CONSERVATION LAW FOUNDATION

October 14, 2004

George Papadopoulos
U.S. Environmental Protection Agency
1 Congress St., Suite 1100
Boston, MA 02114-2023

Re: Proposed NPDES Permit No. MA0004898, Mirant Kendall Station

Dear Mr. Papadopoulos,

The Conservation Law Foundation ("CLF") submits the following comments on the draft National Pollutant Discharge Elimination System ("NPDES") permit and Clean Water Act NPDES Permitting Determination Document for Thermal Discharge and Cooling Water Intake for Mirant Kendall Station (MKS) in Cambridge, MA ("Determination Document"). We are grateful for the opportunity to provide input on this important permit, and thank EPA and DEP for providing the documentation that allowed us to thoroughly analyze the issues relevant to the permit. We acknowledge the substantial effort that the agencies have put into reviewing the many complex issues that bear on this permit, and the development of a comprehensive Determination Document. CLF commends EPA for providing a public hearing and for extending the public comment period until October 14, thereby affording the public an opportunity to carefully review the draft permit and supporting documents.

The operation of the Mirant Kendall Station on the banks of the Charles is a matter of great public concern. The Charles is a public resource that is valued by the community for its wildlife, aesthetic values, and for fishing, boating and other recreational activities. Millions of dollars in public resources have been devoted to restoring the ecological health of the River, and significant progress has been made. It is our judgment that under the permit proposed by EPA, MKS will be allowed to have an unacceptably high impact on the Charles River, thereby undermining that progress. The plant uses antiquated technology: once-through, open cycle cooling that discharges millions of gallons of heated water into the river every day. In fact, according to MA DEP, in comparison to relative river flow, Mirant's discharge is one of the largest heated discharges in the state.[1] We note that facilities in other locations have adopted modern technologies that allow power generation with much lower environmental impact, such as closed cycle systems, helper cooling towers, or the use of the heat-energy by-product for heating (i.e.

[1] NORTHEAST REGIONAL OFFICE, MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL PROTECTION, MEPA COMMENTS RE CAMBRIDGE KENDALL SQUARE STATION DEIR/EOEA # 11754 (December 23, 1999).

62 Summer Street, Boston, Massachusetts 02110-1016 • Phone: 617-350-0990 • Fax: 617-350-4030 • www.clf.org

MAINE: 14 Maine Street, Brunswick, Maine 04011-2026 • 207-779-7733 • Fax: 207-779-7373
NEW HAMPSHIRE: 27 North Main Street, Concord, New Hampshire 03301-4930 • 603-225-3060 • Fax: 603-225-3059
RHODE ISLAND: 55 Dorrance Street, Providence, Rhode Island 02903 • 401-351-1102 • Fax: 401-351-1130
VERMONT: 15 East State Street, Suite 4, Montpelier, Vermont 05602-3010 • 802-223-5992 • Fax: 802-223-0060

co-generation).[2] In short, the proposed permit would allow unacceptable degradation of a critical public resource for private gain.

Our review of the scientific literature and permit conditions leads to the inescapable conclusion that the animal life indigenous to the Charles will be seriously jeopardized if the permit goes into effect. Conditions at the discharge point will be lethal to most aquatic life, and the planned conditions within the Zone of Passage and Habitat (ZPH) will not be appropriate to support the indigenous species. We are not able reconcile EPA's statement that "...the temperature limits EPA has selected in the draft permit strive to achieve a margin of safety to ensure a balanced indigenous population"[3] with the science reviewed in the Determinations Document and the draft permit. Even though the permit includes an intricate system of date-specific temperature limits, and limits based on assessed temperature differential (ΔT), this permit does not achieve an acceptable margin of safety. While EPA has done a laudable job of reviewing many of the critical studies, we feel that EPA has consistently failed to set limits that are supported by the best available science for the species it aims to protect. Accordingly, we cannot support this permit.

CLF is cognizant of the significant air quality benefits associated with MKS's conversion to natural gas. Nevertheless, the permit must comply with the Clean Water Act (CWA) and associated state laws. Unfortunately, the draft permit fails to do so. Specifically, the proposed thermal discharge level will not protect a balanced indigenous population of aquatic species in the Lower Basin as required by 33 U.S.C. § 1326(a), and the proposed cooling water intake structure ("CWIS") is not the best technology available ("BTA") for minimizing adverse environmental effects as required by 33 U.S.C. § 1326(b). Finally, the draft permit fails to comply with Massachusetts Water Quality Standards ("MA WQS").[4]

I. The Thermal Discharge Variance Does Not Provide for the Protection and Propagation of a Balanced Indigenous Population of Aquatic Species in the Lower Basin.

EPA has failed to ensure that the thermal discharge variance in the draft permit adequately protects a balanced indigenous population of aquatic species in the Lower Basin and their habitat as required by section 316(a).[5] Section 316(a) provides that if the owner or operator of a source can demonstrate that the thermal component of an effluent limitation for any discharge is "more stringent than necessary to assure the pro[t]ection and propagation of a balanced, indigenous population [BIP] of shellfish, fish, and wildlife in and on the body of water into which the discharge is to be made," EPA may alter the proposed thermal discharge component of the effluent limitation to a less stringent level that will still assure "the protection and propagation of a balanced, indigenous population of shellfish, fish, and wildlife in and on that body of water."[6]

---

[2] We note that currently, some excess steam from MKS is sold to the local steam grid for commercial and industrial customers in the Boston and Cambridge areas. In order to reduce its thermal discharge, Mirant could increase its sales of excess steam for industrial purposes. Mirant asserts that it is not possible to acquire the necessary property to accommodate closed-cycle cooling towers. EPA apparently accepted this assertion at face value. Further analysis should be required.

[3] ENVIRONMENTAL PROTECTION AGENCY, NEW ENGLAND, CLEAN WATER ACT NPDES PERMITTING DETERMINATIONS FOR THERMAL DISCHARGE AND COOLING WATER INTAKE FROM MIRANT KENDALL STATION IN CAMBRIDGE, MA, NPDES PERMIT NO. MA 0004898, at 39 (June 8, 2004) [hereinafter DETERMINATIONS DOCUMENT].

[4] MASS. REGS. CODE tit. 314 § 4.00 (2000).

[5] 33 U.S.C. § 1326(a) (2004).

[6] *Id.*

The standard for granting a 316(a) variance is stringent; Congress intended that it be granted only in limited circumstances. In the Senate Report on the 1977 CWA Amendments, Congress expressed its concern that section 316(a) was too often being employed in inappropriate circumstances, resulting in heat effectively becoming an unregulated pollutant.[7] The 1977 Senate Report indicates that Congress intended that section 316(a) serve as a "very limited waiver" provision to be employed only in instances where it could be established "beyond any question" that the BIP could be protected by the modified federal effluent limitations.[8] Section 316(a), the Report explains, was not intended to become a "gaping loophole," allowing indiscriminate waivers of federal thermal effluent discharge controls.[9]

In making a 316(a) determination, EPA is obligated to take all other environmental stressors into account. This requirement is set forth in the legislative history of section 316(a), which states:

> It is not the intent of this provision to permit modification of effluent limits required pursuant to Section 301 or Section 306 *where existing or past pollution has eliminated or altered what would otherwise be an indigenous fish, shellfish and wildlife population.* The owner or operator must show, to the satisfaction of the Administrator, that a balanced indigenous population of fish, shellfish, and wildlife could exist even with the modified 301 or 306 effluent limit.[10]

Additionally, such owner or operator would have to show that elements of the aquatic ecosystems which are essential to support a "balanced, indigenous population of fish, shellfish and wildlife" would be protected.[11]

Similarly, the Environmental Appeals Board (EAB) has held that NPDES permits must ensure the protection of the BIP at a level that would otherwise be present but for past pollution.[12] Finally, EPA regulations also require that cumulative impacts of other environmental stressors be taken into account in establishing a 316(a) variance.[13] This tenet reflects the reality that the cumulative effects of multiple environmental stressors adversely affect an organism's ability to cope with additional environmental stress.[14]

As discussed below, the Administrative Record contains ample scientific evidence demonstrating that the Lower Basin's populations of and habitat for fish and benthic species are already severely degraded,

---

[7] S. REP. NO. 95-370 (1977), *reprinted in* 1977 U.S.C.C.A.N 4326, 4334.
[8] *Id.*
[9] *Id.*
[10] *A Legislative History of the Water Pollution Control Act Amendments of 1972, Vol. 1,* 93rd Cong., 1st Session at 175 [hereinafter 1972 Report of the Conference Committee].
[11] *Id.* (emphasis added).
[12] In the Matter of: Pub. Serv. Co. of Indiana, Inc., Wabash River Generating Station, 1 E.A.D. 590, (1979 EPA App. LEXIS 4, *14 (1979). The Environmental Appeals Board stated that, "if prior appreciable harm has occurred in the past, it may be reasonably assumed that it will continue in the future and that a balanced aquatic community will not be maintained." *Id.*
[13] 40 C.F.R. § 125.73(a) (2004). The proposed section 316(a) variance must ensure the protection of the BIP when considering the cumulative impact of the thermal discharge in conjunction with all other significant impacts to the species. *Id.*
[14] DETERMINATIONS DOCUMENT, *supra* note 3, at 43.

and that the Lower Basin is subject to a variety of other stressors. The proposed variance is clearly not sufficiently stringent to protect a balanced indigenous population in the best of circumstances, let alone in the present case where fish and other aquatic life already face multiple stressors.

Prior to draft permit issuance, concerns were expressed about the project's utilization of a once-through cooling system and its potential thermal impact.[15] It is now clear that the impact of this cooling system on the indigenous fauna of the Charles will indeed be profound if the draft permit is implemented. The facility has recently undergone an upgrade in its power production, which will allow MKS to increase its generation from 64 MW to 234 MW,[16] an increase of over 350 percent. As a result, MKS is expected to increase thermal load to the river by approximately 400% over historic levels.[17]

This increase in thermal load, combined with other existing stresses to aquatic life, will interfere with the seasonal migration and breeding of fishes and diminish the overall ecology of a public resource that the community has worked hard to restore. The specific concerns that CLF has with the development of this proposal include: (1) failure to appropriately utilize the best available science in setting appropriate thermal limits that will protect indigenous aquatic species, (2) failure to rigorously analyze the interaction of new thermal stresses with existing stresses, (3) failure to develop a reliable system for monitoring ongoing impacts to the river and (4) the extreme conditions that would be allowed within a large zone of dilution (ZD).

General comments on biological issues.

Based upon our review of the available scientific information on the behavior and ecology of fishes, and other species indigenous to the Charles, the temperature limits put forth in the draft permit for the ZPH (Attachment A) are too high and will not promote a balanced indigenous population in the river. Considering the enormous and well-documented ecological importance of water temperature in regulating behavior, physiology, and timing of reproduction in aquatic animals, EPA should strive to allow water temperatures in the river to follow natural seasonal cycles and the MKS permit should be consistent with this goal. To allow MKS to consistently offset water temperatures during the spring period (i.e. ΔT limit) is to allow the company to alter the timing of behavior of the indigenous fauna so that it is out of synchrony with the ecology of other less impacted portions of the river. This is especially critical for migratory species such as herring and will prevent these species from succeeding in the Charles. To allow MKS to drive water temperatures to limits that exceed what good biology tells us is required by indigenous fauna is unacceptable and not legal. The conditions in the ZPH under the proposed permit will not assure the protection and propagation of a BIP, as required by section 316(a).

The permit allows the plant to discharge large amounts of heated water (105 °F), and this will be lethal to most of the aquatic life that approaches the discharge point within the zone of dilution (ZD). The discharge water is a full 15 °F over lethal temperature limit for the fish species EPA selected as an

---

[15] NORTHEAST REGIONAL OFFICE, MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL PROTECTION, MEPA COMMENTS RE CAMBRIDGE KENDALL SQUARE STATION DEIR/EOEA # 11754, at 1 (December 23, 1999). These comments stated, "the project's reliance on a once-through cooling system using the Charles River as a sink and source for non-contact cooling water raises major concerns on the project's impact on water quality and fisheries." *Id.*

[16] *Id.* at 21-23

[17] DETERMINATIONS DOCUMENT, *supra* note 3, at 42. The Determinations Document determined that the projected increase in heat load as a result of MKS' conversion will range from an approximate 414% increase in June and August to an approximate 545% increase in September over monthly heat load averages from 1998-2000. *Id.*

indicator for developing the draft permit (i.e. yellow perch).[18] EPA's administrative record indicates that the thermal plume may extend 3 miles up river to the Boston University Bridge, covering approximately 67% of the surface area of the Basin (450 acres). Thus EPA is proposing to allow impact to a massive portion of the Basin. The conditions proposed for the ZD will result in high mortality for aquatic animals that enter this zone, including larval fishes and eggs, which have little control over their distribution within the Basin.

The added thermal load allowed under the draft permit would stress the biology of the Charles River beyond the conditions to which the fauna has adapted over millions of years of evolution, and is not consistent with the goal of supporting a balanced ecological community of indigenous species. High temperature excursions do occur naturally, but they are rare and generally brief. Even these naturally occurring extremes can stress the indigenous fauna causing mortality, reduced reproductive output, and increased susceptibility to disease. The added thermal stress that would be allowed under the draft permit would be frequent and prolonged, producing conditions that will not be tolerated well by indigenous fauna.

