

CANDLEWOOD LAKE AUTHORITY

P.O. BOX 37 • SHERMAN, CONNECTICUT 06784-0037 • (860) 354-6928 • FAX (860) 350-5611

Minutes of Regular Meeting May 8, 2013

Attending:

H. Berger	Sherman
P. Schaer	Sherman
E. Hayes	Sherman
J. Hodge	New Fairfield
H. Mayer	New Milford
J. Wodarski	New Milford
C. Robinson	Danbury
E. Siergiej	Danbury
W. Lohan	Brookfield

Absent:

D. Rosemark	Danbury
N. Gyle	New Fairfield
B. Kemble	New Fairfield
M Toussaint	New Milford
J. Murphy	Brookfield

L. Marsicano, CLA Executive Director
M. Howarth, CLA Public Education Director
F. Frattini, CLA Administrative Coordinator

Recorder: E. Siergiej

Guests: G. Linkletter, Sherman
S. Randall, Sherman
R. Stryker, New Fairfield
M. Propper, Danbury
C & B Bassler, Danbury
Chuck Lee and Peter Aarrestad of CT Department of Energy and Environmental Protection

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TOWN CLERK'S OFFICE
DANBURY, CONN.

MAY 13 2013

at 4:33 PM o'clock Map# _____



Town Clerk

Howie Berger, Chairman, called the regular meeting of the Candlewood Lake Authority to order at 7:38 P.M. at Brookfield Town Hall, Brookfield, CT. He welcomed the guests.

Secretary's Report: Ed Siergiej, Secretary, noted there were no corrections to the minutes of the April meeting, Harold Mayer moved that the minutes of the April 10, 2013 meeting be accepted as written, seconded by John Hodge and voted with all in favor. Motion carried, minutes accepted.

Mr. Berger asked Larry Marsicano to introduce the guests from the CT Department of Energy and Environmental Protection – Mr. Marsicano noted that as decided last month to have outside experts speak on Milfoil control on Candlewood he introduced Chuck Lee, from the Water Quality Division and Peter Aarrestad from the Inland Fisheries Division.

Mr. Lee began by saying that he was on the first Technical Committee (with his then boss) back in the mid 1980' when the drawdown was considered the best way to control milfoil on Lake Candlewood. He is now the representative to the present Technical Committee. Mr. Aarrestad, Director of Inland Fisheries, oversees the permits for Grass Carp in the State. They will discuss the control of milfoil on Candlewood both pros and cons.

Mr. Lee noted that Candlewood is five times bigger than the next lake in the State and over the years the drawdown has been the best way to control milfoil – it has been considered too big for harvesting, herbicide use was not favored by the community and the Grass Carp had not been an option. Herbicides have changed over the past thirty years and there may be some that would be accepted for use in Candlewood but the costs would be very expensive. Mr. Mayer asked if he could address the effects of the drawdown on the water quality of the Lake – Mr. Lee noted that with thirty years of data he could see not adverse effects, as it is inconclusive but it is a concern. Mr. Marsicano noted reported concerns that we may be at an “Event Horizon” with regards to water quality causing more concern. Mr. Lee responded it cannot be certain at this time if it is the drawdown causing changes to water quality . The watershed, climate change or other factors may also contribute to a decline of water quality. With a drawdown every year there is not time for the lake to recover so every other year was the recommendation. Mr. Aarrestad noted that nature bounces back from events, maybe increasing the span between deep drawdown would be better for the species in the lake as well as the lake itself. Harvesting in Candlewood just due to its size could be a million dollar enterprise and then you are only cutting the tops off the plants, but Mr. Aarrestad noted that this is a way to remove the biomass. He did note that not only does harvesting remove the weeds; he has seen fish on the conveyors as well. Mr. Marsicano noted that an integrative approach to control the milfoil is currently a preferred approach in lake management literature.

Mr. Aarrestad spoke on the grass carp that in 1989 were first allowed to be used in the State under regulations that the DEP has written in 1988. He spoke about their use in Ball Pond in New Fairfield that was very successful in controlling milfoil and the pond still has a vibrant bass population. He noted that he has learned a lot about grass carp over the years and although “never in Candlewood” was often said in the early days of grass carp use, maybe the idea for Candlewood could be feasible. He reviewed two items from letters to FirstLight from Kleinschmidt (letters are attached to the Executive Director's report attached to these minutes). First the fish going through the turbine into the Housatonic – “ecological isolation” Mr. Aarrestad noted that the Commissioner does have discretion on this part of the regulation. He has suggested that if the fish were stocked in the areas farthest away from the penstock i.e. Danbury and Sherman that they would be too big to get by the trash racks at the intake structure by the time they were in the New Milford arm of the Lake. The second item refers to “ownership” – you need permission of all owners of the lake bottom. Although FirstLight does own the largest

portion there are individuals who also own below the 440. Mr. Aarrestad read from the Regulations 26-551 which refers to the two points noted above.

Using a combination of measures may be the way to control the milfoil using both the grass carp and herbicides could achieve the desired results. Right now the CLA will be focusing on next year – should FirstLight want to discontinue the deep drawdown then they would need to go to FERC to amend their license.

Discussion followed. Mr. Lee advised that he would be glad to come back to speak to a larger group – Mrs. Schaer suggested possibly a Science at Night program at WCSU. He noted that Candlewood is a very complicated resource to manage and commended the CLA for the work they do in managing it.

