EASTERN CONNECTICUT CONSERVATION DISTRICT, INC.

238 West Town Street
Norwich, CT 06360-2111
(860) 319-8806

139 Wolf Den Road
Brooklyn, CT 06234
860-774-9600 ext 24

www.ConserveCT.org/eastern

December 21, 2021

Preston Inland Wetlands and Watercourse Commission
389 Route 2
Preston, CT

RE: Inland Wetlands Application #2021-12, Blue Camp CT, LLC

Background information: Since 2003, Eastern Connecticut Conservation District has been working in partnership with CT DEEP to restore the anadromous fish migratory pathway for Alewife (*Alosa pseudoharengus*) from Long Island Sound to Amos Lake in Preston, CT. Historically, there was a substantial annual alewife migration to Amos Lake. This migratory route originates in the Atlantic Ocean, enters into Long Island Sound, proceeds up the Thames River and into Poquetanuck Cove. From Poquetanuck Cove, the fish swim up Poquetanuck Brook (aka Hewitt Brook) to a fishway installed by ECCD at Hallville Pond. This fishway was completed in 2013 with funding from multiple sources. In 2014, the Straight Pond Dam upstream of Hallville Pond was notched to further benefit the Alewife and allow access further up into the watershed. Currently, ECCD, again in partnership with CT DEEP, is finalizing the design plans for an additional fishway at a dam in Shewville Brook. This dam is the last major man-made obstacle for fish migrating to Amos Lake. Once the new fishway is installed at the Shewville Dam, the fish will be able continue their route to Avery Pond and Amos Lake via Indiantown Brook.

While some river herring lay their eggs in flowing river systems, Alewife lay their eggs in slow-moving water and ponds. Hallville Pond, Avery Pond and Amos Lake are all good breeding habitat for these fish.

Anticipating the construction of the fishway to allow Alewife to circumvent this final barrier to fish migration, DEEP fisheries biologists have been releasing pre-spawn Alewife in Amos Lake, Avery Pond and Hallville Pond. As the fish spawn in these lakes, their fry should chemically imprint on the chemical makeup of these ponds. The fish leave their habitat as juveniles and swim downstream to the Long Island Sound estuary from July to October, and then out to the Atlantic Ocean. Three to five years later, they will reach breeding age and journey back to where they were spawned to deposit their eggs.

Existing site conditions: Avery Pond is a natural pond that formed after the last period of glaciation. There is no human-built dams or flow control structures for artificially raising or lowering the water level in the pond. Indiantown Brook is the main outlet of the pond. It is located in the northeastern corner of the pond. There is a second pond outlet in the southwestern part of the pond that joins with Indiantown Brook further downstream, after crossing under Route 2. This outlet may only function seasonally or at other times when the lake water level is high. On December 10, 2021, I confirmed that this outlet is an intermittent stream originating at Avery Pond. I followed it from the pond to the Route 2 culvert along the western side and noted it continued under Route 2.

Resource Concern: ECCD would like to assure that any future development along the shore of Avery Pond or its outlets, Indiantown Brook and the unnamed stream channel draining from the southern end of the pond, will not impede or impact the efforts to restore the historic alewife fish migration route to Avery Pond, or the breeding habitat of Avery Pond.

Discussion: Alewife are anadromous fish that spawn in lentic (non-flowing) freshwater but live their adult life in the ocean. Alewife begin their upstream migration to freshwater from April – June. The adults return to the ocean shortly after spawning. The eggs hatch in lakes, ponds and other areas with low flow, and juveniles typically begin their migration to salt water in late summer to early fall. While in these freshwater habitats, the juvenile Alewife are an important food resource for other types of fish as well as birds and mammals.