Under the proposed permit (Attachment A), the water temperatures in the ZPH could be held near 83° F for almost 5 months (from 12 June through 31 October). This condition would be highly unnatural, and there is no justification for an agency tasked with environmental protection to suggest that it would be supportive of a balanced indigenous population. For example, this period overlaps a time when river herring are in the Basin, including sensitive larvae and juveniles. According to analysis of habitat suitability reviewed by EPA, 83° F is more than two degrees above the point at which habitat suitability for larval herring drops to zero (i.e. HSI = 0 at 80.6 F).[19] Further, under the draft permit the plant could effectively filter the entire volume (%100) of water held within the lower Basin (i.e. from BU to the Charlestown dam) over a period of about a month, heating it to lethal temperatures, and discharging it back to the Basin. Since the flow through the Basin can be very low during the summer (retention times of 295 days for the Basin), this filtering of the water would have a substantial biological impact.[20] The temperatures proposed will be too high to support healthy populations of breeding fishes during the spring and summer. Alteration of natural temperature cycles will interfere with migrations in and out of the river, and elevated winter temperatures will compromise natural strategies for surviving this period of the year for fishes and other aquatic animals.

In the Determinations Document, the EPA suggests that what we know about the importance of temperature and biology for particular species studied in other bodies of water may not be germane to the Charles. For example, "[r]esident species fish eggs from the lower Charles River are adapted to the range of ambient temperature conditions typically found in the lower Basin, and it is recognized that their sensitivity to elevated temperatures may vary to some extent from the temperature range determined to be protective for the same species eggs tested from a different water body, or from eggs tested using an acclimation temperature or water quality characteristics not representative of the lower Charles River Basin."[21] This suggestion that species widely distributed throughout Eastern North America (e.g. yellow

---

[18] DETERMINATIONS DOCUMENT, *supra* note 3, at 72; D. A. Krieger, J. W. Terrell & P. C. Nelson, *Habitat suitability information: yellow perch*, UNITED STATES DEPARTMENT OF INTERIOR FWS/OBS-83/10.55 (1983); R.H. Stroud, *Water quality standards to protect aquatic life: a summary*, AMERICAN FISHERIES SOCIETY SPECIAL PUBLICATION 4: 33-37 (1967).
[19] DETERMINATIONS DOCUMENT, *supra* note 3, at 105.
[20] *Id.* at 13.
[21] *Id.* at 55.

perch) have evolved adaptations to the very recent (i.e. within 50 years) conditions in the Charles River, is not supported in any way by EPA (i.e. no references to scientific sources provided). Indeed, EPA goes on to explain that this kind of local evolution within a water body is not likely, using an example of how thermal conditions in the Great Lakes (i.e. lake Ontario) cause well known die-offs of alewives, a species that has only recently be introduced to the lakes, and is not adapted to natural temperature extremes.[22] All indications are that the fishes indigenous to the Charles have not undergone major adaptation to current conditions. Had they adapted, they would be flourishing under prevailing conditions, yet their numbers are much lower than expected for a healthy river of this kind (see discussion of carrying capacity for herring below). The species examined (e.g. river herring, yellow perch) are found in many widely distributed bodies of water, do not appear to be isolated populations, but rather appear to enjoy the low rate of gene flow that is required to prevent substantial genetic divergence. Within a species, fundamental aspects of fish biology such as reproductive behavior and egg development are well known to follow regional variation in water temperature, with timing such that the these events usually occur at similar temperatures, but different dates, in various locales.[23] Thus EPA's suggestion that what we have learned about temperature in other parts of a fishes' geographic range may not apply to the Charles is ill founded. In developing the final permit, EPA should use the best available science on the indicator species to set guidelines that will promote a balanced indigenous population. We do not agree with EPA's assertion that studies of indicator species under current conditions in the Charles River add crucial new data upon which permitting limits should be based.

The recent data from the lower Charles Basin, provided by the applicant and reviewed in the Determinations Document, is not compelling as a basis for determining scientific guidelines for the permit for three reasons. First, fish populations are not thriving and the river is currently impaired. Second, there is a severe conflict of interest that undermines the credibility of any data provided by MKS. Third, most of the studies lack the scientific rigor of the other published studies reviewed here and in the Determinations Document. In particular, observations of an individual fish at some particular high temperature in the Basin provides virtually no insight into the natural biology of the species in question and should not be used when rigorous determinations of habitat suitability have already been developed from extensive data sets and reviewed by multiple independent scientists. Additionally, setting protective limits based only on estimates of lethal temperatures, or avoidance temperatures, is also not consistent with promoting the propagation of the indigenous species in question. These data tell us little about the temperatures under which the animals can thrive for prolonged periods, and which promote reproduction. Avoidance and lethal temperatures (e.g. upper incipient lethal temperature) are essential for understanding how temperature changes in the river may influence behavior in the short term (e.g. migration into the river) or for determining whether or not conditions in the ZD will rapidly cause mortality. However, it is dangerous to extrapolate from this kind of information to establish thermal conditions under which fish will thrive and successfully reproduce in the long-term .[24] The

---

[22] *Id.* at 128.

[23] *See, e.g.,* FISHES OF THE GULF OF MAINE, (Bruce B. Collette & Grace Klein-MacPhee eds., Smithsonian Institution Press 3rd ed. 2002); Clemon W. Fay, Richard J. Neves & Garland B. Pardue, *Species Profiles: Life Histories and Environmental Requirements of Coastal Fishes and Invertebrates (Mid-Atlantic) ALEWIFE/BLUEBACK HERRING* (October 1983), *available at* http://www.nwrc.usgs.gov/wdb/pub/0116.pdf; David J. Stier & Johnie H. Crance, *Habitat suitability index models and in-stream flow suitability curves:*
American Shad, U.S. FISH WILDL. SERV. BIOL. REP. 82(10.88) at 34 (1985), *available at*
http://www.nwrc.usgs.gov/wdb/pub/hsi/hsi-088.pdf.

[24] DETERMINATIONS DOCUMENT, *supra* note 3, at 85-87.

Determinations Document does do a good job of reviewing the science upon which the permit should be based, but the way in which this information has been used to set limits is not sound. EPA consistently set temperature limits that are higher than those supported by the best science, and too high to promote the balanced indigenous populations that the permitting agencies should be protecting.

The following is a discussion of specific problems with the permitted temperature limits listed in Attachment A of the draft permit, and other aspects of the permit.

Specific Impacts to Resident Fishes: Yellow perch (Perca flavescens, Mitchill 1814).

Yellow perch have been identified by EPA as an important resident species (i.e. *indicator*) upon which to base temperature limits for the MKS permit, yet the limits proposed are not appropriate for promoting this species.[25] Yellow perch breed during the spring, as early as February but typically during the period from April through May.[26] Thus, this is a period during which water conditions should be supportive of the development of eggs, larva, and juveniles. Normally, water temperatures for breeding yellow perch are within the 44 to 56 °F range.[27]

In the first half of April, the draft permit indicates a temperature limit of 61 °F, increasing to 65 °F in the second half.[28] This period corresponds to the early portion of the spawning period for yellow perch, when temperatures normally would be in approximately 44-50 °F range. The temperature limits are thus about 10 to 15 °F higher than the normal spawning temperatures for this period, and all of the limits for the perch spawning period are well above the norms reported in the literature. The proposed limits are too high for normal reproduction in yellow perch and need to be adjusted downward in the revised permit.

Research on the developmental biology of yellow perch indicates that the spring/summer temperature limits proposed are too high for optimal development and survival. For example, experimental data indicate that 55 °F, the high side of the adult spawning range, is very close to the optimum temperature for the survival of eggs, embryos, and larvae, with the optimum being just 2 °F higher.[29] This makes sense since these life stages follow breeding in the steadily warming spring water. Thus, the *protective maximum* (66.4 °F) proposed by EPA is 11 °F higher than the upper limit for natural breeding, and 7 °F warmer than the temperature at which egg mortality begins to increase greatly.[30] Swimming larvae are more temperature tolerant, showing steeply increasing mortality beginning at about 69 °F, a temperature that could be exceeded in the ZPH beginning 23 May under the proposed permit. Thus, even before the start of the normal breeding period in April, the waters in the ZPH would already

---

[25] *Id.* at 54-56.

[26] K.E.F. Hokanson, *Temperature requirement of some percids and adaptations to the seasonal temperature cycle.* J. FISH. RES. BOARD CAN. 34: 1524-50 (1977); K.E. HARTEL, D.B. HALLIWELL & A.E. LAUNER, INLAND FISHES OF MASSACHUSETTS (Massachusetts Audubon Society, 2002).

[27] *See* D. A. Krieger, J. W. Terrell & P. C. Nelson, *Habitat suitability information: yellow perch*, United States Department of Interior FWS/OBS-83/10.55 (1983); K.E. HARTEL, D.B. HALLIWELL & A.E. LAUNER, INLAND FISHES OF MASSACHUSETTS (Massachusetts Audubon Society, 2002); DETERMINATIONS DOCUMENT, *supra note 3*, at 57.

[28] ENVIRONMENTAL PROTECTION AGENCY, NEW ENGLAND, DRAFT AUTHORIZATION TO DISCHARGE UNDER THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM, NPDES PERMIT NO. MA 0004898, at Attachment A (June 8, 2004) [hereinafter DRAFT AUTHORIZATION]. [0]

[29] *See* J.F. Koonce, et.al., *Factors influencing year-class strength of percids: a summary and model of temperature effects,* J. FISH. RES. BOARD CAN. 34: 1900-09 (1977).

[30] DETERMINATIONS DOCUMENT, *supra* note 3, at 57.

be too warm for larval perch. By early June, the mortality of larvae would reach approximately 20% according to the research of Koonce et al.[31]

EPA concludes that the maximum protective temperature for Yellow Perch larvae should be 80.6 °F.[32] Nevertheless, a precautionary, science-based approach to protecting the propagation of these indigenous fish would dictate halting thermal pollution from MKS at temperatures that are much less than the 80.6 °F. Even though some of the eggs might be cooled by being close to the bottom, spawning and the mobile larvae would still be compromised by the proposed temperature limits.[33] A lower temperature limit is also supported by *Krieger et. al.*, where suitable temperatures (suitability $\geq$ 90%) for spawning and embryo development were in the 46 to 57 °F range, and for later stages of development from about 64 to 75 °F.[34]

EPA apparently adjusted its assessment of the suitable maximum protective temperature upward to 80.6 °F for larvae on the basis of just two samples taken in the Basin during July 2002, when larval perch were collected at 82.4 and 79.0 °F near the BU Bridge.[35] There are several serious problems with the logic used here for larvae and later for setting limits for juvenile perch.[36] There is no scientific justification for using a few observations of larvae at high temperatures as evidence that the larval (or juvenile) perch found were thriving at these temperatures.[37] For example, no data were provided on the condition of the larvae compared with larvae growing at other temperatures, no studies indicating that survival to adulthood was normal compared to other sites where temperatures are lower, and there has not apparently been any quantitative assessment of the population of yellow perch in the Basin so it is not even known how abundance of adults compares to an expected carrying capacity for this species.

The available scientific work indicates that 80.6 °F is too high to be protective of larval perch. As pointed out in the Determination Document, 80.6 °F corresponds to a habitat suitability index of only about 40%.[38] EPA's obligation in permitting is to maintain suitable habitat for indigenous fishes, particularly the selected indicator species. Habitat suitability should be as close to 100% as possible (HSI = 1.0). No explanation is provided for choosing the very low suitability criterion of 40%, and the corresponding marginal conditions for these animals. Additionally, experimental data show that larval mortality begins to increase rapidly when water warms to about 70 °F.[39] There is no justification for using a few observations of larval fish living under marginal conditions as a basis for departing from what the best available science tells us. A protective maximum near 75 °F may be justified for larvae, juveniles and adults, but is still too high for the spawning and egg development. EPA's development of a rational for higher limits for juvenile yellow perch (80.6 °F) is weak for the same reasons presented above.[40]

---

[31] *See* J.F. Koonce, et.al., *Factors influencing year-class strength of percids: a summary and model of temperature effects,* J. FISH. RES. BOARD CAN. 34: 1900-09 (1977).
[32] DETERMINATIONS DOCUMENT, *supra* note 3, at 60.
[33] *Id.* at 56.
[34] *See* Krieger et.al. *supra* note 27; DETERMINATIONS DOCUMENT, *supra* note 3, at 66-67.
[35] DETERMINATIONS DOCUMENT, *supra* note 3, at 60.
[36] *Id.* at 62.
[37] *Id.* at 72.
[38] *See* Krieger et.al. *supra* note 27.
[39] *See* Koonce, et.al., *supra* note 31, at 1900-09.
[40] DETERMINATIONS DOCUMENT, *supra* note 3, at 62-64.

EPA calls into question the value of strong scientific studies on perch (and other species) because they were not conducted in the lower Basin of the Charles, and thus perhaps not applicable to this location. For example, studies on temperature and the developmental biology of yellow perch, carried out in Minnesota, are among the best scientific studies available.[41] EPA suggests that since the summer air temperatures in Minnesota are cooler than those in Massachusetts, the water temperature limits for yellow perch should be correspondingly increased when extrapolating this study to the Charles yellow perch population, yet EPA provides no scientific justification for this.[42] Indeed, the best scientific evidence would lead not to the conclusion reached by EPA, but to the conclusion that the same species of fish in a warmer locale will shift its reproductive biology earlier in the season, maintaining species-typical water temperature for eggs, larvae and young.[43] For example, yellow perch spawn from late January to early March in North Carolina, depending on water temperatures, or roughly 2 months earlier than in the New England region.[44] For a given species, there is much more variation in calendar dates for spawning among localities that in optimal temperature ranges. EPA's discounting of good research on the basis of geography is not well founded.