Mr. Berger thanked Mr. Lee and Mr. Aarrestad for their time and very informative talk.

At 9:10 there was a 5-minute break. The meeting resumed at 9:15 PM

Chairman's Report: Mr. Berger reported that he, Mr. Marsicano and Mrs. Schaer had met with the 5 Town CEO's and they would like the Lake Authority to reach out and establish a better relationship with FirstLight and name a liaison from the CLA – Dan Rosemark, Phyllis Schaer and Jerry Murphy all volunteered to do this. Mr. Berger noted that he would like to form an Ad-Hoc FirstLight (relationship) committee consisting of the above – the committee will pick its own chair and liaison person to meet with FirstLight.

Mr. Berger advised that after that meeting Mrs. Schaer volunteered to speak to each CEO one on one and she will follow up on this.

Mr. Berger went though how the decision to cancel the Clean Up came about – Mr. Marsicano and Mr. Howarth were speaking to Mr. Berger about there was not enough time to organize the Clean Up this year – that was brought to the Executive Committee who advised the Board at the April meeting where it was unanimously voted to cancel the Clean Up for this year as the staff did not have the time. Also it should be noted that no budget funds are used for the Clean Up only money from sponsorships and fundraising is used. There was no political motivation to canceling the Clean Up. Mr. Berger noted that we had been asked to provide the CEO's with the number of hours in organizing the event - it was Boat Captain Coordinator schedule 65 hours, Intern 60 hours, staff over 60 hours approximately two hundred hours to organize the event. The Clean Up is not a budget item. Mr. Berger noted that a Clean Up could be done at the end of the season this year – Mr. Hodge advised that the Towns would do a Clean Up in June. Thank you and the CLA will not plan on one in September.

Vice Chairman's Report: In the absence of the Vice Chairman there was nothing to report.

Treasurer's Report: Phyllis Schaer, Treasurer, advised that the budget is on target to be cash positive at the end of the fiscal year. Mr. Lohan asked about the \$50,000 from FirstLight – Mrs. Schaer noted: that is their donation for the 2013/14 fiscal year, which they have paid in advance. With no questions on the Report of Income and Expenses for the month ended April 30, 2013 Ed Siergiej moved to accept the Treasurer's Report of Income and Expenses for the month ended April 30, 213 be

accepted as presented, motion seconded by Ed Hayes and voted with all in favor. Treasurer's Report of Income and Expenses for the month ended April 30, 2013 has been accepted and filed for audit.

Mr. Berger outlined anticipated cash income for the balance of this fiscal year and noted that the CLA needs to better reflect volunteer hours.

Executive Director's Report: Mr. Marsicano noted that his report is attached to these minutes. He spoke on Project CLEAR, the classroom days are done and the field days will be the end of June – the times needed to be adjusted due to the number of show days. The Middle School program will have a cookout at Squantz Pond on May 23rd and he asked for volunteers. He also reported on recent land disturbance in Brookfield and an issuance from FERC to FirstLight on a project in Sherman that FERC determined required additional and more appropriate mitigation. Other items are in his written report.

Public Education Director and Public Awareness:

Mark Howarth, Public Education Director, noted that his report is attached to these minutes. He advised that new merchandise has been received and local businesses are now carrying some of these items as well as on line.

He brought up the Candlewood Lake magnets, which have been available since 2008 – they are a very popular item. Discussion on ordering a 2013 magnet followed. Phyllis Schaer moved that the CLA order one thousand 2013 magnets at a cost of \$760.00 to be paid for from the fundraising sponsorships for the Dragon Boat Race. Seconded by Chris Robinson and vote with all in favor. Motion carried.

Public Safety: Ed Hayes, Co-Chair, reported he had some policy changes suggested by the Chief of Marine Enforcement that he would like the delegates to review before the next meeting. He would like to bring back a proposal for an appreciation dinner at the next meeting. The Patrol Boat will again be in the Sherman Memorial Day Parade this year.

Mr. Berger advised that he had signed the agreement for the Constables appointed in the Town of Sherman for this season.

Equipment/Facilities: Ed Siergie, Committee Chair reported that the boat donation has been received and they are working on a marketing plan. Also, as there are no spare buoys, he will be ordering a few before the end of June with the money left in the committee budget.

Watershed Management: The Committee did not meet in April. Mr. Mayer did report that he had spoken to Sri Madhusudhan of NU regarding the Trail through Vaughn's Neck/Candlewood Mountain – he was advised that they are checking the feasibility. This trail open to the public will help to preserve the area as open space.

Mrs. Schaer passed a sheet showing the new billboard on zebra mussels that is up on Route 37 in Danbury and advised that there will be another on invasive species that will be going up later in May – a Grant from the DEEP helped pay for these education billboards. Thank you to the Department of Energy and Environmental Protection-

Boating Division for funding the bill board and to the Bureau of Natural Resources for funding Dr. Kelly's work on the zebra mussel veligers at Laurel Brook.

She reported that she is looking into Land Sat photography and will report back when her research is done.

Any and All Business:

Mrs. Schaer made a motion to allow the committees to overspend their line items as long as they do not go over the committee budget, seconded by Harold Mayer and voted with all in favor. Motion carried.

With no further business to come before the Candlewood Lake Authority, Chris Robinson moved to adjourn, seconded by Harold Mayer. Meeting adjourned at 9:47 P. M.

