it was intended by Congress to be a case-by-case provision applied to point sources according to site-specific environmental impacts.<sup>89</sup> Thus, the same rationale underlying § 316(a)-- the reduced need for nationally uniform standards and the relative ease of identification and enforcement of discharging point sources--was meant to apply to § 316(b) for the regulation of cooling water intake structures.<sup>90</sup> Even more, “the use of cooling water, like thermal discharges regulated by 316(a), affects the environment based on the unique characteristics existing at a particular site.”<sup>91</sup> Therefore, it is likely that Congress viewed cooling water intake structures as lending themselves to individualized, site-specific control.<sup>92</sup>

Under the Clean Water Act, Congress distinguished thermal discharges from all other pollutants due to the limited number of sources, their centrality to the steam-electric industry, and their unique effect on the environment.<sup>93</sup> Section 316(a) provides for a “thermal variance” as long as a discharger can demonstrate that an effluent limitation proposed for the control of the thermal component of a discharge would be more stringent than necessary to assure the protection and propagation of a balanced, indigenous population of shellfish, fish, and wildlife in the body of water receiving the discharge. If such a demonstration is made, the EPA Administrator can impose an alternative effluent limitation for the thermal component of the discharge.<sup>94</sup>

This “thermal variance” first appeared in a Conference Report as a compromise between the different approaches taken by the House and Senate.<sup>95</sup> The House “had approached discharges of heat in a manner that was distinct from the regulation of any other pollutant.”<sup>96</sup> It had defined “pollutant” to include “heat,”<sup>97</sup> but also exempted thermal discharges from the effluent limitations and standards of performance if dischargers **\*232** complied with additional thermal discharge regulations to be promulgated by EPA.<sup>98</sup> These regulations were to be designed to allow each individual discharger to choose a technology based on relative social and economic costs and benefits<sup>99</sup> after considering all alternatives, including once-through and closed-cycle cooling.<sup>100</sup> The House’s rationale was that thermal discharges should be regulated on a case-by-case basis according to the environmental and economic conditions at a particular location--an approach adopted after extensive testimony was presented to the House Committee on Public Works about the unique characteristics of heat as a pollutant.<sup>101</sup>

The Senate Committee on Public Works heard similar testimony, yet elected to treat discharges of heat like any other pollutant, subjecting it to the same nationally uniform effluent limitations and standards of performance applicable to other discharges of pollutants.<sup>102</sup>

The Conference Report forged a compromise between the House and Senate.<sup>103</sup> It adopted the Senate’s approach by defining “pollutant” to include “heat,”<sup>104</sup> and by regulating thermal discharges under the effluent limitations<sup>105</sup> and standards of performance<sup>106</sup> used to control other pollutants. However, it also “reflected portions of the House bill by allowing point sources to obtain case-by-case variances from the thermal discharge standards if they could demonstrate such restrictions were ‘more stringent than necessary to assure the protection and propagation of a balanced, indigenous population’ of **\*233** aquatic organisms.”<sup>107</sup> Subsequent floor debates revealed that the Conference Report’s approach balanced the potential effects of heat on a case-by-case basis.<sup>108</sup>

Key to the argument that the legislative history of § 316(a) clarifies § 316(b) is that both cover the steam-electric industry. The legislative history recognizes that the steam-electric industry, the primary user of cooling water, is unique and best regulated case-by-case.<sup>109</sup> For example, power plants are fewer in number and more readily identifiable than other categories of dischargers which release pollutants other than heat.<sup>110</sup> As the floor manager of the house Conference Report stated, the “problems of enforcement, including identification of violators, the apportioning of load limits for a given body of water, and the determination of the effects of a given source, are all less difficult than the problems encountered in the case of the multitude of sources of the various other pollutants.”<sup>111</sup> This indicates that Congress believed it was preferable to regulate a power plant’s cooling water use on a case-by-case, individualized basis.<sup>112</sup>

Consistent with this perspective is EPA’s original proposed regulations to implement § 316(b) and EPA’s 1977 draft guidance, both of which indicated that intake structures must be evaluated on a case-by-case basis.<sup>113</sup> The preamble to the 1976 final rule stated that “decisions relating to the best technology available are to be made on a case-by-case basis and may include factors such as age [of the plant].”<sup>114</sup> The supporting 1976 Development Document stated that “[a] prerequisite to the identification of best technology available for any specific site should be a biological study and associated report to

characterize the type, extent, distribution, and significant overall environmental relation of all aquatic organisms in the sphere of influence of the intake.”<sup>115</sup>

In light of legislative history that supports the conclusion that Congress believed cooling water intake structures should be regulated on an individualized, site-specific basis, EPA’s inclusion of restoration measures in its Phase II existing facility rule was reasonable. A component of the reasonableness of EPA’s decision is that restoration measures can be employed to satisfy site-specific particularities, meaning these measures may be more \*234 effective than uniform technology standards in protecting and supporting surrounding ecosystems simply because site-specific regulation considers factors such as the region the plant is located in, the physical location of the intake structure, and the types of organisms or wildlife affected by the intake structure, among other considerations.

#### **IV. ENVIRONMENTAL AND ECONOMIC REASONS FOR ACCORDING DEFERENCE TO EPA’S SECTION 316(B) RULES**

In addition to the legislative history, there are more fundamental reasons why the Second Circuit’s decision is in error. First, site-specific regulation that permits power plants to use restoration measures can prevent an adverse environmental impact from ever occurring in the aquatic ecosystem. Second, restoration measures may accomplish greater environmental good than a technology-based standard. Finally, granting existing facilities the option of using restoration measures is a more equitable method of imposing costs on a heavily regulated industry.