In the development of the draft permit and temperature limits based on yellow perch, EPA departs from the data provided in reputable scientific sources to shift its recommendations higher based on limited observation made in the river, without adequately acknowledging that the river is impaired and is not currently supporting a balanced indigenous population. EPA utilizes water temperatures measured by MKS in the intake pipe to set limits for the protective maximum temperatures above where the science would indicate they should be. Temperature data from the intake pipe are not reliable since the temperature at the intake is elevated due to the nearby discharge point. Spawning temperature limits (Protective Maximum Temperatures ("PMT")) are set over a range from 54 to 63 °F, extending well outside the ranges considered favorable for normal perch spawning in the in the published literature.[45] Even EPA acknowledges that the best available science indicates that their upper limit of 63 °F corresponds to habitat suitability for spawning in this species of only 20% (i.e. unsuitable habitat; HSI = 0.2).[46] EPA then adds 2 °F to the range of PMTs in order to arrive at proposed temperature limits for the ZPH.[47] It is argued that by using these higher temperature limits for the ZPH, they will ensure that the PMTs are not exceeded in the locations and time periods used by perch during spawning. This is not well justified and will not adequately protect a balanced indigenous population.

Since yellow perch has been selected by EPA as a critical indicator species, the temperature monitoring plan should be designed to provide direct measurements of water temperatures in the habitat areas used by this species for all life stages. As indicated in the Determinations Document, temperature monitoring is apparently not being done in locations that are representative of the habitat used by yellow perch. The monitoring plan is thus not adequate and should be modified so that water temperatures are being monitored in critical habitat areas used by indicator species. There is little justification for setting

---

[41] *See* Koonce, et.al., *supra* note 31, at 1900-09.
[42] DETERMINATIONS DOCUMENT, *supra* note 3, at 59.
[43] *See* FISHES OF THE GULF OF MAINE, *infra* note 55.
[44] NORTH CAROLINA DIVISION OF MARINE FISHERIES, NORTH CAROLINA DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES, STOCK STATUS OF IMPORTANT COASTAL FISHERIES IN NORTH CAROLINA, YELLOW PERCH (2004) *available at* http://www.ncfisheries.net/stocks/yelperch.htm.
[45] DETERMINATIONS DOCUMENT, *supra* note 3, at 69.
[46] *See* Krieger et.al. *supra* note 27.
[47] DETERMINATIONS DOCUMENT, *supra* note 3, at 70.

the temperature limits 2 °F higher than the already excessive temperatures selected as PMTs, and then guessing that the actual temperature where the fish are spawning will be cooler (e.g. in deeper water).[48] The final permit should rest squarely on the thermal conditions derived from published science for yellow perch, and measurements in the ZPH should ensure that these temperatures are not exceeded due to excess thermal loading by MKS or any other user of this public resource.

Clearly, the success of the permit in setting temperature limits that promote a BIP is heavily dependent upon using appropriate seasonal dates for the species evaluated, particularly with respect to critical natural history phases such as migration and spawning. The spawning period indicated for yellow perch is limited to just 5 weeks (20 March through 30 April) and this is not justified by the best available science.[49] Yellow perch begin to spawn when the water has warmed enough and continue to spawn at least into May, so long as the water does not get warmer than about 55 °F. Based on the scientific literature, under improved conditions in the Charles, one would expect these fish to continue to spawn in May, June and possibly into early July. This means that a protective permit would set temperature limits so as to be supportive of spawning, egg and larval development, and the growth and maturation of young through the spring and early summer.

The proposed chill period temperature limit of 50 °F is apparently set to be at the upper limit of temperatures that are sufficient for normal ovary development in yellow perch.[50] Use of the absolute upper limit is not precautionary for yellow perch. A winter temperature of 39.2 °F has been shown to be optimal of ovary development in yellow perch, with females producing eggs at over 75% viability.[51] Viability at the winter temperature proposed by EPA (50 °F) was very low (< 25%).[52] The argument put forth by EPA that the Charles Basin does not currently achieve extended periods with water temperatures near 40 °F is not compelling. The river was impaired during the time period examined by MKS, with thermal pollution from a number of sources including MKS.[53] This is no justification for setting the limits higher than dictated by the biology. Further, the use of 50 °F as an upper temperature limit for winter temperature in a New England river is highly unnatural, and will not support the natural community of aquatic organism that has evolved to pass through a winter period with water temperatures near freezing. The permit should not allow MKS to elevate water temperatures in the ZPH above 39 F during the chill period.

In order to promote the propagation of yellow perch, and other species, EPA must set more protective limits. During the period when perch eggs or larvae would normally be present (i.e. mid March through mid June), the discharge of any heated water should be limited such that water in the shallows of the Basin does not exceed 55 °F. Even though temperatures may naturally rise above 55 °F during this time period and decrease habitat suitability, there is no justification for allowing MKS to stress the perch

---

[48] *Id.* at 73-74.
[49] *Id.* at 70 and Fig 5.6-1.
[50] *See* Krieger et.al. *supra* note 27.
[51] B.R. Jones, K.E.F. Hokanson, J.H. McCormick, *Winter temperature requirements for maturation and spawning of yellow perch (Aerca flavescens)*(Mitchill), BIOLOGICAL BALANCE AND THERMAL MODIFICATIONS VOL. 3 *in* Proceedings of the World Conference Towards a Plan of Action for Mankind-Needs and Resources, Methods of Forecasting, at 189-92 (Paris, France 1974).
[52] DETERMINATIONS DOCUMENT, *supra* note 3, at 65.
[53] *Id.* at 66-67.

population further with discharge of heated water. During the fall and winter, the Basin must be allowed to cool at least to the high 30's.

Specific Impacts to Migratory Fishes (Alosids): Blue Back Herring (Alosa aestivalis, Mitchill 1814), Alewife (Alosa pseudoharengus, Wilson 1811), and American Shad (Alosa sapidissima, Wilson 1811)

The Charles River has the potential to support the vigorous populations of migratory herring (Alolsids) that once typified most New England rivers. There are currently marginal populations of *river herring* (Blue Back, *Alosa aestivalis*, and Alewife, *Alosa pseudoharengus*), and American shad (*Alosa sapidissima*), despite efforts by the state to restore these runs over the past several decades. The best available science leads to an estimated carrying capacity of roughly 300,000 river herring for a healthy river of the size of the Charles, yet recent estimates put the adult population near 45,000 (i.e. only 15% of capacity).[54] The DMF has recently committed about $300,000 for renewed efforts to bring back healthy populations of migratory fishes to the Charles, yet these efforts will be thwarted if the MKS plant is allowed to operate under the proposed permit from EPA. These fishes are already stressed by prevailing conditions in the river, and the proposed added thermal discharge will interact with existing problems to make the river even less supportive of these components of a balanced indigenous population. Like yellow perch, the natural biology of Alosid fishes is closely tied to water temperature. Temperature is a critical determinant of successful migrations in and out of spawning rivers.[55] As with other species, the timing of water temperature changes in the river with respect to the availability of food sources and the suitability of spawning grounds is essential to the ecology of Alosid fishes. The schedule of thermal limits proposed by EPA is not appropriate for promoting healthy reproductive populations of these indigenous fishes in the Charles River.

EPA has determined that the alewife is the most appropriate indicator species to use for its evaluation of river conditions for anadromous fishes because it is judged to be the most sensitive to elevated temperatures at all life stages.[56] The temperature of the freshwater flowing out of the mouth a river serves as a critical regulator of the spring migration of adult fishes into the natal river.[57] One can think of water temperature as a being part of a biological calendar for aquatic species. Exposure to abnormally warm temperatures in a crucial location, such as near the mouth of a river, can result in a misreading of the calendar, and a potentially devastating de-synchronization of reproductive behavior with the availability of suitable habitat and food. As the water temperature increases, the fish that have aggregated near the river mouth are triggered to begin their spring spawning run. If the water is heated by thermal discharge, this natural behavior will be disrupted. If outflow temperatures are too high when migrating fishes arrive, the migration can be blocked.[58] Migration can also be triggered too early leading

---

[54] M. Gibson, *Spawning runs of river herring*, RI Division of Fish and Wildlife (1983); DETERMINATIONS DOCUMENT, *supra* note 3, at 79.

[55] *See* R.A. Cooper, Early life history and spawning migration of the alewife *Alosa pseudoharengus*, at 58 (1961) (unpublished M.S. thesis, University of Rhode Island) (on file with the University of Rhode Island Library); FISHES OF THE GULF OF MAINE, (Bruce B. Collette & Grace Klein-MacPhee eds., Smithsonian Institution Press 3rd ed. 2002); J.G. Loesch, *Overview of life history aspects of anadromous alewife and blueback herring in freshwater habitats* at 686, *in* COMMON STRATEGIES OF ANADROMOUS AND CATADROMOUS FISHES 1:89-103, (M.J. Dadswell et al., eds., Am. Fish. Soc. Symp., 1987).

[56] DETERMINATIONS DOCUMENT, *supra note 3*, at 77-78.

[57] *See* Cooper, *supra* note 55; Collette et. al. *supra* note 55; Loesch, *supra* note 55; *see* DETERMINATIONS DOCUMENT, *supra* note 3, at 74.

[58] W. A. Richkus, *Factors influencing the seasonal and daily patterns of alewife (Alosa pseudoharengus) migration in a Rhode Island river,* J. FISH. RES. BOARD CAN. 31:1485-97 (1974).

to spawning under sub-optimal conditions, including the production of eggs and larvae under conditions that are not favorable to their survival.

Alewives typically begin spawning runs when water temperatures are in the 45 to 55 °F range during April.[59] When spring temperatures reach about 64 °F, alewives generally will no longer migrate into rivers.[60] However, the ZPH temperature limits proposed by EPA for the April-May spawning run period for Massachusetts will exceed 64 °F at the beginning of the typical spawning period in mid April.[61] According to a careful analysis of New England spawning runs presented by EPA, runs are essentially finished (i.e. 95% of fish have migrated) by the time water reaches 65 °F, typically in May.[62] By the end of May, EPA proposes allowing temperature in the ZPH to climb as much as 6 °F above the behavioral threshold for inward migration (i.e. to 70 °F). The water in the ZD will be even warmer and it is these thermally loaded waters that migrating alewives will encounter as they reach the mouth of the river. The schedule of proposed limits is not consistent with the available science on alewife behavior and is not supportive of these indigenous migratory fish that have been selected as indicators of habitat suitability. Indeed, the limits proposed by EPA are inexcusable because they will so obviously interfere with the migrations of alewife, and probably other migratory species.

In the section of the Determinations Document dealing with protective temperatures for migrating adult river herring, EPA writes that ". . . many years of spawning data at a specific river system would be needed to properly characterize the spawning habits of a site-specific spawning school," suggesting that detailed knowledge of herring behavior in the Charles river is required to best understand the habitat requirements of this species and thus set permit limits.[63] As explained above, we do not agree with this reasoning for herring, or for any other species that currently struggles to maintain its toehold in the Charles. EPA provides no support for the notion that temperature, or any of the other cues, regulating behavior of river herring might vary substantially from one river to the next. Indeed, the bulk of the published literature on Alosids would indicate otherwise, with the dates of spawning runs varying with latitude, but being relatively stable with respect to water temperature.[64] As noted in the comments above on Yellow Perch, there is little support for the contention that the sub-populations of herring, or any other fishes, in the Charles have diverged substantially from members of their species studied in other rivers. The lack of site-specific data on these species, particularly data taken in an impaired waterway such as the Charles, does not represent a pronounced obstacle to our scientific understanding of the biology of these species, and should not be put forth as an a justification for departing from the conclusion supported by the published literature for each of the species considered.

---

[59] FISHES OF THE GULF OF MAINE, (Bruce B. Collette & Grace Klein-MacPhee eds., Smithsonian Institution Press 3rd ed. 2002).

[60] *See* Richkus, *supra* note 58, at 1485-97; DETERMINATIONS DOCUMENT, *supra* note 3, at 83-84.

[61] *See* Collette et. al., *supra* note 55; D.L. Belding, *A report on the alewife fisheries of Massachusetts*. MARINE FISH. SER. NO. 1. (Massachusetts Division of Fish and Game 1921); DRAFT AUTHORIZATION , *supra* note 28, at Attachment A[0].

[62] DETERMINATIONS DOCUMENT, *supra* note 3, at 91, Table 5.7.3c-3.

[63] DETERMINATIONS DOCUMENT, *supra* note 3, at 79-96.

[64] See Collette et. al., *supra* note 55; Clemon W. Fay, Richard J. Neves & Garland B. Pardue, *Species Profiles: Life Histories and Environmental Requirements of Coastal Fishes and Invertebrates (Mid-Atlantic) ALEWIFE/BLUEBACK HERRING* (October 1983), *available at* http://www.nwrc.usgs.gov/wdb/pub/0116.pdf; David J. Stier & Johnie H. Crance, *Habitat suitability index models and in-stream flow suitability curves: American Shad*, U.S. FISH WILDL. SERV. BIOL. REP. 82(10.88) at 34 (1985), *available at* http://www.nwrc.usgs.gov/wdb/pub/hsi/hsi-088.pdf.