Respectfully submitted,

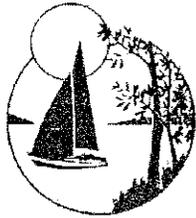


Ed Siergiej Secretary

Frances Frattini, Administrative Coordinator

r/b/lm

These minutes are not considered official until they have been approved at the next regularly scheduled meeting of the Candlewood Lake Authority.



CANDLEWOOD LAKE AUTHORITY

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Executive Director's Report
May 2, 2013
Larry Marsicano

The following report summarizes activities of April 8, 2013 to May 2, 2013.

Invasive Species Management – Zebra Mussels

We coordinated and participated in a conference call on April 17th whose participants also included Dr. Kevin Kelly from the Bureau of Reclamation (BOR of the US Department of Interior) and technical personnel from Praxair. We also continued to work with the CT DEEP to expedite the agreement between the BOR and CT DEEP which is now all set. Dr. Kelly is working on the study plan. Dr. Mitch Wagener and I are planning a trip to Lee, MA to gather more information for Dr. Kelly for preparation of the study plan.

We have coordinated and are participating in a meeting at WCSU on May 3rd with Dr. Mitch Wagener, Greg Bollard of Friends of the Lake (Lillinonah), Phyllis and me to work on a study plan for zebra mussel artificial substrate program. On April 23rd Phyllis and I attended the "Celebration of Giving" put on by the Woman's Club of Danbury/New Fairfield, where we were presented a grant to purchase materials for artificial substrates.

On April 10th I received a copy of a second report from Kleinschmidt Consulting Group hired by FirstLight discussing their reasons why they don't support use of triploid grass carp. I reviewed the report and it appears to contain inaccuracies which I have since discussed with the CT DEEP. Both reports are attached to my report and will be discussed by guests from the CT DEEP attending the May 8th board meeting (see attached).

We were able to line up the representatives from the CT DEEP to speak at the Board meeting on May 8th. Chuck Lee heads the CT Lakes Program and has assisted many lakes in a wide range of efforts to manage nuisance aquatic weeds. He is also a member of the Technical Committee that originated the biennial deep drawdowns many years ago and participates in current Technical Committee meetings. Peter Aarrestad is the Director of the Inland Fisheries Division of the CT DEEP and a member of the CLA's Invasive Species Task Force. His division is responsible for permits for grass carp.

Water Quality

We have continued to assemble data for statistical analyses by faculty/researchers at WCSU. I have also accessed the 30 year water quality data base as prescribed by Dr. Peter Siver at Connecticut College and will continue that work.

We have received additional requests for data from Dr. George Knoecklein for data which we have provided.

Water quality on Candlewood Lake was monitored on May 1st. Measurements were taken in the field and water samples collected for analyses at a State Certified Lab. In addition, I am incorporating an assessment of the phytoplankton into the program. The microflora from the plankton collected on May 1st was dominated by diatoms including species of *Tabellaria Fragilaria*, and *Asterionella*. Taxa from the golden algae included species of *Dinobryon* and *Uroglenopsis*. One species of blue-green algae (or cyanobacteria), *Aphanizomenon sp.*, was observed but was rare.

CLA Budget Proposal

We have spent considerable time on the proposed cuts to the CLA's budget by some of the towns. Staff and delegates have attended municipal meetings (e.g. Danbury Common Council Public Hearing, Brookfield Board of Finance Regular Meeting) explaining the important work the CLA does, the impact a ~20% reduction would have, and the events leading to this being proposed.

On April 18th Howie, Phyllis and I met with the Chief Elected Officers of the CLA member municipalities to discuss the recent events. Howie emailed out a synopsis of that meeting to all board members on April 22nd.

Project CLEAR

The second classroom day for Project CLEAR students occurred on April 30th. As co-leader of one of the research groups, I spent a day getting materials ready for the event.

The next Project CLEAR event, the field research, is scheduled June 24th thru June 28th. I have started assembling a volunteer fleet to transport student / teacher research groups around on the lake.

Vessel Donation

We coordinated a date/time to pick up the vessel. The vessel now resides at the CLA Sherman Office and we need to address this within the next two months.

Vaughn's Neck

We facilitated the field trip for the WCSU Environmental Applications of GIS which took place on April 19th. We provided transportation for 10 students and two faculty members to Vaughn's Neck and assisted in creating waypoints with GPS and taking photographs of points of interest. Also assisting were Mr. Hunter Brawley of Brawley Associates and Ms. Claire Cain of the Connecticut Forest and Park Association. Dr. Neeta Connally who teaches the course is going to create a poster with a map showing the waypoints and the photographs and send one along to Ms. Madhusudhan who directs the real estate division of Northeast Utilities.

Land Use Activity

We followed up with FirstLight and the Town of Brookfield on shoreline disturbance at 18 N. Lakeshore Drive that we first notified both on March 22nd and 24th respectively (see Attachment A). On April 24th Brookfield Inland Wetlands Officer Katherine Daniels informed me that the homeowners were informed of the violation, they received a Notice of Violation, and that notice was copied to FirstLight so they can address the issue. FirstLight has not responded to our correspondence which included the photographs on Attachment A.

Cancelled Clean Up

On April 25th Mark sent out an email notifying the public of our intent to cancel the 2013 John Marsicano Memorial Candlewood Lake Clean Up. We received a number of supportive emails from the community expressing hopes that we continue the event in future years. We also received correspondence from the CEOs expressing their displeasure with our decision and perception that our decision was in response to proposed cuts. We have tried to explain that the decision was based on lack of staff and time to adequately plan for this fairly complex community service event. The CEOs have expressed interest in running the event themselves and have asked us for man-hours required to undertake the event.

