Nos. 07-588, 07-589 and 07-597

IN THE

Supreme Court of the United States

ENTERGY CORPORATION,
Petitioner,
v.
ENVIRONMENTAL PROTECTION AGENCY, *et al.*,

PSEG FOSSIL LLC, *et al.*,
Petitioners
v.
RIVERKEEPER, INC., *et al.,*

UTILITY WATER ACT GROUP,
Petitioner
v.
RIVERKEEPER, INC., *et al.*

On Writ of Certiorari to the United States Court of Appeals for the Second Circuit

AMICUS CURIAE BRIEF OF NATIONAL WILLIFE FEDERATION AND SIERRA CLUB IN SUPPORT OF RESPONDENTS RIVERKEEPER, INC., ET AL.

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INTEREST OF AMICI

Amici Curiae are non-profit organizations committed to protecting our Nation's waters for the use and enjoyment of their members.[1] Collectively, these organizations work to foster public understanding of and participation in solutions to the problems resulting from human impacts on rivers, lakes, bays, estuaries and oceans. Amici Curiae seek to promote the objective of the Clean Water Act ("the Act") to restore and maintain the chemical, physical, and biological integrity of the nation's waters, as well as its national goal to ensure the protection and propagation of fish, shellfish, and wildlife.

Based upon these interests, these groups join in filing this brief in support of Respondents' efforts to invalidate the United States Environmental Protection Agency's (EPA's) regulations for cooling water intake structures at large, existing power plants. Amici curiae ask this Court's ruling that EPA may not, in light of the complex and significant impacts of cooling water intake structures on aquatic ecosystems, employ cost-benefit analysis when making a "best technology available" determination under Section 316(b) of the Clean Water Act, 33 U.S.C. § 1326(b).

SUMMARY OF ARGUMENT

EPA cannot accurately quantify the benefit of minimizing the environmental impacts of once-

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[1] Pursuant to S. Ct. R. 37.3(a) and 37.6, the undersigned represents that (1) all parties consented to the filing of this brief, (2) no counsel for any party authored this brief in whole or part, and (3) no person or entity other than the above-named amici curiae and their counsel made a monetary contribution to the preparation or submission of this brief.

through cooling water systems on aquatic ecosystems because of the uncertainty inherent in measuring those impacts. Agencies using cost-benefit analysis in this context will inevitably fail to properly consider the loss of ecological integrity and other important values. *Amici National Wildlife Federation et al.* offer a summary of the ecological impacts of cooling water intake structures to illustrate why it was a sensible policy choice for Congress to require power plants to install the best technology available to minimize these impacts, independent of any cost-benefit analysis.

Power plants using once-through cooling water systems draw extremely large volumes of water into their cooling water systems and, in the process, destroy innumerable numbers of fish, shellfish, and other aquatic or water-dependent organisms. All of these organisms, whether a highly sought-after commercially valuable fish or a "lowly" worm, play an important ecological role in the rivers, lakes, bays and estuaries from which they are removed. These waters are already stressed by pollution and other human activities and so the significant loss of aquatic life can have far-reaching impacts not readily measured, including fundamental shifts in ecosystem structure and function.

Congress established the "best technology available for minimizing adverse environmental impacts" (BTA) standard precisely because of the difficulty of determining the full benefits of restoring water bodies impacted by cooling water systems. The use of cost-benefit analysis is wholly inconsistent with "minimizing" environmental effects and does not allow for the proper consideration of the values underlying the Clean Water Act's objective to restore and maintain aquatic ecosystems. Congress' use of a technology-forcing standard in Section 316(b) is therefore a rational policy choice.

ARGUMENT

I. Once-through Cooling Water Systems Cause Serious Harm to the Ecological Integrity of Our Nation's Waters

The Second Circuit correctly concluded that the ecological impacts of cooling water intake structures through entrainment and impingement are "staggering." *Riverkeeper, Inc. v. U.S. Environmental Protection Agency*, 358 F.3d 174, 181 (2d Cir. 2004). The volume of water used for cooling water at power plants is vast. The United States Geological Survey (USGS) has estimated the total quantity of water withdrawn for electric power in the year 2000 to be 195 billion gallons per day.[2] Of all the various sources that withdraw water from our nation's waters, thermoelectric power withdrawals accounted for over fifty percent of fresh surface-water withdrawals and over ninety percent of saltwater surface water withdrawals.[3]

The direct impacts of the once-through cooling water systems include the death of over three billion fish and shellfish per year[4] and the removal of

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[2] Hutson, et al., *Estimated Use of Water in the United States in 2000*, USGS Circular 1268 (released March 2004, revised April 2004, May 2004, February 2005) (*Available at* http://water.usgs.gov/watuse/).

[3] *Id*.

[4] This number is expressed as an "age 1 equivalent" which is the method EPA used in its analysis for establishing an "apples to apples" comparison of the losses of fish at all stages from eggs and larvae to fish older than one year old. U.S. Environmental

innumerable fish eggs, larvae, plankton, and invertebrates.[5] The removal of this many living organisms from aquatic ecosystems has other impacts more difficult to quantify. The killing and harming of so many organisms leads to a shift in the structure and health of the ecosystem including a change in the balance of species which would normally be present. Added to the other stresses on aquatic ecosystems from human activities, the use of once-through cooling water technologies has major impacts on the ecological integrity of our nation's waters.[6]

Petitioners and their amici argue that these impacts from operating once-through cooling water systems are not significant or may actually be beneficial.[7] Their argument includes the assertion

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Protection Agency, *Regional Studies for the Final Section 316(b) Phase II Existing Facilities Rule*, (February 2004) A5-4.1 (*Available at* http://www.epa.gov/waterscience/316b/phase2/casestudy/final/cha5.pdf) [hereinafter *Regional Studies*].

[5] U.S. Environmental Protection Agency, *Economic and Benefits Analysis for the Final Section 316(b) Phase II Existing Facilities Rule*, at Table C2-1 (February 2004) (Available at: http://www.epa.gov/waterscience/316b/phase2/econbenefits/final.htm) [hereinafter *Economic and Benefits Analysis*].

[6] These impacts are discussed in more detail *infra*. Excellent summaries of the environmental effects of cooling water systems in the context of Section 316(b) can also be found in two articles: May and 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, 378-385 (1995); and Super and Gordon, *Minimizing Adverse Environmental Impact: How Murky the Waters*, in Dixon, et al., DEFINING AND ASSESSING ADVERSE ENVIRONMENTAL IMPACT FROM POWER PLANT IMPINGEMENT AND ENTRAINMENT OF AQUATIC ORGANISMS, (2003) at 213-230.