The timing of spawning runs of American shad are similar to the river herring, typically taking place from late April through June, when spring water temperatures reach about 50 °F.[65] Migration comes to an end when the water reaches about 68 °F.[66] Again, the temperature limits proposed by EPA are too high and would curtail shad spawning runs by early May, when the ZPH would be allowed to reach the 68 °F behavioral threshold for upstream migration.[67] In the Determinations Document, it is stated that the ". . . agencies have given serious consideration to temperature limits needed to protect American shad (*Alosa sapidissima*). This species has been documented in the Charles River system in the past.[68] MA DMF attempted to reintroduce this species into the system in greater numbers in the 1980's and into the early 1990's. The population has not rebounded and fisheries biologists have been unable to determine the reason(s). Fish sampling by the permittee did not collect adult American shad in 1999, 2000 or 2002."[69] The temperature limits put forth in EPA's draft permit are not consistent with supporting a shad population in the Charles River, and will undermine ongoing efforts by MA DMF to re-establish this species. A renewed DMF shad stocking program is scheduled to begin this year, but will fail if this permit is not revised so as to hold temperatures in the natural range for these migratory fishes.

Juvenile shad remain in the natal river through the summer on into fall. Seaward migrations are triggered when falling water temperatures reach about 66 °F during September through early November.[70] Blueback herring exhibit a similar behavioral pattern, with the young fish beginning their seaward journey when fall temperatures reach 69 °F.[71] If this draft permit goes into effect as written, these young fish will begin the migration out of the upper reaches of the river in cool water, and then will encounter much higher temperatures in the ZPH of the Basin, and even higher if they venture into the ZD. With a maximum protective limit of 83 °F during this period, water could reach this very high temperature if the system of measuring ambient temperature failed due to local thermal loading near the BU Bridge (discussed further below). The unnatural spatial temperature regime is likely to interrupt the temperature-triggered migration to the sea and thus will result in higher mortality among the young of the year.

The habitat in the Basin will be further degraded because elevated temperatures are likely to reduce the availability of crucial invertebrate prey. It is well known that the precise timing of reproduction in fishes with respect to peaks in plankton availability is a critical determinant of the survival of juvenile fishes of many species, or year class strength. Zooplanktons are essential as food for juvenile fishes, including perch and herring, and are also a dominant part of the diet for adult herring.[72] Research on herring indicates that reproduction has evolved to produce synchrony with zooplankton population cycles.[73] With increasing temperatures, the timing and composition of the available zooplankton will change in the Charles.[74] Under the proposed permit, water temperature will approach

---

[65] *See* Collette et. al., *supra* note 55; K.E. HARTEL, D.B. HALLIWELL & A.E. LAUNER, INLAND FISHES OF MASSACHUSETTS (Massachusetts Audubon Society, 2002).
[66] *See* Stier and Crance, *supra* note 64, at 34.
[67] DRAFT AUTHORIZATION , *supra* note 28, at Attachment A[0].
[68] *See* Letter from P.D. Colosi, to Glenn Haas, MA DEP/DWM, Mirant Kendall Impediment on the Potential Recovery of American shad (October 10, 2002) (on file with author).
[69] DETERMINATIONS DOCUMENT, *supra* note 3, at 78.
[70] *See* Hartel et. al., *supra* note 27.
[71] *Id.*
[72] Garland B. Pardue, *Habitat Suitability Index Models: Alewife and Blueback Herring* (1983) *available at* http://www.nwrc.usgs.gov/wdb/pub/hsi/hsi-058.pdf.
[73] (Blaxter *et al* 1982)
[74] DETERMINATIONS DOCUMENT, *supra* note 3, at 137.

the thermal tolerances some of the temperate zooplankton species and the algae that these invertebrates require for their food will decrease in availability. The warmer waters will favor blue-green algae which can be toxic to zooplankton and fishes. When waters are warmed to 77 °F or higher for a protracted period of time, the species makeup of the zooplankton assemblage shifts to smaller species, and the species that form the principal food sources for Alosid fishes are lost.[75] The combined effects of elevated temperatures changing the timing of migrations both in and out of the river, the thermal stress caused by high temperatures in the Basin, the effects on invertebrate prey populations could be devastating for the indigenous species EPA is responsible for protecting. These stresses will interact in a complex fashion with the already marginal conditions in the Basin to produce habitat that will not promote the successful passage of young fish into the sea.

Peer reviewed habitat suitability models have been developed by scientist with the US Fish and Wildlife Service for juvenile river herring and American Shad.[76] During the summer and fall, optimal temperatures for juvenile alewife were determined to be in range of 59 to 68 °F, and for shad 50-77 °F. Blueback herring were found to be more temperature tolerant, with optimal temperatures between 68 and 86 °F. The temperatures proposed in the draft permit are not suitable based upon these careful determinations of habitat suitability. The temperature limit of 83 °F, from June 12 through October coincides with the period during which juvenile river herring and shad should be feeding and growing as they make their way to the sea. Juvenile alewives normally exhibit a pattern of behavior in which the surface waters are used near dawn and dusk.[77] However, under the permit the surface water in the Basin could be at least 15 °F above the optimal range in the ZPH (83 °F , 4 hour average) and even higher in the ZD.[78] Thus, juvenile alewife will clearly be subjected to marginal habitat conditions if they enter the surface waters of the lower Basin; temperatures of 77 °F and above are also known to result in avoidance behavior in alewives.[79]

The proposed conditions for the Lower Basin will add temperature shock to the list of stressors affecting migratory fishes as they are forced to make the abrupt transition from the Basin to the sea at the locks. It is common knowledge that sudden changes in water conditions such as temperature, salinity and pH, stress fishes, often killing them.[80] Due to the absence of well-designed fish-ways through the dams in the lower Charles, the fishes that migrate in and out of the river are forced to experience highly unnatural shifts in water conditions. For example, they are not able to move gradually from salt water to freshwater as they did throughout their evolutionary history, but rather are plunged from one environment to the other through the lock system. Under the proposed permit, those that survive the locks will be subjected to massive temperature changes in addition to pH and salinity changes, as well as to a habitat that has been polluted by many sources[81] and is abnormally stratified.[82] Though these cumulative impacts to the

---

[75] M.M. Moore, C.L. Folt & R. Stemberger, ***Consequences of elevated temperatures for zooplankton assemblages in temperate lakes***, ARCHIV FR HYDROBIOLOGIA 135:289-319 (1996).
[76] *See* Pardue, *supra* note 72; Stier & Crance, *supra* note 64.
[77] *See* Pardue, *supra* note 72.
[78] DRAFT AUTHORIZATION, *supra* note 28, at Attachment A.
[79] *See* Pardue, *supra* note 72.
[80] J.J. Graham, *Observations on the Alewife, Pomolobus pseudoharengus (Wilson), in fresh water*, BIOLOGICAL SERIES NO. 62 (University of Toronto Press 1956); R.G. Otto, et. al., *Lethal and preferred temperatures of the alewife (Alosa pseudoharengus) in Lake Michigan.* TRANS. AM. FISH. SOC., 105: 90-106 (1976); DETERMINATIONS DOCUMENT, *supra* note 3, at 128.
[81] DETERMINATIONS DOCUMENT, *supra* note 3, at 46-48.

migrating fish have not been properly analyzed by EPA, it does not require a lot of new science to recognize that this is a serious problem that undermines efforts to re-establish healthy runs of indigenous fishes in the Charles.

Sadly, migrating herring have been observed to swim into the discharge pipe and attempt to spawn.[83] Migratory fishes have a strong, and usually adaptive, behavior that leads them up-stream (rheotaxis). In this circumstance, where the flow of water through the plant is so large compared to the flow of the river, the fishes' natural behavior short circuits its efforts to reproduce in the Charles. This effect of the discharge should be addressed.

Discussion of warmest temperatures permitted for the ZPH.

Although the specific time periods and temperature limits are laid out in the draft permit (Attachment A), the discussion in the Determinations Document is at times confusing as to which limits will actually be enforced (e.g. Fig 5.6-1).[84] Multiple references are made to 83 °F, apparently because this is a water quality standard for a Class B body of water. However, as written, it is at times difficult to know whether EPA is proposing to use 83°F as some kind of overall limit for the ZPH for all seasons, or only during the 12 June through 31 October period. For example, on page 61 in the section on *Time Period For The Most Sensitive Larval Stage*, EPA writes "Based on the discussion above, the temperature limit of 28.3°C (83°F) must be in place in the Zone of Passage and Habitat from April 1 through July 15 to protect yellow perch larvae, unless replaced by a lower temperature limit to protect a more sensitive life stage or species occurring in the Basin at the same time." However, the draft permit clearly indicates that a standard substantially lower than 83 °F is being proposed during all but the last portion of this period. Fig. 5.6-1 shows the stair-step series of limits developed in the Determinations Document, and presented in Attachment A, but also includes a limit line at 83 °F that extends to through the entire year. The intent of this graph, and the text, needs to be made clear.

Fish Mortality Requirements

Twenty five dead fish observed in 24 hrs is too high – this standard[85] should be adjusted down to 5 fish per 24 hours. This standard should be set based on what one expects to observe in a healthy portion of a river. Observation of 5 dead fish within a 24-hour period and within a small section of healthy river would normally be an unusual event with a corresponding cause that is not normal.

Monitoring.

In the draft permit EPA writes, "One fixed monitoring station downstream of the BU Bridge to access ambient river conditions. This station shall be placed near mid-river at the downstream location closest to the bridge where there is a water depth of at least 15 feet. Efforts will be made to position the station where it will reduce the risk of interference with boat traffic, if possible."[86] Although this section of the

---

[82] *Id.* at 14-16. The Gridley Locks at the New Charles River Dam are the only access point joining the Charles River and Boston Harbor. A Metropolitan District Commission study suggests that approximately 30,000 boats per year use these locks, including hundreds on an average summer weekend. The Metropolitan District Commission, Master Plan for the Charles River Basin The Second Century, "Uses & Perception of the Charles River Basin" at 2. available at http://www.mass.gov/mdc/CRBasinContents.htm.

[83] DETERMINATIONS DOCUMENT, *supra* note 3, at 50.

[84] *Id.* at 60.

[85] DRAFT AUTHORIZATION, *supra* note 28, at 12.

[86] *Id.* at 19.

permit describes a sampling procedure for estimating background conditions at one site, it is not sufficient to use just one station to establish background temperatures. The background temperature assessment is fundamental to the whole monitoring system and should not rest on a single station. Scientific estimates are generally based upon multiple samples, and there is no justification for limiting the assessment to a single station in this case. EPA goes to some length to explain the dependence of temperature on time of day and spatial location in the determination document. Since temperature depends on where one makes a measurement, a good assessment of background conditions should be based on multiple measurements, taken in a variety of locations. A minimum of four background temperature monitoring points, including 3 above the BU bridge, should be used and compared at all times so that aberrant measurements can be detected, and so a clear picture of the inflowing thermal conditions can be obtained. This will reduce the risk that assessment of MKS cooling water impacts will be corrupted by anomalous conditions that may occur at a single station. This could occur due to technical failure or anomalous natural conditions. Additionally, it is also very important to recognize that a single station could also be influenced by unanticipated discharges of heated water near the sampling location. For example, intermittent warm storm water discharge from the Blackstone Power Station, or other as yet unidentified sources of heated water could all lead to failure of the back-ground temperature based monitoring system detailed in this permit. The permit allows for a temporary upward adjustment of maximum temperature limits in the event that background temperature is determined to be above the date-specific limit.[87] Thus, unanticipated thermal conditions near station 1 would translate to elevated limits throughout the Basin, potentially harming aquatic life within the ZPH.

The method proposed by EPA for determining delta T is flawed because the intake can be contaminated by the discharge – corrupting the delta T measurement for facility *temperature rise* and for other uses of delta T.[88] EPA discusses this "re-entrainment" problem on page 81 of the Determinations Document. This problem will cause an underestimate of delta T for facility *temperature rise* and this will translate into a corresponding underestimate of the thermal load. The baseline temperature for determining this and other delta T values should be based on a series of up-stream monitoring stations as discussed above.

The draft permit requires the permittee to undertake certain biological and environmental monitoring requirements during the life of the permit.[89] However, there is such an obvious conflict of interest here that any biological, or other environmental, monitoring data collected by the permit holder will be of little scientific value. Clearly, the outcome of the proposed monitoring by MKS directly impacts the operation and profitability of the facility. Data generated in this fashion, with no peer review or other rigorous system for checking its fidelity, is not credible. The permit should require that the applicant provide the funds required for sound scientific monitoring by DEP, or another neutral party to be selected by DEP.[90]

Existing Impairments to the Charles.

The draft permit must be evaluated in the context of the existing impairments to the Charles, as the effect on a BIP of additional stress introduced under the permit can only be properly evaluated if these are taken into account. DEP has classified the Lower Basin as impaired for organic enrichment, dissolved

---

[87] DRAFT AUTHORIZATION, *supra* note 28, at Attachment A, n. 2.
[88] DRAFT AUTHORIZATION, *supra* note 28, at 9-11.
[89] *Id.* at 1.
[90] *Id.* at 25.

oxygen, nutrients, oil/grease, noxious aquatic plants, taste/odor/color, priority organics,[91] metals,[92] harmful bacteria, unknown toxicity, and increased turbidity.[93] Measurements indicate little or no oxygen in the lower layer of Basin waters.[94] Adequate DO concentrations are critical for the protection and propagation of fish and other aquatic species.[95] Algal blooms, which occur frequently in the warm water of Lower Basin, further decrease DO concentrations and produce compounds toxic to other aquatic life.[96] Low DO concentrations, organic enrichment and nutrient overloading also contribute to eutrophication.[97] Photosynthetic algae have the ability to exploit these additional nutrients leading to algal blooms.

