STATE OF VERMONT
ORANGE COUNTY, SS

IN RE AQUATIC NUISANCE CONTROL)
PERMIT # C93-01-MOREY)

Orange Superior Court
Docket No. 94-5-94 Oecv

Opinion and Order:

Appeal from Decision of Vermont Water Resources Board

This matter comes before the court on appeal from the April 12, 1994, order of the Vermont Water Resources Board ("WRB"). In that order, the WRB reversed the May 11, 1993, order of the Secretary of the Agency of Natural Resources ("ANR") granting Aquatic Nuisance Control Permit # C93-01-Morey (the "permit") to the Town of Fairlee (the "Town"). The permit, issued on May 11, 1993, by the ANR pursuant to 10 V.S.A. § 1263a(e), authorized the application of the pesticide Garlon 3A to the waters of Lake Morey, located in the Town, for the purpose of controlling Eurasian watermilfoil ("milfoil").

An appeal from the ANR decision was timely taken to the WRB,[1] which heard the appeal de novo, pursuant to 10 V.S.A. § 1269. The WRB held three days of hearings (September 28-29, 1993, and October 26, 1993) and took evidence in the form of prefiled testimony of witnesses, live sworn testimony of witnesses, and exhibits. On April 12, 1994, the WRB issued its decision, comprising 134

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[1] The WRB granted party status to the following persons opposing the permit: David Adams, Kern McCarty and Amy McCarty. The WRB granted permissive intervention, under its rules, to the following persons opposing the permit: Anthony H. Gahagan, Melissa P. Gahagan, Noel Gahagan Walker, Peter Wood, Barbara Wood, Peter Berger, Tony Thurston and Theresa Thurston.

The WRB granted party status to the following persons supporting the permit: the Town, the ANR, and the Lake Morey Protective Association ("LMPA"). The WRB granted permissive intervention to the following persons supporting the permit: William Scott, Marjorie Scott, Donald K. Weaver, James Southworth, Margaret Southworth, Richard A. Allen, Philip H. Zalinger, Jr., and Ann Kennard Zalinger.

findings of fact, extensive conclusions of law, and an order reversing the May 11, 1993, decision of the ANR. In re Aquatic Nuisance Control Permit #C93-01-Morey, Docket No. WQ-93-04 (Water Resources Board, April 12, 1994) (hereinafter, "WRB Decision").

The WRB held that the Town failed to meet its burden of proof under 10 V.S.A. § 1263a(e) in that it demonstrated that only two of the five required criteria had been satisfied.[2] Specifically, the WRB held that the Town demonstrated that Garlon 3A presents an acceptable risk to the nontarget environment, 10 V.S.A. § 1263a(e)(2), and that a long-range management plan has been developed, 10 V.S.A. § 1263a(e)(4); but that the Town failed to demonstrate: that no reasonable nonchemical alternative to Garlon 3A is available, 10 V.S.A. § 1263a(e)(1); that Garlon 3A presents a negligible risk to public health, 10 V.S.A. § 1263a(e)(3); and that there is a public benefit to be achieved from the application of Garlon 3A, 10 V.S.A. § 1263a(e)(5). The WRB therefore reversed the ANR's order and declared the permit null and void.

Pursuant to 10 V.S.A. § 1270, the following parties timely appealed to this court: the Town, the ANR, the LMPA, Donald K. Weaver, Richard A. Allen, William Scott and Marjorie Scott (collectively, "Appellants" here, but appellees below). The Town is represented by David A. Otterman, Esq.; the ANR is represented by Assistant Attorney General John W. Kessler, Esq. The LMPA

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[2] Section 1263a(e) reads, in relevant part:

"The secretary shall issue a permit for the use of pesticides in waters of the state for the control of nuisance aquatic vegetation . . . when the applicant demonstrates and the secretary finds:

"(1) there is no reasonable nonchemical alternative available;

"(2) there is acceptable risk to the nontarget environment;

"(3) there is negligible risk to public health;

"(4) a long-range management plan has been developed which incorporates a schedule of pesticide minimization; and

"(5) there is a public benefit to be achieved from the application of a pesticide. . . ." 10 V.S.A. § 1263a(e).

appears pro se, with Kenneth Allen as its spokesperson; the individual Appellants all appear pro se. The following individuals support the decision of the WRB: David Adams, Noel Gahagan Walker, Kern McCarty, Amy McCarty, Peter Berger, Anthony Gahagan, and Melissa Gahagan (collectively, "Appellees" here, but appellants below). The Appellees are represented by Paul S. Gillies, Esq.

On appeal, Appellants argue that the WRB acted "arbitrarily, unreasonably, and contrary to law" in finding that the Town failed to satisfy the statutory requirements found at 10 V.S.A. § 1263a(e)(1), (3) and (5). Appellants raise five specific claims of error to support this argument. First, Appellants claim that the WRB's findings are not supported by the evidence, and that in fact the evidence plainly refutes the WRB's findings. Second, Appellants claim that the WRB's conclusions of law are not supported by their findings. Third, Appellants claim error in the standard of proof employed by the WRB. Fourth, Appellants claim that the WRB manifested an arbitrary and unreasonable bias against the use of chemicals to control aquatic nuisances. And finally, Appellants claim error in the WRB's rulings that three witnesses offered by Appellees were competent to render expert opinions.

I.

The following undisputed facts, taken from the record below, serve as background for the present appeal.

This case arises from the concerted efforts of the Town of Fairlee and the Lake Morey Protective Association to control the spread of Eurasian water-milfoil in Lake Morey. Eurasian watermilfoil, a non-native species of aquatic vegetation first introduced into North America a century ago, has appeared in 37 of Vermont's 284 lakes and ponds over 20 acres in size, including Lake Champlain, Lake Memphremagog, and Lake Bomoseen. Lake Morey has a surface area

of 538 acres and is located in the Town of Fairlee. Milfoil was first discovered in Lake Morey in August, 1991.

Milfoil takes root in lake and pond bottoms in shallow to moderately-shallow waters. Long shoots filled with air grow out from the plant's root crowns and rise through the water to float on the lake surface, where they hinder the recreational uses of the water, such as swimming, boating, or fishing. Milfoil also frequently wins in competition with native plants for nutrients and space. A fast-growing plant, milfoil has been known to grow as much as one inch per day. This makes milfoil difficult to control by trimming or cutting above the root or root crown. Milfoil also has the ability to reproduce and re-root itself from plant fragments, so that care must be taken, when using any cutting or pulling method, not to leave milfoil fragments in the water. Milfoil can spread rapidly within a lake when it is sliced up by motorboats, which can also transport milfoil to other lakes and ponds from plant fragments clinging to the engine rotors.[3]

Lake Morey has long been a center of recreational activity. The Lake Morey Protective Association, a private organization presently comprising the owners of most of Lake Morey's nearly 6-mile long shoreline, was founded in 1907. A resort inn and country club, two children's summer camps, dozens of private camps, a public fish and game access, a public beach, and nearly a hundred private homes presently surround Lake Morey. Because its many recreational uses make it a major tourist attraction, Lake Morey also plays a vital role in the regional economy.

Following the discovery of milfoil in Lake Morey in 1991, the Town, under permits issued by the ANR, engaged in several nonchemical control activities,

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[3] See 10 V.S.A. § 1266 ("No person shall transport . . . Eurasian watermilfoil (Myriophyllum spicatum) to or from any Vermont surface water.").

including bottom barriers, suction harvesting, and hand-pulling. Bottom barriers are sheets of material (nylon, silicone, rubber, fiberglass, polypropylene, or PVC) that are anchored to a lake bottom and that kill plants through a combination of compression and sunlight deprivation. Suction harvesting involves the use of a mechanical suction device by one or more trained divers, who "target" the milfoil visually and use a vacuum hose to remove the entire plant, including the root. "Hand-pulling" is a manual harvesting method performed by either swimmers or divers, who use brute strength to remove entire milfoil plants down to and including the root. In spite of the various control activities used in both 1992 and 1993, milfoil continued to grow in Lake Morey, so that by September, 1993, the milfoil presence in Lake Morey was classified as an "advanced pioneer infestation."

Garlon 3A (also known as "Triclopyr"), a chemical herbicide[4] manufactured by DowElanco, Inc., was registered as a terrestrial herbicide by the U.S. EPA in 1979 and has had many years of terrestrial application. In 1991, the U.S. EPA issued an Experimental Use Permit ("EUP") authorizing the aquatic application of Garlon 3A on up to 2,040 acres in 22 states, including Vermont. To date, there has been no permitted aquatic application of Garlon 3A in Vermont. The EPA renewed the EUP in 1993 to allow further study of the effectiveness of Garlon 3A as an aquatic herbicide and to evaluate its impact on nontarget species. Under the EUP, Garlon 3A is currently being used in seven states to control milfoil. However, registration of Garlon 3A as an

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[4] Garlon 3A consists of 44.4% Triclopyr (3,5,6-trichloro-2-pyridinyloxy-acetic acid, combined with a triethylamine salt) and 55.6% inert ingredients. The word "inert" in the preceding sentence refers only to the relation of the non-active ingredients to the active ingredient and does not reflect a judgment on the potential biological or ecological effects of the non-active ingredients on the environment to which they may be applied. Although the parties dispute the potential environmental effects of the so-called "inerts," they do not dispute that Garlon 3A is a chemical herbicide subject to the requirements of 10 V.S.A. § 1263a(e).

aquatic herbicide is not expected until 1996.

In February, 1993, the Town of Fairlee applied to the ANR for a permit to use Garlon 3A on up to forty-five (45) acres of Lake Morey. The proposal called for application of a liquid formulation of Garlon 3A at a rate of 1.5 parts per million ("ppm") (equivalent to 15 gallons per acre) in treatment areas greater than one acre in size and at a rate of 2.0 ppm (20 gallons per acre) in treatment areas approximately one acre in size. The ANR approved application of Garlon 3A at the proposed rates, but only to a combined area approximately 19.5 acres in size, comprising areas identified as containing contiguous occasional, common, abundant, or very abundant densities of milfoil.

The Appellees here (appellants below) appealed the issuance of the ANR permit to the WRB, which conducted de novo review and issued the decision that forms the basis for the present appeal.

II.

When hearing an appeal from an order of the WRB, this court is limited to a review of the WRB's findings, based entirely on the record below, to determine whether the WRB acted "arbitrarily, unreasonably, or contrary to law." 10 V.S.A. § 1270; In re Town of Sherburne, 154 Vt. 596, 603 (1990). To determine whether the WRB acted "arbitrarily," the court must decide "whether the decision makes sense to a reasonable person." Id. at 605. To determine whether the WRB acted "unreasonably," the court must decide "whether the Board's factual findings are supported by substantial evidence." Id. Finally, to determine whether the WRB acted "contrary to law," the court must decide whether the WRB "consider[ed] all the criteria required by its statute." Id. at 607.

The court now proceeds to consider Appellants' five claims of error.

III.