[7] Petitioners argue, for instance, that once-through cooling systems are a better choice than alternatives which impose an

that the organisms that die from impingement and entrainment would die anyway, or that the organisms that die are merely surplus.[8] Petitioners even suggest that their cooling water systems are beneficial because they remove nuisance species.[9] These arguments fail not just because they lack scientific support, but also because they rely on an overly narrow view of the importance of the organisms killed, a perspective that ignores the interconnectedness of life in aquatic ecosystems.

"energy penalty" on power plants. In this brief, since this case involves application of the Clean Water Act, we have only considered the impacts of once-through cooling water systems on aquatic ecosystems as the relevant "adverse environmental impact." Petitioners' attempts to broaden the relevant inquiry by asserting that requiring power plants to replace once-through with closed-cycle cooling water systems would increase carbon dioxide emissions presents an interesting but fundamentally flawed argument. Petitioners' argument rests on the shaky assumption that the extra power required to run a closed-cycle cooling system would have to be replaced, and that the replacement energy would have to come from carbon-dioxide emitting power plants. This self-serving assumption conveniently ignores the likelihood that the additional cost associated with reducing the impacts of impingement and entrainment would drive reduced consumption, increased efficiency, and more reliance on renewable sources of electricity.

[8] Brief of Petitioners Entergy Corp, PSEG Fossil LLC and PSEG Nuclear LLC at 49-51, Entergy Corp. v. EPA, et al. (July 14, 2008). . *See also* Brief of Petitioner Utility Water Act Group at 8-9, Entergy Corp. v. EPA, et al. (July 14, 2008).

[9] Brief of Petitioners Entergy Corp, et al. *supra* note 8, at 23. *See also* Brief of Petitioner Utility Water Act Group, *supra* note 8, at 10.

A. The Harm to Aquatic Ecosystems from Once-through Cooling Water Systems is Significant and Complex

1. Impingement and Entrainment by Once-through Cooling Water Systems Kills or Injures Large Numbers of Many Different Water-Dependent Species

Power plants kill or harm a broad array of organisms in their cooling water intake structures in two primary ways, through "impingement" and "entrainment."[10] The term "impingement" refers to a circumstance in which the fish or other organism, larger than the apertures in the screen used to keep debris out of the cooling water system, is trapped against the screen by the pressure of the water flowing through the structure such that it suffers physical harm or is killed.[11] Impinged fish may suffocate if they cannot pass water over their gills due to high water pressure.[12] Also, contact with the cooling system equipment can abrade the scales and skin of the fish increasing their susceptibility to infection and osmotic stress.[13]

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[10] *Economic and Benefits Analysis*, *supra* note 5 at A2-4.

[11] *Id*.

[12] U.S. Environmental Protection Agency, *Regional Analysis Document for the Final Section 316(b) Phase II Existing Facilities Rule* A2-9 (February 12, 2004) (*Available at* http://www.epa.gov/waterscience/316b/phase2/casestudy/final.htm) [hereinafter *Regional Analysis*].

[13] *Id*. at A2-8 ("Osmotic stress" refers to the potential for freshwater fish to suffer from excessive water uptake and saltwater fish to lose water.).

The term "entrainment" refers to those organisms which are not caught in the screen but instead are sucked into the cooling water system and exposed to the full range of insults that occur within that system ranging from physical harm from being battered by the turbulence, to exposure to chemicals used for cleaning the system, to abrupt temperature fluctuations.[14] Once entrained, the organisms are subjected to "mechanical and hydraulic shocks (e.g. pressure changes, abrasion of particles, impacts against piping, and turbulence), thermal stresses, and chemical toxicity (e.g. chlorination of cooling water)."[15]

Physical stresses, such as pressure changes from turbulence and acceleration, and physical abrasion are continuous whenever water is being pumped.[16] The air or swim bladder of larval fish are damaged when they undergo rapid pressure changes within the cooling system.[17] Abrupt thermal shocks "may disturb the normal processes in the development of early life stages of aquatic organisms, or result in death of either young or adults."[18] Chlorine (and other biocides) added to cooling water systems "seriously affects the growth and survival of entrained organisms" with "substantial damage to entrained plankton[19] even at very low chlorine dosages."[20]

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[14] *Economics and Benefits Analysis*, *supra* note 5 at A2-4.

[15] *Id*. at A2-4,5.

[16] Schubel, et. al., *Power Plant Entrainment,137-8* (1978).

[17] *Regional Analysis*, *supra* note 12, at A2-9.

[18] Schubel, *supra* note 16, at 22, *citing* O. Kinne, *Temperature*, *in* MARINE ECOLOGY 321-616 (1970).

[19] Plankton are generally defined as "floating organisms whose movements are more or less dependent on currents." Odum et. al., *Fundamentals of Ecology*, 161 (1971).

These stresses impact fish, eggs and larvae with large percentages of mortalities from physical harm alone.[21] Mortality of zooplankton[22] is also significant.[23] Most of these organisms die as a result of being entrained, or are so badly injured that they are susceptible to predation or cannot recover.[24]

Finally, all of these impacts are synergistic.[25] A leading scientist in this area notes that the "three classes of stresses [thermal, chemical and physical] frequently act in combination," particularly during the warmer months.[26] These various stresses either kill the entrained organisms or sufficiently weaken them that they die after being discharged or become easy prey. For this reason, most scientists and EPA have concluded that it is safest to assume that the

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[20] Morgan et. al., *Biocides*, *in* POWER PLANT ENTRAINMENT 123-4 (J.R. Schubel & Barton C. Marcy, Jr. eds., 1978).

[21] Schubel, *supra* note 16, at 142.

[22] Plankton can generally be divided into plant and animal subgroups. Phytoplankton are the plant-like subgroup, including organisms like algae. Zooplankton are the animal-like subgroup which grazes on phytoplankton or preys on smaller plankton and which also serves as food for higher level organisms. Odum, *supra* note 19, at 300-330. Icthyoplankton are the egg and larval stages of fish when they are drifting in the water column. *Regional Analysis*, *supra* note 12, at A3-2.

[23] Schubel, *supra* note 16, at 143-50.

[24] O'Connor et. al., *The effects of power plants on productivity of the nekton, in Estuarine Research,* Vol. 1: Chemistry, Biology and the Estuarine Ecosystem (L.E. Croin, ed., 1975). *See also* Schubel, *supra* note 16, at 137.

[25] Schubel, *supra* note 16, at 137.

