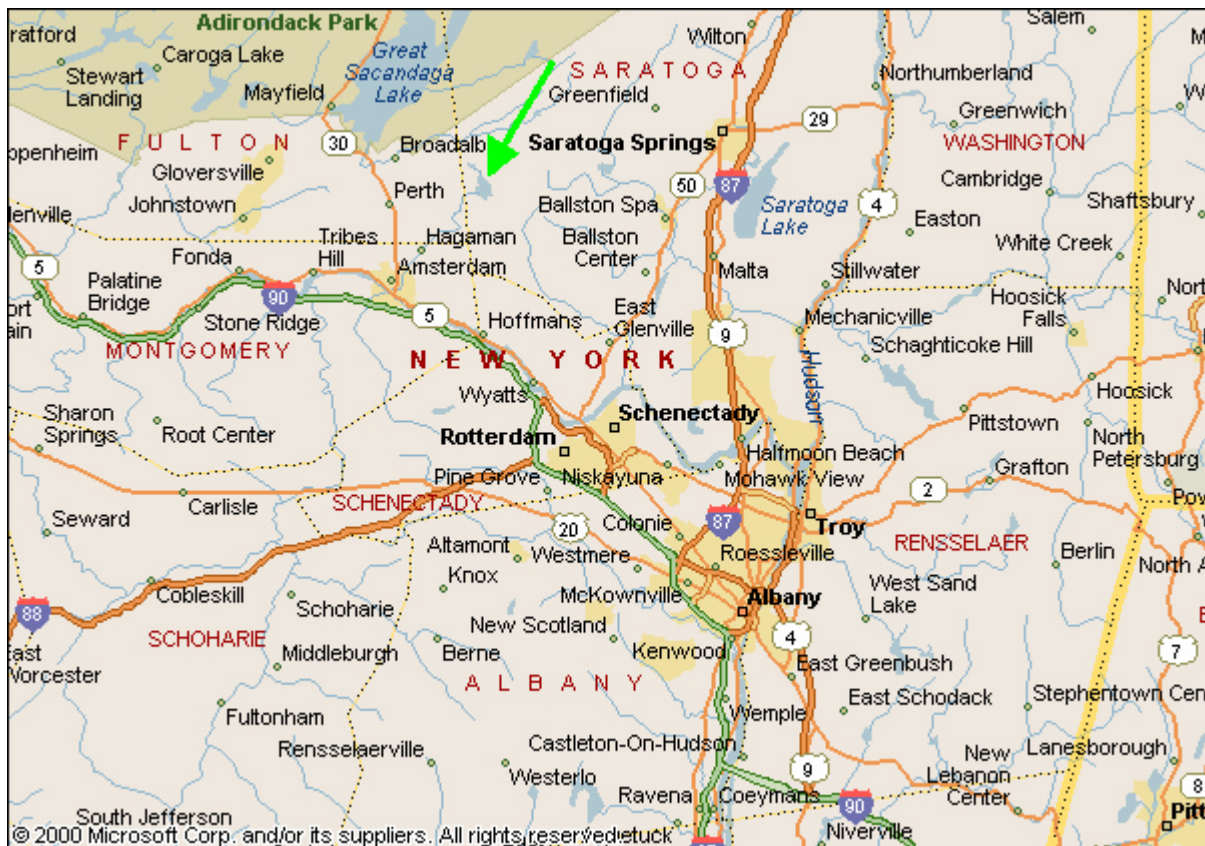


MILFOIL CONTROL AT GALWAY LAKE

Transcript of presentation May 16, 1991, *Conference on Nuisance Plants in Aquatic Environments: Ecology and Management*, Sponsored by the Hudson River Environmental Society, Inc., in cooperation with the Freshwater Institute of RPI.