Appellants first claim that the WRB's findings of fact are not supported by the evidence. The ANR challenges the WRB's findings regarding nonchemical alternative control methods, particularly "bottom barriers" (#35-40), "suction harvesting" (#41-52), "hand pulling" (#53-55), and "weevils" (#56-67). Richard Allen challenges the WRB's findings with respect to: nonchemical alternatives (#15, 46-49, 52, 57 and 69); negligible risk to public health (#101); and public benefit (#133-134). The LMPA challenges certain of the WRB's findings with respect to: nonchemical alternatives (#37-39, 44, 45, 50-53, 55-56, 67-69); negligible risk to public health (#96-125); and public benefit (#126-132).

The Vermont Supreme Court has recently reaffirmed that "the findings of the Board with respect to questions of fact, if supported by substantial evidence on the record as a whole, shall be conclusive." In re Sherman Hollow, Inc., 160 Vt. 627, 627 (1993) (mem.) (referring to Environmental Board); see Town of Sherburne, 154 Vt. at 605. The Court has defined "substantial evidence" to mean "such relevant evidence as a reasonable mind might accept as adequate to support a conclusion." In re Quechee Lakes Corp., 154 Vt. 543, 554 (1990); Green Mt. Power Corp. v. Comm'r of Labor & Ind., 136 Vt. 15, 21 (1978). The Court, however, has had trouble defining the degree of deference which this standard requires a reviewing court to give to the lower tribunal's findings of fact. Compare Quechee Lakes Corp., 154 Vt. at 554, n. 10 (substantial evidence standard "should be distinguished from the 'clearly erroneous' standard") and Green Mt. Power Corp., 136 Vt. at 21-22 (substantial evidence standard "differs little, if at all, from the 'clearly erroneous' test of V.R.C.P. 52(a)"). Although recognizing the confusion thus created, the Court has also declared that the distinctions in its holdings "are too abstract to be useful." Town of Sherburne, 154 Vt. at 606. While both versions of the standard "imply

deference to the factfinder," id.,

> [i]t is perhaps impossible to identify a "quantum" of evidence that is sufficient under either standard; in practice, the level of deference will often depend on how technical or arcane is the subject matter of decision. When an administrative body is deciding a highly technical matter, a reviewing court will defer more readily than where the issues in controversy are accessible to a generalist judge.

Id. at 607 (emphasis added).

In granting a greater "level of deference" to the WRB's review of "technical or arcane" matters, this court is mindful that

> [t]he legislature created the [Water Resources] Board to protect, regulate, and control the water resources of the state in the public interest. 10 V.S.A. § 901. . . . In light of this broad delegation, the Board must be afforded some latitude in interpreting the legislation it is bound to implement.

Id. at 611 (citation omitted).

With this standard in mind, the court proceeds to consider whether the evidence supports the WRB's findings on each of the three statutory elements now under appeal, namely, (A) whether there is no reasonable nonchemical alternative to Garlon 3A, as required by 10 V.S.A. § 1263a(e)(1); (B) whether Garlon 3A presents a negligible risk to public health, as required by 10 V.S.A. § 1263a(e)(3); and (C) whether there is a public benefit resulting from the application of Garlon 3A to the waters of Lake Morey, as required by 10 V.S.A. § 1263a(e)(5). The evidence presented below consisted of: prefiled unsworn testimony of 32 witnesses;[5] live, sworn testimony of 27 witnesses[6] at a

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[5] The following persons submitted prefiled testimony:

For the Town: Gerald Smith, Ann Bove, Wallace McLean, Holly Crosson, Steven Fiske, Richard Langdon, Carl Pagel, Philip R. Benedict, John Berino, Dr. Theodore Farber, the Town of Fairlee Selectboard (Richard E. Hall, Peter J. Durgin and L. Dennis Farmer), J. Blakeney Bartlett, Robert and Nancy Stone, Bob Ferlazo, Edmund A. Winnicki and Posie Taylor, Edwin F. Leach II, A. Clark Johnson, Nancy Low Eberhardt Bonneville, Edwin H. Hylander, Anton J. Campanella, and Mr. & Mrs. R. R. Hummel, Jr.

(continued...)

contested hearing held on September 28-29, 1993, and October 26, 1993; and numerous exhibits admitted into evidence during the course of the hearings.

A. No Reasonable Nonchemical Alternatives: 10 V.S.A. § 1263a(e)(1)

The WRB found that "there are reasonable nonchemical alternatives [to Garlon 3A] for achieving control" of the milfoil infestation in Lake Morey (Finding #133). The WRB heard extensive evidence concerning various nonchemical control methods and made findings of fact with respect to the following methods: bottom barriers (Findings #35-40), suction harvesting (#41-52), "hand-pulling" (i.e., manual harvesting) (#53-55), and weevils (#56-67). The WRB summarized its findings as follows: "The implementation of one or more nonchemical control methods, alone or in combination, can control the infestation of watermilfoil in areas of contiguous occasional, common, abundant, and very abundant densities." WRB Decision, Finding #69 at 13.

Before discussing the WRB's general findings, the court reviews the WRB's specific findings for each nonchemical control method.

1. Bottom Barriers (Findings #35-40)

The WRB found that "[b]ottom barriers can be effective in killing small,

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[5](..continued)
For the LMPA: Kenneth D. Allen (for the LMPA), William Scott, Donald Weaver, and Richard A. Allen.
For the Appellees (appellants below): Jeff Parson, Noel Gahagan Walker, Tony and Theresa Thurston, Amy McCarty, Margaret Ottum, Linden Witherell, and David Adams.

[6] The Town called the following witnesses: Gerald Smith; Anne Bove; Dr. Theodore Farber; Carl Pagel; Richard Langdon; Stephen Fiske; John Berino; Philip R. Benedict; Holly Crosson; Dr. William Bress; Wallace McLean; Blakeney Bartnett; and Edwin Leach.
The LMPA called the following witnesses: Kenneth Allen; William Scott; Donald Weaver; and Richard Allen.
The Appellees (appellants below) called the following witnesses: Linden Witherell; Jeff Parsons; Dr. Margaret Ottum; David Adams; Amy McCarty; Noel Gahagan Walker; Tony Thurston; Martha Wright; Kern McCarty; and Joan Mulhern.

dense patches of watermilfoil" (#35). The WRB, however, also found that the "pond liner material" used for bottom barriers "blocks out sunlight and therefore prevents photosynthesis" (#36). Bottom barriers can thus be installed only temporarily, because, as the WRB found, "[b]ottom barriers decimate all aquatic plants and invertebrate populations in the treated areas during the period of treatment" (#37). Following a year-long installation of bottom barriers in Lake Morey in 1992-93, a "survey of the lake in 1993 revealed that watermilfoil growth had returned to some areas of the lake where bottom barriers had been installed in 1992 and removed in 1993" (#39). The WRB thus found "that the use of bottom barriers is not always successful in eradicating watermilfoil growth in the area of treatment" (id.). Finally, the WRB found that "[t]he use of bottom barriers is expensive," costing an estimated $40,000-45,000 per acre treated (#38), as compared with a cost of $1,200 per acre treated with Garlon 3A (#40). The WRB also found, however, that "[t]he cost factors in determining this estimate [for bottom barriers] are not detailed in the record" (#38), while the cost estimate for Garlon 3A does not include "the cost of surveys, monitoring, residue testing, and other tasks required for compliance with permit conditions" (#40). Nor did the estimate for Garlon 3A account for the cost of treatments over the two subsequent treatment years proposed in the permit application (id.).

In appealing these findings, Appellants contend that the WRB's general finding concerning the effectiveness of bottom barriers is unsupported by the evidence and contradicted by the specific findings concerning the harmful effects and prohibitive costs of bottom barriers.

The WRB received extensive evidence concerning the dangers and high costs associated with bottom barriers. See Exh. P-1E, "PRELIMINARY BUDGET AND COMPARATIVE COST OF RECOMMENDED ALTERNATIVES" (hereinafter, "Cost Estimates")

at 1; Exh. P-2B, "A REPORT FROM THE MILFOIL STUDY COMMITTEE ON THE USE OF AQUATIC HERBICIDES TO CONTROL EURASIAN WATERMILFOIL IN VERMONT" (Vt. Dept. of Environmental Conservation, March 1993) (hereinafter, "Milfoil Committee Report") at 21; and Exh. P-3C, "BOTTOM BARRIER DECISION" (Vt. Dept. of Environmental Conservation, May 13, 1992) at 3. This evidence amply supports the WRB's Findings #36-40.

In addition, two witnesses testified for the Town concerning the use of bottom barriers in Lake Morey. The first witness, Gerald Smith, had prepared the Town's original application to the ANR for a permit to use Garlon 3A in Lake Morey. (Exh. P-1A.) Smith, an aquatic biologist and president of Aquatic Control Technology, Inc. (Exh. P-1 at 3), is also a Vermont-certified Aquatic Applicator who would be responsible for applying Garlon 3A to Lake Morey should a permit issue. (Exh. P-1A at 2.) Smith testified that his firm had extensive experience in the installation and use of bottom barriers. (Smith Test., 9/28/93 Tr. at 25.) With regard to the hazards of bottom barriers, Smith testified that bottom barriers are "not selective for milfoil" (id.) and that "bottom barriers . . . displace all native plants, and they may smother macro-invertebrates, important fish food organisms." (Id. at 26.) Smith concluded that "the use of Triclopyr is a far more selective management technique than bottom barriers." (Id. at 50.) With regard to costs, Smith testified that the estimate of $40,000 per acre for "initially" installing bottom barriers does not include "heavy maintenance costs," such as the costs of inspecting, moving, or relocating the bottom barriers "every year or two." (Id. at 25-26.)

Because of these drawbacks, Smith concluded that the use of bottom barriers in areas where milfoil growth is only occasional, common, or abundant is "impractical." (Id. at 25.) As for using bottom barriers over large areas of lake floor, Smith concluded that "lining your pond bottom or lake bottom

with bottom barriers is certainly not an acceptable or reasonable technique." (Id. at 26.) Despite these recognized disadvantages, however, Smith concluded that, "for small, dense patches of Milfoil, [bottom barriers] work quite well." (Id. at 25.) As Smith explained:

> [T]he bottom barrier will generally control all of the plants underneath that barrier. So, given the high cost, you really don't want to use them where the Milfoil is very sparse and you can hand-pull or you suction harvest it. You want to use it in smaller areas, small areas being an acre or whatever, less, where the Milfoil is quite dense. But for instance, in the southern end of the lake, you can see where the bottom barriers were redeployed. In those areas there are some patches of Milfoil that may not necessarily grow right to shore. They grow out from the shore. So, in those areas, bottom barriers are a suitable kind of technique because it would be difficult, very difficult, to treat that area. It's an open block of Milfoil in an open water situation, it's not against the shore. So, in the southern end of the lake, the use of the bottom barriers would be appropriate like that. Small, dense localized patches of Milfoil.

(Id. at 55) (emphasis added). Smith's testimony thus conforms almost verbatim to WRB Finding #35.