The main food resource for juvenile alewife is various types of zooplankton. The juvenile alewife feed at night. Zooplankton practice diel vertical migration, which means they move up and down in the water column at different times of the day. During the day, zooplankton sink to where there is less light and return to the surface at night to feed. This makes them less vulnerable to predation.[i] Marianne V. Moore conducted a stud and found that artificial light impacts the diel vertical migration of zooplankton, resulting in less zooplankton and reduced water quality because of the reduction of zooplankton feeding on algae at the surface at night.[ii]

The increased water temperatures from impervious surface runoff combined with a likely increase in nutrient enrichment from the developed campground could exacerbate cyanobacteria growth and tip Avery Pond toward hypereutrophic conditions. Water quality data from multiple sources show Avery Pond can become highly nutrient enriched in the summer. When the water quality data is compared to the Connecticut Water Quality Standards and Classifications, it indicates the pond ranges from mesotrophic range to eutrophic/hypereutrophic range. Hypereutrophic conditions and water temperatures above 25°C (77°F) favor cyanobacteria (formerly known as blue green algae) growth over other types of algae. Seasonal cyanobacteria blooms have been documented during the summer of 2020 and 2021 and samples were collected and sent to the US EPA as part of the Cyanobacteria Monitoring Collaborative. These samples are being analyzed for cyanotoxins that may be produced in a harmful quantity as a by-product of cellular metabolism by various types of cyanobacteria. Cyanotoxins can be harmful to humans and other mammals. Avery Pond was sampled for cyanotoxins by volunteers involved with The Last Green Valley water quality monitoring program in the summer of 2020 and 2021. Due to a Covid-19 lab closure, the results are still pending.

Recommendations:

Prevent further nutrient enrichment of Avery Pond: It will be important to assure that additional nutrient enrichment of Avery Pond does not occur as the result of any new development in its watershed. Stormwater management is the primary concern. Stormwater runoff from new development should be managed to minimize overland flow. If infiltration basins are utilized as a stormwater management practice, the soil must be properly perk tested to assure the basin can capture and infiltrate at least the first inch of runoff. Stormwater basins located close to or adjacent to wetlands may not drain. According to the 2004 CT Stormwater Quality Manual, the bottom of an infiltration facility should be located at least 3 feet above the seasonally high-water table or bedrock, and documented on site by lab permeability testing. Percolation testing used for septic systems is not adequate.[1] Stormwater infiltration basins designed for the edge of wetland soils may not function in those locations.

Evaluate Soils for Plow Pan Soil Compaction: The project is proposed for land that was previously farmland. Rain gardens installed where land was previously tilled may not properly drain due to the development of a human induced plow pan layer where soil is compacted after being repeatedly plowed. A plow pan is a subsurface horizon or soil layer having a high bulk density and a lower total porosity than the soil directly above or below it from pressure applied by normal tillage operations, such as plows, discs, and other tillage implements. Proper percolation tests by a qualified soil scientist is recommended prior to constructing any infiltration feature.

Assess for existing tile drainage systems: A portion of the project area was formerly a farm field in an area surrounded by wetlands and the southern shore of Avery Pond. Often tile drainage systems were installed under agricultural fields to drain marginal lands more quickly and extend the growing season. There may be no records of this activity. If tile drains are present, their flow must be intercepted to prevent the direct conveyance of infiltrated stormwater into Avery Pond or the nearby wetlands. Detention ponds and rain gardens only function as pollution filters when the soil and soil microorganisms are in contact with the infiltrated stormwater. Conveyance through a tile system would short cut that contact and reduce the effectiveness of the rain gardens and detention basins as a water treatment method.

Protect and enhance riparian vegetation: CT DEEP in 1991 developed a policy statement recommending maintenance of riparian corridor widths for perennial streams (100 feet) and intermittent streams (50 feet). These recommendations were developed by DEEP's fisheries division. Riparian vegetation helps to stabilize soil, slow down runoff and uptake nutrients in stormwater runoff. ECCD supports this recommendation.