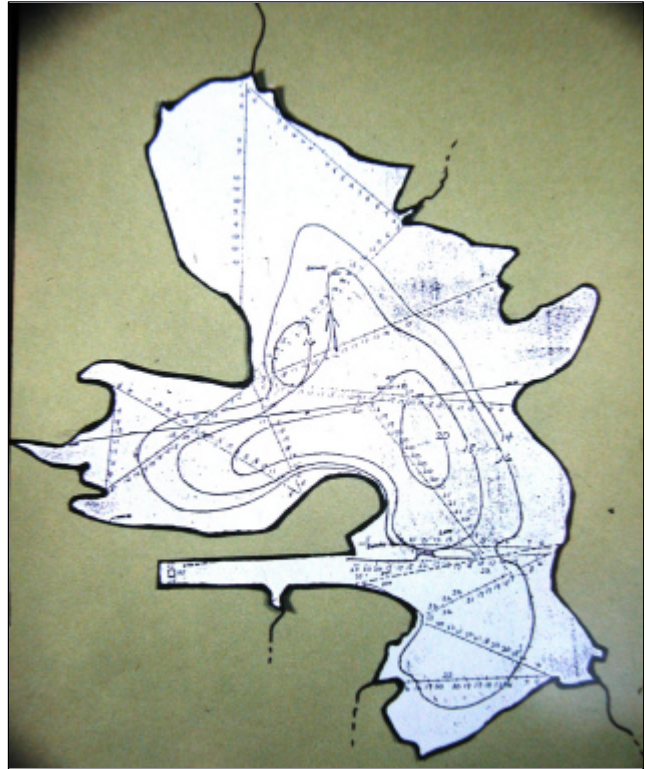
Good afternoon. My name is Jesse Aronstein. I am Chairman of the Engineering Committee of the Galway Lake Campers' Association. The Association owns and operates Galway Lake on behalf of its five-hundred plus members, who are owners of residences - mostly seasonal - in the lake district. I wish to thank the organizers of the conference for the opportunity to share with you information about our apparent success in dealing with an infestation of Eurasian watermilfoil, which I will refer to as "milfoil" for this presentation.



SLIDE #1 REGIONAL MAP WITH ARROW (NEAR TOP CENTER) POINTING TO GALWAY LAKE

Galway Lake is located about thirty miles northwest of Albany, New York, nine miles southeast of Great Sacandaga Reservoir. On some maps it is called "Amsterdam Reservoir."

Galway Lake is irregularly shaped, eight-tenths of a square mile of surface area, and more or less a mile across the widest stretches. Maximum depth is about 25 feet. There are several streams flowing in, and one outlet stream from the dam at the end of this channel (point). This man-made reservoir was originally built more than one hundred years ago to support water-powered industry downstream toward Amsterdam. It was built in two phases, and the original dike is below the present surface at this location (point)



SLIDE #2 - GALWAY LAKE

Recreational activity - sailing, swimming, and fishing - thrives on Galway Lake.

No gasoline motor boats are allowed.

The wonderful environment and recreational activity were severely impacted, however, when an extensive infestation of milfoil occurred in the late 1980's.



SLIDE #3 - SAILING AT GALWAY LAKE

Nobody knows when the first milfoil plants established themselves at Galway Lake. In the early eighties there was no apparent problem. In the mid-eighties some people around the lake were claiming that the weed density was much worse, and starting to interfere with normal activity. Some said that the problem was a new weed on the lake, called "milfoil." Those whose activities or shoreline weren't affected didn't think it was any different than before. Some individuals were concerned and started looking into control methods, such as cutting and chemical. Abruptly, however, in the summer of eighty nine, milfoil took over, and the call for action was almost unanimous.

DEVELOPMENT OF PROBLEM

1981 - NONE

1984 - NOTICED
(some concerned)1989 - MAJOR INFESTATION
(all concerned)**SLIDE #4 - DEVELOPMENT OF
MILFOIL PROBLEM**

A few said "leave it alone, It's not that bad -- just a change from what we were used to. perhaps it will go away as fast as it came." The available literature was not optimistic on that point.

Mechanical control, cutting, had been tried in a small patch, and was deemed to be impractical for this particular situation. This was not a case of keeping a beach or channel open - the property owners each wanted use of their own waterfront, as it had been.

Chemical control had a lot of support, being a familiar method that many used in their lawns and gardens at home. The initial information available -- mostly word of mouth and anecdotal -- pointed toward chemical control, but repeated questions regarding long-term large-scale usage effects and safety were not easily answered.

"Drawdown", intended to mean freezing it out, had some potential but was not considered to be as certain chemical control.

A lot of information was needed.

ALTERNATIVES CONSIDERED

- * do nothing
- * mechanical
- * chemical
- * freeze-out
("drawdown")

SLIDE #5 - ALTERNATIVES

Valuable information was gathered from many sources. The organizations listed provided reports and professional discussion, patiently spending time with an assortment of callers from Galway Lake. Consultants and individuals from other lakes provided additional information and proposals. We thank all of you who patiently put up with us as we struggled to get organized and informed. Eventually, committees were organized within the Association to gather the information and relate it to our particular situation.