The testimony of the second witness, Ann Bove, further supports the WRB's findings. Bove, an aquatic biologist for the Lakes and Ponds Unit of the Vermont Department of Environmental Conservation ("DEC"), testified that she personally surveyed the floor of Lake Morey following the removal of the bottom barriers than had been installed there under the ANR permit in 1992-93. (Bove Test., 9/28/93 Tr. at 86.) She testified that she "dove two of the sites where the installation had occurred" and observed recolonization of milfoil in those areas. (Id.) Her testimony thus supports WRB Finding #39. On this subject, the Appellant ANR characterizes Bove's testimony as being that she "observed fairly rapid recolonization of milfoil" in those areas. (ANR Mem. at 7.) But Bove's testimony itself was less ominous. She testified:

> We made observations this year [1993] to those areas that had had [bottom] barrier in '92 and it was removed at the end

> of the summer this year to assess re-colonization by natives and Eurasian Watermilfoil. I dove two of the sites where the installations had occurred and found that approximately ten percent of the areas that had been covered were being re-colonized by aquatic plants, Milfoil was one of those.

(Bove Test., 9/28/93 Tr. at 86.)

Bove's testimony thus indicates that the recolonization she observed involved several native aquatic plants, as well as milfoil, and affected only a portion of the two areas she surveyed. Her testimony does not support Appellants' claim that bottom barriers are ineffective in targeted areas. Indeed, Bove herself took issue with such an assertion, as the following exchange shows:

> Q [by Appellees' Attorney]: . . . [D]uring the summer of 1992, a series of bottom barriers and other items were used that were not effective, apparently, in preventing [milfoil] from growing even more for 1993?
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> A [by Bove]: I would disagree in part with that statement in that the areas where those methods were employed I think were effective at targeting populations of Milfoil, yet the[re] are many other areas of the lake that were not targeted with any method, and so Milfoil was able to continue to grow and spread.

(Id. at 89) (emphasis added).

The testimony of the Town's own witnesses provides substantial support for the WRB's finding that bottom barriers are effective at controlling small, dense patches of milfoil. As those witnesses made clear, such a finding is not incompatible with the WRB's other findings concerning the potential damage or high costs involved in using bottom barriers over large areas of the lake floor. Indeed, the WRB's findings do not suggest that bottom barriers can or should be used extensively on the floor of Lake Morey. The WRB simply found, based on the evidence before it, that targeted use of bottom barriers in certain areas can provide an effective means of controlling milfoil.

Appellants, however, argue that an "effective" nonchemical method is not

necessarily a "reasonable alternative" to chemical treatment if the cost of the nonchemical method greatly exceeds the costs involved in using bottom barriers. The court notes that the WRB received varying estimates of the costs involved in using bottom barriers. One written estimate showed a unit cost of $45,000 per acre treated. (Cost Estimates at 1.) Gerald Smith testified that bottom barriers cost "in the range of $40,000 per acre initially," with additional "heavy maintenance costs." (Smith Test., 9/28/93 Tr. at 25-26.) However, the DEC's Milfoil Study Committee, in its March, 1993 report, estimated the cost of bottom barriers at from $7,000 to $15,000 per acre treated, not including installation and removal costs. (Milfoil Committee Report at 21.) The Study Committee did not estimate the amount of the additional costs. (Id.) In addition, the WRB received only incomplete estimates for the total costs of each Garlon 3A treatment over the three proposed treatment years. (Smith Test., 9/28/93 Tr. at 28; Milfoil Committee Report at 13.)

Despite these variations, the evidence demonstrated that, on a per-unit basis over a specified treatment area, chemical treatment with Garlon 3A would likely be less expensive than treatment with bottom barriers. However, the WRB had to consider additional factors beyond a per-unit cost comparison between the two treatment methods. The WRB also had to consider, for example, the risks associated with each treatment method. The evidence showed that the only risk associated with bottom barriers is "if the material billow[s] and in so doing endanger[s] swimmers and boaters." (Exh. P-3C at 3.) This risk can be greatly reduced or even eliminated with proper installation and maintenance. (Id.) The risks of using Garlon 3A, however, are subject to intense debate, as the contested WRB hearing amply demonstrates. These risks are discussed in greater detail infra, in the discussion of risks to public health. The greater risk of using Garlon 3A imposes additional costs (e.g., public notifi-

cation before each treatment, prohibiting public use for a fixed time after each treatment, etc.) that are not reflected in a per-unit cost comparison.

The court therefore disagrees with Appellants' suggestion that the costs of alternative treatment methods can be evaluated separately from the public risks and public benefits associated with those methods. After reviewing the evidence, the court is satisfied that the WRB acted reasonably in finding that bottom barriers represent an effective nonchemical method of controlling milfoil, alone or in combination with other methods at various locations in the lake, in that there was substantial evidence to support the finding. A reasonable mind could accept the notion that the evidence was substantial enough to support the Board's finding. The WRB's findings concerning bottom barriers must stand.

2. Suction Harvesting (Findings #41-52)

The WRB found that, "[i]f properly operated, a suction harvester can remove watermilfoil plants, including roots from a lake bed, thereby controlling the milfoil infestation" (#41). The WRB found that a suction harvester was previously employed at Lake Morey during the summer of 1992 to control milfoil (#42). But the WRB also found that that particular machine, "a converted dredging machine which sucks plants from the lake bottom into a [surface] carrier," had two unforeseen side effects: first, it disturbed the bottom silt, which interfered with the visual targeting required for thorough mechanical harvesting; and second, it fragmented the milfoil plants, which led to re-rooting and recolonization of the milfoil (#43-45). The WRB found that, in the time since the 1992 suction harvesting operation at Lake Morey, a new suction harvester, which "incorporated certain design improvements over the harvester used in Lake Morey," had been constructed and operated at Hall's Lake in Newbury, Vermont, during the summer of 1993 (#46). This machine employed a

"fragment barrier/silt curtain system to prevent milfoil fragments and silt from passing into the other areas of the lake" (id.). The WRB found that the final results of the Hall's Lake harvesting operation would not be known until the summer of 1994 (#49). The WRB further found that suction harvesting posed a potential threat to the fish eggs and fry of large- and smallmouth bass if employed during spawning season (#50); that suction harvesting "is a slow and labor intensive method of harvesting watermilfoil plants" (#51); and that, based on the Town's estimates, suction harvesting would cost approximately $22,000 per year for a minimum of three years to control the milfoil infestation (#52).

Appellants now contend that WRB Finding #41 -- that a suction harvester "cam remove watermilfoil plants, . . . thereby controlling the milfoil infestation" -- is wholly unsupported by the evidence and wholly contradicted by the WRB's finding concerning the problems actually encountered during the 1992 suction harvesting operation at Lake Morey. Because the evidence showed that the 1992 operation at Lake Morey actually spread the milfoil infestation through plant fragmentation, and because the final results of the Hall's Lake suction harvesting operation were unavailable to the WRB, Appellants contend that the WRB erred in finding that suction harvesting represents an effective method for controlling milfoil.

Appellants are correct that the evidence supports the WRB's findings concerning the costs and potential harmful effects of suction harvesting. (Milfoil Committee Report at 12; Exh. P-2N at 2.) Gerald Smith testified that, "as the harvesters go along and collect the weeds, there are escaping fragments, and harvesting would only spread the plant." (Smith Test., 9/28/93 Tr. at 24-25.) Smith also testified that "[h]arvesting is not selective for milfoil," but rather "mows all the plants," so that

> [o]ftentimes, what happens with harvesters [is that] you give the Milfoil a competitive advantage. . . . [When you] [c]ut down the native plants [and] cut down the Milfoil, the actual Milfoil will canopy out and gains a competitive advantage.

(Id. at 64-65.) For these reasons, Smith concluded that "where we have a relatively small advanced pioneer [infestation] of Eurasian Watermilfoil, mechanical harvesting would not be recommended, it's just not recommended." (Id. at 24.)

But Appellants are incorrect concerning the sufficiency of the evidence about recent design improvements in suction harvesting equipment. The court finds that the WRB had sufficient evidence to make findings concerning the effectiveness of suction harvesting, in spite of the known hazards. This evidence concerned the 1993 suction harvesting operation at Hall's Lake in Waterbury, Vermont. An Appellee, Noel Gahagan Walker, first raised the subject of Hall's Lake in her direct testimony to the WRB. (Walker Test., 10/26/93 Tr. at 112.) Walker, a Lake Morey resident and member of the Town of Fairlee Planning Commission, testified that she had heard of the Hall's Lake harvesting operation during conversations with members of the Hall's Lake Association.[7] (Id. at 113.) Walker testified as follows:

> I am aware of the Hall's Lake Association and their use of a suction harvester that was very successful this past summer [1993]. My concern with Lake Morey is that this type of treatment and management of Milfoil needs to be continued to be explored. The Hall's Lake Association developed a suction harvester with the expertise of the divers that were used in Lake Morey the previous year. And they also used the suction harvester information that had been used in Lake Morey and redesigned the suction harvester to downsize it and create a machine that would work on pulling Milfoil.

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[7] Walker's testimony concerning these conversations was admitted without objection by any of the Appellants. On November 1, 1993, following the adjournment of the WRB hearing, the Town moved to strike Walker's testimony on the grounds of hearsay and unfair surprise. In its April 12, 1994, decision, the WRB denied the Town's Motion. WRB Decision at 2, n.1.

> I was, I guess, taken aback that the amount of money that was spent last, this past summer on Hall's Lake to essentially remove the Milfoil from their lake to the tune of about $12,000, [of which] [$]8,000 was the design of the machine itself, was a success. I asked are they planning to use it next summer. I was told that . . . they weren't planning to use it because it had removed the Milfoil that they had targeted.

(Id. at 112-13.)

To rebut this testimony, the Town recalled Ann Bove, who testified that she had "been working with the Hall's Lake Association on trying to battle the Milfoil growth in the lake since it was first discovered by DEC staff in August of 1991." (Bove Test., 10/26/93 Tr. at 184-85.) She testified that she was involved in the suction harvesting plan at Hall's Lake (id. at 185) and was aware of the design, construction, and use of a new suction harvester in Hall's lake in 1993. (Id. at 186.) According to Bove, the Hall's Lake suction harvester employs "a fragment silk curtain so that you're basically containing any Milfoil fragments within an areas and any sediment or silt that's created by the suction [de]vice within an area." (Id. at 218.) Bove testified, based on information provided to her by others, that this new suction harvester "has been successful in targeting dense [milfoil] infestation" in Hall's Lake. (Id. at 187.) But because Lake Morey is a "much larger lake" with a "much denser population of Milfoil" than was present on Hall's Lake in 1993, Bove concluded that the WRB should not withhold a permit for Garlon 3A in order to test the Hall's Lake harvesting machine on Lake Morey. (Id. at 188.)