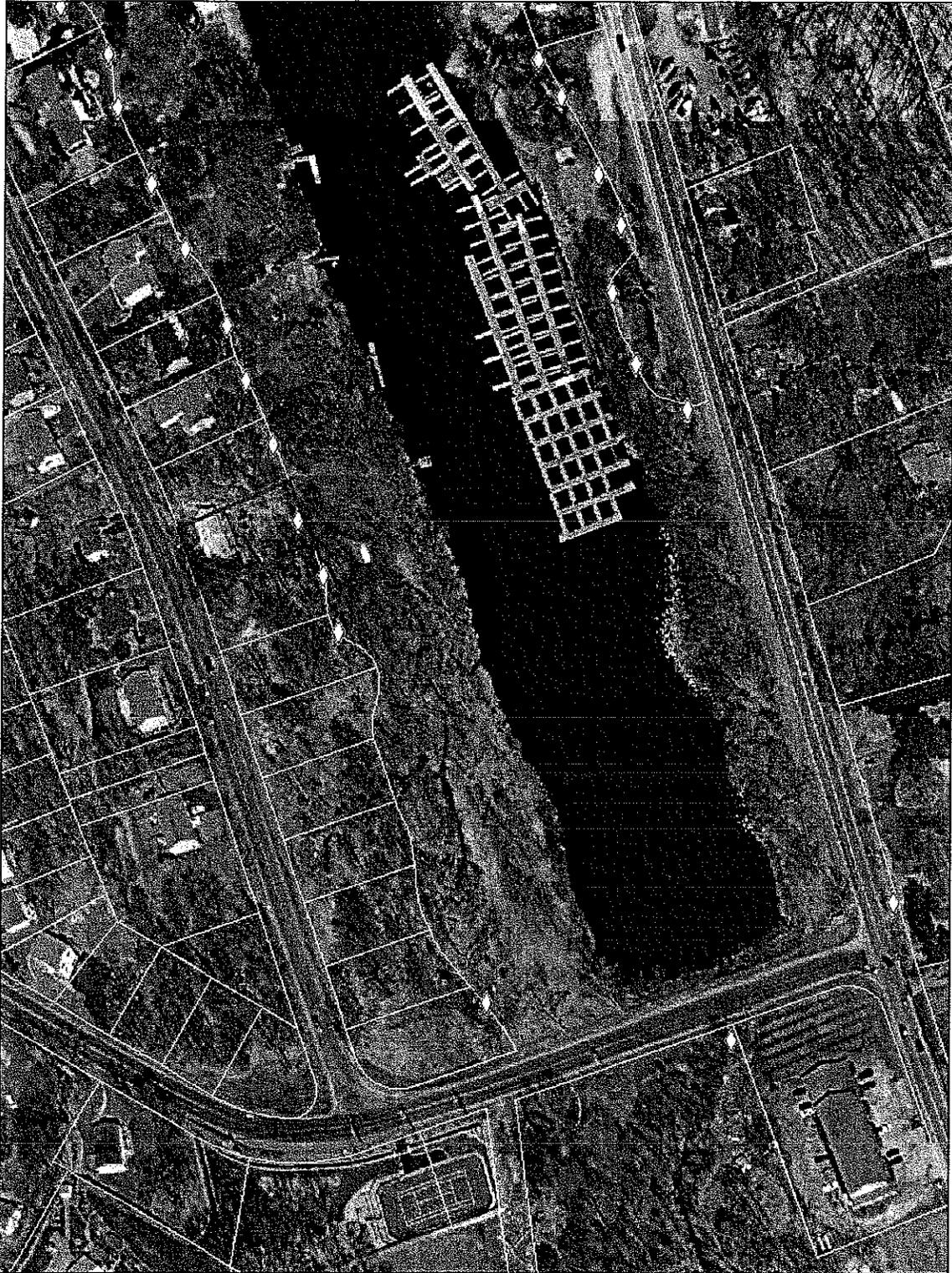
Committee Meetings

Executive Committee met on May 1st.

Other

I was invited and attended a luncheon put on by the Western Connecticut State University Foundation to honor one of their significant donors, Praxair, Inc. on April 26th. There I was able to meet Scott Sanderude, VP of Global Market Development and Marketing, who expressed great interest in the Dr. Kelly / CO₂ / zebra mussel study we are coordinating. I also was able to speak with a wide range of WCSU faculty, deans, and the President of the University, elected leaders, and other employees of Praxair.

We have received numerous calls and have spoken to newspaper and radio reporters including the Citizen News, Danbury News-Times, Litchfield County times, and WLAD on a wide range of topics including the cancelation of the clean-up, proposed funding cuts, work on the zebra mussel / CO₂ study, etc. I have also fielded numerous phone calls and correspondence from members of the public who have expressed great concerns over recent events.