Artificial lighting and shielding: Shield the pond from light pollution that will impact the daily vertical migration of zooplankton. In addition to structural shields to block the artificial light from shining on the pond surface, to minimize the impact of any security lighting in the campground, we recommend maintaining a minimum 100-foot vegetated riparian buffer comprised of plant species native to Connecticut and made up of mature trees and understory shrubs to block light trespass onto the pond. The vegetated buffer will serve the dual purpose of filtering stormwater runoff from the developed area. This proposal as presented includes removal of the existing trees along parts of the shoreline within the 100-foot upland review area. ECCD recommends maintaining a 100-foot vegetated riparian buffer along Avery Pond.

Water withdrawal concerns: When contacted about potential environmental impacts from developing a campground on the shore of Avery Pond and Indiantown Brook, staff from CT DEEP fisheries expressed concerns over water withdrawals and use by the project. We already know that areas of the stream watershed are severely taxed by water withdrawals from existing uses. In 2020, water withdrawals "pumped the stream dry and prevented the emigration of juveniles [alewife] from late summer to well into the fall." If any additional surface or groundwater withdrawals from the stratified drift deposit associated with Avery Pond are planned, they must be carefully evaluated for conflicts with existing uses and with fish passage in late summer.

Water Quality: Avery Pond is not currently classified as an impaired water in the Connecticut Integrated Water Quality Report, last updated in 2020, but data is available indicating the pond

[1] From the 2004 Connecticut Stormwater Quality Manual, Chapter 11-P3-3.

can become hypereutrophic in summer and the pond has been documented to experience seasonal cyanobacteria blooms. These cyanobacteria blooms are being monitored by volunteers with The Last Green Valley Volunteer Water Quality Monitoring program and the information is being shared with CT DEEP and the US EPA. As part of the planned restoration of the fish migration pathway from the Atlantic Ocean to Avery Pond and Amos Lake, further degradation of water quality in Avery Pond needs to be avoided.

Additional information and/or useful links:

CT DEEP Department of Environmental Protection, Inland Fisheries Division Policy Statement Riparian Corridor Protection
https://portal.ct.gov/-/media/DEEP/fishing/restoration/RiparianPolicypdf.pdf

I hope that the information included in this document will help guide the Preston IWWC with deciding whether this Bluewater Recreation Campground Resort at Avery Pond as designed will impact the wetlands and water resource of the Town of Preston, or if design changes are necessary to allow the development near Avery Pond while minimizing those impacts. If ECCD can be of any further assistance, or if any clarification is needed, please do not hesitate to contact me.

Sincerely,

Jean Pillo, Watershed Conservation Project Manager
Eastern Connecticut Conservation District
860-774-9600 x 24
Jean.Pillo@Comcast.net