Data availability.

We also note that all data collected under this permit should be made available in electronic form to the public through a web site. This is a public resource that is being used by a private company for profit. Scientists, and other interested citizens of the Commonwealth, must be allowed timely access to any and all scientific data collected under this permit. This will allow the best use of the data from this public resource and will allow any interested member of the public to examine the condition of their resource. This will require changing part B of the draft permit (*Monitoring and Reporting*).

II. The Draft Permit's Variance Provisions Fail to Comply with Massachusetts Water Quality Standards.

The proposed variance impermissibly allows violations of Massachusetts' Water Quality Standards ("MA WQS"). In enacting the CWA, one of Congress' principal goals was to "recognize, preserve, and protect the primary responsibilities and rights of States to prevent, reduce, and eliminate pollution, [and] to plan the development and use (including restoration, preservation, and enhancement) of land and water resources."[98] In accordance with this goal, the CWA and its regulations are clear that all provisions in a

---

[91] Hazardous compounds found in lower Basin sediments include, among others, PCBs and pesticides. DETERMINATIONS DOCUMENT, *supra* note 3, at 46-47; EPA New England Press Release, "USGS Studies Show Extent of Sediment Contamination and Saltwater Impacts on Charles River," Release #01-03-24 (March 30, 2001) at 1 [hereinafter Release #01-03-24] *citing* R.F. Breault et al., USGS, *Distribution and Potential for Adverse Biological Effects of Inorganic Elements and Organic Compounds in Bottom Sediment, Lower Charles River, Massachusetts*, Report 00-4180.

[92] Metals found in lower Basin sediments include, among others, lead, cadmium, and mercury. DETERMINATIONS DOCUMENT, *supra* note 3, at 46-47; *see* Release #01-03-24, *supra* note 90.

[93] DIVISION OF WATERSHED MANAGEMENT, MASSACHUSETTS YEAR 2004 INTEGRATED LIST OF WATERS, PROPOSED LISTING OF THE CONDITION OF MASSACHUSETTS' WATERS PURSUANT TO SECTIONS 303(D) AND 305(B) OF THE CLEAN WATER ACT (April 2004), at 94; DETERMINATIONS DOCUMENT, *supra* note 3, at 15.

[94] E-mail from Eric Adams (March 6, 2000, 6:18 EST) (on file with author).

[95] US EPA Office of Environmental Measurement and Evaluation, *Clean Charles 2005 Water Quality Report 2002 Core Monitoring Program*, November 2003, at 8, http://www.epa.gov/region1/lab/reportsdocuments/charles/report2002.pdf..

[96] DETERMINATIONS DOCUMENT, *supra note 3*, at 47; NORTHEAST REGIONAL OFFICE, MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL PROTECTION, MEPA COMMENTS RE CAMBRIDGE KENDALL SQUARE STATION EQUIPMENT UPGRADE PROJECT FEIR/EOEA # 11754, at 6 (June 23, 2000).

[97] DETERMINATIONS DOCUMENT, *supra note 3*, at 46-47; NORTHEAST REGIONAL OFFICE, MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL PROTECTION, MEPA COMMENTS RE CAMBRIDGE KENDALL SQUARE STATION EQUIPMENT UPGRADE PROJECT FEIR/EOEA # 11754, at 6 (June 23, 2000); Letter from Michael Hill, Office of Ecosystem Protection, US EPA Region I, to Norm Cowden, Project Director, Mirant Kendall LLC, Attachment A (July 9, 2001) (on file with author) (discussing EPA 1998-2000 Basin monitoring, which identified excessive amounts of algae in the River).

[98] 33 U.S.C. § 1251(b); 40 C.F.R § 122.4(d). ("No permit may be issued: . . . (d) When the imposition of conditions cannot ensure compliance with the applicable water quality requirements of all affected States"); 40 C.F.R § 122.44(d)(1), (d)(4) ("[E]ach NPDES permit shall include conditions meeting the following requirements when applicable: . . . (d) any requirements in addition to or more stringent than promulgated effluent limitations guidelines or standards under sections 301,

NPDES permit must comply with state WQS.[99] Pursuant to section 401, EPA has an independent obligation to ensure such compliance prior to issuing the permit.[100] Moreover, Congress' intent when drafting section 316(a) was to only allow variances of federal thermal effluent limitations. In the Senate Report on the 1977 CWA Amendments, Congress specifically rejected interpreting section 316(a) to allow variances of state water quality standards.

> The Agency also concluded that the 1972 act was preemptive with respect to the application of State water quality standards and effluent limits for heat. This is a determination for which there is no substance in law and which *is wholly contrary to the committee's long-held view that the States are free to establish any more strict standards or effluent limitations, as specifically set forth in section 510 of the act.*[101]

In sum, interpreting the plain language of section 316(a) to only authorize variances of federal thermal effluent limitations is consistent with legislative history, EPA's statutory obligations under the CWA and EPA regulations.[102]

Massachusetts has designated the Lower Basin Class B, which means that all permits must be consistent with its use as designated habitat for fish, other aquatic life, and wildlife, for primary and secondary contact recreation (which includes swimming, boating and fishing), and ensure consistently good aesthetic value.[103] As discussed above, the proposed variance fails to support habitat or recreation; it creates a habitat that does not support certain indigenous fish, including game fish such as American shad, alewife and yellow perch. Further, by failing to protect existing uses, the draft permit violates the anti-degradation standards of the MA WQS as well as the Clean Water Act.[104] Finally, it is unclear how the draft permit will ensure that the thermal load will not exacerbate ongoing problems with eutrophication, thereby compromising aesthetics.

The 316(a) thermal discharge variance in the draft NPDES permit is fundamentally inconsistent with the MA WQS policy on mixing zones.[105] The Massachusetts mixing zone policy requires effluent discharge areas designed to minimize impacts on aquatic life, provide safe and adequate passage zones for swimming and drifting organisms, and should not create nuisance conditions.[106] In addition, the water

---

304, 306, 307, 318, and 404 of CWA necessary to: . . . (1) [a]chieve water quality standards established under section 303 of the CWA, including State narrative criteria for water quality . . . .".

[99] 33 U.S.C. § 1370 (allowing state WQS to be more stringent than federal technology-based standards).

[100] 33 U.S.C. § 1341(a) (requiring compliance with WQS in both the state where the discharge originates and of any state affected by the discharge).

[101] S. REP. NO. 95-370 (1977), *reprinted in* 1977 U.S.C.C.A.N 4326, 4334 (emphasis added).

[102] 33 U.S.C. § 1311(b)(1)(C); 33 U.S.C. §§ 1341(a)(1), (a)(2); 40 C.F.R. § 122.4(d); 40 C.F.R. § 122.44.

[103] MASS. REGS. CODE tit. 314 § 4.06, Table 19 (classifying Charles River Basin as Class B); MASS. REGS. CODE tit. 314 § 4.05(3)(b); 314 § 4.02

[104] MASS. REGS. CODE tit. 314 § 4.04(1); 33 U.S.C. § 1313(d).

[105] MASS. REGS. CODE tit. 314 § 4.03(2).

[106] *Id.* at 4.03(2)(b) ("Mixing zones shall not interfere with the migration or free movement of fish or other aquatic life. There shall be safe and adequate passage for swimming and drifting organisms *with no deleterious effects* on their populations.") (emphasis added); MASS. REGS. CODE tit. 314 § 4.03(2)(c) ("Mixing zones shall not create nuisance conditions, accumulate pollutants in sediments or biota in toxic amounts or otherwise diminish the existing or designated uses of the segment

temperature limits and the discharge temperature limits within the ZD are well above recommended temperatures. Under Massachusetts WQS, the maximum allowable mixing zone temperature is set at 90°F to avoid short-term adverse effects to aquatic life within the mixing zone. To ensure 90°F is not exceeded, the MA DEP recommends an end of pipe temperature limit of 95°F. Here, the EPA set no specific temperature limits for the ZD and an end of pipe temperature limit of 105°F.[107] Further, Massachusetts WQS also require mixing zone areas to have a "safe and adequate passage for swimming and drifting organisms [causing] no deleterious effects on their populations."[108] As discussed above, the draft permit fails to meet these requirements as well. Finally, EPA did not comply with Massachusetts policy urging site-specific studies to show the adequacy of the zone of passage in waterways used by anadromous and catadromous fishes.[109]

Mirant's Variance Request did not Meet the Requisite Burden of Proof Under Section 316(a).

We also note that Mirant's proposed 316(a) variance was inadequate. When a permittee requests a variance, it bears the burden of proof of justifying an alternative limit.[110] It is well established that the standard for the burden of proof is high.[111] In its original 2001 NPDES permit application, and subsequent requests, Mirant requested a section 316(a) variance. The variance would have allowed noncompliance with MA WQS and mixing zone standards during certain summer and fall months and allowed a ΔT of 5°F on the edge of the ZPH.[112] In November 2002, the permittee modified its initial submission and requested a ΔT of not less than 8 °F. The permittee based this request on field data it had collected showing river herring distribution based on temperature variation. Due to the scientific methodology employed, neither EPA nor DEP were convinced by this science and did not increase the proposed ΔT. Mirant then submitted additional information showing that fish have been observed in parts of the river where they would experience a surface to bottom (i.e. vertical) temperature gradient of 15-18 °F in the Lower Basin. Again, DEP and EPA questioned the conclusions reached by this study and properly refused to increase the proposed ΔT.[113] Then, in January 2003, Mirant proposed a ΔT gradient that separated the Basin into separate thermal temperature blocks. According to EPA, theoretically the proposal's designs would allow a ΔT of 15°F between the first and last thermal blocks. Mirant attempted to justify the monitoring arrangement by arguing that fish are unlikely to swim past all monitoring stations in a short period, and thus unlikely to experience the ΔT of 15°F in its entirety. EPA and DEP both correctly rejected this proposal.[114] There are a variety of sound biological reasons why large thermal gradients will interfere with the goal of promoting a balanced indigenous population of fishes and other animals. This is particularly true for migratory fish species, as reviewed above.

III. The Draft Permit Fails to Comply with Section 316(b).

---

disproportionately."). EPA acknowledges in the Determinations Document that the draft permit allows acute lethal effects in the ZD. DETERMINATIONS DOCUMENT, *supra* note 3, at 122.

[107] DRAFT AUTHORIZATION, *supra* note 28, at 2.

[108] MASS. REGS. CODE tit. 314 § 4.03(2)(b).

[109] Memorandum from Warren A. Kimball, "Thermal Discharge/NPDES Review" at 1 (June 9, 1992) (on file with author)

[110] *Id.*

[111] *In re Public Service Co. of New Hampshire*, 10 ERC 1257, 1261, 1263 (Permit Appeal Decision By Administrator of the EPA (June 17, 1977).

[112] DETERMINATIONS DOCUMENT, *supra* note 3, at 124.

[113] *Id.* at 125.

[114] *Id.* at 125.

MKS currently operates using a once-through cooling system. MKS withdraws cooling system water from the Broad Canal, near the Longfellow Bridge through three intake structures, circulates it through the plant's three condensers, where the heat from the condensers is transferred to the water, and discharges it into the Charles River through two pipes located on the seawall directly east of the plant.[115] Just as the plant is expected to increase its heat load due to its increased generating capacity, intake is expected to significantly increase intake as well. Prior to MKS renovations, MKS utilized approximately 50 million gallons per day[116] ("MGD") of a 70 MGD monthly average allowance to cool the plant.[117] At full capacity, the plant requires approximately 70 MGD of cooling water. If MKS operates at full capacity for the entire year, this will result in an average increase of approximately 40 percent increase over historical water usage.[118] Permit intake provisions are subject to section 316(b), which requires that the "location, design, construction, and capacity of cooling water intake structures reflect the *best technology available for minimizing adverse environmental impact.*"[119] As explained below, the draft permit fails to meet this standard.

EPA has consistently held that the assessment of the significance of adverse environmental impact must take the condition of the ecosystem into account.[120] Accordingly, as discussed above, losses from a stressed ecosystem like the Lower Basin are considered more environmentally significant than greater losses from a healthy ecosystem.[121] Another important factor is the biological value of the source water, including the presence of spawning grounds, migratory pathways, and nursery and feeding areas.[122] Again, as discussed above, the Lower Basin has significant biological value. EPA must also consider cumulative impacts, that is, other stresses in addition to the CWIS[123] in making BTA determinations.[124] However, in the Determinations Document, EPA acknowledges that the "overall cumulative effects of multiple CWIS withdrawals, increased thermal discharges at MKS and existing impairment in the lower Basin are not assessed in any detail or quantitatively in the current section 316(b) analysis for the MKS permit.[125]

The draft permit would allow excessive withdrawals from the Basin. The draft permit (which allows a maximum daily withdrawal of 80 MGD), changes the terms of the original permit, which required a monthly average of 70 MGD, to terms requiring a yearly average of 70 MGD, thus allowing increased usage during critical summer months.[126] Further, EPA states that MKS has proposed to withdraw up to 80 MGD for longer periods during the critical months of May through August than it has in the past, which would clearly increase and impingement rates.[127] As the river's 7Q10 flow is only 14

---

[115] *Id.* at 21.
[116] DETERMINATIONS DOCUMENT, *supra* note 3, at 21. According to EPA, maximum daily withdrawal was approximately 58 MGD. *Id.*
[117] DETERMINATIONS DOCUMENT, *supra* note 3, at 23.
[118] *Id.* at 201.
[119] 33 U.S.C. § 1326(b) (emphasis added).
[120] .*See* 41 Fed. Reg. 17388 (April 26, 1976); May 1977 Draft § 316(b) at 11-15.
[121] DETERMINATIONS DOCUMENT, *supra* note 3, at 193.
[122] EPA May 1977 Draft § 316(b) Guidance, pp.11-15
[123] *See* DETERMINATIONS DOCUMENT, *supra* note 3, at 201 (listing additional cumulative impacts).
[124] *Public Service Company of New Hampshire*, 10 ERC at 1262.
[125] DETERMINATIONS DOCUMENT, *supra* note 3, at 201.
[126] DRAFT AUTHORIZATION, *supra* note 28, at 2; DETERMINATIONS DOCUMENT, *supra* note 3, at 23.
[127] DETERMINATIONS DOCUMENT, *supra* note 3, at 206.