[26] *Id*. at 231.

cooling water systems kill one hundred percent of the organisms which are entrained.[27]

The fish mortality rates associated with "impingement" and "entrainment" can be extremely large.[28] A significant number of fish mortality studies show losses from individual power plants of millions of fish per year.[29] For example, at a power plant in Galveston, Texas, over seven million fish were impinged in year,[30] at a plant in Connecticut, fish mortality included the loss of over two million individuals in just a period of a few months,[31] and over a ten week period, over one million fish were killed by the cooling water intake structure of a power plant on the Hudson River.[32]

Macroinvertabrates and crustaceans such as crabs, lobsters and shrimp also become impinged or entrained. The losses of smaller organisms, in terms of the numbers of individuals harmed or killed, are even

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[27] National Pollutant Discharge Elimination System—Final Regulations to Establish Requirements for Cooling Water Intake Structures at Phase II Existing Facilities 69 Fed. Reg. 41,576, 41,620 (July 9, 2004). Pet. App. 322a. ("EPA believes the current state of knowledge does not support reliable predictions of entrainment survival that would provide a defensible estimate for entrainment survival above zero at a national level.").

[28] *See* Laws, *Aquatic Pollution*, 353-356 (3rd ed. 2000), Tables 11.3 and 11.4 (summarizing data from numerous studies regarding fish loss due to impingement and entrainment).

[29] *Id*. *See also* Hall, et al., *Environmental Impacts of Industrial Energy Systems in the Coastal Zone*, Annual Review of Energy, 395, (November 1978) ; Clark, et. al., *Electric power plants in the Coastal Zone* (1973).

[30] *Id*.

[31] *Id*.

[32] *Id*.

greater than adult fish losses. A broad array of planktonic organisms, including algaes, zooplankton, and fish eggs and larvae which are suspended in the water column are entrained into once-through cooling water systems.[33] These organisms, while they may have some limited mobility, are largely powerless to escape the suction from cooling water intake structures.[34] Estimated losses for large power plants drawing their cooling water from estuaries can exceed one billion organisms per year.[35]

It is not just fish, crustaceans and planktonic organisms which are affected by impingement and entrainment, but also birds, sea turtles and marine mammals.[36] EPA has noted that "[m]any other kind of aquatic organisms are vulnerable to impingement and entrainment, either during early development or throughout their life cycle,"[37] including sea turtles, seals and diving birds which can die if drawn into intake structures or impinged on intake screens.[38]

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[33] U.S. Environmental Protection Agency, *Case Study Analysis for the proposed Section 316(b) Phase II Existing Facilities Rule* A3-2 (February 28, 2002) (*Available at* http://www.epa.gov/waterscience/316b/phase2/casestudy/) [hereinafter *Case Study Analysis*].

[34] *Id*. at A3-1.

[35] Kennish, *Practical Handbook of Estuarine and Marine Pollution*. 484 (1996).

[36] *Economics and Benefits Analysis*, *supra* note 5, at B6-5.

[37] *Case Study Analysis*, *supra* note 33, at A3-4.

[38] *Regional Analysis*, *supra* note 12, at A3-3, and A4-1,2.

2. Killing or Injuring Large Numbers of Water-Dependent Species Causes Far Reaching Damage to the Ecological Integrity of Our Nation's Waters

Collectively, these direct losses of fish and other organisms are by themselves dramatic. The full implications of these direct losses, however, go well beyond the loss of the individual organisms. Simple population studies and analysis are insufficient to judge the full significance of the ecological harm from impingement and entrainment. As EPA has noted, "[t]o fully appreciate the harm of once-through cooling water systems requires looking at the nature, structure and function of the ecosystem."[39] EPA summarizes the array of potential ecological impacts from cooling water intake structures, citing to well-accepted scientific literature:

> In addition to their importance in providing food and other goods of direct use to humans, the organisms lost to [impingement and entrainment] are critical to the continued functioning of the ecosystems of which they are a part. Fish are essential for energy transfer in aquatic food webs, regulation of food web structure, nutrient cycling, maintenance of sediment processes, redistribution of bottom substrates, the regulation of carbon fluxes from water to the atmosphere, and the maintenance of aquatic biodiversity (Peterson and Lubchenco, 1997;

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[39] National Pollutant Discharge Elimination System: Regulations Addressing Cooling Water Intake Structures for New Facilities, 66 Fed. Reg. 65,256, 65,292-3. (Dec. 18, 2001).

> Postel and Carpenter, 1997; Holmund and Hammer, 1999; Wilson and Carpenter, 1999).[40]

A proper understanding of the impacts of impingement and entrainment at cooling water intake structures thus requires an appreciation of the complexity of aquatic ecosystems.

As a first step in understanding this complexity, it is important to appreciate the duality of every fish's role in the ecosystem: fish that are killed are not only not available as food, to people, marine mammals, birds and other fish, but are also not available to fill their own predatory role in eating other organisms. The loss of entrained organisms is a double-loss to the ecosystem since we lose both "the reproductive phases of higher forms and a loss of food organisms."[41] As noted above, the impacts of cooling water intake structures are not limited to adult fish but reach to all life stages including eggs, larvae and young fish. Similarly, when planktonic organisms are lost to the ecosystem, they cannot serve their function at the base of the food chain.[42]

Petitioners and their amici ask this Court to ignore this broad, ecological understanding of the impacts and invite instead a narrow focus, suggesting that

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[40] *Regional Analysis*, *supra* note 12, at F5-2.

[41] Schubel, *supra* note 16, at 14, *citing* Beck, et al., *Analysis of Inner Plant Passage of Estuarine Biota*, American Civil Engineering, 199-226 (1974).

[42] National Pollutant Discharge Elimination System - Proposed Regulations to Establish Requirements for Cooling Water Intake Structures at Phase II Existing Facilities 67 Fed. Reg. 17,122, 17,136 (April 9, 2002); *see also* National Pollutant Discharge Elimination System: Regulations Addressing Cooling Water Intake Structures for New Facilities 66 Fed. Reg. 65,256, 65,263 (Dec. 18, 2001).

the death of these organisms is unimportant since most would have died anyway.[43] Such a narrow view ignores the fact that the organisms which are impinged or entrained would have served a variety of ecological functions. The loss of this array of organisms and life stages has a ripple effect across the ecosystem and can lead to imbalances including, contrary to the suggestion of petitioners, the proliferation of nuisance species.[44]

EPA has noted that "[i]n addition to the harm that results from the direct removal of organisms by impingement and entrainment, there are the indirect effects on aquatic food webs that result from the impingement and entrainment of organisms that serve as prey for predator species."[45] As one example

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[43] Brief of Petitioners Entergy Corp, et al., *supra* note 8, at 49-51.

[44] National Pollutant Discharge Elimination System—Regulations Addressing Cooling Water Intake Structures for New Facilities 65 Fed. Reg. 49,060, 49,075 (August 10, 2000). ("[Harmful environmental] effects could have the potential to reduce the population of indigenous species; change the species mix because some species are more susceptible to impingement and entrainment than others; might increase nuisance species; harm and kill endangered and threatened species; damage critical aquatic organisms, including important elements of the food chain; and reduce commercial and sport fisheries.") *citing* NYDEC, *Clean Water Act Section 316(b), statement provided to U.S. EPA at public meeting to discuss adverse environmental impacts resulting from cooling water intake structures*, New York State Department of Environmental Conservation, Division of Fish, Wildlife, and Marine Resources, June 29, 1998.