Nevertheless, on cross-examination, Bove testified that "[i]t's not out of the question" to imagine using the Hall's Lake machine at the north end of Lake Morey, where milfoil growth is deemed "very abundant." (Id. at 190-91.) While Bove testified that it would not be appropriate to use suction harvesting alone to combat milfoil growth in Lake Morey (id. at 193), she admitted, under questioning by the WRB members themselves, that, in two of the three areas of

densest milfoil growth in Lake Morey, suction harvesting "is appropriate if it successfully removes the roots of the entire area." (Id. at 210.) Successful removal of roots depends on the type of substrate found in the targeted area, (id. at 204), with sandier and siltier sites being more amenable to suction harvesting. (Id. at 206.) Two of the three areas of densest milfoil growth in Lake Morey have a sand or silt substrate, with the third area having a "gravelly substrate type" in which suction harvesting is less effective. (Id. at 205-6, 208-9.) Bove expressed concern that the size and density of the infestations in these areas might thwart suction harvesting efforts because "[m]ilfoil is still growing and spreading in those areas while you're trying to control it with that method." (Id. at 210.) But if multiple suction harvesters were employed continuously over a sufficient time period in the targeted areas, the results "wouldn't be significantly different" from the results reported in Hall's Lake during the summer of 1993. (Id. at 210-11.) Bove further testified that, in a suction harvesting operation that successfully removed the plant roots as well as the plants, "the impact on Eurasian Milfoil would be equivalent for suction harvesting [as] with Garlon 3A." (Id. at 216.) Moreover, since the cost of constructing suction harvesters represents the major expense in a harvesting plan, then, unlike with Garlon 3A, an investment in suction harvesters would last for several years, rather than for just a single year. (Id. at 203.)

Bove's testimony concerning the suction harvesting operation at Hall's Lake formed the basis for the WRB's Findings #46-49.[8] In addition, Bove's

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[8] Appellant Richard Allen contends that Findings #46-49 "are the result of hearsay in the testimony of Noel Walker" that "were not reported by her as facts and were never substantiated." R. Allen Brief at 1. As noted in n. 8, supra, this claim was the subject of the Town's Motion to Strike, filed November 1, 1993 and denied by the WRB on April 12, 1994. See WRB Decision at 1, n. 2. No Appellant has made the WRB's denial of this Motion a ground (continued...)

testimony provided substantial evidence on the question of the general effectiveness of suction harvesters "[i]f properly operated," as the WRB stated in Finding #41. From this evidence, the court finds that the WRB acted reasonably in finding that suction harvesters "can remove watermilfoil plants, including roots from a lake bed, thereby controlling the milfoil infestation" (#41). Although final results of the Hall's Lake harvesting operation would not be known until the following summer, the WRB had sufficient evidence to find that a device similar in design to that used in Hall's Lake could provide an effective of means of controlling milfoil growth in two of the densest areas of milfoil infestation in Lake Morey, while reducing or eliminating the problems associated with the 1992 Lake Morey harvesting operation. The evidence showed that such a device, if used in the target areas, represented a control method "equivalent" in its effectiveness to the proposed chemical treatment. Because there was substantial evidence to support the WRB's findings with respect to suction harvesting, these findings must stand.

3. Manual Harvesting ("Hand-Pulling") (Findings #53-55)

The WRB found that "[h]and-pulling is an effective, selective, but labor-intensive means of controlling watermilfoil" (#53). "Hand-pulling has been utilized in Lake Morey for the purpose of attempting to control the watermilfoil infestation of scattered density" (#54). The WRB found, however, that "handpulling has not successfully controlled the spread of watermilfoil in other areas, particularly in the northern end due to the murky conditions of the lake bottom, plant density and large areas of infestation" (#55).

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[8](..continued)
for the present appeal. But, even assuming arguendo that Appellant Allen's claim could be characterized as an appeal from the WRB's denial of the Town's Motion to Strike, the court's review of Ann Bove's extensive testimony concerning the Hall's Lake project amply demonstrates that Appellant Allen's claim is groundless.

Appellants acknowledge that "[h]and-pulling would only be effective in areas where the milfoil infestation is of scattered density and the overall area is not too large." ANR Mem. at 6. But Appellants contend that the limited effectiveness of hand-pulling renders it an unreasonable alternative to chemical treatment. Id. at 6-7; see also Town Mem. at 8-9; LMPA Brief at 4; Scott Brief at 3.

The record reveals substantial evidence to support the WRB's findings concerning the effectiveness of hand-pulling in areas of scattered milfoil density. See, e.g., Milfoil Committee Report at 23 (hand-pulling is "most effective on newly established populations that are scattered in density"); Smith Test., 9/28/93 Tr. at 55 ("where the Milfoil is very sparse . . . you can hand-pull or you suction harvest it"). Ann Bove testified that hand-pulling is not one hundred percent effective

> in that you have to repeatedly go back and check . . . your hand-pulling to try to remove stem portion as well as root portion of the plant, and there's always a chance that you miss a part of the root or part of the stem and then that's left within the area to become reestablished.

(Bove Test., 9/28/93 Tr. at 111.) Nonetheless, Bove testified that, between May, 1993 and September, 1993, she observed a decline in milfoil infestation in an area of Lake Morey that had a "scattered rating [of] one to five percent Milfoil." (Id. at 110-11.) Bove testified that this decline "is a direct result of hand-pulling of Milfoil plants in that area." (Id. at 111.)

Given that Appellants do not dispute the effectiveness of hand-pulling in areas of scattered milfoil density, and based on substantial evidence in the record, the court finds that the WRB's findings with respect to hand-pulling are reasonable and must stand.

4. Weevils (Findings #56-67)

The WRB found that "[t]he use of insects, especially a native weevil

(Euhrychiopsis lecontei), may be an effective means of controlling Eurasian watermilfoil infestations, although no conclusive data have been generated at this time to determine just how effective this control may be" (#56). The WRB found that studies have shown "that the weevils have a highly selective appetite for watermilfoil, especially for larger and healthier plants" (#58); the WRB also found that the weevil "pupates inside the stem" of watermilfoil and that "[l]arvae burrow through the stem and hollow out the vascular tissue of the stem," thus causing the plant to sink to the bottom of the lake or pond and die (#59). The WRB found "evidence that resident weevils played a major role in the reduction of watermilfoil" in Brownington Pond in Brownington, Vermont, between 1986 and 1989 (#57). The WRB further found that researchers "were very successful at reducing watermilfoil through the use of weevils under controlled conditions" at Norton Brook Pond in Bristol, Vermont, in 1992 (#61). However, at Sunrise Lake and Lake Iroquois, the WRB found that, despite the presence of weevils in both lakes for a number of years, watermilfoil continues to spread at a rapid rate in those lakes (#67); based on these experiences, the WRB found that "it is not known whether watermilfoil must reach some peak biomass rate before weevils will have any effect upon its growth" (id.). The WRB also found that "weevils occur naturally in Lake Morey," having been discovered there during the milfoil survey in September, 1993 (#66). Although the results of weevil experiments at Norton Brook Pond and Lake Bomoseen were not expected until the summer of 1994 (#62, 64), the WRB found that "[p]reliminary results on the use of weevils to control watermilfoil are promising" (#64).

Appellants now contend that the results of weevil testing are not "promising," but rather are premature and inconclusive; that, however one interprets the current evidence, weevils are not presently an effective control

method; and that the WRB acted unreasonably in considering weevils as an available alternative.

The WRB received substantial evidence concerning the use of weevils to control milfoil. See e.g., Milfoil Committee Report at 20; and Exh. A-50, "The Potential for Biological Control of Eurasian Watermilfoil (Myriophyllum spicatum)" (Middlebury College, Dept. of Biology, April 1, 1993). In addition, Holly Crosson, an aquatic biologist and Coordinator of the DEC's Eurasian Watermilfoil Control Program, provided extensive testimony concerning the results of weevils observations and experiments in Vermont since 1990.

Crosson testified that the DEC since 1990 has conducted a weevil project, called the Lake Bomoseen Demonstration Program, with funding support from the U.S. EPA. (Crosson Test., 9/29/93 Tr. at 6.) This project began when Crosson and Ann Bove observed a decline in milfoil infestation in Brownington Pond in Brownington, Vermont, in 1989. (Id. at 13-14.) A 1986 DEC survey "found Eurasian Watermilfoil to be growing in very, very abundant beds around the pond." (Id. at 13) But in 1989, Crosson, said, she and Ann Bove "went up to do another aquatic plant survey, and when we got there, we did not find much Milfoil at all." (Id.) They did, however, find weevils occurring naturally in the pond (id. at 16) and using milfoil as a food source. (Id. at 17, 20.)

During three years of observation and sampling, researchers found that the milfoil was declining even as "the native aquatic plant community rebounded like crazy." (Id. at 14.) The researchers were thus able to rule out certain causative factors, such as an illegal chemical herbicide application (id. at 64-65) or a nutrient deficiency in the sediment or in the water column (id. at 14, 15), which would have damaged all aquatic vegetation equally. From their work, Crosson testified that the researchers

> have determined that the weevils did play some role . . . and potentially, a major role, but how major, we don't

> know. There may have been other factors that came into play. One possibility is there is a fungus that is very pathogenic to Milfoil called Mycoleptodiscus terristris, MT for short. And MT was found to be occurring in Brownington Pond. . . . What we suspect may have happened is if the weevils caused enough damage to the Milfoil to stress the plants, then maybe this fungus could have helped cause the decline. We don't know for sure.

(Id. at 15.)

Crosson testified that weevils prefer Eurasian Watermilfoil over native watermilfoil as a food source. (Id. at 19.) Crosson also testified that female weevils lay their eggs inside the stems of milfoil plants for "pupation, which is the life stage in between a larv[a] and an adult." (Id.) One female weevil raised in the DEC laboratory laid approximately 462 eggs over a five-month period, with an 87% hatch rate. (Id. at 18-19.) For pupation purposes, weevils actually prefer "[l]arger [milfoil] plants with very healthy growing tips." (Id. at 20.) Crosson summarized the resulting effects:

> The adults bite the stem, feed on the leaves. The larvae actually burrow through the stem and hollow out the vascular tissue in the stem. . . . [T]he way Milfoil grows, it has . . . a long Milfoil stem with chambers in it, those chambers are filled with air and that is what allows a Milfoil plant to remain buoyant. . . . And what the larvae do is actually burrow, they start at the tip and burrow down through, and actually hollow out the stems. So, what happens is the stem is not able to remain buoyant; air leaks out of the stem. . . . [A]quatic plants take in nutrients or they can take in nutrients from the sediment, and the nutrient[s] are translocated up through the plant So, you need a good intact plant in order for that function to happen. And what we think happens, when the larvae disturb that whole system and hollow it out, is that that is disrupted as well. So, the plants just gradually become in worse and worse shape. And the big question is does that allow -- at that point, could other things take over, different pathogens that may be present, [which] further attack the plant and cause it to decline. . . . [B]ut there's no question that weevils do very significant damage to Milfoil, just by their feeding and burrowing activity.

(Id. at 21.) The available evidence also shows that, as the milfoil infestation declines, the weevil population declines in response. (Id. at 17, 20.)