September 2006



March 22, 2013



April 15, 2013

Kleinschmidt

January 24, 2013

VIA E-MAIL

Mr. Brian D. Wood
Land Manager
FirstLight Power Resources
143 West St. Suite E,
PO Box 5002
New Milford, CT 06776

Proposed Grass Carp Introduction to Candlewood Lake

Dear Mr. Wood:

As you are aware Candlewood Lake has a chronic infestation of the exotic invasive plant Eurasian Water Milfoil (*Myriophyllum spicatum*). The milfoil infestation has reduced the recreational uses of the lake within the littoral zone for boating, swimming and other forms of recreation. The Candlewood Lake Authority (CLA) is responsible under state statute for managing this issue, and is seeking new ways to reduce or eliminate this plant. Recently the CLA has proposed in the press to stock Candlewood Lake with presumably 10-inch-long commercially available grass carp (*Ctenopharyngodon idella*) that are genetically triploid to reduce the chances of the adults from successfully reproducing.

IMPACTS OF GRASS CARP

Grass carp are native to Asia and were introduced to the United States in the 1960s for aquatic weed control. Although grass carp have been used in situations to control aquatic vegetation, the introduction of non-indigenous species will often result in unforeseen consequences. For example, in Washington State, grass carp often fail to control the target plants, or in some cases, *all* submerged plants (including desirable native plants) are eliminated from the water body (*Dept. of Ecology, Washington State*). Plants like Eurasian milfoil and coontail are *not* preferred forage of grass carp; in ponds and lakes where grass carp have eliminated all submerged vegetation, the water becomes turbid, and fish will resort to eating organic material out of the sediments. (<http://www.ecy.wa.gov/programs/wq/plants/management/aqua024.html>).

Furthermore, grass carp are native to and prefer riverine habitat; they may not feed in open water and shoreline areas where there is a desire to target management to reduce the impacts of milfoil such as, swimming areas, boat docks, boating areas, or other sites where there is heavy human activity. According to the Texas Parks and Wildlife Department, triploid grass carp readily seek flowing water and often escape before controlling nuisance aquatic plants. Escapement can reduce or eliminate their potential for plant control within targeted areas, and threatens the beneficial plants outside of targeted areas

(http://www.tpwd.state.tx.us/landwater/water/habitats/private_water/pcarp.phtml#facts).

These factors suggest that this species may not effectively manage or consume milfoil, they may cause other unforeseen impacts in Candlewood Lake, and potentially could have these same effects on the Housatonic River's watershed should these fish escape and inhabit riverine conditions found elsewhere in the river system.

ESCAPEMENT POTENTIAL FROM CANDLEWOOD LAKE

Grass carp could easily escape from Candlewood Lake during power generation cycles. Candlewood Lake is the storage reservoir created by the Rocky River Power Station, which is a pumped storage power generating facility. During generation mode, flow exits the Lake through an intake structure with trashracks that are spaced at 2 $\frac{1}{4}$ " on center with 3/8" thick steel stock, meaning that there is a 2 $\frac{1}{2}$ " clear spacing between trashracks. Flow then passes through a penstock and exits to the main stem of the Housatonic River via a turbine. The turbine is a vertical shaft, single runner Francis design, 200 RPM, 101 inches in diameter, and a peripheral runner velocity of approximately 88 ft/sec. The intake and turbine is the only way for water and fish to exit the Lake as there are no gates or spillways that are normally operated.

Any grass carp sufficiently narrow to pass through the trashracks would be susceptible to becoming entrained through the powerhouse and discharged into the Housatonic River. The critical body width of a fish is the width of the skull as that part of the anatomy cannot be compressed, and therefore, represents a limiting factor for fish passage through trash racks. Grass carp at a length of 10 inches would be expected to have a skull width of approximately one inch (Smith, 1985), and therefore, could easily pass between trashrack bars and enter the penstock and turbine. After passing through the trashracks, grass carp would become entrained through the penstock and pass through the turbine.

Fish passage survival through turbines has been studied extensively and includes studies conducted at turbines similar to those at Rocky River (Franke *et al.*, 1997). Turbine mortality is in large part a function of relative size of the fish to the size and speed of the turbine passageway. Larger fish passing through a relatively fast spinning turbine have a higher probability of experiencing injury or death due to collision with blades, wicket gates or turbulence/cavitation hydraulics (EPRI, 1992; Franke *et al.*, 1997) than do smaller fish passing through a relatively slower spinning turbine with better clearances or less turbulence (Eicher, 1987, Cada, 1990). A number of turbine survival tests have performed on a range of Francis turbines with similar engineering characteristics to that at the Rocky River powerhouse. The test methodology was to mark batches of test fish, pass them through the turbines, then re-collect them in a full draft tube net and evaluate their survival. A brief review of test results taken from species groups with similar overall types of body form (*i.e.* "fusiform", "soft ray" and "salmonids") suggests that turbine survival could range from approximately 7% up to 85%, with an average of 54%. In no instance were tests identified showing that survival was 0%, and in most instances survival was well over 60%.

CONCLUSIONS

My conclusion is that the proposed introduction of grass carp to Candlewood Lake would be risky, as the species may or may not have the desired effect of controlling the milfoil problem, while posing the potential to have unintended impacts to other species, water quality and habitat. Furthermore, there is a high probability that grass carp could escape the Lake and survive the passage experience to the Housatonic River, where additional ecological impacts could result in the future.

Thank you for opportunity to provide an opinion on this subject.