[45] *Economics and Benefits Analysis*, *supra* note 5, at B6-5, *see also Regional Analysis*, *supra* note 12, at A3-4, ("[m]ost aquatic organisms are also susceptible to indirect impacts as a result of the impingement or entrainment of prey items. Unfortunately,

of how far up the food chain the impacts can extend, EPA has noted that studies show indirect harm to certain bird species as a result of losses of fish and shellfish to impingement and entrainment, organisms that would otherwise be available as a food source.[46] EPA states that "[t]he impacts of [impingement and entrainment] on bird populations, though subtle cannot be discounted. Many do not realize their full reproductive potential because of loss of food resource."[47] Disruption of the food chain is, however, only one facet of the impacts of once-through cooling water systems.

The full range of public and ecological services provided by healthy water bodies is quite broad[48] and

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few studies consider how [cooling water intake structures] impact may disrupt aquatic food webs.").

[46] *Regional Analysis*, *supra* note 12, at A4-1,2.

[47] *Id*. at A4-10.

[48] EPA provides the following examples of ecological and public services disrupted by impingement and entrainment:

- decreased numbers of ecological keystone, rare, or sensitive species;
- decreased numbers of popular species that are not fished, perhaps because the fishery is closed;
- decreased numbers of special status (e.g., threatened or endangered) species;
- increased numbers of exotic or disruptive species that compete well in the absence of species lost to impingement and entrainment;
- disruption of ecological niches and ecological strategies used by aquatic species;
- disruption of organic carbon and nutrient transfer through the food web;
- disruption of energy transfer through the food web;

"many of these services can only be maintained by the continued presence of all life stages of fish and other aquatic species in their natural habitats."[49] Creating a substantial risk to these ecological services, power plant once-through cooling water systems kill disproportionate amounts of organisms in the early stages of their lives when they are most vulnerable, and also harm some species more than others. For instance, some saltwater fish are more likely to be harmed by cooling water intake structures,[50] and anadromous[51] fish may be particularly vulnerable when transitioning between their freshwater and saltwater phases.[52] Power plants are "selective predators that may not only reduce the abundance of vulnerable organisms but which may also disrupt community structure through selective cropping and concomitant enhancement of surviving

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- decreased local biodiversity;
- disruption of predator-prey relationships;
- disruption of age class structures of species;
- disruption of natural succession processes;
- disruption of public uses other than fishing, such as diving, boating, and nature viewing; and
- disruption of public satisfaction with a healthy ecosystem.

Id. at A9-1.

[49] *Id*.

[50] Versar, *Vulnerability of Biota of Freshwater (Rivers, Lakes, Reseviors) versus Marine (Tidal River, Estuary, Ocean) Habitats to Entrainment and Impingement*, (April 2002).

[51] "Anadromous fish live in the sea and migrate to fresh water to breed." Encyclopedia Britannica Online at http://www.brit annica.com/ EBchecked/topic/22290/anadromous-fish.

[52] *Case Study Analysis*, *supra* note 33, at A2-9.

species."[53] The effects of impingement and entrainment thus include "changes to the community structure through changes in diversity caused by elimination of less tolerant species and life stages, and size selectivity."[54]

Appreciating the effects of selective "predation" by power plants is critical to understanding their full impact on aquatic ecosystems. The impact goes far beyond the direct mortality of large fish and includes the much broader and more difficult to assess effects of selectively removing a large component of living organisms from rivers, lakes, estuaries and oceans. Ultimately, the use of once-through cooling water systems leads to exactly the problem that Congress sought to address – a shift in the nature, structure and function of aquatic ecosystems which interferes with the recovery of the ecological integrity of our nation's waters.

B. The Cumulative Impacts of Once-through Cooling Systems Combined with Other Anthropogenic Damage Impedes Restoration of the Ecological Integrity of Our Nation's Waters

1. Once-through Cooling Water Systems Impact Aquatic Ecosystems Already Stressed from Other Human Activities

The harms from impingement and entrainment at cooling water intake structures for once-through sys-

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[53] Schubel, *supra* note 16, at 230. Contrary to Petitioners suggestion, there is no evidence that this selective cropping and enhancement preferentially removes invasive or nuisance species. *See* Brief of Petitioners Entergy Corp, et al., *supra* note 8, at 23. *See also* Brief of Petitioner Utility Water Act Group, *supra* note 8, at 10.

[54] Schubel, *supra* note 16, at 151-2.

tems do not occur in pristine waters but are instead taking place in aquatic ecosystems already struggling to maintain equilibrium. For this reason, the impacts of cooling water intake structures must be understood within the larger context of other environmental stressors including "alterations in physical habitat, modifications in the seasonal flow of water, changes in the food base of the system, changes in interactions within the stream biota, and release of contaminants (conventional pollutants)."[55]

The Clean Water Act represents an effort to deal with all of these various stressors in a comprehensive manner. Congress included provisions in the Act to address a broad array of impacts on water quality. *City of Milwaukee v. Illinois and Michigan,* 451 U.S. 304, 318 (1981)("Congress' intent in enacting the Amendments was clearly to establish an all-encompassing program of water pollution regulation."). The goals and structure of the Act make clear that Congress did not contemplate a regulatory program which involved marginal analyses of discrete harms considered independently of all other impacts. To the contrary, the broad objective of this legislation, "to restore and maintain the biological, chemical and physical integrity of the Nation's waters," 33 U.S.C.

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[55] National Academies of Science, *Assessing the TMDL Approach to Water Quality Management*, Commission on Geosciences, Environment and Resources 28-29 (2001) (discussing categories of environmental stressors on waterbodies from human activities) (*Available at* http://www.nap.edu/openbook.php?record_id=10146&page=R1) *citing* J. R. Karr, *Bioassessment and Non-Point Source Pollution: An Overview* 4-(1-18) (1990). *See also* National Research Council, *Restoration of Aquatic Ecosystems* (1992) 1-3 (*Available at* http://www.nap.edu/catalog.php?record_id=1807#toc).

§ 1251(a), reflects a desire to address all impacts on aquatic ecosystems.

EPA must, therefore, consider the overall health of our Nation's waters when determining the "best technology available for minimizing adverse environmental impacts." While it is true that there have been notable improvements in water quality in the decades following the implementation of the Clean Water Act,[56] our lakes, rivers, bays and estuaries are far from being restored. Across the nation, the states have reported significant numbers of waterbodies not meeting water quality standards.[57] Of particular relevance to this case, EPA has surveyed existing facilities with cooling water intake structures and found that ninety-nine percent of those surveyed were within two miles of waters not meeting water quality standards.[58]

The failure to achieve standards and the accompanying harms to aquatic ecosystems are due to a range of causes including erosion, mining runoff, acid rain, uncontrolled stormwater runoff, improperly managed agricultural waste, acid rain, excessive water withdrawals for irrigation, municipal sewage,

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[56] Smith et. al., *Water Quality Trends in the Nation's Rivers*, Science, March 1987, 1607 (*Available at* http://www.sciencemag.org/cgi/content/abstract/235/4796/1607?ijkey=75af02e96c5a7dadedbf7eca3e340b4117cc86e8&keytype2=tf_ipsecsha).