##### ***A. If there is no “adverse environmental impact,” there is no need to employ “best technology available”***

The plain language of § 316(b) requires intake structures to reflect “best technology available for minimizing environmental impact.”<sup>116</sup> Though the legislative history of § 316 makes EPA’s inclusion of restoration measures in its Phase II rules reasonable, an additional argument can be made that when restoration measures prevent an “adverse environmental impact” from occurring in the first place, § 316(b)’s BTA trigger is never engaged. This is so because if there is no “adverse environmental impact,” then there is nothing to minimize, and the objective of BTA is satisfied.<sup>117</sup> This line of reasoning turns on whether adverse environmental impacts should be viewed from a population or individual organism level. Resorting to other federal laws for the answer is necessary because the language of § 316(b) does not shed light on this.<sup>118</sup>

There is ample support for the view that the adverse environmental impact analysis should focus on harm to populations of organisms rather than solely on individual organisms. According to the EPA’s definition of “adverse,” adverse environmental impact should pertain to harm at the population, community, or ecosystem levels: loss of individual organisms does not reach this threshold.<sup>119</sup> EPA’s practice in administering § 316(b) over the years confirms this standard.<sup>120</sup> For example, in its 1975 Draft Guidelines, EPA stated, “[a]dverse environmental impacts occur when the ecological functioning of the organism[s] of concern is impaired or reduced to a level which precludes the maintenance of existing \*235 populations.”<sup>121</sup> “EPA has consistently adopted this position by considering losses to populations rather than individuals in determining adverse environmental impact.”<sup>122</sup> Additionally, EPA and state permitting agencies have followed this population-based approach to adverse environmental impact specifically in § 316(b) cases.<sup>123</sup> The overly narrow reading of § 316(b) supplied by the environmental organizations who initiated the *Riverkeeper* litigation ignores the fact that a given amount of aquatic mortality may have no important impact on a fish or shellfish population as a whole, especially when compared to impacts resulting from commercial and recreational fishing--activities that have a far greater influence on fish population size and health.<sup>124</sup>

Additionally, when viewed in the context of the objectives and goals of the Clean Water Act, an “adverse environmental impact” refers to those environmental factors that determine the health of aquatic populations and ecosystems.<sup>125</sup> Courts have looked to the objective of the Clean Water Act, which is “to restore and maintain the chemical, physical, and biological integrity of the Nation’s waters,” when construing other provisions to identify adverse impact.<sup>126</sup> Specifically, “courts have noted that Congress used the term ‘integrity’ to ‘convey a concept that refers to a condition in which the natural structure and function of ecosystems is maintained.’”<sup>127</sup> In other words, only man-made changes that overtax nature’s ability to restore conditions to a natural or original state are unacceptable perturbations.<sup>128</sup> Therefore, in accordance with EPA practice, when a change does not upset an overall population, no adverse environmental impact has occurred.

Just as small changes to a population and losses that are “offset by natural compensatory mechanisms are not an ‘adverse

environmental impact,” offsetting losses by other measures may prevent a facility from exceeding the adverse environmental impact threshold.<sup>129</sup> Such offsets may be accomplished through restoration measures, such as introducing fish stocking programs or wetlands enhancements.<sup>130</sup>

**\*236** EPA’s earliest efforts to implement § 316(b), in both its 1973 Proposed Rule and a 1973 Development Document, determined that it is the “net” effect of impingement and entrainment losses that matters.<sup>131</sup> Losses that are offset by other measures are not logically “adverse environmental impact[s]” if they do not interfere with the maintenance of sustainable populations or the structure and function of ecosystems.<sup>132</sup> Both EPA and state agencies have recognized in permitting decisions that restoration measures can play a significant role under § 316(b) in addressing impingement and entrainment losses.<sup>133</sup>

Considering adverse environmental impact at the population level as opposed to an individual organism level also accords with the approach of a number of federal environmental laws.

The Magnuson-Stevens Fishery Conservation and Management Act,<sup>134</sup> which regulates commercial fishing in coastal waters, requires that fishery management plans be developed to establish conservation measures to prevent overfishing and to assure “optimum yield.”<sup>135</sup> Optimum yield is defined as the amount of fish that will provide the greatest overall benefit to the nation, particularly with respect to food production and recreational opportunities, while taking into account the protection of marine ecosystems.<sup>136</sup> The most significant requirements in setting optimum yield are that it must prevent overfishing and not exceed “maximum sustainable yield,” which is a scientific determination of the level of harvest that can be taken consistently on a long-term basis without diminishing the overall population of fish stocks, and that it will assure an inexhaustible and perpetually renewable resource.<sup>137</sup>

Another example is § 7 of the Endangered Species Act, which prohibits a federal agency from granting a permit for any action that jeopardizes the continuing existence of a population of an endangered species by destroying or adversely modifying critical habitat.<sup>138</sup> Notably, § 7 has been interpreted by federal agencies and the courts to authorize the use of restoration measures.<sup>139</sup> For example, in *Fund for Animals, Inc. v. Rice*, the construction of a municipal landfill was allowed to proceed although it would destroy the habitat of two **\*237** endangered species because the impact would be mitigated by restoration measures suitable for the continued well-being of the population of endangered species involved.<sup>140</sup>

Additionally, the Fish and Wildlife Coordination Act,<sup>141</sup> which seeks to protect ecosystems and populations of wildlife living in ecosystems, has been implemented by the U.S. Fish & Wildlife Service through a policy that actively espouses the use of restoration measures in a degree in proportion to the value, scarcity, and replaceability of the habitat at risk.<sup>142</sup>

Finally, the National Environmental Policy Act requires EPA to consider the environmental benefits of proposed restoration measures in Environmental Impact Statements (EIS).<sup>143</sup> An EIS must be prepared for all federally-approved actions that will have a “significant” impact on the environment, but restoration measures undertaken and implemented in connection with a proposed action can obviate the need for an EIS altogether by reducing the project’s environmental impact so that the impact is no longer “significant.”<sup>144</sup>

Notwithstanding these examples to the contrary, some believe that the adverse impact analysis should focus on harm to individual organisms, and that the threshold for “adverse” is a relatively low one.<sup>145</sup> In support of their position, these individuals point to EPA’s 1973 Proposed Regulations, in which EPA suggested that *any* detrimental environmental impact could be considered “adverse,”<sup>146</sup> and to an EPA General Counsel’s statement that “[s]imply because cooling water could be discharged at a temperature which does not unduly disrupt the aquatic ecosystem does not mean that the withdrawal of the cooling water therefore will also not have an adverse environmental impact.”<sup>147</sup>