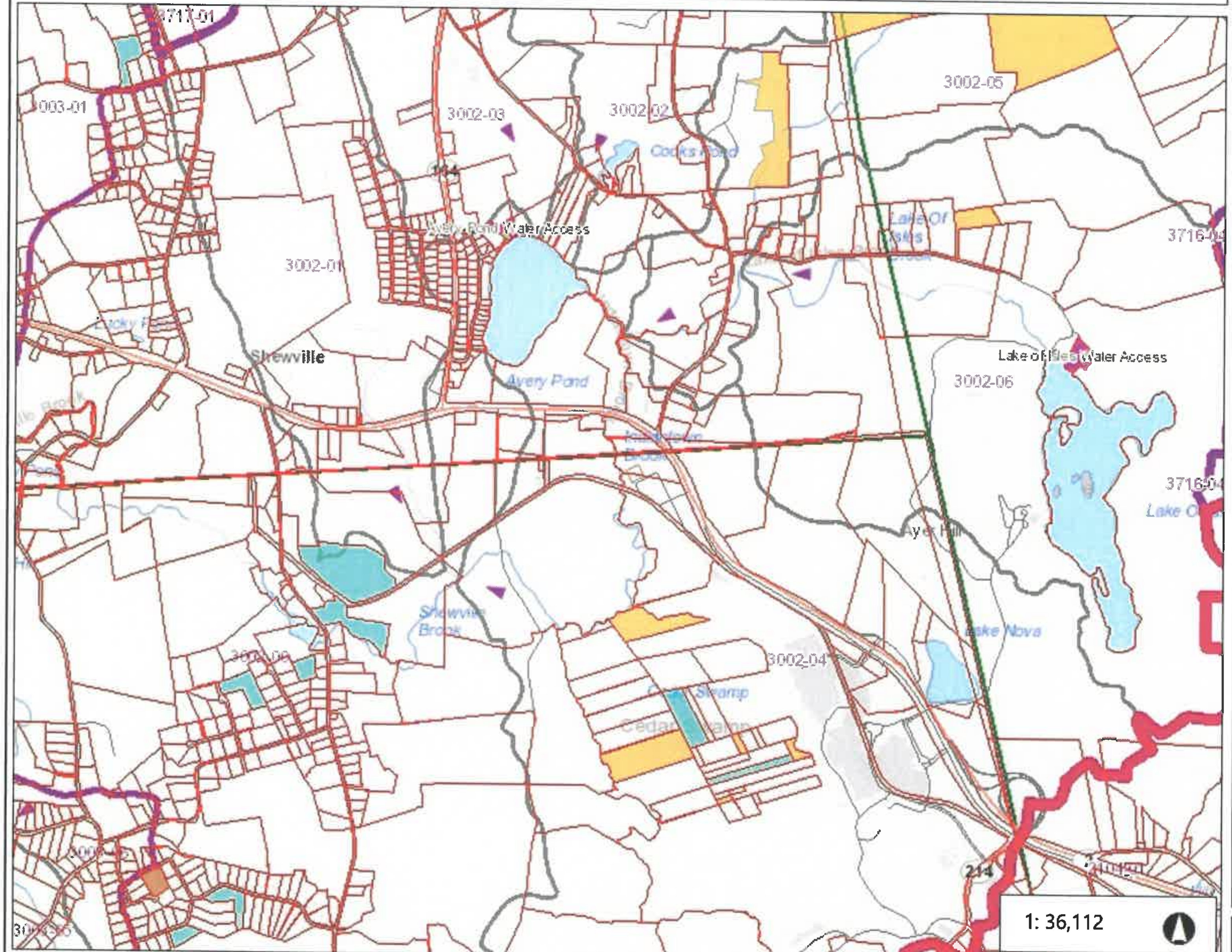
---

[i] What is vertical migration of zooplankton and why does it matter? October 28, 2021 by Allen Collins, NOAA Fisheries National Systematic Laboratory and Smithsonian National Museum of Natural History https://oceanexplorer.noaa.gov/facts/vertical-migration.html

[ii] January 2001, Urban light pollution alters the diel vertical migration of Daphnia. Marianne V. Moore et al., Conference: Proceedings of the International Association of Theoretical and Applied Limnology Volume: 27

CT Environmental Conditions Online

Avery Pond Drainage Areas



Legend

- Parcels for Protected Open Sp
- DEEP Property
  - State Forest
  - State Park
  - State Park Scenic Reserve
  - State Park Trail
  - Natural Area Preserve
  - Historic Preserve
  - Wildlife Area
  - Wildlife Sanctuary
  - DEP Owned Waterbody
  - Water Access
  - Flood Control
  - Fish Hatchery
  - Other
- Protected Open Space Mappin
  - Federal
  - Land Trust
  - Municipal
  - Private
  - State
- Local Basin Boundary
  - Major Basin
  - Regional Basin
  - Subregional Basin
  - Local Basin

Notes

Watershed drainage outlines are shown by grey lines.

1.1 0 0.57 1.1 Miles

This map is intended for general planning, management, education, and research purposes only. Data shown on this map may not be complete or current. The data shown may have been compiled at different times and at different map scales, which may not match the scale at which the data is shown on this map.

