

STATE OF VERMONT
WATER RESOURCES BOARD

In re: 1996 Petition of Lake
Bomoseen Association to
amend the current Lake
Bomoseen Surface Level Rules

10 V.S.A. § 905

Introduction

The Lake Bomoseen Association (Association) filed two separate petitions with the Water Resources Board (Board) in May of 1996, both seeking to amend the current surface level rules pertaining to Lake Bomoseen (the Lake).

One petition requested the adoption of a rule that would require the Lake to be drawn down every third year beginning on November 1, to maintain a water level of minus six feet at the gage between December 15 and January 31, and then to refill to minus 12 inches until spring ice out as a means of controlling Eurasian water milfoil (milfoil).

The second petition requested the adoption of a rule that would allow an annual drawdown of between 12 and 18 inches from December 1 until spring ice out to reduce ice damage to the shore land and shore land structures.

The current surface level rules pertaining to the Lake, adopted in 1982, require that the Lake be maintained year round at plus or minus three inches as measured at the gage at the dam (normal water level).

The Board, by a unanimous vote of all five members, decided on to deny both of the Association's petitions because the amendments to the current rules requested by the Association's 1996 petitions have not been shown to be in the public interest.

Procedural History

The Association filed the two petitions under consideration in this proceeding on June 3, 1996. The Association agreed to file additional supporting documents by the deadline of July 15, 1996. On that basis, the Board filed the proposed rules requested by these petitions with the Administrative Rules Committee on June 10, 1996 and subsequently with the Secretary of State on July 3, 1996.

Following public notice by the Secretary of State's Office and notice via direct mail by the Board, a public hearing was held in Castleton, Vermont on August 28, 1996 beginning at 7:00 p.m. At the request of the Association, the deadline for written public comment was extended from September 13, 1996 until October 15, 1996. The Board



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reviewed its record in this matter, including the testimony received at a public hearing on August 28, 1996 and written comment received by the deadline of October 15, 1996, on November 14, December 12, and January 29, 1997, before deciding to issue this decision.

Board Authority and Standard of Review

The Board is authorized by 10 V.S.A. § 905(2) to "adopt rules governing surface levels of lakes and ponds which are public waters of Vermont." In exercising this authority the Board is guided by 10 V.S.A. § 901, which requires that such decisions serve the public interest and promote the general welfare.

The Board understands this standard to mean that its action should consider the best interests of both current and future generations, taking into consideration impacts on aquatic habitat, fisheries, wildlife, wetlands, recreational uses, other public and private uses of the waters, and nearby property owners.

The Board is also guided by applicable state law pertaining to water resource management. For example, it must consider whether the action requested by petition is consistent with applicable Board rules such as the Vermont Water Quality Standards, including the classification of the waters affected, and the Vermont Wetland Rules. Furthermore, no rules can be adopted under 10 V.S.A. § 905(2) that have not been shown to be consistent with other Vermont law pertaining to water resource management.

In appropriate cases the Board will also consider the impact of any rule proposed under 10 V.S.A. § 905(2) on public trust values.

The proponents of the adoption of new surface level rules or, as in this proceeding, amendments to existing surface level rules have the burden of persuasion to demonstrate that the change they propose is in the public interest and consistent with the above standards of review.

FINDINGS

1. Lake Bomoseen (the Lake) is located in the Towns of Castleton and Hubbardton, constitutes public waters of the state of Vermont.
2. The Lake has a surface area of 2,364 acres. The Lake's surface level is controlled by a dam at the southern end of the Lake. The Lake drains into the Castleton River.
3. The Lake is approximately seven miles long and is divided into

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two sections by the Grady Bridge (bridge) near the northern end of the lake. North of the bridge is a 300-acre wetland (the northern wetland). South of the bridge, in the main body of the Lake, much of the shore land is developed with approximately 1,000 year-round and summer residences.