The environmental organization that spurred the *Riverkeeper* litigation takes this position, considering *any* mortality to fish or other aquatic life caused by a cooling water intake structure to be an adverse environmental impact.<sup>148</sup> Accordingly, even if the impingement and entrainment impacts caused by an intake structure would not interfere with the existence of a “balanced indigenous population,” such impacts must be minimized nevertheless.<sup>149</sup> This outlook arguably assures a high degree of fish protection and can be **\*238** supported by a straightforward, yet overly narrow, reading of § 316(b).<sup>150</sup> In practice, however, the EPA has defined the term “adverse” in general terms to mean “unfavorable, harmful, difficult, or detrimental,” but not “irreversible” or “irretrievable.”<sup>151</sup>

## ***B. Policy Reasons to Permit Restoration Measures for Section 316(b) Purposes***

While the legislative history of § 316 and the population-based approach to considering adverse environmental impact support permitting restoration measures for purposes of § 316(b) compliance, there are other practical reasons that make EPA's restoration measures approach in its remanded § 316(b) rules reasonable.

For one, allowing power plants to use restoration measures, such as restocking impacted fish species or improving the critical habitat surrounding intake structures, provides facilities with additional flexibility in complying with § 316(b).<sup>152</sup> Similarly, setting performance standards as ranges--as EPA did in its remanded § 316(b) rules--gives facilities flexibility in complying with the regulations. In fact, ecosystem-specific restoration measures often have economic and environmental advantages over source-based controls in achieving environmental protection in some settings.<sup>153</sup> This is because these measures can be tailored to the distinctive circumstances and needs of specific ecosystems--particularly, the climate of the region, the size of the waterbodies, and the type of fish, shellfish, and wildlife living in the waterbodies.<sup>154</sup> It is no wonder that restoration measures have been widely used by regulatory agencies in a variety of federal and state environmental programs, including programs dealing with power plant cooling water intakes, and that the courts have sustained agencies' use of such measures.<sup>155</sup>

Critics of ecosystem-based restoration claim that regulatory statutes preclude their use in lieu of uniform, technology-based controls.<sup>156</sup> As a matter of policy, critics also contend that restoration measures should not be accepted in place of source controls because their performance is unreliable and difficult to monitor and enforce.<sup>157</sup> The critics argue that, at most, restoration measures should be used only as additional protection after all available source-based technological controls have been applied.<sup>158</sup>

**\*239** These critics fail to recognize that fisheries and other habitats may exist in large part because of restoration measures undertaken as part of power plant construction and operation, and even if the habitats predated power plant construction and operation, restoration measures improve existing habitats. For example, in cooperation with conservation groups as well as state and federal agencies, the South Texas Nuclear Power Plant created an official sanctuary for waterfowl, and developed a large tract of native prairie grass, one of only a few such areas left on the Gulf Coast.<sup>159</sup> In addition to the sanctuary for waterfowl, the South Texas Nuclear Power Plant site includes 12,220 acres that provide protected habitat for a variety of threatened species including bald eagles, peregrine falcons, white-tailed hawks and alligators.<sup>160</sup> Notably, the area encompassing the plant consistently leads the United States with the highest number of bird species in the National Audubon Society's annual Christmas Bird Count.<sup>161</sup>

Beyond the benefits that restoration measures provide, it offends notions of fairness to require EPA to promulgate retroactive regulations based on a determination that restoration measures are not permitted under § 316(b). Such an interpretation would necessarily require retrofitting existing facilities-- an expensive and, in some cases, impractical task.<sup>162</sup> The explicit language of § 316(b) provides that a point source "shall require that the location, design, construction, and capacity of cooling water intake structures reflect the best technology available ...."<sup>163</sup> But, in the case of existing power plants, the location, design, construction, and capacity are already set, and were established with no guidance from EPA on what constituted BTA.<sup>164</sup> Without a reliable definition of adverse environmental impact in the first place, it was impossible for power plants to have known how to minimize those impacts.<sup>165</sup>

An overly-narrow reading of § 316(b) could lead to an EPA decision that dry-cooling or wet closed-cycle cooling is BTA for purposes of § 316(b), causing the retrofitting of many existing cooling water intake structures at prohibitive costs--in the tens to hundreds of millions of dollars per plant.<sup>166</sup> In addition, especially with regard to a move to **\*240** dry-cooling, there would be a loss of plant efficiency because of the inefficiencies inherent in operating cooling water towers.<sup>167</sup> The state of New York adheres to the overly-narrow reading, and is planning to make wet closed-cycle cooling the presumptive BTA for existing power plants within the state.<sup>168</sup> New York's State Department of Environmental Conservation estimates that compliance for the state's twenty-seven existing steam-electric power plants, if spread over twenty years, would be over \$8.5 billion, roughly 6.7% of the gross annual revenues for the New York electric generation industry for the twenty-year period.<sup>169</sup>

Retrofitting for dry-cooling technology, if considered BTA, would also put increased stress on turbines and generators and result in increased air emissions, potentially creating an "adverse environmental impact" of its own.<sup>170</sup> The output of a plant with dry-cooling technology will be about 2% less than that of a similar plant with wet closed-cycle cooling, meaning that more fuel will need to be burned to make up for the drop in output.<sup>171</sup>

Finally, EPA should be permitted to factor in cost when developing its § 316(b) rules. On appeal of *Riverkeeper II*, considering the narrow issue of whether EPA may rely upon a cost-benefit analysis in interpreting § 316(b), the Supreme Court ruled that the agency could do so.<sup>172</sup> When costs are taken into account, it would be extraordinarily financially burdensome for EPA to both neglect the benefits of restoration measures and determine that dry cooling or closed-cycle cooling technology is BTA for existing facilities. Although EPA's recently promulgated proposed § 316(b) rules applicable to existing facilities \*241 do not include provisions allowing for the use of restoration measures, they also do not mandate closed-cycle cooling for purposes of compliance with § 316(b)--primarily because of the costs associated with such a requirement and drops in plant efficiency.