[57] U.S. Environmental Protection Agency, *National Water Quality Inventory: Report to Congress, 2002 Reporting Cycle* (October 2007) (*Available at* http://www.epa.gov/305b/2002report/).

[58] National Pollutant Discharge Elimination System - Proposed Regulations to Establish Requirements for Cooling Water Intake Structures at Phase II Existing Facilities 66 Fed. Reg. 65,256, 65,263 (Dec. 18, 2001).

industrial discharges, removal of riparian vegetation, and filling of wetlands.[59] Thermal discharges from power plants add to the ecosystem damage from these activities.[60] Federal agency reports by EPA and the United States Geologic Survey ("USGS"), and National Academies of Sciences document that water contamination from many varied pollutants is widespread[61] and includes pesticides, nutrients, salinity, acid deposition, sediment, and metals.[62] Saltwater ecosystems are not immune from this pollution.[63]

Our nation's waters have also been filled, diverted, dammed, diked, and channelized. As a result, impor-

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[59] *Id*.

[60] Laws, *supra* note 28 at 335 (3rd ed. 2000). ("Electric power plants account for 75-80% of the thermal pollution in the United States.").

[61] Hamilton, et al., *Water Quality in the Nation's Streams and Aquifers, Overview of Selected findings 1991-2001*, USGS Survey, Circular 1265 2 (2004) (*Available at* http://pubs.usgs.gov/circ/2004/1265/pdf/circular1265.pdf).

[62] *Id*. *See also* U.S. Environmental Protection Agency, *Wadeable Streams Assessment: A Collaborative Survey of the Nation's Streams* (December 2006) (*Available at* http://www.epa.gov/owow/streamsurvey/); U.S. Environmental Protection Agency, *National Estuary Program Coastal Condition Report* (June 2007) (*Available at* http://www.epa.gov/owow/oceans/nepccr/index.html); National Academies of Science, *Clean Coastal Waters: Understanding and Reducing the Effects of Nutrient Pollution* (2002) (*Available at* http://books.nap.edu/catalog.php?record_id=9812#toc).

[63] U.S. Commission on Ocean Policy, *An Ocean Blueprint for the 21st Century Final Report*, 163-84 (2004) (*Available at* http://oceancommission.gov/documents/full_color_rpt/welcome.html#full).

tant aquatic habitat has been lost, seasonal flows have been disrupted and fish passage blocked.[64]

As if that were not enough, the species native to our lakes, rivers, bays and estuaries are being out-competed by the introduction of non-native species such as the zebra mussel in the Great Lakes,[65] and the snake-head fish in Maryland[66] – just two of the more notorious invasive species impacting our waters. In another, more systemic analysis, scientists studying the Columbia River Basin have determined that the impacts of non-native species are equivalent to other major impacts such as "habitat loss and degradation, climate change, and human population growth and development."[67] The U.S. Commission on Ocean Policy calls invasive species "one of the greatest threats to coastal environments."[68]

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[64] U.S. Fish and Wildlife Service, *Fish Passage Program*, Overview (*Available at* http://www.fws.gov/fisheries/FWMA/fish passage/Overview.htm); *see also* Collier, M., R.H. Webb and J.C. Schmidt, U.S. Geological Survey, *Dams and Rivers: Primer on the Downstream Effects of Dams*, (1996) (*Available at* http:// pubs.er.usgs.gov/pubs/cir/cir1126).

[65] U.S. Geological Survey, *Zebra Mussels Cause Economic and Ecological Problems in the Great Lakes* (2007) (*Available at* http://www.glsc.usgs.gov/main.php?content=research_invasive_z ebramussel&title=Invasive%20Invertebrates0&menu=research_ invasive_invertebrates).

[66] Snakehead Scientific Advisory Panel, *First Report to the Maryland Secretary of Natural Resources* (July 2002) (*Available at* http://www.dnr.state.md.us/irc/ssap_report.html).

[67] Independent Scientific *Advisory Board, Non-Native Species Impacts on Native Salmonids in the Columbia River Basin* (July 2008) (*Available at* http://www.nwcouncil.org/library/isab/isab 2008-4.htm).

[68] U.S. Commission on Ocean Policy, *An Ocean Blueprint for the 21st Century Final Report* 252-62 (2004) (*Available at*

The overharvesting of fish and shellfish presents a direct threat to the recovery of some commercially valuable or recreationally desirable species, both freshwater and saltwater. Marine fisheries in particular have suffered from overexploitation over the past thirty years with negative consequences for many fishing communities and ecosystems.[69] Further, as EPA notes, "because modern ecological studies do not typically consider the long-term historical record, existing fishery resource baselines may be inaccurate, and 'Even seemingly gloomy estimates of the global percentage of fish stocks that are overfished are almost certainly far too low.'"[70]

Finally, global warming is adding to the stress on aquatic ecosystems. The Intergovernmental Panel on Climate Change has determined that rising water temperatures associated with global warming affect algal, plankton and fish abundance.[71] This conclusion is supported by the findings of the Food and Agriculture Organization of the United Nations

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http://oceancommission.gov/documents/full_color_rpt/welcome.html#full).

[69] *Id*. at 274-303, *See also* National Research Council, Committee on Ecosystem Management for Sustainable Marine Fisheries, Ocean Studies Board, *Sustaining Marine Fisheries* 19 (1999).

[70] National Pollutant Discharge Elimination System: Regulations Addressing Cooling Water Intake Structures for New Facilities, 66 Fed. Reg. 65,256, 65,293 (Dec. 18, 2001), *citing* J.B.C. Jackson, et al., *Historical overfishing and the recent collapse of coastal ecosystems*, Science 293 (2001).

[71] Intergovernmental Panel on Climate Change, *Climate Change 2007: Synthesis Report* 33 (2007) (*Available at* http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr.pdf) (emphasis in original).

which recently determined that global warming will have a strong impact on fisheries.[72]

The fact that many aquatic ecosystems across the country are in decline or at risk of disruption due to other stressors makes it all the more important to prevent the harms associated with impingement and entrainment.