Sincerely,

KLEINSCHMIDT ASSOCIATES



Brandon Kulik
Senior Fisheries Scientist

BHK:SDM

LITERATURE CITED

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- Eicher, G. 1987. Turbine-related fish mortality: Review and evaluation of studies. EPRI, Palo Alto, CA. Res. Proj. 2694-1.
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- Franke, G.F., D.R. Webb, R.K. Fisher, D.Mathur, P.N Hopping, P.A. March, M.R. Headrick, I.T. Lazo, Y. Ventikos, and F. Sotiropoulos. 1997. Development of environmentally advanced hydropower turbine system concepts", prepared by DOE Contract No. DE-AC07-96ID13382.
- Smith, C.L. 1985. The inland fishes of New York. NY Dept. of Environ. Cons., Albany, NY. 522 p.

Kleinschmidt

April 8, 2013

VIA E-MAIL

Mr. Brian D. Wood
FirstLight Power Resources
143 West St. Suite E,
PO Box 5002
New Milford, CT 06776

Considerations Related to the Use of Grass Carp Stocking in
Candlewood Lake to Control Nuisance Eurasian Milfoil

Dear Mr. Wood:

Candlewood Lake in New Milford, Connecticut has a chronic infestation of the exotic invasive plant Eurasian water milfoil (*Myriophyllum spicatum*). The Candlewood Lake Association (CLA) is proposing to control the Eurasian water milfoil (milfoil) in Candlewood Lake by introducing triploid grass carp for grazing. The grass carp is an herbivorous species of fish native to flowing waters in Asia.

The use of triploid grass carp in Candlewood Lake, is not necessarily an effective means to control Eurasian water milfoil, and poses ecological risks because there is no assurance that grass carp would not escape Candlewood Lake and establish a wild population.

1.0 EFFECTIVENESS OF GRASS CARP TO CONTROL MILFOIL

Milfoil is not a highly preferred food of grass carp. Grass carp have food preferences and in some studies, consumed more palatable plant species, such as native pondweeds and waterweed before they consumed milfoil. As a result, they can enhance milfoil growth by removing competition from desirable and ecologically-important native plants and opening up more area for milfoil to colonize (WDE 2011) while at the same time eliminating growths of desirable native aquatic plant species. Therefore the desired milfoil cropping effect of grass carp may vary from one water body to another, and may or may not be effective in Candlewood Lake.

1.1 POTENTIAL ECOLOGICAL IMPACTS TO THE WATERSHED

The introduction of the non-native grass carp has the potential to disrupt the ecology and thereby impact aquatic habitat and native natural communities within Candlewood Lake. Further, the impacts of grass carp may expand throughout the watershed, should they escape from the Lake.

Grass carp can have unanticipated ecological impacts. Because this fish feeds on aquatic plants, carp can sometimes be used to control nuisance aquatic plant growth, although desired results are often hard to achieve or at least, inconsistent (Conover et al. 2007).

HABITAT

High densities of carp are often necessary to achieve the desired effect, especially in a large lake. Such high densities have the potential to alter habitats significantly. Native communities can be adversely affected through interspecific competition with invertebrates and other fishes; decrease refugia for aquatic organisms; degradation of native fish habitats; increase nutrient enrichment and eutrophication of lakes; disruption of food webs and trophic structure; and spread nonnative parasites and diseases (Conover et al. 2007). Further, grass carp can alter the physical environment within riparian areas and can cause erosion by consuming terrestrial vegetation by digging into banks and uprooting riparian vegetation (Conover et al. 2007).

SPECIES INTERACTIONS (COMPETITION TO NATIVE SPECIES)

The introduction of an exotic species can impact native species by direct or indirect competition. For example, plant species not eaten by the carp or re-growth of preferred species can follow grass carp introduction. However, grass carp feeding, if selective for the native plants, might facilitate the spread of less pleasant invasive species (Conover et al. 2007). This is likely at Candlewood Lake as the target species, water milfoil, is not a preferred food item of grass carp (WDE 2011). This means that grass carp may eradicate native plants, and allow the water milfoil to expand. Further, grazing by grass carp promotes competition for vegetation and has been documented to decrease abundances of snails and cause significant declines in crayfish populations (Fedorenko and Fraiser 1978; Chilton and Muoneke 1992). Another example is the effects on waterfowl. Studies suggest that removal of aquatic macrophytes, will change the species composition of birds that use aquatic macrophytes will be replaced by species that use open-water habitats (Conover et al. 2007).

WATER QUALITY

Grass carp can affect water quality (IDNR 2005) and have been associated with increased turbidity and alkalinity and reduced dissolved oxygen as a result of their feeding behavior and removal of macrophytes (Conover et al. 2007). An uncontrolled reduction in macrophytes in Candlewood Lake, as a result of grass carp grazing, will increase the availability of nutrients, such as phosphorous, and can result in the proliferation of planktonic or filamentous algae blooms. Dense algae levels can result in wide swings in oxygen levels and diminished water clarity.

The grass carp is a non-native exotic species. They prefer riverine habitats, highly migratory, and actively seek flowing waters (Conover et al. 2007). If grass carp were to be stocked in Candlewood Lake, they would be attracted to the Project intake during power generation and pumpback when flowage occurs. This preference for areas of flowing waters may act to concentrate grass carp at the intake area and the outlet, thus, increasing the potential for escapement while also drawing them away from the targeted milfoil areas.

RISKS OF GENETIC TRIPLOIDY IN CANDLEWOOD LAKE

Triploid carp are typically sterile and *usually* unable to naturally reproduce. However, some fertility may occur and could result in a naturally reproducing population. Should grass carp

establish a population in the Lake, the likelihood of escapement to the Housatonic River is substantially increased as no physical barrier at the Project can effectively exclude the small sized juvenile and larval carp that would be produced.