THIS MAP IS NOT TO BE USED FOR NAVIGATION

© Connecticut Environmental Conditions Online

Verh. Internat. Verein. Limnol.	27	1–4	Stuttgart, October 2000

Urban light pollution alters the diel vertical migration of *Daphnia*

Marianne V. Moore, Stephanie M. Pierce, Hannah M. Walsh, Siri K. Kvalvik and Julie D. Lim

Introduction

Light is the fundamental factor controlling the diel vertical migration (DVM) of zooplankton (RINGELBERG 1987, HANEY 1993). It not only serves as the proximate cue triggering the ascent of zooplankton, but it also reduces the amplitude of migration if light levels are sufficiently high at night. For example, the light of a full moon reduces the amplitude of *Daphnia* (GLIWICZ 1986, DODSON 1990) and chaoborid (SMITH et al. 1992) migrations. Night-time light intensities, however, are influenced not only by moonlight but also by artificial outdoor lighting, particularly in urban areas. Light pollution, or the sky glow produced by inefficient outdoor lighting, is prevalent in metropolitan areas (LOCKWOOD et al. 1990), and these areas often border freshwater lakes, coastal ecosystems, or both. Urban water quality may be influenced indirectly by light pollution, because zooplankton grazing influences water quality and the depth distribution of many zooplankters is affected by light.

We tested the hypothesis that light pollution associated with urban areas reduces the amplitude and magnitude of zooplankton vertical migration. A field experiment manipulating underwater light intensity at night was performed in a suburban lake bordering a large metropolitan area.

Methods

An enclosure experiment was performed on 7–8 July, 1997, 3 nights after the new moon, in Lake Waban (area 0.4 km^2, mean depth 4.8 m), a dimictic kettle lake, located 16 km southwest of Boston in Norfolk County, MA. Lake Waban's watershed (~36 km^2) circumscribes dense residential and commercial areas as well as major highways (MOORE et al. 1998). According to Carlson's Trophic State Index, this suburban lake falls between the boundary of mesotrophy and eutrophy (see MOORE et al. 1998 for limnological details). Resident fish include bluegill (*Lepomis macrochirus*), pumpkinseed sunfish (*Lepomis gibbosus*), golden shiners (*Notemigonos crysoleucas*), yellow perch (*Perca flavescens*), black crappie (*Pomoxis nigromaculatus*), white perch (*Morone americana*), largemouth bass (*Micropterus salmoides*), chain pickerel (*Esox niger*), brown bullhead (*Ictalurus nebulosus*), and common carp (*Cyprinus carpio*). Low densities (0.3 ± 0.1 ind./L) of the planktonic predator, *Chaoborus punctipennis*, also occur in the lake (FISCHER & MOORE 1993).

Field enclosures (diameter, 56.6 cm; length, 4.5 m), constructed from collapsible, coiled metal frames, were covered with either thick black (6 mm) or clear (4 mm) sheet plastic to shield or expose portions of the water column, respectively, to night-time downwelling irradiance. All enclosures were open at the bottom, but closed at the surface with lids made from circular plastic hoops (diameter, 80 cm) and covered with the appropriate plastic sheet. A slit, cut in the middle of the plastic of each lid, allowed passage of sampling equipment. Black enclosures blocked up to 96% of daytime downwelling irradiance according to a comparison of light measurements made with a Li-Cor quantum sensor in these enclosures and the lake.

At midday, prior to the evening experiment, the Secchi disk depth and underwater light measurements were obtained with a Li-Cor quantum sensor. The latter measurements were made per meter from the surface to the bottom of the lake. Daytime depth distributions of crustacean zooplankton were also determined at depths of 2, 4, 6, 8, and 9 m by filtering water samples collected with a Kemmerer bottle (4.2 L) through a plankton net (10 µm mesh). All zooplankton samples were preserved immediately with 5% buffered, sucrose–Formalin.