## V. CONCLUSION

The Second Circuit erred in striking down EPA's inclusion of restoration measures as a means for complying with § 316(b). While restoration measures cannot directly reduce losses of individual organisms at an intake structure, they can prevent or reduce any adverse impact that such losses might have on populations and communities by improving and expanding habitat and food supplies.

The legislative history of § 316(b), an appropriate focus on harm to populations and ecosystems rather than individual organisms when considering the potential for an adverse environmental impact, and practical considerations such as the economic and ecosystem benefits that restoration measures can provide--all support a conclusion that the use of restoration measures at existing power plants is permissible and reasonable. Accordingly, the Second Circuit in *Riverkeeper II* should have accorded deference to EPA's § 316(b) rules under the *Chevron* doctrine.

As it stands, 559 existing power plants are affected by the Second Circuit's decision<sup>173</sup>-- a chilling fact considering an EPA conclusion that closed-cycle cooling is BTA would be extraordinarily expensive for industry.<sup>174</sup> As previously noted, EPA did not select closed-cycle cooling as BTA in its recently proposed § 316(b) rules, promulgated as a result of the remand of its previous § 316(b) existing facility rules. EPA's proposal is currently in the midst of a comment period that ends on July 19, 2011. In finalizing its proposal, EPA should both affirm its decision to not require all existing facilities to retrofit to closed-cycle cooling for purposes of compliance with § 316(b), and reevaluate its position regarding restoration measures.

## Footnotes

<sup>a1</sup> James Holcomb is an associate in the Austin, Texas office of Vinson & Elkins LLP. The author wishes to thank Professor Hannah Wiseman of the University of Tulsa College of Law, Molly Cagle of Vinson & Elkins, and Sara Burgin of Baker Botts for their comments on and contributions to this article. Special thanks to the members of the Arizona Journal of Environmental Law & Policy for their thoughtful editing.

<sup>1</sup> Clean Water Act, 33 U.S.C. § 1251 (2006).

<sup>2</sup> Defined as "[w]ater used for contact or noncontact cooling, including water used for equipment cooling, evaporative cooling tower makeup, and dilution of effluent heat content." 40 C.F.R. § 125.93 (2007).

<sup>3</sup> Defined as the "total physical structure and any associated constructed waterways used to withdraw cooling water from waters of the U.S." *Id.* In layman's terms, a cooling water intake structure is the structure "used by steam-electric power plants to obtain water from a nearby river, lake, ocean, or estuary to cool purified steamwater that rotates the turbines generating electricity." John Kadwany, *Comparing Clean Water Act Section 316(b) Policy Options*, 2(S1) THE SCIENTIFIC WORLD JOURNAL 106-07 (2002).

<sup>4</sup> "[T]he entrapment of any life stages of fish and shellfish on the outer part of an intake structure or against a screening device during periods of intake water withdrawal." 40 C.F.R. § 125.93 (2007).

<sup>5</sup> James R. May & Maya K. van Rossum, *The Quick and the Dead: Fish Entrainment, Entrapment, and the Implementation and Application of Section 316(b) of the Clean Water Act*, 20 VT. L. REV. 373, 381 (1995).

<sup>6</sup> *Id.* at 381; OFFICE OF WATER AND HAZARDOUS MATERIALS, E.P.A., DEV. DOCUMENT FOR BEST TECHNOLOGY AVAILABLE FOR THE LOCATION, DESIGN, CONSTRUCTION AND CAPACITY OF COOLING WATER INTAKE STRUCTURES FOR MINIMIZING ADVERSE ENVIRONMENTAL IMPACT 6 (1976) [hereinafter DEVELOPMENT DOCUMENT].

<sup>7</sup> “[T]he incorporation of any life stages of fish and shellfish with intake water flow entering and passing through a cooling water intake structure and into a cooling water system.” 40 C.F.R. § 125.93 (2007).

<sup>8</sup> May & van Rossum, *supra* note 5, at 383.

<sup>9</sup> 33 U.S.C. § 1326(b) (2006).

<sup>10</sup> Final Regulations to Establish Requirements for Cooling Water Intake Structures at Phase II Existing Facilities, 69 Fed. Reg. 41,576, 41,609 (July 9, 2004) [hereinafter Final Regulations for Cooling Intake Structures].

<sup>11</sup> *Riverkeeper, Inc. v. United States E.P.A. (Riverkeeper II)*, 475 F.3d 83 (2d Cir. 2007).

<sup>12</sup> NPDES--Cooling Water Intake Structures at Existing Facilities, 76 Fed. Reg. 22,174 (Apr. 20, 2011) [hereinafter Cooling Water Intake Structures at Existing Facilities]. EPA and environmentalist groups entered into a settlement agreement on November 22, 2010, in which the groups received assurances from EPA that proposed § 316(b) regulations applicable to existing facilities would be published by March 14, 2011, with final rules promulgated by July 27, 2012. Order Terminating the Second Amended Consent Decree and Dismissing the Complaint, *Riverkeeper, Inc. v. Jackson*, Case No. 93 Civ. 0314, Slip op. (S.D.N.Y. Dec. 3, 2010). Industry groups asked to participate in the district court’s consideration of the settlement agreement, but the federal district court for the Southern District of New York denied the industry groups’ request. Order Denying Utility Water Act Group’s Amicus Motion, *Riverkeeper, Inc. v. Jackson*, Case No. 93 Civ. 0314, Slip op. (S.D.N.Y. Dec. 3, 2010).

<sup>13</sup> Cooling Water Intake Structures at Existing Facilities, 76 Fed. Reg. at 22,190.

<sup>14</sup> 40 C.F.R. § 125.90 (2007).

<sup>15</sup> An Existing Facility for purposes of Phase II was defined as:  
any facility that commenced construction as described in 40 C.F.R. § 122.29(b)(4) on or before January 17, 2002, and any modification of or any addition of a unit at such a facility that does not meet the definition of a new facility at § 125.83 that also is a point source, uses or proposes to use cooling water intake structures with a total design intake flow of 50 million gallons per day or more to withdraw cooling water from waters of the United States and as its primary activity, the facility both generates and transmits electric power, or generates electric power but sells it to another entity for transmission, and it uses at least 25% of water withdrawn exclusively for cooling purposes, measured on an average annual basis.  
40 C.F.R. § 125.91(a) (2007).