A triploid male grass carp can fertilize a diploid female and, therefore, natural reproduction could result from the accidental introduction of a single diploid female with triploid males. Although the USFWS considers triploid grass carp to be sterile (USFWS 2011), triploid males produce substantial testes and can be induced to spermiate and will attempt to spawn (Allen and Wattendorf 1987). Van Eenennaam et al. (1990) artificially inseminated diploid female grass carp with triploid male milt. The fertilization rate was one-half to one-third that of diploid x diploid mating.

The USFWS conducts a triploid grass carp monitoring program, National Triploid Grass Carp Inspection and Certification Program (NTGCICP). However, the program does not require the testing of every fish; therefore, the certification of triploid carp by the monitoring program is based on statistically sub sampling, and the presence of diploid carp within a certified group therefore is possible.¹

In a *Risk Analysis Pertaining to the Use of Triploid Grass Carp for the Biological Control of Aquatic Plants*, the Florida Department of Environmental Protection Bureau of Invasive Plant Management and the Florida Department of Agriculture and Consumer Services Division of Aquaculture reported that the USFWS monitoring program identified 11 diploid grass carp out of 121,080 tested or 0.0091%. Based on this incident rate, it is not likely that the stocking proposed at Candlewood Lake would result in the introduction of diploid carp, but it is possible.

2.0 IMPACTS TO THE ROCKY RIVER HYDROELECTRIC PROJECT

CLA proposes that FirstLight prevent escapement by reducing intake rack spacing to create physical barriers at the Rocky River Project. CLA has theorized that such rack spacing would retain grass carp within the Lake, and is consistent with CTDEEP standards.

2.1 NARROW (1.5") TRASH RACK SPACING

Engineering Considerations

- Costs to FirstLight for design, construction, and implementation of a modified trashrack to prevent escapement is estimated at \$100,000, not including annual O&M (debris loading/cleaning) and licensing costs.
- Decreasing trashrack spacing has the potential to decrease station hydraulic capacity due to reduced flow and head loss. Smaller opening will increase the flow resistance through the intake; thus, reducing net available head at turbine inlet and decreasing generating capacity.

¹ The NTGCICP requires the inspection of a subsample of fish from commercially available stock. The USFWS inspection consists of a retesting by the producer, in the presence of the inspector, of 120 individuals randomly selected by the inspector from the identified lot of alleged 100 percent triploid grass carp. If all 120 fish tested are triploid, the inspection is complete.

- Reducing the rack spacing (open area) will increase intake velocities and thus increase the potential for impingement and entrainment of all species.
- FERC license amendment and approval would be needed for these modifications.
- Naturally produced juvenile grass carp (*see discussion above*) would not be blocked from exiting the Lake.

2.2 FULL DEPTH BARRIER NET

Considerations

- Feasibility assessment to determine if a barrier net can be designed and implemented to physically exclude grass carp from the Project intake canal would be required.
- Costs of design and implementation. All work will likely be performed from a barge so as not to compromise the walls of the canal.
- Potential O&M impacts.
- Debris loading.
- Net must be designed to address flow in both directions (upstream and downstream).
- When pumping upstream from the river to the lake, fish may become entrapped between the barrier net and intake.
- The net would not likely be in the water during winter due to icing.
- Estimated cost to FirstLight for design, construction and implementation of a barrier net and supporting infrastructure is \$1.5M, with annual O&M estimated at \$100K.
- Naturally produced juvenile grass carp (*see discussion above*) would not be blocked from exiting the Lake.

3.0 CT STOCKING RECOMMENDATIONS, POLICIES AND GUIDANCE

3.1 SCREENING CONSIDERATIONS IDENTIFIED BY CTDEEP

Triploid grass carp sizes sold in Connecticut are typically 10" or 12" and the CTDEEP requires the screening mesh size to be no greater than 1 ½".

3.2 THE CTDEEP REQUIRES THAT TRIPLOID GRASS CARP MAY ONLY BE LIBERATED INTO LAKES AND PONDS THAT MEET THE FOLLOWING CRITERIA (CTDEEP 2011A):

- Those approved for liberation, in writing, by all individuals who have ownership rights on such waters.
- Those which, in the opinion of the Commissioner are ecologically isolated.
- For the purposes of grass carp liberation (stocking) the CTDEEP defines an ecologically isolated lake or pond as one from which the emigration of such grass carp will not significantly impact public waters or waters of another, or *from which there is no surface water outflow* (Regulations of Connecticut State Agency (RCSA) Section 26-55-1).
- Those which, in the opinion of the Commissioner, *are adequately screened so as to prevent fish emigration.*

Further,

- The CTDEEP requires the owners to define management goals and investigate alternatives before any single management tool is selected.
- Grass Carp stocking is prohibited in most New England States, due to ecological concerns, including Massachusetts, Vermont, New Hampshire, Maine.

4.0 CONCLUSION

I conclude that the proposed introduction of grass carp to Candlewood Lake for purposes of milfoil control is risky because:

- There is risk that the aquatic ecosystem of Candlewood Lake will be affected that will result in further degradation of habitat, water quality and erosion.
- There is risk that grass carp may reproduce and escape and become established throughout the Housatonic watershed.
- No cost-effective barrier has been developed that would ensure no grass carp would escape the Lake.

Please feel free to contact me should you have any additional questions or desire additional information.