4. There are several wetlands, regulated under both federal and state law, that are contiguous to the Lake south of the bridge. The water level in these wetlands is controlled by the surface level of the Lake.
5. In 1982, milfoil was found in the Lake. Since then, milfoil has spread to several areas in the Lake at depths of as much as 20 feet. Milfoil now infests approximately 600 acres, or approximately 25% of the lake bottom.
6. Several mechanical harvesters operated by the Town of Castleton and the Association trim milfoil and other aquatic plants to a depth of five to eight feet below the Lake's surface level two or three times each year. Harvesting provides limited relief from the milfoil problem and is costly.
7. Surface level rules for the Lake were first adopted by the Board in 1973. The rules adopted in 1973 provided for a winter drawdown of between 12 and 18 inches as measured at the gage at the Lake's dam between November 1 and spring ice out.
8. In response to concerns regarding the impacts of this annual winter drawdown, in 1980 the Lake Bomoseen Surface Level Committee, consisting of representatives of the Town of Castleton and Hubbardton, the Association, as well as state officials, was formed for the purpose of reviewing problems associated with the 1973 rules and recommending changes.
9. In response to that Committee's recommendations, the Board amended Lake surface level rules in November of 1982. These amended rules, which became effective in May of 1983 and remain in effect today, require that the surface level of the Lake be maintained at a constant level of plus or minus three inches as measured at the gage at the Lake's dam.
10. The Association's 1996 petitions request the adoption of rules providing for the surface level of the Lake to be drawn down 12 to 18 inches between December 1 and spring ice out each year to reduce ice damage to the shoreland and structures, and for the surface level to be drawn down six feet between December 15 and January 31 every third year to control milfoil.
11. The date of spring ice out on the Lake varies but typically occurs in the latter part of April.

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12. Drawdowns for extended periods during winter months "control" milfoil in shallower areas by exposing the plants and their roots to unfavorable conditions, desiccation, and freezing for a sufficient length of time to kill individual plants. Such drawdowns also kill most other aquatic plants and many aquatic organisms within the dewatered area.
13. The Lake's littoral zone, generally the shallow waters adjacent to the shoreline, is biologically its most productive and important area.
14. The Association in its petition identified several lakes in Vermont and in neighboring states whose water levels are drawn down by depths ranging from several inches to several feet.
15. The Association provided no information to show any particular relevance of this list of lakes to its petitions concerning Lake Bomoseen.
16. Among the seven Vermont Lakes identified, three are manmade hydroelectric reservoirs whose water level manipulation, to the extent regulated at all, is controlled by the terms of licenses issued by the Federal Energy Regulatory Commission. Lake Memphremagog's water level is regulated by a Canadian utility. Lake Champlain's water level fluctuates naturally.
17. Candlewood Lake in Connecticut (Candlewood) was specifically identified as a body of water where drawdowns have been used to control milfoil without causing adverse impacts to the bass fishery. The 5,420 acre reservoir is drawn down about five feet annually and ten feet every second year for milfoil control.
18. Candlewood has few similarities to Lake Bomoseen. The key differences are that Candlewood is not a natural lake but is a 60+ year old manmade reservoir operated by Northeast Utilities as a pumped-storage facility for hydropower generation, it has no wetlands along its shoreline, it contains no threatened or endangered species, it is not normally used for ice fishing, and in drier years the utility has the ability to pump water from the nearby Housatonic River to refill the reservoir to normal summer recreational levels.
19. Biologists from the Connecticut Department of Environmental Protection have noted recent increases in small mouth bass spawning success on Candlewood. Whether this trend will be sustained over the long term is not clear from the record in this proceeding. Moreover, these same officials have noted negative impacts on other fish species, including pickerel and perch.
20. In evaluating drawdowns as a lake management tool, scientists have documented negative, unintended consequences such as algal

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blooms, freezing of water lines in shorefront homes, frost damage to retaining walls or other shoreline structures, drying up of shallow wells, and potentially devastating effects on fish, wildlife, and native plant populations that depend on normal lake conditions for their survival.