Three experimental enclosures (black plastic) and three control enclosures (clear plastic) were deployed at the deepest point (11.5 m) of the lake 30 min before sunset. In addition, three adjacent locations in the lake served as controls for "enclosure effects". A total of nine sites for the enclosures and the lake sampling were arranged in a grid pattern of three rows with three sites per row. Treatments (black, clear, and open lake) were blocked across rows, and treatments were randomly assigned a site within each row. Blocking of treatments across rows prevented isolated light sources near shore from differentially

0368-0770/00/0027-01 $ 1.00
©2000 E. Schweizerbart'sche Verlagsbuchhandlung, D-70176 Stuttgart

affecting some treatments but not others.

Immediately prior to sampling the enclosures, temperature and dissolved oxygen were measured each meter from the lake surface to the substrate with a YSI model 58 oxygen meter. Night-time light intensities were below the detection limit (0.01 $\mu Einst/m^2/s$) of a Li-Cor quantum sensor so subsequent measurements were made with an Optec SPS-3 photomultiplier on 9 October, 1997. On the night of the experiment, between 23:45 and 03:45 h, three replicate water samples were collected with a Kemmerer bottle (4.2 or 3.2 L) at each of three depths (2, 4, and 6 m) inside or directly below each enclosure and in the open lake locations. Samples were filtered and preserved as described previously. Crustacean zooplankton were later identified to species and counted using a stereo microscope (30×). Nauplii were sub-sampled with a 5-mL Hensen–Stempel pipette when their densities ≥50 ind./mL. The coefficient of variation for sub-sampling was <0.02.

Proportions of zooplankton per taxon collected at night were compared among depths and treatments using two-way ANOVA. In the lake, zooplankton proportions per taxon were also compared among times (day vs. night) and depth to determine if taxa exhibited DVM. All zooplankton proportions were normalized using an arcsin transformation (Sokal & Rohlf 1981).

Results and discussion

The depth distribution of a single species, *Daphnia retrocurva*, differed significantly among treatments (Table 1; $F_{4,68} = 4.11$, $P < 0.01$). The movement of *Daphnia* was significantly greater in both amplitude (2 m higher) and magnitude (10–20% more individuals) in the black enclosures than in control enclosures or the lake (Fig. 1). An 'enclosure effect' did not bias the results, because the depth distribution of *Daphnia* was similar in the clear enclosures and the lake. Also, because all enclosures were open at the bottom, kairomones from predators and the abundance and distribution of algal food should have been similar among enclosures. Interestingly, *Daphnia* did not exhibit DVM in the lake. Its vertical distribution was similar during the day and night in Lake Waban ($F_{2,30} = 12.26$, $P > 0.05$).

None of the other cladoceran (*Bosmina* and *Diaphanosoma*) or copepod species in Lake Waban were affected by light pollution in the enclosure experiment. Copepod nauplii and *D. retrocurva* dominated numerically the crustacean zooplankton community with mean densities of 41.4 and 37.3 ind./L, respectively, across all sampling depths. Of the four copepod species present, *Diaptomus minutus* was most abundant (mean density, 5.7 ind./L across all sampling depths).

Table 1. Two-way ANOVA comparing proportional abundance of *Daphnia retrocurva* among treatments (black enclosures, clear enclosures and open lake) and depths (2, 4, and 6 m) in Lake Waban, Massachusetts on 8 July, 1997. Proportional abundance is the proportion of total density over all depths sampled.

Source	df	Sum of squares	F	P
Treatment	2	0.002	0.94	>0.05
Depth	2	0.179	99.96	<0.01
Treatment × depth	4	0.015	4.11	<0.01
Error	68	0.061		

Night-time light intensity resulting from light pollution at the surface of Lake Waban was less than that of full moonlight (i.e. 0.01 $\mu Einst/m^2/s$; Moore Rodenhouse 1986) and ten times less than that measured at the surface of an urban lake near the center of Boston, MA. Problems with the photomultiplier prevented