2. Aquatic Ecosystems Do Not Carry a Fish "Surplus" Available for Destruction by Once-Through Cooling Water Systems

Fish have evolved strategies to survive natural fluctuations in environmental conditions. A primary strategy for many fish species is to produce many more offspring than are needed to maintain a stable population. This long-term production and high fecundity allow any given fish species to survive seasons in which the species is afflicted with natural stressors such as heavy predation, extreme weather, or major geological disruptions.[73] Further, there is evidence that fish species respond to population losses through increases in rates of reproduction.[74]

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[72] Food and Agricultural Organization of the United States, *Climate Change will have Strong Impact on Fisheries: Decrease in Fisheries Production Likely - FAO Holds Scientific Symposium* (July 2008) (*Available at* http://www.fao.org/newsroom/en/news/2008/1000876/index.html).

[73] Boreman, *Surplus Production, Compensation, and Impact Assessments of Power Plants*, Environmental Science & Policy 31 2000, at 445-6, *cited in* Super and Gordon, *supra* note 5, at223. *See also* National Pollutant Discharge Elimination System: Regulations Addressing Cooling Water Intake Structures for New Facilities, 66 Fed. Reg. 65,256, 65,291-4 (Dec. 18, 2001).

[74] *Id*. at 446.

This phenomenon, referred to as "compensation," is offered by the Petitioners as support for the conclusion that killing the "surplus" fish through impingement and entrainment has only a minor impact on fish populations.[75] This conclusion ignores the fact that the reproductive strategies of fish evolved in response to variations in natural conditions and that any "surplus" in fish populations may already be needed as insurance against other stressors.[76] Fish populations are at greater risk from natural disturbances that the species might otherwise tolerate as a result of non-natural, anthropogenic impacts.[77] Adding the additional impact associated with impingement and entrainment from once-through cooling systems can only add to the risk that the impacts collectively will exceed the ability of fish populations to rebound.

[75] Brief of Petitioners Entergy Corp, et al., *supra* note 8, at 49-50. *See also* Brief of Petitioner Utility Water Act Group, *supra* note 8, at 8-9.

[76] Boreman, *supra* note 73 at 447. ("What constitutes a surplus in reproductive effort one year may be needed the next to counteract changes in environmental conditions that affect cohort survival.").

[77] National Pollutant Discharge Elimination System: Regulations Addressing Cooling Water Intake Structures for New Facilities 66 Fed. Reg. 65,256, 65,294 (Dec. 18, 2001). "[E]ven if there is little evidence that cooling water intakes alone reduce a population's compensatory reserve, EPA is concerned that the multitude of stressors experienced by a species can potentially adversely affect its ability to recover.") *citing* J.A. Hutchings & R.A. Myers, *What can be learned from the collapse of a renewable resource? Atlantic cod, Gadus morhus, of New Foundland and Labrador*, Canadian Journal of Fisheries and Aquatic Sciences 51, 2126-2146 (1994).

In addition, as noted above in Section I.A.2, the fish and other organisms removed by cooling water intake structures are important to the ecosystem, either as food sources or predators. These indirect impacts on the ecosystem and fish populations are ignored by petitioners. Their analytical framework for determining a hypothetically available "surplus" is fundamentally flawed because it does not take account of the predator and prey relationships, or the many other interconnections, among the organisms in the impacted water body.

Dr. John Boreman of the National Marine Fisheries Service frames the issue of a "surplus" as being whether to use such "excess production" for "supporting fisheries, for allowing the population to hedge against bad times, for providing extra sustenance for natural predators, or for supporting other uses of the resource?"[78] The answer to this question becomes especially clear when considering the cumulative impacts of impingement and entrainment on fish combined with other anthropogenic harms. Fish populations and aquatic ecosystems are already at risk and may not be able to absorb additional losses. If we hope to restore aquatic ecosystems, as Congress has directed, we should not allocate natural fish population buffers to avoidable losses from impingement and entrainment in once-through cooling water systems, but should instead take all available steps to preserve that surplus as a "hedge against bad times."

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[78] *Id.*

C. There is Insufficient Information or Knowledge to Predict the Extent to Which Once-through Cooling Water Systems Impact the Ecological Integrity of Our Nation's Waters

As may be evident from the above discussion, the full scope of the impacts on aquatic ecosystems from killing vast numbers of fish, shellfish, crustaceans, plankton and other organisms cannot be accurately measured. A group of leading fisheries scientists who studied the impacts of impingement and entrainment losses from a proposed power plant noted that,

> After more than a decade of study and the expenditure of tens of millions of dollars, it was still not possible to draw definitive conclusions about the long-term effects of entrainment and impingement on fish populations in the Hudson River.[79]

These same scientists concluded from their study that,

> The ultimate question "what will be the long-term effect of once-through cooling on Hudson River fish populations?" was unanswerable.[80]

The reason the question was, and continues to be, unanswerable is that aquatic ecosystems are complex and hard to study.[81] Identifying the impacts of

[79] Barnthouse et al., *Population Biology in the Courtroom: the Hudson River Controversy*, (1984), Bioscience, vol. 34, No. 1, at 18.

[80] *Id*.

[81] *See e.g.* Barnthouse et al., *What We Didn't Learn About the Hudson River, Why and What it Means for Environmental Assessment*, Am. Fisheries Monograph 4:329-335 (1988) at 331.

human activities on fish populations requires overcoming an array of challenging issues. These issues include consideration of factors such as the high degree of natural variability in fish populations over time, the variety of habitats that fish species may use, understanding interactions among the broad community of organisms impacted, and quantifying the sublethal, synergistic and cumulative impacts of anthropogenic harms.[82]

This conclusion, that predicting fish population responses to human-induced disturbances is an uncertain business, is not an isolated one nor does EPA dispute it. Indeed, over the course of developing the various phases of the 316(b) regulations, EPA has noted the significant uncertainties inherent in evaluating the impacts of cooling water intake structures multiple times in multiple contexts.[83]

The fish population models that petitioners have urged EPA to accept as part of a cost-benefit analysis are not sufficient to overcome the inherent uncertainty in predicting the impact of cooling water systems on aquatic ecosystems.[84] Major limitations on the use of mathematical models "include inaccurate estimates of population sizes and the inability to accurately account for marked fluctuation in reproductive success and survival of organisms from year

[82] Rose, *Why Are Quantitative Relationships Between Environmental Quality and Fish Populations So Elusive?*, Ecological Applications 10 (2000) 367-385 (*Available at* http://www.jstor.org/stable/2641099).

[83] *Case Study Analysis*, *supra* note 33, at A26. See also *Regional Studies*, *supra* note 4, at 11-5.