Crosson noted, however, that "[w]eevils will not eradicate Milfoil." (Id. at 28.) Milfoil plants damaged by weevils

> still had a root system, but it was not as good as the nondamaged plants. We do know that [the weevil] doesn't eradicate Milfoil. And in all the instances, you know, from the Brownington Pond example, Milfoil does come back, but they are still able to -- it's never come back to the point where it was [in Brownington Pond] in '86.

(Id. at 36.) Still, Crosson explained, "to give you an idea, there was approximately 45 acres of Milfoil, that's real approximate, [in Brownington Pond] in '86, and there's less than two acres now." (Id. at 37.)

Crosson testified about ongoing controlled studies at Brownington Pond. (Id. at 23.) She described an experiment in which six areas of milfoil infestation were enclosed in plastic columns that "were pinned into the sediment and went all the way up to the surface." (Id.) Three of these columns had weevils introduced into them, while the other three "were controls, meaning no weevils were added." (Id.) The three columns containing weevils showed a "50% reduction in Milfoil within five weeks" (id.), while "the Milfoil was fine in the nonweevil-added enclosures." (Id. at 24.) Crosson testified that the next phase of the experiment involves introducing 5,000 weevils into Brownington Pond "just free," i.e., without enclosures or a control group (id.); and that results from these tests would be available by the end of July, 1994. (Id. at 44.)

However, Crosson testified that the preliminary success at Brownington Pond is somewhat offset by the contrary results from Sunrise Lake and Lake Iroquois, two lakes that "do have weevils, [but] no control methods," and where "Milfoil is spreading at a rapid rate." (Id. at 32.) As Crosson explained:

> [i]n all of the cases where we have seen Milfoil declines in Vermont -- and again, Brownington is really the only one where we can attribute, at least in part, the decline to the weevils, of the eight lakes where we've seen Milfoil decline and there are weevils, in all of those

> instances, but one, Milfoil has been very, very dense. You know, abundant to very abundant in most areas of the shoreline before a decline occurred.

(Id.)

Crosson testified that the weevil project has expanded its field research to include Lake Memphremagog (id. at 17), Lake Bomoseen (id. at 22), and Norton Brook Pond (id. at 23.) She also testified that the DEC hatched 10,000 weevils at its Waterbury laboratory in the summer of 1993. (Id. at 8, 42.) Crosson described herself as "optimistic" concerning the possibility of weevils as a method of controlling milfoil in Vermont. (Id. at 24.) "I do feel that they represent a good possibility or we wouldn't be continuing with the study," she said. (Id.) In addition, she testified that there has been a good deal of interest and attention on the part of the press (id. at 25), the scientific community (id.), the lakes' community (id.), and funding agencies. (Id.)

Nevertheless, Crosson concluded that weevils "are not a reasonable alternative at this point in time" in Lake Morey. (Id. at 7.) She based her conclusion on three facts: first, that conclusive data on the effectiveness of weevils are not presently available (id. at 8); second, that the DEC's weevil project is presently restricted by its funding source to implementation first in Lake Bomoseen (id.); and third, that sufficient numbers of weevils are not presently available for widespread distribution to all 37 of Vermont's large lakes where milfoil infestations have been found. (Id. at 8-9.)

After reviewing the existing administrative, scientific, and fiscal constraints on introducing weevils into Lake Morey, Crosson was asked by the WRB members to evaluate the wisdom of delaying the milfoil control program until weevils are available. She responded:

> Just seeing the urgency of this situation [at Lake Morey], knowing how Milfoil can spread, it would be taking a big risk, in my opinion, doing something like that. . . . I don't mean to downplay my optimism for the

> weevils, but it's just simply not an alternative right now. . . . [W]hen I look at a Milfoil control method, I want to pick something that has a good chance of succeeding. And right now, I would just feel more comfortable banking on other things rather than weevils. I'm very optimistic, but it would be taking a big risk doing something like that.

(Id. at 43-44.)

Crosson noted that naturally-occurring weevils were found in Lake Morey in September, 1993. (Id. at 9.) But the fact that the milfoil infestation on Lake Morey is less dense than the infestations found on Lake Bomoseen (id. at 7) or Brownington Pond (id. at 32) means, with respect to Lake Morey, that Crosson "would expect Milfoil to continue to spread quite rapidly, even though weevils are there, and even if we put more in." (Id.) Because milfoil declines associated with weevils have almost all occurred in very dense, very abundant milfoil infestations, Crosson testified that

> my concern would be that that would happen here [in Lake Morey] also if nothing else were done. It's certainly conceivable that the scenario would be [that] Milfoil would spread [to] that point, and maybe the weevils would do something, maybe they wouldn't.

(Id. at 33.)

Crosson testified that milfoil infestation would continue to spread even if nonchemical control methods, such as bottom barriers, suction harvesting and hand-pulling, were used in conjunction with weevils in Lake Morey. She testified that

> anywhere where you're doing a control method where you're removing or damaging Milfoil, the weevils aren't going to do well. I do think that if Garlon is not used, and only hand pulling and bottom barrier are the methods that are targeting Milfoil, that it's going to be extremely difficult to keep up with the growth of Milfoil. I would expect it to spread, and therefore, there would be lots of healthy, robust Milfoil plants around that weevils could live and survive on. Whether they could actually control that Milfoil, I don't know, but there certainly would be lots of nice healthy Milfoil plants around for them to live on.

(Id. at 63.)

From the foregoing review of Holly Crosson's extensive testimony on the subject of weevils, the court concludes that the WRB had substantial evidence to support its Findings #57-68. These findings rest squarely on the facts provided in Crosson's testimony.

A closer question for the court is the reasonableness of WRB Finding #56, that weevils "may be an effective means of controlling Eurasian watermilfoil infestations." Holly Crosson's testimony amply demonstrates that weevils are not a control method that is currently available for use in Lake Morey. But Finding #56, unlike the WRB's findings for other nonchemical control methods, was not stated as a certainty. The WRB recognized the present uncertainties about the weevils' future availability and effectiveness. However, after reviewing the current state of knowledge of weevils, the WRB chose to view these uncertainties with optimism. The court finds that Holly Crosson's testimony concerning the early results of Vermont's weevil project justified the WRB's optimism. But Crosson's testimony also reflected the more cautious view that, without in any way downplaying the successful preliminary results, she was not able to state with scientific certainty that weevils would fulfill the early promise they had shown.

The question for the court, then, is whether the WRB was reasonable in giving greater weight to Crosson's factual testimony than to her opinion testimony about future uncertainties. As a general matter, the weight of evidence and its persuasive effects are matters for the exclusive determination of the trier of fact. Beyel v. Degan, 142 Vt. 617, 620 (1983). A reviewing court should guard against the temptation to substitute its personal judgment for that of an administrative body authorized by the legislature to make decisions in the first instance. This is especially true where the

administrative body is deciding matters within its areas of expertise, in which case the reviewing court will defer more readily to the administrative body's decisions. Town of Sherburne, 154 Vt. at 607. In the instant matter, the court finds substantial evidence in the record to support the WRB's finding that weevils "may be an effective method" for controlling milfoil. The tone of the finding reflects the WRB's tentative, cautious optimism about future prospects for a role for weevils, without expressing any confidence in them as currently reliable, and the factual evidence supports this position. That the WRB made such a finding in spite of expert opinion testimony to the contrary was not an abuse of discretion. See Sherman Hollow, Inc., 160 Vt. at 628 (affirming Environmental Board's finding of fact, despite conflicting evidence in record, in deference to the Board's "specialized knowledge in the environmental field"). The WRB's findings with respect to weevils must stand.

5. Summary

After reviewing the entire record below, the court concludes that the WRB's findings with respect to each nonchemical control method were reasonable and supported by substantial evidence. The WRB found that bottom barriers could be effective in killing small, dense patches of milfoil; that suction harvesters are an appropriate means of controlling "very abundant" densities of milfoil; that hand-pulling is an effective method of controlling an infestation of "scattered density"; and that weevils may provide an effective method for controlling milfoil in areas from common to very abundant densities. The court has reviewed the evidence in support of each of these findings. Based on this evidence and the court's conclusions concerning these findings, the court also concludes that WRB summary Findings #69 and #133 were reasonable. There is substantial evidence in the record to support a finding that "[t]he implementation of one or more nonchemical control methods, alone or in

combination, can control the infestation of milfoil in areas of contiguous occasional, common, abundant and very abundant densities" (Finding #69). The WRB analyzed the alternatives in relation to the different areas of density throughout the lake and determined that alternatives existed for each type of growth area. Therefore, the WRB's conclusory finding is supported by the more specific findings as to each alternative method. Thus, there is substantial evidence to support the overall finding that "there are reasonable nonchemical alternatives for controlling milfoil" (Finding #133). Because the court finds substantial evidence to support the WRB's findings, these findings must stand.

B. Negligible Risk to Public Health: 10 V.S.A. § 1263a(e)(3)

The WRB found that "there is more than a negligible risk to public health from exposure to [Garlon 3A] through drinking water and several water-based recreational activities" (Finding #34). As grounds for this finding, the WRB found that Lake Morey serves as a public drinking water supply for some households (#96). The WRB found that Garlon 3A degrades in an aquatic environment primarily by sunlight (#24). However, the depth at which sunlight loses sufficient intensity to degrade Garlon 3A is unknown (#25); and cool temperatures, such as those found in Lake Morey's waters in late May and early June, may slow Garlon 3A's photodegradation (#26). The WRB thus found that Garlon 3A may not degrade in Lake Morey and may enter the domestic water supplies of lakeshore and downstream residents (#97). The WRB also found that, "[d]uring the application and post-application period, persons might come in contact with Garlon 3A through swimming and other recreational activities" (#98).

The WRB found that a 1987 study by the California EPA "showed possible adverse effects of triclopyr, such as increased kidney weight in males at two years, while all other available studies showed no adverse effects (#117). The

WRB found, however, that the majority of available studies of Garlon 3A were animal studies that made "extrapolations cross-genus" to humans "without substantiation of the accuracy of these extrapolations" (#118). The WRB found that the "safe level" of Triclopyr in drinking water is 0.5 ppm (0.5 mg per liter) (#114). The Town proposes to apply Garlon 3A at an application rate of 1.5 ppm in treatment areas greater than one acre in size and at a rate of 2.0 ppm in treatment areas approximately one acre in size (#27). The application of Garlon 3A in Lake Morey meets the standard of "negligible risk" through "the imposition of certain restrictions on the use of the lake during and following chemical treatment" (#124). If, following an application of Garlon 3A, a concentration level of 0.5 ppm were found in a public water supply, the Department of Health would go door-to-door to notify the public of the "possibility of liver and kidney toxicity" and to warn the public not to drink the water (#135).

Appellants contend that the evidence does not support the foregoing findings. Specifically, Appellants argue that the testimony of their expert witnesses contradicts these findings and was unrebutted by any competent expert testimony from Appellees.

The court has reviewed the entire record below and finds substantial evidence to support the WRB's findings with respect to more than a negligible risk to public health.