21. In 1988, the Vermont General Assembly mandated a "one time" drawdown of Lake Bomoseen "to the extent possible without physical modification of the outlet," for the apparent purpose of evaluating the effectiveness and environmental impacts of drawdowns as a method of milfoil control. In authorizing this drawdown, the General Assembly directed the Agency of Natural Resources (ANR) to evaluate the effectiveness and environmental impacts of this method of milfoil control and to file a detailed report with the General Assembly in 1989.
22. In the fall of 1988, the Lake's surface level was lowered 3.8 feet (the 1988/89 drawdown), which was the maximum extent the surface level could be lowered without dredging the northern end of the channel between the main body of the Lake and the dam.
23. Based on the experience of the 1988/89 drawdown, the six-foot drawdown requested by one of the Association's 1996 petition could not be achieved without dredging an estimated 28,000 cubic yards of sediment from the channel.
24. The Association's preliminary cost estimate for this dredging is \$275,000, although it is unclear whether this preliminary estimate includes the cost of obtaining any required permits or approvals and/or the cost of disposing of the dredged material in an appropriate manner.
25. The Association has presented no plans to show how such a major dredging operation would be conducted, including where and how the disposal of dredged material would be accomplished. The Association has presented no information regarding how frequently the channel area would need to be redredged to maintain the ability to lower the Lake's surface level by six feet.
26. The Association has presented no information to show such a major dredging operation would be paid for and has not provided copies of any permits or approvals authorizing such work or any information to show that this work could in fact be accomplished in compliance with applicable local, state or federal law.
27. The Association's assessment of the environmental impact of both of its proposed drawdowns was predicated on the construction and operation of a dam-like structure, termed a wetland protection structure, that the Association proposed to construct at a location just south of Grady Bridge.

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28. The proposed structure would be approximately 700 feet in length, consisting of interlocking steel sheet piling buttressed by rock fill. The rock fill would be approximately 30 feet high (mostly underwater) and would have a "footprint" approximately 100 feet wide on the lake bottom.
29. The purpose of this structure would be to maintain the water level in the extreme northern portion of the Lake, including the northern wetland area, while the surface level of the balance of the Lake is drawn down.
30. The Association's preliminary estimated cost for this structure is \$1,300,000. It is unclear whether this preliminary estimate includes the costs of obtaining approvals for this structure, acquiring ownership of the property on which the structure would be built, or operating and maintaining the structure after it is constructed.
31. The Association's "Preliminary Engineering Report," in which the preliminary estimated cost was provided, included the further qualification that:

Additional geotechnical evaluation is required to define the structural properties of the soft clay and permeability of the ledge in the dam foundation. Results of these investigations could affect the final construction cost estimate.
32. The Association has presented no information about how such a major construction project would be paid for and has not provided copies of any permits or approvals authorizing such work or any information to show that this work could in fact be accomplished in compliance with applicable local, state, or federal law.
33. Milfoil grows in waters to a depth of approximately 20 feet. In the Lake, milfoil is most abundant at depths from five to 15 feet, where it often forms dense surface mats that can interfere with swimming, boating, and fishing. Substantial portions of the 600 acres of lake bottom currently infested with milfoil were not exposed in the 1988/89 drawdown and would not be exposed by the six-foot drawdown requested by the Association's current petition.
34. The 1988/89 drawdown of the Lake was extensively evaluated by ANR in a report filed with the Legislature in 1989. This report, entitled "LAKE BOMOSEEN DRAWDOWN: An Evaluation of its Effects on Aquatic Plants, Wildlife, Fish, Invertebrates and Recreational Uses" (1989 ANR Study), details a series of significant adverse environmental impacts that resulted from this 3.8 foot drawdown, including but not limited to the following:

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- a. Prior to the 1988/89 drawdown the density of milfoil in the area exposed by that drawdown was relatively low. Milfoil is now the dominant plant in this area.
 - b. Impacts on fish in the Lake were difficult to measure because only one year of data could be collected. Brown trout reproduction in the Castleton River downstream of the Lake was nearly eliminated in 1989, most likely as a result of the drawdown.
 - c. Using the assumptions of the analysis method applied in the ANR wildlife study, serious impacts on wetland wildlife abundance were indicated, for instance 57 percent and 50 percent losses in value of habitat for muskrat and beaver, respectively.
 - d. The drawdown had a severe impact (86 percent reduction) on one threatened plant species and eliminated a species which has been proposed for legal protection in Vermont.
 - e. Aquatic vegetation in the northern wetland decreased by 50 percent in abundance and 40 percent in diversity. In the lake proper, aquatic plant diversity decreased.
 - f. Impacts on invertebrate communities in areas exposed by the drawdown were adverse and significant.
35. The 1989 ANR Study also predicted several possible long-term impacts including:
- a. Some plants with low reproductive rates may not recover, thus reducing the vegetative diversity and resulting in serious primary and secondary impacts on water quality and vertebrate and invertebrate species. While these plants were able to recover from the pre-1970's drawdowns, it is important to note that they did not have to compete with milfoil to do so.
 - b. Because milfoil is an aggressive species with extremely high reproductive capacity, it is very likely to quickly establish itself in greater abundance in the areas exposed by and disturbed during drawdowns, including areas where milfoil was previously excluded by native species that were reduced or eliminated by the 1988/89 drawdown.
 - c. The long-term interrelationship of the documented impacts is unknown. For instance, invertebrates are a major source of food for fish, and their reduction or elimination is likely to adversely affect fish size and perhaps numbers.

- d. The increased abundance and occurrence of milfoil as a result of the "one time" 1988/89 drawdown is likely to result in pressure for frequent and regular drawdowns.
 - e. The number and significance of adverse ecological impacts observed as a result of the 1988/89 drawdown would increase precipitously with repeated drawdowns, since none of the species studied may be capable of recovering as fast as milfoil. Under such assumptions frequent drawdowns are likely, therefore, to diminish species diversity and ecosystem integrity at an ever-increasing rate.
36. There were several follow-up studies conducted by ANR on the Lake in 1990 to monitor the condition of the lake and the northern wetland two years after the drawdown. Those studies and more recent monitoring indicate:
- a. The milfoil in the Lake had recovered from the 1988/89 drawdown by the summer of 1990, and in fact had expanded its growth in many shallow areas exposed by that drawdown due to the lack of recovery of native plants in that area. The milfoil control achieved by the 1988/89 drawdown lasted less than two years.
 - b. By the summer of 1990, milfoil had dramatically expanded its coverage in the northern wetland, as anticipated by the 1989 ANR Report, due to its ability to out-compete the native plants that were negatively impacted by the 1988/89 drawdown. Milfoil was five times more abundant in the northern wetland in 1990 than it was before the 1988/89 drawdown.
 - c. By 1990, the native plants in the northern wetland had not recovered from the drawdown, with the loss of water lilies being the most noticeable difference. Since the water lily population did not significantly recover during the four years following the 1988/89 drawdown, it is highly likely that drawdowns of 3.8 feet or more every third year would significantly reduce the lily population and its associated habitat value.
 - d. There was no significant recolonization of the shallow shoal areas by large mussels and snails two years after the 1988/89 drawdown. The species richness and diversity of the slate-shale littoral zone macro invertebrate community remained impaired two years after this drawdown.
 - e. The macro invertebrate community of the cobble/sand littoral area at Avalon Beach had also not recovered by 1990, with less abundance and fewer species.