<sup>16</sup> 40 C.F.R. § 125.90-99 (2007).

<sup>17</sup> 33 U.S.C. § 1326(b) (2006).

<sup>18</sup> *Riverkeeper, Inc. v. E.P.A. (Riverkeeper I)*, 358 F.3d 174, 194 (2d. Cir. 2004); Robert Glennon & Andrew M. Reeves, *Solar Energy’s Cloudy Future*, 1 ARIZ. J. ENVTL. L. & POL’Y 91, 99 (2010).

- 19 *Riverkeeper I*, 358 F.3d at 182 n.5. One example of these “other processes” is “blowdown,” where water is removed from the cooling cycle to reduce the salt content of the cooling water. *See* Glennon & Reeves, *supra* note 18, at 98-99.
- 20 *Riverkeeper I*, 358 F.3d at 194 n.22.
- 21 May & van Rossum, *supra* note 5, at 379. *See* SCIENCE APPLICATIONS INTERNATIONAL CORPORATION, BACKGROUND PAPER NUMBER 2: COOLING WATER USE FOR SELECTED U.S. INDUSTRIES AND SUMMARY OF SELECTED EPA REGIONAL AND STATE SECTION 316(B) ACTIVITIES 2-4 (Dec. 13, 1993) (Preliminary Draft) [hereinafter SCIENCE APPLICATIONS]; John Clark & Willard Brownell, *Electric Power Plants in the Coastal Zone: Environmental Issues*, 7 AMERICAN LITTORAL SOCIETY SPECIAL PUBLICATION III-5 (1973).
- 22 Clark & Brownell, *supra* note 21, at III-5.
- 23 May & van Rossum, *supra* note 5, at 380. *See* SCIENCE APPLICATIONS, *supra* note 21, at 2-3; Clark & Brownell, *supra* note 21, at III-1, III-5.
- 24 May & van Rossum, *supra* note 5, at 380. *See* SCIENCE APPLICATIONS, *supra* note 21, at 2-3; Clark & Brownell, *supra* note 21, at III-3.
- 25 Clark & Brownell, *supra* note 21, at III-3.
- 26 *Riverkeeper, Inc. v. E.P.A. (Riverkeeper II)*, 475 F.3d 83, 104 n.16 (2d 2009).
- 27 Incidentally, while once-through and closed-cycle cooling systems are the primary methods for obtaining cooling water for the condenser system, use of one does not necessarily preclude use of the other. Some electric generating facilities employ “the concepts of the once-through and closed-cycle cooling systems at the same time.” SCIENCE APPLICATIONS, *supra* note 21, at 2-4; May & van Rossum, *supra* note 5, at 380 n.26.
- 28 May & van Rossum, *supra* note 5, at 390; *Minimizing Adverse Environmental Impact*, 41 Fed. Reg. 17,387, 17,388 (Apr. 26, 1976).
- 29 *Id.* (discussing that EPA declared that it believed the appropriate technology is best determined after a careful evaluation of the specific aspects at each site).
- 30 *Entergy Corp. v. Riverkeeper, Inc.*, 129 S.Ct. 1498 (2009).
- 31 40 C.F.R. § 125.94 (2007).
- 32 40 C.F.R. § 125.94(c).
- 33 Final Regulations for Cooling Intake Structures, 69 Fed. Reg. 41,576, 41,609 (July 9, 2004).
- 34 *Riverkeeper II*, 475 F.3d 83 (2d. Cir. 2009).
- 35 Reda M. Dennis-Parks, *Riverkeeper, Inc. v. U.S. EPA: Finally a Solution the Courts Can Live With ... Almost*, 32 ECOLOGY L. Q. 689 (2005).

36 *Appalachian Power Co. v. Train*, 566 F.2d 451, 456-57 (4th Cir. 1977).

37 *Id.* at 457.

38 Dennis-Parks, *supra* note 35, at 691.

39 EPA, DRAFT GUIDANCE FOR EVALUATING THE ADVERSE IMPACT OF COOLING WATER INTAKE STRUCTURES  
ON THE AQUATIC ENVIRONMENT: SECTION P.L. 92-500 (1977),  
[http://www.epa.gov/lawsregs/lawsguidance/cwa/316b/upload/2006\\_10\\_26\\_316b\\_1977AEIguid.pdf](http://www.epa.gov/lawsregs/lawsguidance/cwa/316b/upload/2006_10_26_316b_1977AEIguid.pdf).

40 Public Service Company of New Hampshire, 1 E.A.D. 332 (EAB 1977).

41 *Id.*

42 Cronin v. Reilly, 93 Civ. 314 (S.D.N.Y. 1995) (consent decree entered October 10, 1995).

43 The district court denied a motion by fifty-six electric utility companies to intervene. Cronin v. Browner, 898 F. Supp. 1052, 1064 (S.D.N.Y. 1995).

44 Cronin v. Browner, 90 F. Supp. 2d 364, 376 (S.D.N.Y. 2000).

45 40 C.F.R. § 125.94(a) (2007).

46 40 C.F.R. § 125.94(b). Performance standards were developed based on consideration of a range of technologies that EPA determined to be commercially available for the industries affected as a whole. Final Regulations for Cooling Intake Structures, 69 Fed. Reg. 41,576, 41,598-99 (July 9, 2004).

47 40 C.F.R. § 125.94(a)(3) (2007). Restoration measures would be allowed once a plant has demonstrated to the EPA Regional Director that the plant has:  
[E]valuated the use of design and construction technologies and operational measures for [the] facility and determined that the use of restoration measures is appropriate because meeting the applicable performance standards or site-specific requirements through the use of design and construction technologies and/or operational measures alone is less feasible, less cost-effective, or less environmentally desirable than meeting the standards or requirements in whole or in part through the use of restoration measures; [and t]he restoration measures [the plant] will implement ... will produce ecological benefits ....  
40 C.F.R. § 125.94(c).