As an initial matter, Appellant William Scott contends that Findings #96 and 97 are in error because "[n]o one uses lake water [from Lake Morey] as their only source of drinking water." Scott Brief at 2. However, Appellant Kern McCarty, who resides with his family on the western shore of Lake Morey, testified that he and his family draw their drinking water supply from Lake Morey. (K. McCarty Test., 10/29/93 Tr. at 152.) McCarty acknowledged that his

1985 property deed granted him "the right, title and interest in and to a certain spring" located across the road from his residence, with the condition "that the water from said spring shall be used only for drinking purposes." (Id. at 151; Exh. P-12C at 1.) However, McCarty testified that the owners of the property on which this spring is located "subsequently redid their driveway and covered up the spring of which there is no access to it," so that "it is not a source of water for us at this point." (K. McCarty Test., 10/26/93 Tr. at 151.) The evidence showed that Lake Morey is the source of drinking water for McCarty and his family. Appellant Scott's claim therefore fails.

With respect to the WRB's other findings on this subject, the court finds that Appellants' own witnesses provided substantial factual support for those findings to which Appellants now object. Appellants presented two expert witnesses to testify about the public health risks involved in treating Lake Morey with Garlon 3A. Dr. Theodore Farber, a retired Chief Health Scientist for the U.S. EPA's Pesticide Programs, reviewed in detail the "standard risk assessment process" developed by the National Research Council and used by the EPA and other federal agencies to evaluate a chemical's risk to human health. (Farber Test., 9/28/93 Tr. at 139-44.) He then explained the method used to determine a chemical's "safe level of exposure to a human being." (Id. at 144-48.) For Garlon 3A, Dr. Farber testified,

> the EPA in its deliberations has established a safe level of Triclopyr in the water of a half part per million. That can be expressed in another way as 500 micrograms in a kilogram of water or in a liter of water, which is slightly more than a quart. So we're talking about a half milligram of the material in a quart of water is considered to be the safe level of exposure.

(Id. at 146) (emphasis added).

Dr. Farber then testified that "the proposed treatment of the lake and the proposed process will result in a level, after two weeks of prohibition in

regards to drinking water from the lake, of a level of .005 parts per million or less." (Id. at 147) (emphasis added). Dr. Farber testified that Garlon 3A "might very well be dangerous" if applied to a water supply "in an uncontrolled manner," but that

> here in this situation, you have a controlled situation. People will know that the material [] has been added to the water supply and will be told not to drink the water for 15 days of the month. So, it's controlled.

(Id. at 161.)

Appellants' second expert witness, Dr. William Bress, explained the particular dangers involved in using Garlon 3A and the reasons for requiring a prohibition on the post-treatment use of the lake water. (Bress Test., 9/29/93 Tr. at 82-96.) Dr. Bress, the State Toxicologist for the Vermont Department of Public Health, testified that "Garlon 3A can cause some acute eye irritation" (id. at 82); that "there might be some minor skin toxicity" if Garlon 3A were applied in its pure form directly to the skin (id.); that a woman who "wished to commit suicide" died after drinking "half a bottle of pure Garlon 3A" (id. at 81); and that, "based on animal studies, [there] would be the possibility of liver and kidney toxicity" (id. at 96). Dr. Bress's testimony comported with the documentary evidence submitted to the WRB concerning Garlon 3A's health risks. This evidence showed that Garlon 3A "[m]ay cause severe eye irritation with corneal injury"; that ingestion of Garlon 3A "may cause gastrointestinal irritation or ulceration"; and that "[e]xcessive exposure may cause liver and kidney effects." (Exh. A-54, "Material Data Sheet: Garlon 3A," DowElanco, June 8, 1990, at 1.) DowElanco, Garlon 3A's manufacturer, warned: "Do not contaminate domestic water supplies or water used for irrigation." (Id. at 2.)

Based on these health concerns, Dr. Bress testified that

> if Garlon 3A was just going to be applied in the lake with no conditions, no water tolerances, no restrictions[,] that wouldn't be acceptable to the Health Department.

(Bress Test., 9/29/93 Tr. at 83.) This conclusion led to the following exchange with Appellants' Attorney on redirect examination:

> Q [by Appellants' Attorney:] [B]ased on what you've said in this decision, it's your opinion that .5 parts per million in a public water system would not cause anything greater than negligible risk to public health?
>
> A [by Dr. Bress:] Not quite. .5 parts per million is an action level[.] [T]hat and above, you would have to wait two weeks.

(Id. at 100-1) (emphasis added).

According to Dr. Bress, therefore, a concentration of Garlon 3A of 0.5 ppm or more represents a greater than negligible risk to public health, requiring "action" to reduce the risk. Another of Appellants' expert witnesses, Gerald Smith, testified that Garlon 3A would be applied to Lake Morey in a concentration of 2.0 ppm in some areas, and that it was possible that a concentration level greater than 2.0 ppm would be present in the lake, "based upon dispersion and mixing of the herbicide with the treatment area." (Smith Test., 9/28/93 Tr. at 35-36.)

Dr. Bress testified that, if Garlon 3A were present in a public water supply at "the application concentration," the Department of Health would issue a public "Do Not Drink" notice, "[b]ecause the concentrations exceed the EPA tolerance for potable water." (Bress. Test., 9/29/93 Tr. at 94-95.) By contrast, if a chemical substance posing a negligible risk to public health were found in a public water system, Dr. Bress

> would send them [i.e., the public] a copy of the lab report just to show them what was in their water, but we don't issue them a notice not to drink it.

(Id. at 102) (emphasis added).

Finally, Dr. Bress testified that, to be certain there is a negligible risk to public health following treatment with Garlon 3A, persons using water

from Lake Morey for domestic purposes should curtail such uses until the concentration of Garlon 3A drops below 0.5 ppm; and "if it's feasible for the people drinking the water to wait until the chemical disappears completely, that's great." (Id. at 104.)

According to the U.S. Department of Agriculture, "[r]apid photodegradation is the major means by which triclopyr is degraded in aquatic environments." (Exh. A-14, "Pesticide Background Statements, Vol. I: Herbicides," U.S. Dept. of Agriculture, undated, at T-3.) Appellees presented two expert witnesses to testify that "rapid photodegradation" of Garlon 3A may be hindered by conditions found in Lake Morey. Jeffrey Parsons, a consulting ecologist and adjunct instructor in Ecology at the University of Vermont, testified, based on his review of photodegradation studies of Garlon 3A, that "th[ose] studies were all conducted at 25 degrees [C]entigrade, and that amounts to about 80 degrees Fahrenheit." (Parsons Test., 9/29/93 Tr. at 253.) His testimony is supported by the documentary evidence submitted to the WRB. (Exh. A-45, Woodburn, et al., "The Aquaeous Photolysis of Triclopyr," 12 Envtl. Toxicol. Chem. 43 (1993), at 43, 45, 46, 48, 49, 54; Exh. A-14 at T-24.) But the Garlon 3A treatment proposed for Lake Morey would occur in late May and early June, when "the temperature [of Lake Morey] will probably be closer to 55 or 60 degrees [Fahrenheit]." (Parsons Test., 9/29/93 Tr. at 253.) From Parsons's "fairly extensive understanding of the effects of temperature on photolysis and photodegradation of Garlon 3A," Parsons concluded that "[t]he photodegradation could be decreased substantially in cooler temperatures." (Id. at 254.)

In addition, Linden Witherell, an Environmental Officer of the U.S. Public Health Service assigned to the Vermont Department of Health, testified that photolytic breakdown requires sunlight. (Witherell Test., 9/29/93 Tr. at 201.) Lake Morey, however, supplies drinking water to wells around the shore, and

> there is certainly the possibility that there is recharge from the lake to those wells. There may be what is called groundwater under the direct influence of surface water. . . . You certainly won't have sunlight in the groundwater, and the rapid breakdown products which are associated with photolysis will not occur.

(Id. at 201-2.)

Finally, Appellants' expert, Gerald Smith, testified that a lack of sunlight, as on an overcast day, "may have an impact" on photodegradation. (Smith Test., 9/28/93 Tr. at 36-37.) Smith also testified that "it's possible, but I don't believe it's probable," that dying milfoil plants containing Garlon 3A would sink so deep into the lake that the Garlon 3A would not be degraded by sunlight. (Id. at 44-45.) However, Smith concluded that such concerns would not affect his recommendation to apply Garlon 3A to Lake Morey. (Id. at 37.)

From the foregoing review of testimony and evidence contained in the record below, the court finds that the WRB's findings are supported by substantial evidence. Contrary to Appellants' assertions, the testimony of Dr. Farber and Dr. Bress was not that Garlon 3A poses a negligible risk to public health; rather, it was that Garlon 3A, at its proposed application concentration in Lake Morey, poses a greater than negligible risk that is only reduced through the imposition of certain restrictions on the domestic and recreational uses of the lake water for a period of time until the concentration level of Garlon 3A falls below 0.5 ppm. The evidence showed potentially serious health effects from exposure to Garlon 3A at concentrations 0.5 ppm and above. Moreover, the WRB heard substantial evidence that the "photodegradation" of Garlon 3A may be hindered by the depth of Lake Morey; by the penetration of lake water through "recharge" groundwater into wells for drinking water; and by the cool temperatures found in Lake Morey at the proposed treatment times. There is therefore substantial evidence to support the WRB's finding that "there is more than a negligible risk to public health from exposure to" Garlon 3A.

Because the court finds substantial evidence to support each of the WRB's findings with respect to the risks to public health posed by Garlon 3A, the court concludes that the WRB acted reasonably in making these findings and that these findings must stand.

C. Public Benefit from Application of Garlon 3A: 10 V.S.A. § 1263a(e)(5)

The WRB found that "[t]he control of Eurasian watermilfoil infestation at Lake Morey . . . is a public benefit" (Finding #132). In support of this finding, the WRB found that the density of the milfoil infestation "has a detrimental effect on some recreational uses of some portions of the lake" (#126), including fishing (#127), boating and waterskiing (#128), and swimming (#129). The WRB also found that the recreational impediments "indirectly but adversely affect the value" of residential and commercial lakeshore real estate (#130); and that, by outcompeting native plants, milfoil "may adversely affect wildlife habitat and the natural resource value of the lake" (#131).

The WRB heard extensive evidence concerning the negative recreational and economic effects of milfoil on Lake Morey. Edwin Leach, the owner of 1200 feet of lakefront property on Lake Morey, testified on behalf of Appellants concerning the substantial negative impact that the milfoil infestation has had on fishing, swimming and boating in Lake Morey. (Leach Test., 9/29/93 Tr. at 123-24.) Leach also testified that he has been unable to sell his properties because of the milfoil and that his family faces severe economic hardship unless the infestation is brought under control. (Id. at 123-25.) Blakeney Bartnett, a real estate broker in Fairlee, in her testimony on behalf of Appellants, underscored the negative economic effects of milfoil on real estate values around Lake Morey. (Bartnett Test., 9/29/93 Tr. at 117-18.)