MGD,[128] the plant will take in an amount of water equal to the flow of the Charles River in certain summer months,[129] and up to five times the flow of the river during low flow conditions.[130] In fact, when MKS is operating at full capacity, the draft permit would allow the entire volume of water in the lower Basin to circulate through the plant once every 36 days.[131] In effect, plant will function as a filter, essentially cleansing a substantial fraction of the Basin volume of aquatic life every day.

Best Professional Judgment Should be the Operative Standard

As detailed below, we believe that Best Professional Judgment should be the operative standard in making the 316(b) determination in the present case, and take issue with the application of the Phase II regulations. However, if they were applicable in the present case, EPA should apply them more stringently. Further, we believe that an appropriate application of the BPJ standard would yield a significantly more stringent permit.

When making a section 316(b) determination, the Region must first look to EPA promulgated guidelines. Where EPA has not yet published such regulations or the regulations are not yet effective, the Region must, on a case-by-case basis make the determination using its best professional judgment ("BPJ").[132] Recent EPA Guidance on the application of the Phase II regulations clearly requires that in the present case, where the draft permit is proposed before the Phase II rule takes effect, but the final permit would be issued after it takes effect, and the applicant has not submitted the requisite information under the Phase II rule, BPJ is applicable (although EPA has discretion to reopen the permit proceedings).[133]

In the present case, at the time of review there were no 316(b) regulations in effect.[134] Therefore, EPA decided to use a BPJ standard for ensuring that the location, design, construction, and capacity of the CWIS reflect the best available technology ("BTA") for minimizing adverse environmental impact.[135] Anticipating the publication of the rule, EPA also determined the BTA for MKS's CWIS by applying the unofficial version of the Phase II section 316(b) regulations.[136] The rationale behind the utilization of two standards was to avoid unnecessary delays in permit issuance once the Phase II regulations were issued.[137] While we recognize the importance of minimizing delay, in the present case, BPJ should be the operative standard.

---

[128] NORTHEAST REGIONAL OFFICE, MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL PROTECTION, MEPA COMMENTS RE CAMBRIDGE KENDALL SQUARE STATION DEIR/EOEA # 11754, at 2 (December 23, 1999).

[129] For example, during June 1999, plant flow was equal to river flow. NORTHEAST REGIONAL OFFICE, MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL PROTECTION, MEPA COMMENTS RE CAMBRIDGE KENDALL SQUARE STATION DEIR/EOEA # 11754, at 1 (December 23, 1999).

[130] NORTHEAST REGIONAL OFFICE, MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL PROTECTION, MEPA COMMENTS RE CAMBRIDGE KENDALL SQUARE STATION EQUIPMENT UPGRADE PROJECT FEIR/EOEA # 11754, at 2 (June 23, 2000)

[131] DETERMINATIONS DOCUMENT, *supra* note 3, at 13.

[132] Natural Resources Defense Council v. United States Environmental Protection Agency, 863 F.2d 1420, 1424-25 (9th Cir. 1988).

[133] EPA, 316(b) Phase II Implementation Question and Answer Document, at 2-3 (August 19, 2004).

[134] DETERMINATIONS DOCUMENT, *supra* note 3, at 178.

[135] *Id.*

[136] *Id.* at 178-79.

[137] *Id.* at 178-79, 183.

We also note that in light of the recent legal challenge to the rule, the status of the Phase II rule is uncertain.[138] It is of note that the Phase II regulations and the current Phase I regulations contain similar provisions, including provisions for restoration measures (overturned in the Phase I regulations) and a multiple alternative compliance approach for BTA.[139] As both of these provisions were challenged in *Riverkeeper, Inc.* it is likely that the Phase II regulations are similarly vulnerable to legal challenge.[140] Such a challenge may very well result in staying the regulations, thereby delaying this NPDES Permit proceeding indefinitely.[141] Similarly, the legality of the cost-based variance provision in the Phase II regulations is in question. In *Riverkeeper*, the Second Circuit approved a provision in the Phase I regulations that allowed variances when the compliance costs are wholly out of proportion to the benefits.[142] Allowing variances where the costs are wholly disproportionate is consistent with prior precedent on section 316(b).[143] The Phase II cost-based variance provision, however, contains language allowing variances when the costs are significantly greater than the benefits. This places undue emphasis on cost as a factor in a section 316(b) determination, and is inconsistent with the statute and case law. In sum, as explained in greater detail in the complaints filed in *Rhode Island v. EPA*[144] and *Riverkeeper v. EPA*,[145] the Phase II regulations are contrary to the statute and precedent interpreting section 316(b). In this instance, reliance on regulations that may be stayed due to current litigation is inappropriate.

Even if EPA decides to apply the Phase II regulations in the present case, Mirant has not yet submitted sufficient information to trigger analysis under the regulations.[146] In the Determinations Document, EPA explicitly recognizes that fact.[147] Nevertheless, EPA still issued a conditional BTA determination pursuant to the regulations. Given EPA's invitation to all parties to submit further materials pursuant to the Phase II requirements, CLF is especially concerned that EPA may alter the conditions of the draft permit based on permittee's submission of materials addressing the Phase II section 316(b) regulations.[148] Reliance upon information not available during the public comment period unfairly prejudices the public. If EPA anticipates altering the intake limitations following submission of additional materials required pursuant to the Phase II regulations, EPA should reopen the public comment period to ensure that all stakeholders have ample opportunity to review any new information.

---

[138] *See* Martha Kessler, *Six Northeastern States Seek Review of Rule on Power Plant Cooling Water Intake*, 35 ENVIRONMENT REPORTER NO. 31, 1643 (2004)(describing Rhode Island v. EPA, docket number unavailable (1st Cir. filed July 26, 2004)); *Fifteen Environmental Groups Sue EPA Over Power Plant Cooling Water Intake Rule,* 35 ENVIRONMENT REPORTER NO. 31, 1643, 1644 (2004) (describing Riverkeeper v. EPA, docket number unavailable (2nd Cir. filed July 26, 2004)).

[139] 40 C.F.R § 125.94(c).

[140] Riverkeeper, Inc., v. United States Environmental Protection Agency, 358 F.3d 174, 183 (2nd Cir. 2004).

[141] *Riverkeeper,* 358 F.3d at 174 (remanding all provisions relating to restoration measures).

[142] *Riverkeeper,* 358 F.3d at 192.

[143] In the Matter of Pub. Serv. Co. of New Hampshire, et al., 1 E.A.D. 332, (1977 EPA App. LEXIS 16, *21 (1977)) (explaining consideration of costs via "wholly disproportionate" test is a secondary consideration is consistent with the legislative history and court decisions on section 316(b)).

[144] *See* Kessler, *supra* note 153, at 1643 (describing Rhode Island v. EPA, docket number unavailable (1st Cir. filed July 26, 2004)); *see Fifteen Environmental Groups Sue EPA Over Power Plant Cooling Water Intake Rule, supra* note 153, at 1643-44 (describing Rhode Island v. EPA, docket number unavailable (1st Cir. filed July 26, 2004)).

[145] *See Fifteen Environmental Groups Sue EPA Over Power Plant Cooling Water Intake Rule, supra* note 153, at 1643-44 (describing Riverkeeper v. EPA, docket number unavailable (2nd Cir. filed July 26, 2004)).

[146] *See* 69 Fed. Reg. at 41,592 (requiring the Source Water Physical Data report, Cooling Water Intake Structure Data report, and Cooling Water System Data report to be submitted 180 days prior to expiration of the existing NPDES permit). Moreover, each facility must prepare a Comprehensive Demonstration Study for its chosen compliance approach. *Id.*

[147] DETERMINATIONS DOCUMENT, *supra* note 3, at 183.

[148] *Id.* at 184-85.

Assuming for the sake of argument that the Phase II regulations are applicable, the current case clearly requires a higher standard of reduction than that proposed under the draft permit. EPA has determined that under the Phase II regulations, impingement mortality at MKS must be reduced by 80 to 95 percent, and that entrainment mortality must be reduced by 60 to 90 percent from the calculated baseline.[149] However, the draft permit requires reductions at the lowest end of the suggested ranges; it requires impingement reductions of 80 percent and entrainment reductions of 60 percent.[150] As detailed below, given the degradation of the Lower Basin coupled with the significant entrainment and impingement impacts of MKS, the impingement mortality should be reduced by 95 percent, and the entrainment mortality should be reduced by 90 percent.

An appropriate BPJ analysis would yield stricter standards as well. Entrainment and impingement at the plant are significant problems. According to MA DMF, MKS's potential entrainment of fish larvae could be between tens of millions and hundreds of millions.[151] The permitee's own studies indicated that the estimated percentage of river herring larvae mortality from entrainment was 14 percent in 1999 and 23 percent in 2000.[152] The Determinations Document details numerous points of concern, including total numbers of fish impinged per year, the number of priority species being impinged, the high concentration of impingement from May to August, and the widely varying sample numbers from year to year.[153] In light of the severity of the problem, the degradation and biological value of the Basin, and other cumulative stresses, and availability of superior technology, impingement and entrainment at MKS should be essentially eliminated.

The Barrier Net System is Not the Best Technology Available for Minimizing Adverse Environmental Impacts.

CLF agrees with the Division of Marine Fisheries that the chosen technology is not the BTA for minimizing adverse environmental impacts.[154] While the proposed barrier nets were found to decrease the velocity of the intake waters, the actual effectiveness of the prototype barrier nets at limiting impingement and entrainment was inconclusive at best. At times, the studies actually found more fish eggs and larvae behind the barrier nets than in front of them.[155] Across all species and sampling dates, only 52 percent of larvae and eggs were excluded.[156] Thus, the prototype nets fail to meet even the

---

[149] 40 C.F.R § 125.94(b)(2).

[150] DETERMINATIONS DOCUMENT, *supra* note 3, at 229.

[151] US ENVIRONMENTAL PROTECTION AGENCY, NEW ENGLAND, COMMENTS TO EOEA RE KENDALL SQUARE STATION EQUIPMENT UPGRADE PROJECT , DRAFT ENVIRONMENTAL IMPACT REPORT, at 3 (December 23, 1999). (stating entrainment is "relatively high in the vicinity of the plant, indicating the potential loss of tens of millions to hundreds of millions of fish larvae from the Charles River system as a result of entrainment at Kendall Square Station.").

[152] DETERMINATIONS DOCUMENT, *supra* note 3, at 213.

[153] *Id.* at 216.

[154] *See* Letter from Paul J. Diodati, Division of Marine Fisheries, Public Comment Letter Re Draft NPDES Permit for MKS (September 10, 2004) (on file with author) ("[DMF] believes the barrier net design, with a specified approach velocity of 0.05 fps and through-net velocity of 0.5 fps, no passive return system for impinged organisms, the net location within the Broad Canal which does not prevent re-impingement, along with the absence of a safe alternative method to return impinged organisms to the water column other than spray washing the panels, does not constitute Best Technology Available.").

[155] Memorandum from Todd Callaghan , Comments re Mirant's Barrier Net Demonstration May-July 2000 (July 2000) (explaining that "[b]etween two and 46 times as many [river herring] eggs were found INSIDE the barrier than outside") (emphasis in original). Callaghan also explains that on 7 of 10 dates, the barrier net only excluded a mean of 59.9 % of white perch larvae and across all dates and all species, exclusion was 52 percent, including eggs. *Id.*

[156] *Id.*

inadequate goals set by EPA. Moreover, the proposed barrier nets have yet to be tested in actual field conditions.[157]

If the barrier net system were to be retained, the permit should be changed to require that the barrier system be deployed at the entrance to the Broad Canal. Barrier structures should be required through out the entire year to minimize impact to local indigenous fauna. The provision in the draft permit that would allow MKS to operate without barrier nets for 10 percent of the year is most likely to be utilized when impingement is highest.[158] This provision should be eliminated, being replaced by engineering that will ensure that barriers are in place at all times. We strongly urge EPA to give careful consideration of the specific recommendations on barrier net requirements provided by MA DMF in their comment letter dated 10 September 2004.

Aquatic filter barriers with booms may be a potential solution for minimizing impingement and entrainment from CWIS. These booms may minimize or completely eliminate the impingement and entrainment of aquatic organisms. They may also address the concerns about public boat access expressed at the Cambridge public hearing on September 13, 2004. Gunderboom Inc., a firm that builds and installs boom apparatuses, has communicated to CLF that they have encountered boat access issues before and they have designed both boom systems that are submerged and boom systems that can be raised and lowered.[159]

The Costs of Requiring a Technology Superior to Once Through Cooling are not Wholly Disproportionate to the Environmental Benefits.