48 Mitigation technologies and operational measures are techniques that prevent entrainment and impingement from occurring in the first place. Power plants in New York, for example, use mitigation measures such as acoustic deterrent systems, barrier nets, variable speed pumps, and fine-mesh intake screens. *See e.g. Aquatic Habitat Protection*, NY DEP'T OF ENVTL CONSERVATION, <http://www.dec.ny.gov/animals/32847.html> (last visited May 12, 2011). These strategies are different from restoration measures, which improve the ecological quality of the waterbody as a whole.

49 40 C.F.R. § 125.94(c).

50 *Id.*

51 *Riverkeeper I*, 358 F.3d 174, 189 (2d Cir. 2004).

52 *Id.*

53 *Id.* at 190.

54 *Id.* (citing Clean Water Act Amendments of 1982: Hearings on S. 777 & S. 2652 Before the Subcomm. on Envtl. Pollution of the Comm. On Env't and Pub. Works, 97th Cong., 2d Sess. 113-14 (1982)).

55 *Id.* at 191 (citing Harper & Row Publishers, Inc. v. Nation Enters., 471 U.S. 539, 561 (1985)).

56 *Riverkeeper II*, 475 F.3d 83 (2d Cir. 2009).

57 *Id.* at 131.

58 *Id.* at 110.

59 *Id.* at 104 n.15; Proposed Regulations to Establish Requirements for Cooling Water Intake Structures at Phase II Existing Facilities, 67 Fed. Reg. 17,122, 17,189 (Apr. 9, 2002) [hereinafter Proposed Regulations for Cooling Intake Structures].

60 *Riverkeeper II*, 475 F.3d at 104 n.16.

61 *Id.*

62 *Id.*

63 *Id.*

64 *Id.* at 104 n.15.

65 Final Regulations for Cooling Intake Structures, 69 Fed. Reg. 41,576, 41,605 (July 9, 2004).

66 Proposed Regulations for Cooling Intake Structures, 67 Fed. Reg. 17,122, 17,155 (Apr. 9, 2002).

67 *Riverkeeper II*, 475 F.3d 83, 104 (2d Cir. 2009).

68 Entergy Corp. v. Riverkeeper, Inc., 129 S.Ct. 1498 (2009). EPA is using cost-benefit analysis to develop § 316(b) regulations applicable to existing facilities. For example, on January 21, 2011, EPA forwarded its final information collection request to the Office of Management and Budget for approval. Willingness to Pay Survey for § 316(b) Existing Facilities Cooling Water Intake Structures, 76 Fed. Reg. 3,883 (Jan. 21, 2011).

69 *Riverkeeper II*, 475 F.3d at 106.

70 *Id.*; The Phase II rule provided for a site-specific variance from the national standards in the form of a “cost-benefit alternative.”

This alternative allowed local permitting agencies to make site-specific determinations of BTA if the facility could demonstrate that the costs of compliance with the national standards were significantly greater than the benefits of compliance. *See* 40 C.F.R. § 125.94(a)(5)(ii) (2007).

71 *Riverkeeper II*, 475 F.3d at 106.

72 *Id.* at 107.

73 *Id.*

74 *Id.*

75 *Id.* at 108.

76 *Id.* at 109.

77 *Id.* at 109-10.

78 *Id.*

79 Thomas J. Schoenbaum & Richard B. Stewart, *The Role of Mitigation and Conservation Measures in Achieving Compliance with Environmental Regulatory Statutes: Lessons from Section 316 of the Clean Water Act*, 8 N.Y.U. ENVTL. L.J. 237, 242 (2000).

80 *Chevron U.S.A., Inc. v. Natural Res. Def. Council, Inc.*, 467 U.S. 837, 843-44 (1984).

81 *Energy Corp. v. Riverkeeper, Inc.*, 129 S.Ct. 1498, 1505 (2009).

82 Schoenbaum & Stewart, *supra* note 79.

83 *See, e.g.*, Findings and Determinations *in re* Fla. Power Corp., Crystal River Power Plant, NPDES Permit No. FL0000159, EPA Region IV (Sept. 1, 1988) (fish hatchery); Waste Discharge Requirements for Pac. Gas & Elec. Co., Pittsburg Power Plant, NPDES Permit No. CA0004880, Calif. Reg'l Water Quality Control Bd., San Francisco Bay Region (Apr. 18, 1990) (fish stocking program); Settlement Agreement subsequent to *Cent. Hudson Gas & Elec. Corp. v. E.P.A.* and Settlement Agreement subsequent to *In re Nat. Resources Def. Council v. N.Y. State Dept. of Env'l Conservation* (fish hatchery, donation of public park, and stocking program); Marine Review Comm., Final Report to the Calif. Coastal Comm'n on the San Onofre Nuclear Generating Station, Doc. No. 89-02 (wetlands restoration and construction of artificial reefs).

84 Schoenbaum & Stewart, *supra* note 79, at 249.

85 *Ohio Valley Env'tl Coal. v. Aracoma Coal Co.*, 556 F.3d 177, 202-07 (4th Cir. 2009).

86 40 C.F.R. § 230.75(d) (2008).

87 William A. Anderson & Eric P. Gotting, *Taken In Over Intake Structures? Section 316(b) of the Clean Water Act*, 26 COLUM. J. ENVTL. L. 1, 14 (2001).

88 *Id.* at 21.

89 *Id.*

90 *Id.*

91 *Id.*

92 *Id.*

93 Anderson & Gotting, *supra* note 87, at 21.

94 33 U.S.C. § 1326(a) (2006).

95 Anderson & Gotting, *supra* note 87, at 3. Compare S. 2770, 92nd Cong. (1st Sess. 1971), at §§ 301, 306, *reprinted in* A Legislative History of the Water Pollution Control Act Amendments of 1972, at 1608-10, 1623-27, with H.R. 11,896, 92nd Cong. (1st Sess. 1971), at § 316, *reprinted in* A Legislative History of the Water Pollution Control Act Amendments of 1972, at 1043-45 [hereinafter A Legislative History].