[84] Newbold, et. al., *Impacts of cooling water withdrawals on fish populations at a regional scale*, 41 Environmental Science & Technology 2108, 1209 (2007).

to year."[85] Acknowledging this uncertainty in the preamble to the Phase I regulations, EPA recognized "that the limitations of existing population models, including models used to manage fisheries, may be related to our overall limited understanding of the complexity of aquatic ecosystems and the long-term effects of anthropogenic activities."[86] EPA also cited the work of a National Marine Fisheries Service advisory panel which concluded that "[u]ncertainty and indeterminancy are fundamental characteristics of the dynamics of complex adaptive systems. Predicting the behaviors of these systems cannot be done with absolute certainty, regardless of the amount of scientific effort invested."[87]

Given these uncertainties and the challenges of predicting the impacts of human activities on fisheries and aquatic ecosystems, determining the precise contribution to fisheries impacts associated with cooling water intake structures is nearly impossible. The loss of such significant numbers of organisms can cause changes that cannot be quantified such as shifts in the structure of an ecosystem and the resultant change in species diversity.[88] When considering

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[85] Kennish, *supra* note 35 at 484 *citing* Langford, *Electricity Generation and Ecology of Natural Waters* (1983).

[86] National Pollutant Discharge Elimination System: Regulations Addressing Cooling Water Intake Structures for New Facilities, 66 Fed. Reg. 65,256, 65,293 (Dec. 18, 2001).

[87] *Id*. *citing* National Marine Fisheries Service Ecosystem Principles Advisory Panel, *Ecosystem-based fishery management: A Report to Congress* 13 (1998) (*Available at* www.nmfs.noaa.gov/sfa/EPAPrpt.pdf).

[88] National Pollutant Discharge Elimination System: Regulations Addressing Cooling Water Intake Structures for New Facilities 66 Fed. Reg. 65,256, 65,292 (Dec. 18, 2001). ("EPA determined that there are multiple types of undesirable and

the combination of these impacts from impingement and entrainment with the host of other impacts, it is a rational policy choice to take all available steps to minimize human impacts on aquatic ecosystems. In this case, requiring existing power plants to shift away from the use of once-through cooling water systems to other available technologies that are much less harmful is the obvious policy choice. This is the policy choice that EPA made in the context of new power plants[89] and it is the choice that Congress intended.

II. Allowing Power Plants to Damage Aquatic Ecosystems Based On a Cost-Benefit Analysis is Not Consistent with the Objective of the Clean Water Act to Restore and Maintain the Ecological Integrity of Our Nation's Waters

A. Section 316(b) Must Be Understood in the Context of the Objective of the Clean Water Act to Restore and Maintain the Ecological Integrity of the Nation's Waters

Since the full extent of harms caused by once-through cooling water systems is potentially massive and difficult to quantify, and because of the societal importance placed on the ecological health of our nation's fisheries, Congress made a logical decision to "[minimize] adverse environmental harm" through requiring the "best technology available" and not

unacceptable adverse environmental impacts, including . . . stresses to overall communities or ecosystems as evidenced by reductions in diversity or other changes in system structure or function.").

[89] *Id*. at 65,293.

through a cost-benefit analysis. This approach is consistent with the overriding policy objective of the Clean Water Act that we not just "maintain" but "restore" the "biological, chemical and physical integrity" of our waters, an objective which reflects "a comprehensive legislative attempt 'to restore' the waters' ecological integrity." *U.S. v. Riverside Bayview Homes*, 474 U.S. 121, 132-33 (1985). The approach in Section 316(b) is also consistent with this Court's determination that the Clean Water Act should be broadly construed to protect fish habitat. *PUD No. 1 of Jefferson County v. Washington Dept. of Ecology*, 511 U.S. 700, 714, 719 (1994) (Holding that, under the Clean Water Act, a state could require minimum stream flows to protect fish habitat based on the Act's "broad conception of pollution-one which expressly evinces Congress' concern with the physical and biological integrity of water").

EPA's Phase II regulations are not, however, consistent with Section 316(b), or the goals and objectives of the Act. These regulations will result in a degree of protection no more stringent than can be proven to lead to a quantifiable benefit. Restoration of the Nation's waterways is not possible if, at the same time we are developing strategies to address a broad range of water pollution, power plants using once-through cooling systems are allowed to disrupt the aquatic ecosystems we are trying to recover. Interpreting the Clean Water Act to allow EPA to balance the multitude of complex direct and indirect impacts of once-through cooling water systems against the cost of installing available technology is inconsistent with this important objective. Given the uncertainty associated with measuring ecological harm from cooling water intake structures, authorizing EPA to go no further than it can prove is economically justifiable through a cost-benefit analysis, shifts the allocation of risk to the environment in a manner flatly inconsistent with Congress' goal to restore aquatic ecosystems.

B. Congress' Choice to Impose Stringent Technology-Based Controls on Power Plant Cooling Water Intake Structures was Necessary given their Uncertain Yet Potentially Major Impacts on Aquatic Ecosystems

The language of Section 316(b) makes clear that EPA is not allowed to balance costs against benefits when determining BTA. This point is underscored when reading Section 316(b) in context, as a provision of a law in which Congress chose to use a technology-forcing approach to addressing water pollution. Respondent Riverkeeper's brief provides a thorough analysis of the language of the statute at pages 22 through 23. This analysis suffices to answer the question presented and we will not repeat it here. It is, however, worth pondering why Congress required EPA to minimize "adverse environmental impacts" through the use of the "best technology available." 33 U.S.C. § 1326(b).

The mostly likely answer can be found by reference to the body of science, discussed above, demonstrating the complexity and magnitude of the ecological impacts from cooling water intake on water bodies. Once one understands that the harms caused to aquatic ecosystems by the large volumes of water intake resulting from once-through cooling water systems are at once both massive and extremely difficult to accurately quantify, it becomes clear that the only practical way to minimize that harm is to take all available actions to avoid it in the first place. The potential damage to aquatic ecosystems from once-through cooling water systems was well-known at the time that the Clean Water Act was enacted. Many of the studies demonstrating the massive impacts to fisheries from cooling water intake structures were reported in the early 1970's at the same time that the debate in Congress over the Clean Water Act was taking place.[90]

In addition, technologies were available in the early 1970s and are now even more clearly available to dramatically reduce the risks of harm to fisheries from impingement and entrainment. Low-water intake systems are in use at a significant number of power plants. As noted in a recent USGS Report, "[s]ince the 1970's power plants increasingly were built with or converted to close-loop cooling systems or air-cooled systems instead of using once-through cooling system. By 2000, an alternative to once-through cooling was used in about 60 percent of the installed steam-generation capacity in the power plants."[91] Use of alternative cooling water systems is thus available to minimize environmental impacts by

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[90] U.S. Environmental Protection Agency, *In re Brunswick Steam Electric Plant*, Decision of the General Counsel, EPA GCO 41 at fn. 10 and accompanying text (June 1, 1976) (The decision notes that "[i]n the course of debating the conference report of the Act on October 4, 1972, the Senate was well aware of the dangers posed to aquatic life by the withdrawal of large volumes of water through cooling water intake structures" and cites in a footnote Senator Buckley's reference to two newspaper articles relating to the environmental impacts of cooling water systems at power plants on the Hudson River.).