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- f. The macroinvertebrate monitoring data indicated that the 1988/89 drawdown had long-term adverse effects on the benthic littoral invertebrates in the Lake, severely impairing the biological integrity of the lake's littoral zone community.
 - g. Given the degree of such impairment observed two years after the 1988 3.8 foot drawdown, it is likely that six-foot drawdowns every three years would not allow sufficient time for the benthic littoral invertebrate community in the Lake to recover from the adverse impacts of each drawdown, even if such recovery were possible.
 - h. It is likely that repeated drawdowns would magnify the impacts, severely degrading the lake's ecological functions and its biological diversity. Several species of large mollusca could be completely lost from the Lake.
37. If the Lake were drawn down six feet as proposed, the numerous and significant negative environmental impacts observed during and following the 3.8-foot 1988/89 drawdown would occur over a much larger area of the Lake exposed by the deeper drawdown.
38. In addition, repeated six-foot drawdowns would not enable the lake ecosystem to recover from the negative, potentially compounding, environmental impacts. Permanent losses of abundance and diversity of invertebrates and plant cover would result in decreased fish and wildlife production and a biologically impaired ecosystem.
39. The dam-like structure proposed by the Association might mitigate these impacts in the northern wetland area, but would have no affect on these adverse impacts in the main body of the Lake, particularly in the important littoral zone.
40. The rule providing for a six-foot drawdown, as proposed by the Association, requires the dam to be closed on January 31 to allow the Lake to begin refilling. A rising lake level under ice cover could make for unsafe ice conditions during the remainder of the winter, impairing several winter recreational uses of the Lake, including the popular use of ice fishing every third year.
41. Hydrologic modeling by ANR predicts that if conservation flows are maintained in the Castleton River while the Lake refills following a six-foot drawdown, in some drier years the Lake would not refill during spring runoff and would remain below its normal level through the summer recreation season. Although this would not happen in most years, when it did occur low water levels would significantly impair summer recreational uses of the Lake, and would result in additional negative impacts to the Lake's littoral zone. Delayed refill in the spring would impede fish

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passage into wetlands or inlet streams, and would negatively affect spawning success for fish such as bass and smelt.

42. Analysis by the Association's own expert witnesses, assuming conservation flows are maintained in the Castleton River shows that in those years when the Lake was drawn down six feet, approximately 33% of the time it would not refill by the end of April, and about 11% of the time it would not refill by the end of May.
43. It is ANR's opinion that failure to provide for maintenance of conservation flows in the Castleton River while the dam is refilling would result in a violation of the Vermont Water Quality Standards. Both the lake outlet stream and the Castleton River are Class B waters and are further designated as cold-water fish habitat.
44. Maintenance of conservation flows downstream of the dam at all times are important to the protection of the Castleton River, which depends on the Lake's watershed for 40% of its flow.
45. Many shore land property owners on the Lake experience ice damage to their shoreland and to structures adjacent to the Lake. To some degree winter ice damage is an inherent risk associated with the ownership and particularly the development of shoreland property within reach of winter ice on all Vermont lakes.
46. The information the Board received regarding such damage on Lake Bomoseen was largely anecdotal. There are no surveys to show how much damage occurs or with what frequency, the extent to which damage occurs to structures that encroach beyond the Lake's shoreline, or the extent to which the amount of ice damage that does occur is likely to be reduced by an annual drawdown of the magnitude requested by the Association.
47. The Association's petition seeks to maintain the normal summer recreational water level until December 1 in order to minimize impacts on recreational boating and water systems dependent on the Lake's surface level.
48. Drawdowns of 12 to 18 inches would cause many of the adverse impacts associated with a six-foot drawdown but in general to a lesser degree. Those adverse impacts would be further reduced if such a drawdown began in early September and reached its 12 to 18 inch magnitude more slowly, thereby allowing many of the affected aquatic organisms to retreat to deeper water.
49. Even if authorized by a rule adopted by the Board, a 12 to 18 inch drawdown could not proceed until a Threatened and Endangered

Species Permit and a Conditional Use Determination Permit were obtained. There is no indication in the record of this proceeding that such approvals have either been applied for or obtained.

DECISION

The Association has failed to show that the triennial six-foot drawdown proposed in its petition would be consistent with the public interest or the standard of review applicable in this proceeding (see "Board Authority and Standard of Review" above). In fact, the record in this proceeding shows conclusively that such a drawdown would have substantial adverse impacts on aquatic habitat, fisheries, wildlife and wetlands, and would impair several recreational uses, including ice fishing and perhaps other winter uses, as well as summer recreational uses in those drier years when the Lake would not receive sufficient inflow to allow it to return to its normal water level in the spring.