EPA has estimated that implementation of closed-cycle cooling, the most expensive of the several superior technologies considered, would cost $14 million.[160] In light of the significant environmental improvement that would result, the public uses protected, and the public and private investments that have been directed toward the protection of the Charles River over the last decade, $14 million is a relatively small price to pay. It is well established that cost is not a primary factor in a section 316(b) determination.[161] Only where the costs of the technology are wholly disproportionate to environmental

---

[157] *See* Letter from Paul J. Diodati, Division of Marine Fisheries, Public Comment Letter Re Draft NPDES Permit for MKS (September 10, 2004) (on file with author).

[158] DRAFT AUTHORIZATION , *supra* note 28, at 12.

[159] Email from Gunderboom, Inc. to Nathan Wenstrup (July 30, 2004) (on file with author).

[160] DETERMINATIONS DOCUMENT, *supra* note 3, at 221. This figure includes the cost of land acquisition.

[161] Section 316(b) makes no specific mention of cost considerations and the legislative history of section 316(b) only requires that the chosen technology be commercially available. *See* Remarks of Rep. Clausen, House Consideration of the Report of the Conference Committee, 1972 Legislative History at 264 (BTA "is intended to be interpreted to mean the best technology available commercially at an economically practicable cost"). Section 316(b) has been interpreted not to require a formal cost benefit analysis, but a determination that the costs are not wholly disproportionate to the environmental benefit. 41 Fed. Reg. 17388 (April 26, 1976); *Public Service Company of New Hampshire*, 1 E.A.D. 332, *21. Application of the "wholly disproportionate" test as a secondary consideration is consistent with the legislative history and court decisions, which consistently state that the CWA was meant to force new technologies on existing pollution sources in ways that might cause economic impact on power plant operations. Congress even accepted the prospect of significant costs to power plants that could result in plant closings and lost jobs. Before passing the Clean Water Act, Congress reviewed a report predicting 200 to 300 plant closings and specifically rejected a proposal to allow pollution discharge variances based on economic hardship. *See* U.S. Council on Environmental Quality, Dept. of Commerce, & EPA, The Economic Impact of Pollution Control (1972). *See* Legislative History of the Water Pollution Control Act Amendments of 1972, 93d Cong., at 156, 523 (1973). *See also* United States Environmental Protection Agency v. National Crushed Stone Ass'n, 449 U.S. 64, 79-81 (1980) ("Instead of economic

benefit can cost even be considered.[162] In this instance, there is no question that the costs of even the most expensive technology (closed-cycle cooling) are insignificant compared to its environmental benefits.[163]

Considerable public and private resources have been and will continue to be devoted to cleaning up the Charles River and enhancing its environs. In 1995, the EPA launched a *"Clean Charles 2005"* initiative to improve the quality of the river by reducing discharges of untreated sanitary waste and combined sewer overflows from storm water. This program is designed to focus local and national government attention and funding toward making the Charles fishable and swimmable by 2005. The city of Cambridge has spent nearly $200 million dollars in renovating its sewer system to reduce flow into the river. The city of Boston is also financially committed to the project, using city funding to identify illicit sewer connections. In addition, the Massachusetts Water Resources Authority has received grants from the EPA to sustain their efforts to clean up the Charles, and the Charles River Watershed Association has received over a million dollars in federal funding to support their efforts. Further, significant public and private resources have gone and are slated to go into projects such as improving recreational and access areas, upgrading the Watertown Dam and the New Charles River Dam and Locks, restoring the Charles River Basin, and creating the North Point Park across from the Museum of Science. Finally, as discussed above, DMF intends to spend more than $300,000 repairing the New Charles River Dam and aiding American shad reintroduction in the Charles.[164] In short, the Charles is clearly a highly valued public resource, as evidenced by the significant amount of public investment in its protection. The environmental benefits associated with virtually eliminating entrainment and impingement, thereby helping to establish at healthy fishery, dwarf the costs of such measures.

IV. The Draft Permit Intake Determinations Fail to Comply with MWQS.

In enacting the CWA, one of Congress' principal goals was to "recognize, preserve, and protect the primary responsibilities and rights of States to prevent, reduce, and eliminate pollution, [and] to plan the development and use (including restoration, preservation, and enhancement) of land and water resources."[165] In accordance with this goal, the CWA and its regulations are clear that section 316(b) cooling water intake requirements for a NPDES permit must comply with state WQS.[166] The requirement

---

variances, Congress specifically added two other provisions to address the problem of economic hardship [- a loan program for small business and an employee protection provision.]")

[162] *Id.*

[163] We note that under 316(a), cost is not a consideration.

[164] *See* Letter from Paul J. Diodati, Division of Marine Fisheries, to David M. Peters, Commissioner, Massachusetts Dept. of Fish and Game re Hubline mitigation/restoration work plan, at 6 (April 28, 2004)(on file with author).

[165] 33 U.S.C. § 1251(b).

[166] 33 U.S.C. § 1311(b)(1)(C) (specifically requiring the inclusion of conditions and limitations necessary to assure attainment of state water quality standards); 33 U.S.C. § 1370 (allowing state WQS to be more stringent than federal technology-based standards); 33 U.S.C. § 1341(a) (requiring that NPDES permits comply with state WQS); 40 C.F.R § 122.4(d) ("No permit may be issued: . . . (d) When the imposition of conditions cannot ensure compliance with the applicable water quality requirements of all affected States"); 40 C.F.R § 122.44(d)(1), (d)(4) ("[E]ach NPDES permit shall include conditions meeting the following requirements when applicable: . . . (d) any requirements in addition to or more stringent than promulgated effluent limitations guidelines or standards under sections 301, 304, 306, 307, 318, and 404 of CWA necessary to: . . . (1) [a]chieve water quality standards established under section 303 of the CWA, including State narrative criteria for water quality . . . (4) Conform to applicable water quality requirements under section 401(a)(2) of CWA when the discharge affects a State other than the certifying State").

that the permits comply with state WQS allows no exceptions for cost or technological feasibility.[167] Pursuant to section 401 of the CWA, Massachusetts's certification of the permit must include any conditions necessary to ensure compliance with state WQS.[168] Moreover, it is well established that MA DEP has authority under state law to impose conditions based on narrative WQS on Petitioner's non-discharge related activities.[169] Generally, EPA defers to all conditions imposed during the certification process,[170] but where the conditions imposed are not sufficiently stringent to meet state WQS, EPA must independently impose conditions to ensure that the permit complies with state WQS. In *In re City of Moscow, Idaho,* the Environmental Appeals Board stated that "when the Region reasonably believes that a state water quality standard requires a more stringent permit limitation than that specified by the state, the Region has an independent duty under section 301(b)(1)(C) of the CWA to include more stringent permit limitations."[171] This independent obligation has been widely upheld.[172] Moreover, the Phase II regulations also require compliance with state WQS when setting NPDES permit conditions.[173]

---

[167] In re City of Fayetteville, Ark., 2 E.A.D. 594, 600-01 (CJO 1988) (interpreting the language of section 301(b)(1)(C) to require "unequivocal compliance with applicable water quality standards," and prohibit "exceptions for cost or technological feasibility"), *aff'd sub nom.* Arkansas v. Oklahoma, 503 U.S. 91 (1992).

[168] Section 401 requires that a state where the discharge originates must have the opportunity to certify the conditions of a federally issued NPDES Permit, and that such certification must include "effluent limitations and other limitations" necessary to ensure compliance with state water quality standards. 33 U.S.C. § 1341(a)(1); § 1341(d). Pursuant to the Supreme Court's holding in *PUD No. 1 of Jefferson County v. Washington Dept. of Ecology*, once section 401 is triggered by a discharge, a certifying state may include any limitations necessary to ensure compliance with state WQS. *PUD No. 1*, 511 U.S.511 U.S. at 712 ("EPA's conclusion that *activities* not merely discharges – must comply with state water quality standards is a reasonable interpretation of § 401, and is entitled to deference").

[169] MASS. GEN. LAWS ch. 21, § 43(2); MASS. REGS. CODE tit. 314 § 3.04 (authorizing regulation of any activity directly or indirectly resulting in the discharge of pollutants.

[170] In re City of Jacksonville, Dist. II Wastewater Treatment Plant, 4 E.A.D. 150, 157-58 (EAB 1992) ("The Region's duty under CWA § 401 to defer to considerations of State law is intended to prevent EPA from *relaxing* any requirements, limitations, or conditions imposed by State law.") (emphasis in original).

[171] 2001 EPA App. Lexis 12, *41 (EAB 2001); *City of Jacksonville*, 4 E.A.D. at 157-58 (Region IV has an independent obligation to comply with Florida WQS, even if Florida may have interpreted its WQS less stringently); In re Ina Rd. Water Pollution Control Facility, 2 E.A.D. 99, 100 (CJO 1985) (Where state commits error in applying its WQS, Region has an independent obligation to ensure compliance).

[172] *See Riverkeeper, Inc.*, 358 F.3d at 200-01 (upholding a provision in the Phase I section 316(b) regulations that makes a CWIS permit contingent "on compliance with whatever additional requirements the permitting authority (be it the state or the EPA) decides are necessary under state law, notwithstanding otherwise full compliance with federal regulations"); Dubois v. United States Dept. of Agriculture, 102 F.3d 1273, 1301 (1st Cir. 1996) ("[C]hallenge must be addressed as part of EPA's independent obligation to ensure that EPA-issued NPDES permits meet state water quality standards") (internal quotations omitted); Natural Resources Defense Council v. United States Environmental Protection Agency, 279 F.3d 1180, 1187 (9th Cir. 2002) ("Under the CWA, the EPA has its own independent obligation to determine whether a permit will comply with the state's water quality standards"); *see also* Roosevelt Campobello International Park Com. v. United States Environmental Protection Agency, 684 F.2d 1041,1056 (1st Cir. 1982) ("it is clear that even in the absence of state certification, EPA would be bound to include in the federal permit any more stringent limitations established pursuant to any State law or regulations") (internal quotations omitted).

[173] 40 C.F.R § 125.94(d) ("The Director may establish more stringent requirements as best technology available for minimizing adverse environmental impact if the Director determines that your compliance with the applicable requirements of this section would not meet the requirements of applicable State and Tribal law, or other Federal law"); 40 C.F.R. §125.90(d) ("Nothing in this subpart shall be construed to preclude or deny the right of any State or political subdivision of a State or interstate agency under § 510 of the CWA to adopt or enforce any requirement with respect to control or abatement pollution that is not less stringent than those requirement by Federal law.").

As explained above, Massachusetts classifies the Charles River as Class B water.[174] Class B waters must support habitat for fish, other aquatic life and wildlife, as well as primary and secondary contact recreation.[175] As discussed above, the impingement and entrainment impacts associated with the draft permit would result in a degraded habitat for resident and anadromous fish (including game fish) as well as other aquatic species. Further, the draft permit violates the anti-degradation standards of the MA WQS and the Clean Water Act.[176]

V. The Diffuser is not a Viable Option at this Time

CLF supports EPA's decision to not include the diffuser in the permit at this time. Initial review of the proposed diffuser indicates that there are many unanswered questions about the effects the diffuser will have. There is the potential for serious negative effects due to dispersal of heated water, liberation of toxic materials from the bottom (e.g. metals), and mixing of nutrients from the deep parts of the Basin with oxygenated water. These impacts could decrease the availability of habitat for aquatic life in the lower Basin, and increase the frequency of algal blooms that reduce the value of the Basin as a recreational resource. The value of the diffuser to the permittee is clear, as it would allow the plant to discharge more heat while remaining within the temperature limits of the permit. However, the potential harm of a diffuser to the balanced indigenous population of fish, shellfish, and wildlife is too great to justify its use before studies are complete.[177]

---

[174] MASS. REGS. CODE tit. 314 § 4.06, Table 19 (classifying Charles River Basin as Class B).

[175] MASS. REGS. CODE tit. 314 § 4.05(3)(b). Primary and secondary contact recreational water use includes fishing and swimming.

[176] MASS. REGS. CODE tit. 314 § 4.04(1); 33 U.S.C. § 1313(d).

[177] DETERMINATIONS DOCUMENT, *supra* note 3, at 38-39 (explaining that modeling of diffuser impacts not yet complete).

VI. Conclusion

This permitting process represents a critical opportunity to realize the goals of the Clean Water Act for the Charles River. While the permit only lasts five years on its terms, it may very well remain in effect three times that long (the current permit took effect in 1988). Thus, the decision EPA makes now will have important long-term repercussions for the health of the Charles and the success of public and private efforts to restore this vital public resource. As detailed above, the draft permit would allow unacceptable degradation of the Charles, and is inconsistent with the Clean Water Act and state law. Accordingly, we urge EPA to strengthen this permit by incorporating thermal discharge limits that are consistent with the protection of a BIP, incorporating intake limits that minimize environmental impacts, and bringing it into compliance with state water quality standards.

Thank you for your consideration of our comments.

Sincerely,

John Crawford, Ph.D.
Marine Scientist

Carol Lee Rawn
Attorney

cc: Tim Williamson, EPA
David Webster, EPA
Robert Varney, EPA
Bob Golledge, MA DEP
Ellen Roy Herzfelder, MA EOEA
Stephen Burrington, MA OCD
Ralph Child, Mintz Levin Cohn Ferris Glovsky and Popeo P.C.