Donald Weaver, an owner of lakefront property on Lake Morey, testified

about his personal experiences while swimming and boating in the lake. Weaver testified that, while swimming in Lake Morey, he became "entrapped" in the "fingers that protrude out of the Milfoil" and had to "push [my] hands on the top of the weed, push it down and pull [my]self through." (Weaver Test., 9/29/93 Tr. at 164-65.) He testified that he believes the milfoil is life-threatening to swimmers. (Id. at 165.) He also testified that, while he was towing two canoes behind his motorboat in Lake Morey, his boat engine became entangled in milfoil, stopping the engine. (Id. at 166.) Weaver testified that he was forced to float to shore, untangle the milfoil from the engine, and "paddle the whole convoy, so to speak, out beyond the Milfoil before we could start the engine again." (Id. at 167.)

From the foregoing testimony, the court finds substantial evidence to support the WRB's findings concerning the negative effects of milfoil on the use of Lake Morey. The court concludes that the WRB acted reasonably in finding that "[t]he control of Eurasian watermilfoil at Lake Morey is . . . a public benefit." The WRB's findings must stand.

IV.

Appellants' next claim is that the WRB's conclusions of law are not supported by its findings of fact. The court, when hearing an appeal from an administrative board, "must defer to the Board . . . when its conclusions are rationally derived from its findings and based on a correct interpretation of the law." In re Southview Associates, 153 Vt. 171, 178 (1989); see Sherman Hollow, Inc., 160 Vt. at 628.

The WRB concluded that Appellants had failed to demonstrate: that there are no reasonable nonchemical alternatives to Garlon 3A, as required by 10 V.S.A. § 1263a(e)(1); that the risk to public health from the application of

Garlon 3A in Lake Morey is negligible, as required by 10 V.S.A. § 1263a(e)(3); and that the use of Garlon 3A results in a public benefit, as required by 10 V.S.A. § 1263a(e)(5). The court reviews these conclusions seriatim.

A. Reasonable Nonchemical Alternatives

From its findings with respect to nonchemical alternative control methods, the WRB concluded that there are reasonable nonchemical alternatives to Garlon 3A for treating milfoil in Lake Morey. WRB Decision at 24. The WRB acknowledged that "[s]ome of the control measures historically used at Lake Morey have been only partially successful in removing watermilfoil from certain sections of the Lake." Id. But the WRB also noted that even Appellants agreed that "no measure, including the use of Garlon 3A, will completely eradicate milfoil." Id. Based on its findings, the WRB concluded that

> hand-pulling, the use of bottom barriers, and targeted harvesting with one or more improved suction harvesting devices, combined with waiting for the results of weevil studies, are reasonable, nonchemical alternatives to the use of Garlon 3A available for the treatment of watermilfoil at Lake Morey.

Id. at 28.

Appellants contend that the foregoing conclusion of law is at odds with the WRB's findings of fact concerning the problems encountered with each nonchemical control method and the ineffectiveness of each method in certain growth areas in the Lake. Given the limited effectiveness, operational difficulties, and high costs associated with the use of some of the particular nonchemical control methods in Lake Morey, Appellants argue that such methods, whether used alone or in combination, do not represent a "reasonable alternative" to the use of Garlon 3A, and that therefore the Town demonstrated that there was no reasonable nonchemical alternative.

The court has already addressed, supra, Appellants' assertion that the

problems and costs associated with a nonchemical control method made it unreasonable for the WRB to find that each such method was "effective." The WRB made findings that delineated, with respect to each alternative method, its advantages and disadvantages, its range of effectiveness, its cost factors, its design problems, its operational issues, and its projected measure of success as compared to Garlon 3A. Based on the substantial evidence available to the WRB and its extensive findings, there is no inconsistency in the WRB's findings that particular nonchemical control methods can be "effective" in certain defined areas within the lake, in spite of certain operational problems or high per-unit costs associated with such methods. The fact that a particular non-chemical control method presents problems that limit its effectiveness in certain growth or density areas, or that the method involves higher per-unit costs than Garlon 3A, does not render use of that method unreasonable, any more than it renders that method ineffective. The determination of whether a particular method is reasonable does not turn upon a single attribute or measure of utility or value. Rather, the WRB's task was to assess the reason-ableness of nonchemical alternative control methods from all the circumstances. The WRB did so by analyzing individual methods, and it went further and considered whether the aggregate use of different methods, applied selectively to different areas of the lake depending on the size and density of local areas of milfoil growth and substrata soil conditions, presented a reasonable nonchemical method of control. It also viewed "reasonableness" in the light of what level of effectiveness could be expected from the use of Garlon 3A.

The question before the court is whether the WRB, having determined the facts as it found them and applying this type of analysis to them, could reasonably have concluded that the Town had failed to demonstrate that there is no reasonable nonchemical alternative available. The court holds that the

WRB's conclusion of law with respect to reasonable use of nonchemical alternatives, as that term is used in 10 V.S.A. § 1263a(e)(1), was rationally derived from the WRB's findings of fact. A reasonable mind would be satisfied that the conclusion has a sound basis in the facts as found. The WRB's conclusion must be affirmed.

B. Negligible Risk to Public Health

The WRB concluded that it was "not able to affirmatively find that there is negligible risk to public health in the use of Garlon 3A in Lake Morey as proposed by the permittee." WRB Decision at 29. Appellants contend that the WRB's decision was not based on the evidence but rather on "arguments that the results of the use of the chemical are unknown." Town's Appeal Memo at 11. In addition, Appellants contend that "[t]he only plausible explanation [for the WRB's conclusion] is that the Board incorrectly interpreted § 1263a(e)(3) to require a finding of something more than negligible risk." ANR's Appeal Memo at 15. Appellants argue that "[a] close examination of both the Board's findings and the evidence demonstrates that the Board's conclusion is apparently based not on whether the risk is negligible, but on whether there is any risk at all." Id.

The court has already reviewed the substantial evidence supporting the WRB's findings with respect to the health risks posed by application of Garlon 3A to Lake Morey at the proposed concentration levels. The evidence, including the testimony of Appellants' own experts, amply supports those findings of fact. The WRB did not interpret its statutory mandate incorrectly; rather, the WRB carefully considered substantial evidence, offered by parties on both sides of this contest, that demonstrated that application of Garlon 3A to Lake Morey at the proposed treatment levels would pose a greater than negligible risk to public health. The WRB did not impose the impossible standard of "no risk at

all." The findings demonstrate that the WRB was aware that the level of 0.5 ppm might be tolerable and therefore "negligible," but that there were findings that established that the level of Garlon 3A in the lake and in drinking water supplies could be up to 2.0 ppm and could degrade more slowly than the two weeks contemplated in the proposed restrictions on lake water use. In light of the substantial evidence that supports the WRB's findings and the reasonableness of the WRB's awareness of elevated levels of Garlon 3A in the lake beyond an acceptable "negligible" level, the court holds that the WRB's conclusions of law are rationally derived from those findings.

C. Public Benefit

The WRB concluded that it "is not able to affirmatively find that there is a public benefit to be achieved from the application of Garlon 3A in Lake Morey, as proposed by the permittee." WRB Decision at 31. In so concluding, the WRB departed from its finding of fact that "[t]he control of Eurasian watermilfoil infestation at Lake Morey . . . is a public benefit" (Finding #132). The WRB justified its negative conclusion, in spite of several positive findings of fact, on the ground that

> the determination of public benefit requires a weighing of many factors, not just those identified by the permittee. The Board must consider all of the factors previously discussed in addition to the merits of the particular pesticide application.

WRB Decision at 31-32.

Appellants contend that the WRB improperly interpreted 10 V.S.A. § 1263a(e)(5) by factoring the WRB's conclusions on 10 V.S.A. § 1263a(e)(1) and (3) into its determination of public benefit, rather than making an independent determination. According to Appellants,

> 10 V.S.A. § 1263a(e)(5) simply states that there must be a public benefit. This language does not require any consideration of the previous four criteria.

Town's Appeal Memo. at 13 (emphasis in original).

The court agrees. In the instant matter, section 1263a(e)(5) requires an applicant to demonstrate only that "there is a public benefit to be achieved from the application of a pesticide." 10 V.S.A. § 1263a(e)(5).

In construing statutes, the court must give effect to the plain meaning of the words chosen, and must read provisions that are part of the same statutory scheme in pari materia. In re Cottrell, 158 Vt. 500, 504 (1992). Ordinarily, the court will accept the construction of a statute made by the administrative body responsible for its execution. In re Petition of Twenty-Four Vermont Utilities, 159 Vt. 339, 361 (1992). However, a court need not defer to an agency's construction where the agency's decision is based on an erroneous interpretation of the statute. Harris v. Town of Waltham, 158 Vt. 477, 481 (1992); Vermont State Employees Ass'n v. State, 151 Vt. 492, 493 (1989); see Twenty-Four Vermont Utilities, 159 Vt. at 361.

In the instant matter, the legislature expressly provided that Appellants must demonstrate only that there is "a" public benefit to be achieved from the application of Garlon 3A; Appellants need not demonstrate that, taking all benefits and disadvantages into account and weighing their value, the net effect is to the public good. In construing 10 V.S.A. § 1263a(e)(5) to require a weighing of positive and negative factors, the WRB exceeded the scope of its statutory authority. This particular statutory criterion does not, by its terms, require such a weighing. It calls for "a public benefit" as one of five independent criteria that must be affirmatively met by the applicant. In this case, Appellants met their affirmative burden.

The court has found that the WRB did not err in finding as fact that there is a public benefit to controlling milfoil. The court has also upheld the WRB's findings of fact with respect to the effectiveness of Garlon 3A in

controlling milfoil. These findings satisfy the statutory requirement of 10 V.S.A. § 1263a(e)(5). Therefore, the WRB's contrary conclusion -- that Appellants have failed to meet their burden of demonstrating that there is a public benefit to be achieved from the use of Garlon 3A -- is not supported by the findings of fact. The WRB's conclusion cannot stand.

Accordingly, the portion of the WRB's decision which holds that there is no public benefit to be achieved from the use of Garlon 3A in Lake Morey must be stricken. "However, 'the case will not have to be remanded, as enough appears by the record to show what the judgment should be.'" Pecor v. Gen. Motors Corp., 150 Vt. 23, 27 (1988) (quoting Chaffin v. Bitinsky, 126 Vt. 218, 220 (1967)). The WRB's decision with respect to the other statutory elements, which the court affirms herein, are sufficient to sustain the WRB's order as a whole. Although the WRB's conclusion on this one criterion is reversed, the court upholds the WRB's conclusions that two of the five criteria were not established by Appellants.

V.