Sincerely,

KLEINSCHMIDT ASSOCIATES



Brandon Kulik
Senior Fisheries Scientist

BHK:SDM

cc: Chris Tomichek
Bryan Apell

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CANDLEWOOD LAKE AUTHORITY

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May 8, 2013
Public Education
Mark Howarth

Merchandise:

New merchandise has been produced (and continues to be produced) for the CLA Online store. In addition, we are working with some local businesses who will now be carrying a selection of our items for sale so that customers who do not wish to order online, may instead visit a retail location and see and purchase them in person.

ENews:

We sent out several email mini-newsletters the past month. One of particular importance was a reminder to the public about the new phosphorous laws in CT that went into effect this year. With spring being a time when many people would normally fertilize their lawns, we created a mini-newsletter that explained the new laws applying to all CT residents, as well as regulations specific to those who live along a body of water.

We explained the connection between storm water runoff and water quality and we tied this newsletter into promoting "Soil Testing Day", which is an event put on by the Candlewood Watershed Initiative with support from the CLA, in which local residents can get their soil tested free of charge to see what if any nutrients their soil is missing.

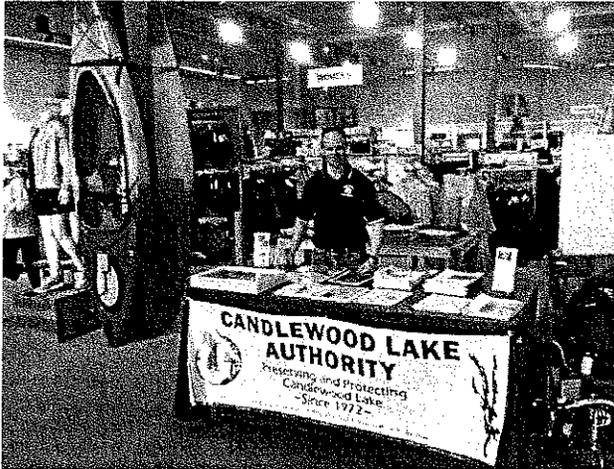
Dragon Boat Races:

We have begun to promote and sign up dragon boat teams for our event in August. We are finalizing the design for the poster which will be put up around the towns to help advertise the races and we have sent out emails to our distribution lists to start signing up teams. Since registration officially opened five days ago, we have received our first 5 team registrations.

We are working now to generate sponsorships for the Dragon Boat Races, which will have a combined sponsorship with Project CLEAR this year. We are excited to offer our sponsors an opportunity to be involved with two great events. To have Project CLEAR, an successful and highly-regarded educational program, as a second sponsor event will give potential sponsors an opportunity to reach a new audience this year.

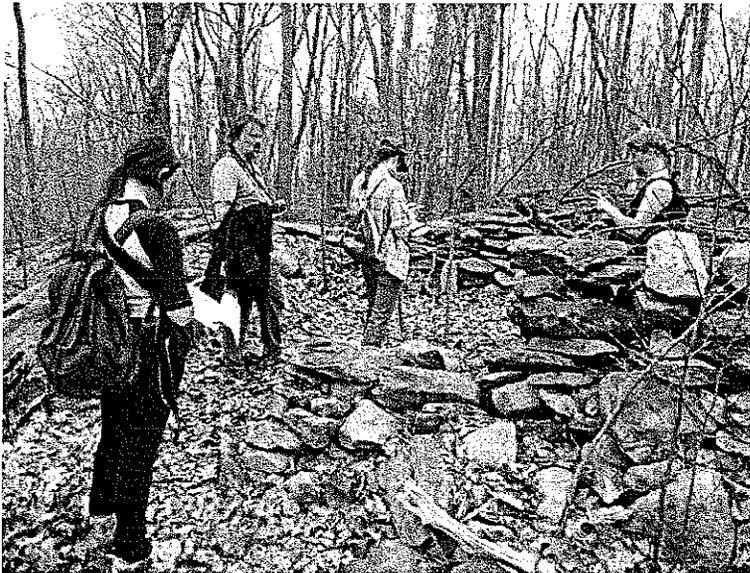
LL Bean:

The CLA was invited by LL Bean Danbury to participate in their Paddle Sports Weekend, the weekend of April 27th. They asked if we would like to have a table in the store to interact with the public, answer questions about Candlewood Lake, safe boating and preventing the spread of zebra mussels and other invasive species. We enjoyed our time there and got to meet many nice people.



WestConn Class:

We brought Dr. Neeta Connally's GIS Analysis for Environmental Applications class out to Vaughn's Neck on April 19th and we spent part of the day out there with them as we surveyed a portion of the land for landmarks and other points of interest. Several groups of students lead by instructors spread out over part of Vaughn's Neck and used handheld GPS units and cameras to mark and photograph the points. Also leading and assisting with the groups were Dr. Mitch Wagener of WCSU, Hunter Brawley of Brawley Associates and Ms. Claire Cain of the Connecticut Forest and Park Association.



26 Angels Foundation Benefit Tournament:

On Saturday May 4th, the CLA attended the evening pre-event briefing and kick-off for the 26 Angels Foundation Benefit Tournament, hosted by the CT BASS Federation Nation, to benefit Sandy Hook. The CLA was asked to attend the event to help answer questions competitors may have and to further promote zebra mussel awareness. We spoke about zebra mussels at the tournament, addressing the competitors, and provided each competitor with our tri-fold that contains more specific information about zebra mussel spread prevention.