[91] Hutson, *supra* note 2 at 42 *citing* Bozek, *A towering challenge*, Electrical Perspectives, January/February 2002 (*Available at* http://www.eei.org/magazine/editorial_content/nonav_stories/2002-01-01-tower.htm).

substantially avoiding both the known and unknown environmental impacts of cooling water intake structures. The selection of these cooling water systems available for minimizing adverse environmental impacts is therefore the most logical and practical choice and is the solution that Congress intended.

While Congress did not have the benefit of the past thirty-five years of intensive research to know that the true extent of the contribution of cooling water intake structures to ecological harm would remain unknown, and perhaps unknowable, Congress' choice of words makes clear that it understood this was a possibility. Rather than leave this important policy question – whether to force industry to install the best technology available regardless of the known or quantified benefit – to EPA, Congress established the standard in Section 316(b). Confronted with uncertainty, Congress chose to act and to require, not just any technology, but the "best technology available for minimizing adverse environmental impact." 33 U.S.C. § 1326(b).

C. The Value of the Ecological Integrity of the Nation's Waters Cannot be Quantified

Congress' decision to use a technology-forcing approach in Section 316(b) was a rational policy choice. In this case, the Court does not need, and should not be tempted, to adopt a particular economic policy in order to make a decision. The debate among proponents of various economic or social policy theories is a debate that belongs generally, and in the case of Section 316(b) actually took place, in Congress. The language of the Clean Water Act provides sufficient guidance to make it clear that EPA strayed beyond its authority when it employed cost-benefit analysis in determining the "best technology available" for existing power plants. As noted in Respondents' brief at greater length, pages 33-43, Congress knows how to require cost-benefit analysis and did not do so in this instance. *American Textile Mfrs. Institute, Inc. v. Donovan*, 452 U.S. 490, 510 (1981).

Although the Court need not settle on any particular rationale, it is worth noting that Congress' choice of a regulatory approach in this case is supported by well-considered policy considerations. For instance, requiring the use of the "best technology available for minimizing adverse environmental impact" is consistent with a concept referred to as the precautionary principle. This approach, requiring preventive action in the face of uncertainty, is not a new one and is found not only in the Clean Water Act but in other environmental laws such as the Clean Air Act. Professor Percival notes that, "the essential notion embodied in the precautionary principle – that uncertainty should not be used as an excuse to eschew cost-effective preventive measures – is fundamental to modern environmental law's quest to transcend the limits of its common law legacy."[92] EPA itself used the language associated with this principle when adopting the Phase I regulations in 2001.[93] Use of a precautionary approach provides the

[92] Percival, *Who's Afraid of the Precautionary Principle?* 23 Pace Envtl. L. Rev. 21, 22 (2005).

[93] National Pollutant Discharge Elimination System: Regulations Addressing Cooling Water Intake Structures for New Facilities 66 Fed. Reg. 65,256, 65,293 (Dec. 18, 2001) ("EPA and other fishery scientist [sic] support the concept of a precautionary approach, particularly when dealing with complex systems.") *citing* Dayton, *Reversal of the burden of proof in fisheries management*. 279 Science 821-822. (1998).

best means to address the uncertainty associated with the ecological impacts of once-through cooling water systems and is the approach most consistent with objectives and goals of the Clean Water Act.

Another way to understand the rationality of Congress' choice is through the deep connection that Americans have with their rivers, lakes, estuaries and coastal waters. Commercial fisheries represent more to our nation than the dollar value of their catch but are instead part of the cultural fabric of many communities impacted by the decline in fishery ecosystems. Similarly, recreational fishing represents much more to Americans than the sum of the tourism dollars or money spent on baitfish and fishing equipment. For many American Indian communities, fisheries have deep spiritual meaning grounded in shared cultural experiences. In the words of law professor Lisa Heinzerling and economist Frank Ackerman's recent book critiquing the misapplication of cost-benefit analysis, the benefits from protecting the environment are "priceless,"[94] and "[c]ost benefit analysis of health and environmental policies trivializes" the values underlying modern environmental laws.[95] Similarly, economist Eric Davidson discusses the intangible benefits of protecting ecosystems, noting that the affected life "is a type of *natural capital* that is virtually irreplaceable and, therefore, invaluable…. [W]hen the value of a resource is unmeasurable by economists' tools, it is not *un*valuable, but rather *in*valuable."[96]

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[94] *Id*. at 8.

[95] Heinzerling, et. al., *Priceless: On Knowing the Price of Everything and the Value of Nothing* (2004) 234.

[96] Eric A. Davidson, *You Can't Eat GNP: Economics As If Ecology Mattered*, 45 (Perseus Publishing 2000).

In its cost-benefit analysis of cooling water intake structures, EPA ignores these underlying values and instead has adopted an approach which balances the known economic costs to the industry of installing alternative technologies to reduce impingement and entrainment against a calculation limited to only the known and quantifiable benefits of avoiding harm to aquatic ecosystems.[97] Although acknowledging the fact that these ecological impacts are complex and not fully known, EPA simply side-steps those complexities and makes assumptions in order to assign a numerical benefit value to the loss of fish.[98] This analysis is not only incomplete, since it ignores a wide range of non-commercial fish impacts, but also fundamentally unsound given the uncertainties.

When Congress passed the Clean Water Act, they asked EPA and states to work together to protect and restore the biological integrity of our waters as well as the chemical and physical. As noted above, this Court has understood this language as a directive to protect and restore the "ecological integrity" of the nation's waters. *Riverside Bayview Homes at* 132-33. Congress decided that we must restore the ecological integrity of our waters, not just because it is necessary to our economic well-being, but because restoring our rivers, lakes and harbors is fundamental to our nation's identity. EPA's decision to balance such

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[97] National Pollutant Discharge Elimination System Final Regulations to Establish Requirements for Cooling Water Intake Structures at Phase II Existing Facilities, 69 Fed. Reg. 41,576, 41,655-64 (July 9, 2004). Pet. App. 472a-515a.

[98] National Pollutant Discharge Elimination System—Proposed Regulations to Establish Requirements for Cooling Water Intake Structures at Phase II Existing Facilities 67 Fed. Reg. 17,122, 17,192-3 (April 9, 2002).

a profound goal against costs where Congress did not instruct them to do so, assumes more power than Congress has given the agency. Due to the complexity of aquatic ecosystems, and their importance to Americans, Congress made this choice for EPA and required the agency to choose the best technology it could find available. Congress has thus already considered this issue and its determination in Section 316(b) that EPA should choose the "best technology available to minimize adverse environmental impacts" should be respected.

CONCLUSION

The Court should affirm the holding of the Second Circuit that Section 316(b) does not authorize EPA to perform a cost-benefit analysis when determining the "best technology available."

Respectfully submitted,

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