Appellants next claim that the WRB erred in its allocation of the burden of proof. Although the WRB claimed to be rendering judgment by a "preponderance of the evidence," Appellants claim that the evidence actually presented before the WRB substantially supported Appellants' position and so should have resulted in a decision favorable to Appellants. According to Appellants,

> the Town presented a substantial amount of evidence from highly qualified expert witnesses on each of the various statutory criteria in dispute. The contestants [i.e., Appellees] attempted to raise questions and expressed fears about the use of the chemical. They particularly questioned data gaps and expressed fears about inert ingredients. However, no evidence was presented by the contestants on these issues. While the contestants do not have the duty to provide greater evidence than the Town, they do have the obligation to meet the Town's evidence. In other words, the contestants' evidence must equalize the weight of the Town's evidence. Here, the Town's evidence

went unchallenged by the contestants.

Town's Appeal Mem. at 5-6 (citation omitted).

The court has already reviewed, supra, the substantial evidence submitted to the WRB that supported the WRB's factual findings on each statutory element in dispute. The previous discussion, however, addresses the quantum of evidence that a reviewing court must find in the record below in order to uphold the decision of the lower tribunal. In re Muzzy, 141 Vt. 463, 471 (1982). What Appellants take issue with here is the standard of proof that the WRB itself should have applied in the de novo hearing in rendering a judgment from the evidence presented therein.

In a civil case, the plaintiff must prove each element of its claim by a preponderance of the evidence. Neverett v. Towne, 123 Vt. 45, 47-48 (1962). This burden of proof comprises both the "burden of production" which shifts from the plaintiff to the defendant after the plaintiff produces competent evidence on each element of its prima facie case; and the "burden of persuasion," which remains with the plaintiff at all times and never shifts to the defendant. Black's Law Dictionary (6th ed.), at 196; see Town of Manchester v. Town of Townshend, 110 Vt. 136, 142-43 (1938). The Vermont Supreme Court has held that "[t]he burden of persuasion on factual issues before an administrative body 'is met by the usual civil standard of "a preponderance of the evidence."'" Muzzy, 141 Vt. at 472 (quoting McCormick, Evidence § 355, at 853 (E. Cleary ed. 1972)).

In this case, the WRB quite clearly stated that

> [p]ursuant to 10 V.S.A. § 1269, the Board is required to hear this matter de novo, in other words, as though no decision had been made by the Agency of the Natural Resources. The Town of Fairlee, the Permittee . . . has the burden of proof and must demonstrate to the Board by a preponderance of the evidence that it is entitled to an Aquatic Nuisance Control Permit under the standards of 10 V.S.A. § 1263a(e).

(9/28/93 Tr. at 9.) In light of this standard, however, the WRB also made the following observation:

> [T]he Town has the burden of a preponderance of the evidence to show that the four criteria that are before this Board today are met. The standards, however, are a severe standard to meet. Four criteria that there is no reasonable non-chemical alternative available, that there is an acceptable risk to the nontarget environment, that there is a negligible risk to public health, and that there is a public benefit to be achieved from the application of a pesticide are high standards that the Town must meet.

(Id. at 14.)

The court finds that the WRB used the correct standard of proof. The WRB acts not only as "a detached and impartial finder of fact," see Muzzy, 141 Vt. at 471 (referring to Labor Relations Board), but also as an administrative agency vested with broad power "to protect, regulate, and control the water resources of the state." Sherburne, 154 Vt. at 611. The WRB is to be given "some latitude in interpreting the legislation it is bound to implement." Id. In this case, the WRB viewed the statutory elements of 10 V.S.A. § 1263a(e) as providing "high standards that the Town must meet." Within the framework of these statutory elements, Appellants had to prove each element by a preponderance of the evidence. The WRB's articulation of the applicable standard of proof is proper within the framework of its responsibilities and authority as defined by the Vermont Supreme Court in Muzzy and Sherburne.

Appellants, however, contend that, even if the WRB articulated the correct standard, the WRB failed to apply that standard correctly. The court disagrees. As the court already discussed, supra, in reviewing the substantial evidence in support of the WRB's findings of fact, the record below does not support the contention that Appellants' experts unequivocally endorsed Appellants' position on each statutory element; or that Appellees' evidence was "based merely on expressions of apprehension by lay witnesses." Town's Appeal Mem. at 6. The

court need not review again the substantial evidence offered by both sides that the WRB relied on to render its findings of fact. The WRB weighed the evidence relating to each criterion and required the Town to meet the standard of proving that each criterion was met by a preponderance of the evidence. The court is satisfied that the WRB properly applied the correct standard of proof. The WRB found that Appellants had failed to meet their burden of proving each of the five statutory criteria by a preponderance of the evidence. The court sees no reason for disturbing the WRB's decision.

VI.

In their fourth claim of error, Appellants allege that the WRB demonstrated an arbitrary and unreasonable bias against the use of chemical methods to control milfoil. The court finds this assertion to be without merit. As this court has already discussed, the WRB was given a "broad delegation" of power by the Legislature "to protect, regulate, and control the water resources of the state in the public interest." Sherburne, 154 Vt. at 611. From its reading of the applicable statutory scheme, the WRB concluded that

> . . . the statutory scheme of 10 V.S.A. § 1263a dictates that the Board scrutinize applications for the use of pesticides in Vermont waters more stringently than other treatment measures. . . . The Legislature has expressed its intention that non-pesticide control measures are preferable to pesticides for use in controlling nuisance aquatic vegetation. . . . The Legislature has decided that pesticide use should be discouraged and approval should be granted only where there are no other reasonable, nonchemical alternatives available.

WRB Decision at 23-24, 32.

In light of the "deference [that] may be given to an administrative agency's construction of its own enabling legislation or regulations," Sherburne, 154 Vt. at 607, the court sees no error in the WRB's interpretation of its statutory mandate.

"The mere fact that a decision was rendered contrary to the wishes of a party does not denote bias." Sherman Hollow, 169 Vt. at 629. As the Court in Sherman Hollow stated under similar circumstances:

> [A]pplicant claims to show evidence of bias by raising many arguments that we have already addressed in this opinion. None of these issues shows bias because the Board's decisions were correct. Applicant also contends that several findings imply that the Board did not believe applicant. It is the Board's job to judge the credibility of witnesses, see In re Young, 134 Vt. 569, 571, 367 A.2d 665, 666 (1976), and findings indicating that the Board did not believe applicant do not demonstrate bias.

Id. Appellants' claims in the instant matter require a similar result.

VII.

Appellants' final claim of error challenges the rulings of the WRB Chair that allowed three witnesses[9] to testify as experts for Appellees. Specifically, Appellants contend that these witnesses improperly testified about the toxicological effects of Garlon 3A despite having neither training nor certification in the specialty of toxicology.

Appellants rely for their argument on V.R.E. 702, which permits testimony "in the form of an opinion or otherwise" by "a witness qualified as an expert by knowledge, skill, experience, training, or education." Appellants contend that the witnesses whom Appellees offered, and whom the WRB accepted, as qualified "experts" did not have sufficient "knowledge, skill, experience, training, or education" to offer opinion testimony as "experts."

The purpose of V.R.E. 702 is to "assist the trier of fact to understand

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[9] Linden Witherell, an Environmental Officer for the United States Public Health Service, currently assigned to the Vermont Department of Health and to the Vermont office of the United States Environmental Protection Agency; Jeffrey Parsons, a consulting ecologist and Instructor in Ecology at the University of Vermont; and Dr. Margaret Ottum, Professor of Environmental Science at Johnson State College.

the evidence or to determine a fact in issue." V.R.E. 702; Chilkott v. Chilkott, 158 Vt. 193, 197-98 (1992). "The language of the rule is intended to embrace not only witnesses having technical expertise, but so-called 'skilled witnesses' as well -- those having any relevant special knowledge." Cappiallo v. Northrup, 150 Vt. 317, 319 (1988).

Under V.R.E. 702, the competency of an expert witness is a question to be determined by the trial court within its sound discretion. State v. Fortier, 149 Vt. 599, 601 (1988). The trial court's decision is conclusive unless it appears from the evidence to have been erroneous or unfounded on law. Cappiallo, 150 Vt. at 318 (1988).

In this matter, the WRB served as the trial court at the de novo hearing. On appeal, this court is thus limited to determining whether the WRB's qualification of Appellees' expert witnesses was erroneous or unfounded on law. But this court is further constrained in its review of the WRB's evidentiary rulings by the fact that agencies such as the WRB are authorized by statute to depart from strict adherence to the Vermont Rules of Evidence when conducting contested hearings. As a general matter, Vermont law provides that, in administrative hearings, "[t]he rules of evidence as applied in civil cases in the superior courts of this state shall be followed." 3 V.S.A. § 810(a)(1). But the statutory scheme further provides that, "[w]hen necessary to ascertain facts not reasonably susceptible of proof under those rules, evidence not admissible thereunder may be admitted (except where precluded by statute) if it is of a type commonly relied upon by reasonably prudent men (sic) in the conduct of their affairs." Id. In addition, "[t]he agency's experience, technical competence, and specialized knowledge may be utilized in the evaluation of the evidence." 3 V.S.A. § 810(a)(4).

The statutory scheme thus recognizes that agencies such as the WRB possess

a level of technical expertise that the "generalist" trier of fact, such as a trial judge or especially a trial jury, does not possess. A trial court's role in avoiding the possibility of misleading the jury is not present in administrative hearings, and for this reason this court on review is less inclined to find error in evidentiary rulings made by the WRB in the course of a contested hearing.

Nonetheless, even using the rules of evidence applicable in trial courts, the court concludes that the WRB did not err in qualifying Appellees' three witnesses as experts. The court does not agree with Appellants' contention that these witnesses should have been wholly precluded from discussing the environmental and health effects of Garlon 3A. In this matter, the three witnesses offered by Appellees possessed significant educational and professional credentials related to the subject matter before the WRB. The WRB was free to determine in the first instance that their testimony would be helpful, and in the second instance to weigh the probative value of their opinions, taking into account the extent and content of their education and experience. As an administrative board, the WRB may accept any evidence upon a finding that such evidence is "of a type commonly relied upon by reasonably prudent men (sic) in the conduct of their affairs." 3 V.S.A. § 810(a)(1).

The court finds no error in the admission of the witnesses as experts.

VIII.

The record of the WRB proceedings below fails to demonstrate that the WRB's decision was "arbitrary, unreasonable or contrary to law." The court finds substantial evidence to support the WRB's findings of fact, and, with one exception, finds that these findings of fact support the WRB's conclusions of law. The court does find that the WRB erred in concluding that the use of

Garlon 3A at Lake Morey would not achieve a public benefit, as required under 10 V.S.A. § 1263a(e)(5). The court reverses the WRB's decision on this one element, but finds no need to remand this action, because the remaining portions of the WRB's conclusions of law, which the court herein affirms, support the WRB's decision to reverse the ANR and to nullify the permit.

The other claims of error, as described above, are without merit.

Order

The Findings of Fact of the Vermont Water Resources Board are AFFIRMED. The Conclusions of Law of the Water Resources Board are AFFIRMED in part and REVERSED in part.

The Order of the Vermont Water Resources Board is AFFIRMED.

Dated this 3rd day of February, 1995, at Chelsea, Vermont.

Mary Miles Teachout

Hon. Mary Miles Teachout
Superior Judge