September 9, 2004

U.S. Environmental Protection Agency
One Congress Street, Suite 1100
Boston, MA 02114-2023

Re: US EPA NPDES Permit No. MA 0004898 –Mirant Kendall Station, Cambridge, MA

Dear Sir or Madam:

The Charles River Watershed Association (CRWA) has reviewed the draft NPDES permit (no. 0004898) and accompanying documentation for the thermal discharge and cooling water intake at the Mirant Kendall Station in Cambridge, MA. The station is being upgraded to produce up to 283 MW of power, a considerable increase over its previous capacity of 113 MW. Rather than operate as a "peaking" facility as it previously did, the upgraded facility will operate as a year-round "base-load" facility, discharging up to five times the former heat load. CRWA presents the following comments on the draft permit.

Diffuser

CWRA supports the U.S. Environmental Protection Agency (EPA) and the Massachusetts Department of Environmental Protection (DEP) in their joint decision to exclude the diffuser from the NPDES permit at this time. CRWA originally proposed that Mirant Kendall use a diffuser for its thermal discharge, hoping that it would break up the salt wedge in the bottom layers of the river, allowing the water to become reoxygenated. The salt water, from Boston Harbor, is denser than fresh water and becomes trapped at the bottom of the river where it becomes anoxic. It is not clear that possible benefits associated with the diffuser (such as increased dissolved oxygen concentrations) would out-weigh possible negative impacts (such as increased eutrophication). We feel it is prudent for the regulators to wait until the basin model, being configured by TetraTech for the EPA, can be applied to evaluate use of the diffuser so that EPA can predict impacts related to eutrophication and algal blooms.

Intake Barriers

EPA and DEP have outlined performance standards for the intake barrier system. CRWA feels that with further modifications, mortality associated with the intake could be drastically reduced. First, the intake barrier system should be constructed outside of Broad Canal to prevent eggs, larvae, and small fish from being pulled into the Canal. It does not make sense to construct in the canal as these organisms are fairly immobile and would be unable to move out of the canal and back into the Charles, against the force of

the plant's intake. Second, a mechanism to dislodge the organisms from the net (with air or water, perhaps) without harming them should be added to the system.

Placement of Continuous Monitoring Stations

Accurate, reliable monitoring of the discharge is key to protection of the Charles. With heat inputs from stormwater discharges and combined sewer overflows discharging in warm weather, CRWA feels that temperatures measured at the Background Station (Station 1) will not represent ambient conditions. On page 152 of the Determination Document EPA and DEP acknowledge that MWRA's Cottage Farm CSO Facility "could potentially compromise the objective of Station 1 to ambient river temperatures in the Charles River." EPA and DEP's rationale for not moving the station further upstream is, in part because "there are other CSO discharges further upstream of the Cottage Farm facility, which would likely pose the same potential to effect (sic) the ambient temperature monitoring objective of the background station during storm events." However, according to MWRA's Cottage Farm CSO Facility Assessment Report, dated January 2004, the Cottage Farm CSO facility is expected to activate a total of six times and discharge 23.9 million gallons in a typical year. On the other hand, only 1.78 million gallons of combined sewage are expected discharge upstream of Cottage Farm in a typical year (D. Kubiak, MWRA, presentation entitled Charles River Basin CSO Control April 8, 2004). Upstream CSO discharges will have a negligible effect on temperature, when compared to the Cottage Farm Facility. CRWA recommends that the Background Station be moved upstream to avoid the influence of Cottage Farm.

At least two other monitoring stations are needed to determine the upstream boundary of the thermal plume in the Charles. Station 2, established to monitor the Zone Boundary, was designed to define conditions across the river, between Cambridge and Boston. However, according to Mirant's "Supplemental Surface Water Monitoring Report" dated May 14, 2001, elevated temperatures are predicted to creep upstream of Station 2, along the Cambridge side of the river, during extremely low flows. Therefore, additional monitoring stations are necessary to further define the upstream extent of the Mixing Zone. One station should be located adjacent to Station 2 and closer to Cambridge. The shallow waters along the Cambridge bank are important yellow perch habitat and it is critical that they be preserved.

Resident Fish – Breeding

According to the Determination Document (page 68), the literature identified yellow perch adults as the resident adult fish stage most sensitive to elevated water temperatures. The literature cited reports that yellow perch spawning occurs in shallow areas, when temperatures are between 44 and 54 degrees F (page 69). EPA and DEP selected a Habitat Suitability Index of 0.5 (representing habitat suitability between optimal and completely unsuitable), which corresponds with an upper temperature limit of 59 degrees F. There is no justification for adopting the Habitat Suitability Index of 0.5 and the higher temperature limit of 59 degrees F. The range for adult breeding extends only to 54 degrees F. EPA and DEP present no evidence to show that yellow perch adults can spawn at higher temperatures.

Next, EPA and DEP apply the literature's recognition of the need for rising temperatures during spawning to the maximum temperature limits to arrive at a limit of 63 degrees F for the later part of the spawning season. This further exacerbates the deviation from 54 degrees F, the upper temperature limit for adult breeding.

Finally, the draft permit slaps on another 2 degrees F to its temperature limit to account for daily temperature fluctuations. It makes no sense to set the maximum temperature limit 11 degrees F higher than the yellow perch's maximum breeding temperature. EPA and DEP propose to start the breeding season at temperatures higher than the breeding range of 44 to 54 degrees F. High temperature limits and a Habitat Suitability Index of 0.2 fly in the face of EPA's ten-year effort toward a swimmable and fishable Charles River by Earth Day 2005. It would be unacceptable to further impact this already degraded habitat.

Resident Fish - Larvae

The Determination Document cites the literature to bracket the temperatures at which yellow perch larvae would likely be present in the Charles. One reference (Koonce, et al. 1977) found that 100% of the larvae die at temperatures higher than 30 degrees C. Between 27 and 30 degrees C (80.6 and 86 degrees F), daily mortality of yellow perch larvae was observed to be very high – between 45 to 100 percent. Despite these high and unacceptable mortality rates, the draft permit go on to refine expected mortality in the range between 27 and 30 degrees C. There does not appear to be any evidence backing the permit's supposition that, because this study was conducted in Michigan where temperatures are 8 degrees F cooler than Boston, the 45% mortality in Michigan at 27 degrees C could have been higher than what might be observed in Boston. The permit refers to a USFWS publication by Krieger et al. (1983) and states the "yellow perch larvae tolerated temperatures up to 28 degrees C." A pivotal question is how well they "tolerated" these temperatures.

Permit limitations would allow temperatures to rise to 75 degrees F between June 8-11 and 83 degrees F between June 12 and October 31. These temperatures approach or are at the temperatures that cause between 45 and 100% daily mortality of the larvae. The larvae are drifting organisms that cannot easily move out of a heated zone. These temperatures are not protective of the larvae nor is there a margin of safety associated with the permit's temperature limitations. Additionally, the "no effect" temperature should be used to set temperature limits outside of the Mixing Zone. EPA and DEP must state what this temperature is and describe how it will be used to set protective limits in the Zone of Passage and Habitat.

Anadromous Fish – Breeding

The Determination Document examines protective temperatures for sensitive anadromous fish. Pages 90-93 (including Table 5.7.3c-3) of the Determination Document present data from alewife runs in Massachusetts and New Hampshire. The average avoidance temperature observed for alewife runs ranged from 64.4 to 65.9 degrees F. The highest river temperature reached by the end of the run ranged from 57 to 70 degrees F. This means that all fish had migrated by the time the rivers reached these temperatures.

However, within the Zone of Passage and Habitat, proposed temperature limits will go from 66.4 degrees F on May 1 to 72 degrees F on June 1. At the mouth of the river, temperature limits will go from 65 degrees F on May 1 to 70 degrees F on June 1. It makes no sense to start the run with temperature limits associated with the end of the run in other systems. It is unclear how readily the fish will migrate when temperatures at the mouth of the river (the point of entry for the herring run) are at, or exceed by up to 5 degrees F, the average avoidance temperatures cited by the literature. Both CRWA's volunteer fish counting program and observations made by members of the citizen's group, River Watch in Watertown, indicate that the number of river herring present in this year's run may be lower than in past years. Further, the number of herring counted by Mirant Kendall (45,000 in 2002) was far lower than the estimated carrying capacity of the Charles of approximately 400,000 for river herring, as estimated by the Massachusetts Division of Marine Fisheries (Phil Brady, personal communication, July 8, 2004). While volunteer observations certainly are not quantitative, CRWA believes it is unwise to subject the herring to inhospitable conditions that could further reduce their numbers. We are quite concerned that these temperature limits will stop the run during years with high ambient water temperatures.

Mixing Zone, Zone of Passage and Habitat, and Variance Determination

The draft permit [Attachment A (Footnote 1)] defines the aerial extent of the Zone of Passage and Habitat (ZPH). The ZPH "includes, at all times, all Monitoring Points at Station 4, with the exception of the 2-foot monitoring point. However, since Station 4 is located 60% of the distance from Cambridge to Boston (draft permit, page 20) and is, therefore only protective of 20% of the surface area, this seems to violate the DEP's requirement that, "The ZPH must make up a minimum of 50% of any cross sectional, bank to bank area of the lower Charles River Basin" (Determination Document, page 149). The permit and supporting documentation should indicate the boundaries of the Mixing Zone and the ZPH under various conditions.

The Determination Document (page 179) also states that, according to Section 316(a) of the Clean Water Act, "thermal discharge effluent limitations in permits may be less stringent than those required by applicable standards and limitations if the discharge demonstrates that such effluent limitations are more stringent than necessary to assure the protection and propagation of a balanced, indigenous population (BIP) of shellfish, fish and wildlife in and on the body of water into which the discharge is made." According to EPA and DEP, the thermal limits were established to protect and allow the propagation of the "balanced indigenous populations of sensitive resident and anadromous species (Determination Document, page 123). As a result, the draft permit grants a variance from the Massachusetts Water Quality Standards temperature limits and the state's Mixing Zone Policy (Determination Document, pages 149 and 179). Documentation supporting the permit states that, "A key aspect of the Massachusetts WQS subject to this variance is the mixing zone policy which calls for no lethal affects (sic) in the Zone of Initial Dilution." The permit appears to waive this requirement. It also appears that the requirement in DEP's Mixing Zone Policy stating that, "to protect swimming and drifting organisms, the in-zone quality must be such that these organisms can pass through the mixing zone without exposure to toxicants (Section IV-b)" has been waived. EPA should

explain how adding so much heat to the system is protective. CRWA believes that this permit will violate the anti-degradation provisions of the Massachusetts Surface Water Quality Standards by eliminating or impairing existing uses. CRWA would also like to know what was excluded or changed by the variance.

With respect to a "balanced indigenous population," CRWA does not agree that these temperatures are protective. CRWA is very concerned that the high temperature limits proposed in this permit will result in death or disruption/prevention of breeding of these organisms. EPA and DEP should explain how the aerial extent and temperatures of the mixing zone/zone of dilution are protective of aquatic life. EPA and DEP should construct a population dynamics model to evaluate Mixing Zone impacts in combination with intake effects and habitat loss due to the high temperatures.

Nor do we feel that the aquatic life in the lower Charles is "balanced." There is virtually no benthic community, there are blue-green algal blooms, and the system is highly eutrophic. With funding from EPA, CRWA is currently working with state and federal fisheries biologists to determine the "target" fish community for the Charles. As mentioned above, the Massachusetts Division of Marine Fisheries estimated the carrying capacity of the Charles River for river herring is 400,000 fish per year, much lower than the 45,000 (including 8,000 alewife) counted in 2002 by Mirant Kendall.

While we support EPA and DEP in their decision to exclude the diffuser from the current permit and we have offered comments related to positioning of the intake barrier system and continuous monitoring stations that are necessary, CRWA cannot support the proposed temperature discharge limits, which will cause fish mortality or disruption to their reproduction.

Sincerely,

Kathleen M. Baskin, P.E.
Director of Projects

October 14, 2004

U.S. Environmental Protection Agency
One Congress Street, Suite 1100
Boston, MA 02114-2023

Re: US EPA NPDES Permit No. MA 0004898 –Mirant Kendall Station, Cambridge, MA

Dear Sir or Madam:

The Charles River Watershed Association (CRWA) is submitting the following comments on the draft NPDES permit (no. 0004898) and accompanying documentation for the thermal discharge and cooling water intake at the Mirant Kendall Station in Cambridge, MA. These comments are in addition to comments submitted earlier by CRWA.

Parklands

Mirant Kendall and its predecessor, Southern Energy, have made significant commitments to the Cambridge and Charles River communities regarding its Chapter 91 license and other public park amenities. Specifically, Mirant has committed to constructing both a walkway along its side of Broad Canal and a handicapped-accessible public dock on the Charles River, in front of its station. We understand Mirant has filed for bankruptcy, however, CRWA feels strongly that Mirant should be held to its commitments and should not be allowed to back away from these or other promised public park improvements.

Please do not hesitate to contact us with any questions concerning this important public issue.

Sincerely,

Kathleen M. Baskin, P.E.
Director of Projects

Certificate of Service

I, Yan Au, hereby certify that on October 27, 2006, I served copies of Conservation Law Foundation's and the Charles River Watershed Association's Petition for Review of NPDES Permit Issued by Region I on September 26, 2006 and the Joint Scheduling Motion on the following parties by way of first class U.S. mail:

Ronald A. Fein
Timothy Williamson
Mark Stein
U.S. Environmental Protection Agency –
Region I
1 Congress St. Suite 1100 RAA
Boston, MA 02114-2023

Ralph A. Child
Mintz, Levin, Cohn, Ferris, Glovsky and Popeo, P.C.
Once Financial Center
Boston, MA 02111

10/27/06
Date

Yan Au
Yan Au