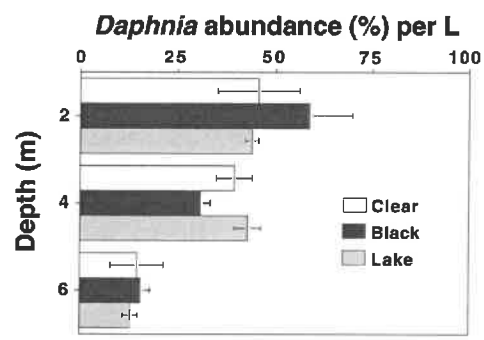


Fig. 1. Mean (n = 3) percent abundance (% ± 1 SD) of *Daphnia retrocurva* (per L) across all sampling depths (2, 4, and 6 m) and treatments (Clear: clear enclosure; Black: black enclosure; Lake: lake sampling site) in Lake Waban, Massachusetts on 8 July 1997.

us from obtaining absolute measurements of light intensity at night. At midday, 7 July 1997, the Secchi disc depth of Lake Waban was 1.7 m, and the light extinction coefficient (k) equaled 0.82/m. On the night of the experiment, the metalimnion occurred between 4 and 10 m, and hypoxic or anoxic conditions occurred at depths ≥5 m (Fig. 2).

Using the Secchi depth recorded for Lake Waban and a regression model developed by DODSON (1990), a migration amplitude of 2.1 m is predicted empirically for *Daphnia* under normal conditions (i.e. no light pollution) in Lake Waban. Daphnia's upward movement of 2 m in the black enclosures, coupled with its absence of DVM in the lake, suggests that light pollution either eliminated *Daphnia* DVM or reduced its amplitude to a distance too small for detection with the experimental methods used. Interestingly, the model of DODSON (1990) also predicts that full moonlight reduces the amplitude of *Daphnia* DVM by 2 m in north temperate lakes. This prediction, in conjunction with the results of this current study, suggests that the ecological effects of light pollution in this lake are comparable to those of full moonlight.

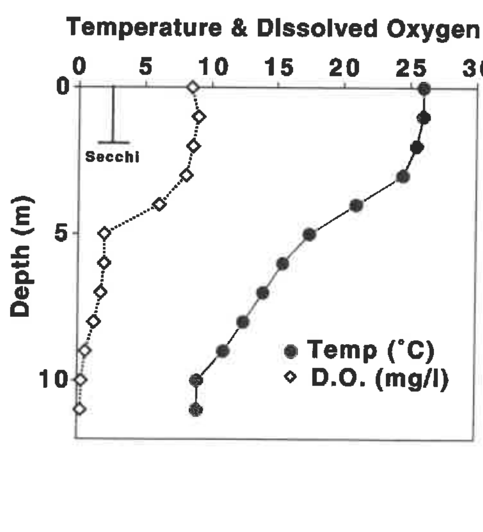


Fig. 2. Temperature (°C) and dissolved oxygen (mg/L) profiles for Lake Waban, Massachusetts on 7 July 1997 at 21:00 h.

Suppression of zooplankton DVM by light pollution is probably most likely to occur in lakes with fish and relatively clear water. In lakes with fish, *Daphnia* genotypes most sensitive to light (i.e. negative phototaxis) occur, and these genotypes respond more strongly to the induction of DVM by fish kairomones than clones from fishless habitats (DE MEESTER 1993). Finally, the penetration of light pollution and its effects should be greater in clear lakes with low concentrations of DOC and algae.

The suppression of DVM by light pollution may have consequences for both algae and zooplankton. Algal mortality in the epilimnion may be reduced due to lower rates of zooplankton grazing. Alternatively, the lack of nutrient regeneration by zooplankton in the upper surface waters at night could actually slow algal growth in lakes experiencing severe nutrient limitation (STERNER & HESSEN 1994). If light pollution confines zooplankton to metalimnetic depths, individual growth and reproduction may decline markedly due to colder water temperatures (LOOSE & DAWIDOWICZ 1994).