The Board has rejected the Association's argument that these impacts would be either eliminated or substantially mitigated to acceptable levels by a dam-like structure that might be built in the northern portion of the Lake near the Grady Bridge for two reasons. First, the future existence of such a structure, and therefore its ability to eliminate or mitigate the adverse impacts of either of the proposed drawdowns is, at this time, purely speculative. Secondly, the Association has not shown that even with such a structure in place, the impacts of the proposed six-foot drawdown in the main body of the Lake south (i.e., downstream) of the proposed structure would be in the public interest.

The dam-like structure does not now exist and has not been approved for construction. It has not been reviewed or approved under any applicable local, state, or federal law. There was inadequate evidence of its technical feasibility or its environmental, social, or other impacts. Finally, it is not clear who would pay for such a structure or who would be responsible for its operation. The Board cannot adopt rules predicated on such a highly speculative concept.

As frustrating as the milfoil problem on the Lake clearly is for many, it is not the only factor that this Board must consider in determining the public interest. The understandable desire of some shore land property owners and others to "do something" in response to the frustrations of the milfoil problem cannot justify actions that would most likely provide only limited relief from that problem at the cost of severely damaging the Lake's ecology and adversely impacting many of the Lake's recreational uses.

When it authorized the 1988/89 drawdown of the Lake as a "one time" experiment in milfoil control, the Vermont General Assembly also

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directed the ANR to evaluate the impact of the drawdown on the Lake's ecology and its effectiveness in controlling milfoil. In addition to ANR, others with expertise in this area have studied the impact of the 1988/89 drawdown on the Lake.

While the Association has identified ways in which the impacts of the 1989/89 drawdown might be reduced somewhat (e.g., by controlling the drawdown to reduce scouring in the Castleton River), and has shown that the ANR and other studies are not conclusive on a few particular issues (i.e., the impact on the bass fishery), it has not met its burden of affirmatively showing that its proposal for repeated six-foot drawdowns is in fact in the public interest.

Based on the specific experience of the 3.8 foot drawdown in 1988/89 and the overwhelming body of scientific information regarding the impacts of artificial drawdowns generally, the Board finds that a six-foot drawdown every three years would have a dramatic adverse impact on the Lake's ecology. Such drawdowns would also interfere with several recreational uses of the Lake. Moreover, such drawdowns would provide at best limited and temporary relief from the milfoil problem. Accordingly, the Board concludes that the Association has failed to meet its burden of showing that the triennial six-foot drawdown, as proposed in its petition, would be in the public interest.

The Board has also concluded that the Association has failed to show that the limited benefits to some shore land property owners from the annual winter drawdown requested would be in the public interest. Here the problem lies with the timing of the drawdown and how rapidly it would occur.

As shown by the testimony of ANR, it may be possible to design a limited drawdown for the purpose of reducing winter ice damage that would be consistent with the public interest. However, based on the record in this proceeding, the pace and timing of the drawdown proposed here may be in conflict with other recreational uses of the Lake, including late season boating and perhaps fishing. Moreover, such a drawdown apparently requires at least two permits that have not been either applied for or obtained.

Although an annual winter drawdown would apparently reduce winter ice damage to some extent, it is not clear by how much. Shore land properties on Vermont lakes, particularly filled land and manmade structures built close to the water's edge, are inherently at risk of damage by ice during the winter months.

This petition seeks to reinstate the winter drawdown practice which was in place prior to 1982. Dissatisfaction with that drawdown practice, due to its adverse impacts on local water supplies, fisheries, wildlife, wetlands, and navigation, led to the Water Resources Board to adopt the current rules in 1982. To change the

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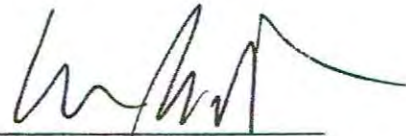
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current rules the petitioner, in this case the Association, has the burden of providing the Board with evidence that these problems either would not reoccur or have been adequately addressed. In this proceeding the Association has not made such a showing.

For the reasons stated above, both petitions are denied.

Dated at Montpelier, Vermont this 10th day of February, 1997.

For the Vermont Water Resources
Board by



William Boyd Davies
Chair

Water Resources Board members
concurring:

William Boyd Davies
Stephen Dycus
Ruth Einstein
Gail Osherenko
Jane Potvin