96 Anderson & Gotting, *supra* note 87, at 15. See H.R. 11,896, 92nd Cong. (1st Sess. 1971), at § 316, *reprinted in* A Legislative History, *supra* note 95, at 1043-45.

97 Anderson & Gotting, *supra* note 87, at 15; H.R. 11,896, 92nd Cong. (1st Sess. 1971), at § 502(6), *reprinted in* A Legislative History, *supra* note 95, at 1068.

98 Anderson & Gotting, *supra* note 87, at 15; H.R. 11,896, 92nd Cong. (1st Sess. 1971), at § 316(b), *reprinted in* A Legislative History, *supra* note 95, at 1043-44.

99 *Id.*

100 *Id.*

101 Anderson & Gotting, *supra* note 87, at 15-16; Industry witnesses explained that thermal discharges, as opposed to other pollutants, dissipate quickly, result in only local and temporary effects, and can benefit the environment under certain circumstances. See generally Water Pollution Control Legislation, 1971 (Oversight of Existing Programs): Hearings Before the Committee on Public Works, House of Representatives, 92nd Cong., 1st Sess. (1971); Water Pollution Control Legislation, 1971 Proposed Amendments to Existing Legislation: Hearings Before the Committee on Public Works, House of Representatives, 92nd Cong., 1st Sess. (1971); Water Pollution Control Legislation, 1971: Hearings on H.R. 11,896, H.R. 11,895 Before the Committee on Public Works, House of Representatives, 92nd Cong., 1st Sess. (1971).

102 S. 2770, 92nd Cong. (1st Sess. 1971), §§ 301, 306, 502(f), *reprinted in* A Legislative History, *supra* note 95, at 1608-10, 1612-20, 1697-98.

103 Anderson & Gotting, *supra* note 87, at 18; S. CONF. REP. NO. 92-1236, at 119-21, 124-29, 137 (1972), *reprinted in* A Legislative History, *supra* note 95, at 302-04, 307-12, 320.

<sup>104</sup> Anderson & Gotting, *supra* note 87, at 18; Federal Water Pollution Control Act, § 502(6), *reprinted in A Legislative History*, *supra* note 95, at 73.

<sup>105</sup> Anderson & Gotting, *supra* note 87, at 18; Federal Water Pollution Control Act, §§ 301, 304, *reprinted in A Legislative History*, *supra* note 95, at 31-33, 37-40.

<sup>106</sup> Anderson & Gotting, *supra* note 87, at 18; Federal Water Pollution Control Act, § 306, *reprinted in A Legislative History*, *supra* note 95, at 41-43.

<sup>107</sup> Anderson & Gotting, *supra* note 87, at 18; Federal Water Pollution Control Act, § 316(a), *reprinted in A Legislative History*, *supra* note 95, at 63.

<sup>108</sup> Anderson & Gotting, *supra* note 87, at 18. *See, e.g.*, 118 Cong. Rec. 33,763, 33,765-66 (1972), *reprinted in A Legislative History*, *supra* note 95, at 267-68, 273-74.

<sup>109</sup> Anderson & Gotting, *supra* note 87, at 19.

<sup>110</sup> *Id.*; 118 Cong. Rec. 33,761 (1972), *reprinted in A Legislative History*, *supra* note 95, at 263.

<sup>111</sup> *Id.*

<sup>112</sup> Anderson & Gotting, *supra* note 87, at 19.

<sup>113</sup> *Id.* at 22. In the preamble to the 1973 Proposed Rule, EPA stated that the new regulations would “provide a framework for the case-by-case determination” of “best technology available.” Proposal Regarding Minimizing Adverse Environmental Impact, 38 Fed. Reg. 34,410, 34,410 (Dec. 13, 1973) [hereinafter Proposal Regarding Minimizing Adverse Evntl Impact].

<sup>114</sup> Minimizing Adverse Environmental Impact, 41 Fed. Reg. 17,387, 17,388 (Apr. 26, 1976).

<sup>115</sup> U.S. E.P.A., DEVELOPMENT DOCUMENT, *supra* note 6, at 176.

<sup>116</sup> 33 U.S.C. § 1326(b) (2006).

<sup>117</sup> Anderson & Gotting, *supra* note 87, at 39.

<sup>118</sup> Kadwany, *supra* note 3, at 109.

<sup>119</sup> Schoenbaum & Stewart, *supra* note 79, at 307.

<sup>120</sup> *Id.*

<sup>121</sup> *Id.*

122 Schoenbaum & Stewart, *supra* note 79, at 307 (citing U.S. E.P.A., *Draft Guidelines to Determine Best Available Technology for Location, Design, Construction, and Capacity of Cooling Water Intake Structures for Minimizing Adverse Environmental Impact: § 316(b)* Pub. L. No. 92-500, 18-19, 32-33, 37, 42 (1975)).

123 *See, e.g.,* Seacoast Anti-Pollution League v. Costle, 597 F.2d 306, 309-11 (1st Cir. 1979).

124 Kadvany, *supra* note 3, at 108.

125 Anderson & Gotting, *supra* note 87, at 39.

126 Federal Water Pollution Control Act, § 101, *reprinted in* A Legislative History, *supra* note 95, at 3.

127 Anderson & Gotting, *supra* note 87, at 39. *See* United States v. Riverside Bayview Homes, 474 U.S. 121,132-33 (1985) (citing the House Report language and concluding Congress intended to focus on protection of aquatic ecosystems).

128 H.R. REP. NO. 92-911 (1972), *reprinted in* A Legislative History, *supra* note 95, at 764.

129 Anderson & Gotting, *supra* note 87, at 46.

130 Final Regulations for Cooling Intake Structures, 69 Fed. Reg. 41,576, 41,609 (July 9, 2004).

131 Anderson & Gotting, *supra* note 87, at 47. “Adverse environmental impacts that could occur from cooling water intakes relate to the net damage or destruction of benthos, plankton and nektonic organisms ....” Proposal Regarding Minimizing Adverse Evntl Impact, 38 Fed. Reg. 34,410 (Dec. 13, 1973).