Conclusions

Diel vertical migration of *Daphnia* was significantly reduced in both amplitude (2 m lower) and magnitude (10–20% fewer individuals) by urban light pollution in a suburban lake. Reduced algal grazing by zooplankton at night in epilimnetic waters could potentially contribute to enhanced algal biomass in lakes and coastal waters near urban areas, thereby lowering water quality.

Acknowledgements

We thank SUE KOHLER for her expert technical assistance regarding light instrumentation and LEE HAWKINS for the loan of the Optec SPS-3 photomultiplier. Field assistance was kindly provided by MYNA JOSEPH. This research was supported by a Brachman–Hoffman Fellowship to the first author. Coauthors were supported by an NSF-REU site grant (IBN 9424179) and grants from the Sherman Fairchild Foundation and the Howard Hughes Medical Institute.

References

De Meester, L., 1993: Genotype, fish-mediated chemicals, and phototactic behavior in *Daphnia magna*. – *Ecology* **74**: 1467–1474.

Dodson, S., 1990: Predicting diel vertical migration of zooplankton. – *Limnol. Oceanogr.* **35**: 1195–1200.

Fischer, J. M. & Moore, M. V., 1993: Juvenile survival of a planktonic insect: effects of food limitation and predation. – *Freshwat. Biol.* **30**: 35–45.

Gliwicz, M. Z., 1986: A lunar cycle in zooplankton. – *Ecology* **67**: 883–897.

Haney, J. F., 1993: Environmental control of diel vertical migration behaviour. – *Arch. Hydrobiol. Beih. Ergebn. Limnol.* **39**: 1–17.

Lampert, W., 1992: Zooplankton vertical migrations: Implications for phytoplankton–zooplankton interactions. – *Arch. Hydrobiol. Beih. Ergebn. Limnol.* **35**: 69–78.

Lockwood, G. W., Floyd, R. D. & Thompson, D. T., 1990: Sky glow and outdoor lighting trends since 1976 at the Lowell observatory. – *Publ. Astron. Soc. Pac.* **162**: 481–491.

Loose, C. J. & Dawidowicz, P., 1994: Trade-offs in diel vertical migration by zooplankton: The costs of predator avoidance. – *Ecology* **75**: 2255–2263.

Moore, M. V., Zakova, P., Shaeffer, K. A. & Burton, R. P., 1998: Potential effects of Canada geese and climate change on phosphorus inputs to suburban lakes of the Northeastern U.S.A. – *J. Lake Reservoir Manage.* **14**: 52–59.

Moore Rodenhouse, M., 1986: *Age-specific predation and predation risk of Chaoborus punctipennis.* – Ph.D. dissertation, Dartmouth College, Hanover.

Ringelberg, J., 1987: Light induced behaviour in *Daphnia*. – In: Peters, R. H. & De Bernardi, R. (eds): *Daphnia*: 285–323. – *Mem. Ist. Ital. Idrobiol.*

Smith, S. L., Pieper, R. E., Moore, M. V., Rudstam, L. G., Greene, C. H., Zamon, J. E., Flagg, C. N. & Williamson, C. E., 1992: Acoustic techniques for the in situ observation of zooplankton. – *Arch. Hydrobiol. Beih. Ergebn. Limnol.* **36**: 23–43.

Sokal, R. R. & Rohlf, F. J., 1981: *Biometry.* – Second edition. W. H. Freeman, San Francisco, 859 pp.

Sterner, R. W. & Hessen, D. O., 1994: Algal nutrient limitation and the nutrition of aquatic herbivores. – *Annu. Rev. Ecol. Syst.* **25**: 1–29.

Authors' addresses:

Marianne V. Moore, Stephanie M. Pierce, Hannah M. Walsh, Siri K. Kvalvik, Department of Biological Sciences, Wellesley College, Wellesley, Massachusetts, 02481-8203 USA.

Julie D. Lim, Newton North High School, 360 Lowell Avenue, Newtonville, Massachusetts, 02460 USA.