132 Anderson & Gotting, *supra* note 87, at 46.

133 See examples, *supra* note 86.

134 16 U.S.C. §§ 1801-82 (2006).

135 16 U.S.C. § 1851(1)-(2).

136 16 U.S.C. § 1802(33)(a).

137 16 U.S.C. § 1829.

138 16 U.S.C. §§ 1536 (2006).

139 Schoenbaum & Stewart, *supra* note 79, at 259.

140 85 F.3d 535, 544-45 (11th Cir. 1996).

141 16 U.S.C. § 661 (2006).

142 Fish and Wildlife Service Mitigation Policy, 46 Fed. Reg. 7,644, 7,650 (Jan. 23, 1981).

143 Schoenbaum & Stewart, *supra* note 79, at 301.

144 *Id.* at 277.

145 May & van Rossum, *supra* note 5, at 453.

146 Proposal Regarding Minimizing Adverse Evntl Impact, 38 Fed. Reg. 34,410 (Dec. 13, 1973).

147 In re Central Hudson Gas and Elec. Corp., 2 U.S. Envtl. Protection Agency Gen. Counsel Opinions 371, 381-82 (Env't L. Publishing Service) (1977).

148 Kadwany, *supra* note 3, at 108.

149 *Id.*

150 *Id.*

151 May & van Rossum, *supra* note 5, at 454.

152 Final Regulations for Cooling Intake Structures, 69 Fed. Reg. 41,576, 41,609, 41,622 (July 9, 2004).

153 Schoenbaum & Stewart, *supra* note 79, at 237.

154 *Id.* at 299-300.

155 See *supra* note 86. The state of Washington allows the use of restoration measures in their water permitting program. *Frequently Asked Questions About SEPA*, DEP'T OF ECOLOGY: STATE OF WASH., [http:// www.ecy.wa.gov/programs/sea/sepa/faq.htm](http://www.ecy.wa.gov/programs/sea/sepa/faq.htm) (last visited May 12, 2011).

156 May & van Rossum, *supra* note 5, at 478-80.

157 *Id.* The groups point out that long-term population impacts are a moving target.

158 *Id.*

159 *Conservation*, SOUTH TEXAS NUCLEAR POWER PLANT, [http:// www.stpnoc.com/#/about-us/conservation](http://www.stpnoc.com/#/about-us/conservation), (last visited May 12, 2011).

160 *Id.*

<sup>161</sup> *Id.* The power plant's prairie wetlands are included in the Texas Parks and Wildlife Department's "Great Texas Wildlife Trails" list. *Rio Colorado Loop Central Texas Coast Wildlife Trail*, TEXAS PARKS AND WILDLIFE, <http://beta-www.tpwd.state.tx.us/huntwild/wildlife/wildlife-trails/coastal/central/rio-colorado-loop> (last visited May 12, 2011).

<sup>162</sup> Proposed Regulations for Cooling Intake Structures, 67 Fed. Reg. 17,122, 17,155 (Apr. 9, 2002) (indicating that requiring closed-cycle cooling could close nine of the 539 existing power plants subject to the Phase II rule).

<sup>163</sup> 33 U.S.C. § 1326(b) (2006).

<sup>164</sup> Interview with Molly Cagle, Partner, Vinson & Elkins (Nov. 14, 2009).

<sup>165</sup> Kadvany, *supra* note 3, at 107.

<sup>166</sup> Final Regulations for Cooling Intake Structures, 69 Fed. Reg. 41,576, 41,605 (July 9, 2004) ("[R]etrofits may be impossible or not economically practicable"). EPA estimated that capital costs would be between 130-200 million dollars for each plant to convert to a closed-cycle system, with annual operating costs in the range of 4-20 million dollars, with total social costs exceeding 3.5 billion dollars per year. *Id.* Exelon is closing its Oyster Creek plant in part because of its anticipation of the need to install closed-cycle cooling towers under EPA's new 316(b) rules. Matthew L. Wald, *Oyster Creek Reactor to Close by 2019*, N.Y. TIMES, Dec. 8, 2010.

<sup>167</sup> Dry-cooling is ineffective in hot and arid climates. Direct acting dry-cooling, the most common dry-cooling technique in the United States, works like an automobile radiator with the steam in the tube cooled by air blown over the outside. Since dry-cooling systems can approach only the ambient air temperature, they are best suited to cold, wet climates. As the cooling system outlet temperature increases, plant efficiency decreases. Over the course of a year, the output of a plant with dry-cooling will be about 2% less than that of a similar plant with evaporative closed-loop cooling, and plant efficiency may decrease by up to 25% in extremely hot weather. *See, e.g.*, Benjamin K. Sovacool, *Preventing National Electricity-Water Crisis Areas in the United States*, 34 COLUM. J. ENVTL L. 333, 372 (2009) (discussing dry-cooling technology); U.S. DEP'T. OF ENERGY, ENERGY DEMANDS ON WATER RESOURCES: REPORT TO CONGRESS ON THE INTERDEPENDENCY OF ENERGY AND WATER 37 (2006).

<sup>168</sup> *Best Technology Available (BTA) for Cooling Water Intake Structures*, NY STATE DEP'T OF ENVTL. CONSERVATION POL'Y, available at [http://www.dec.ny.gov/docs/fish\\_marine\\_pdf/drbtapolicy1.pdf](http://www.dec.ny.gov/docs/fish_marine_pdf/drbtapolicy1.pdf).

<sup>169</sup> *Id.*

<sup>170</sup> Sovacool, *supra* note 167, at 372.

<sup>171</sup> *See, e.g., id.* at 372.

<sup>172</sup> *Entergy Corp. v. Riverkeeper, Inc.*, 129 S.Ct. 1498, 1513 (2009).

<sup>173</sup> Cooling Water Intake Structures at Existing Facilities, 76 Fed. Reg. 22,174, 22,190 (Apr. 20, 2011).

<sup>174</sup> *See id.* at 22,204-05.