**SOURCES OF INFORMATION
AND ASSISTANCE**

- RPI Freshwater Institute
- EPA
- Federation of Lake Associations
- NY State Dept. of Env. Conservation
- Individuals (other lakes)

SLIDE #6 - LIST OF SOURCES

In spite of all the discussion, nobody knew the extent of the infestation with any degree of certainty. A series of observations were made from the surface, using a face mask, to determine the extent of the infestation in the deeper water. A pattern was obvious. Shallow and deep areas were essentially clear of milfoil, it was growing in a range of intermediate depths. Additional observations were more detailed, using a sounding line to measure the upper and lower depth boundaries of the growth.

OBSERVATIONS REQUIRED

Needed to Know -

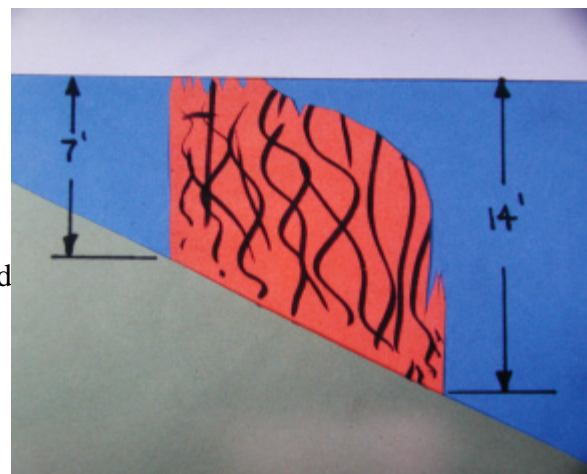
how extensive?

How to -

Face Mask, Sounding Line

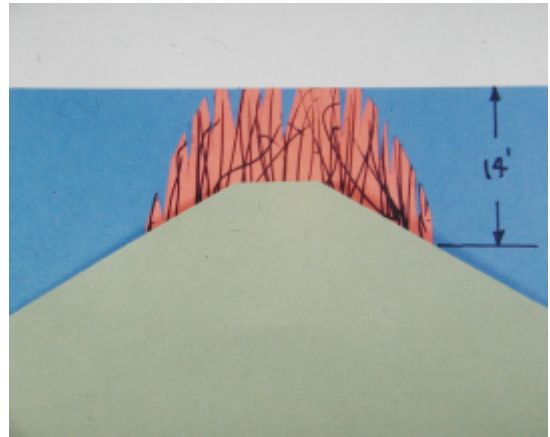
SLIDE #7 - OBSERVATIONS

Plus or minus a foot or so, the growth started at seven foot depth, and ended at fourteen feet. Traverses were made from shallow to deep, soundings being taken at the first and last plants observed. The deepest plants were generally isolated and stunted, compared to the thick, surface-penetrating growth in the shallower part of the field.



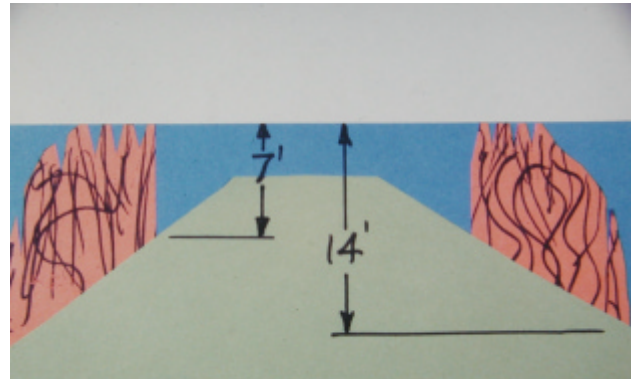
SLIDE #8 - TRAVERSE SECTION

One of the thickest and most obvious milfoil growth areas was over the old dike. This field all but cut the lake into two isolated sections. Getting through it was difficult or impossible by swimming, rowing, or sailing, except for one narrow opening where the old dike had been breached many years before.



SLIDE #9 - TRAVERSE ACROSS
OLD DAM (DEEP SECTION)

Where the top of the old dike rose at the ends to shallower depths, the milfoil field divided into two bands, the top of the dike being clear of milfoil. Wherever we looked, whoever looked, and whatever method they used, the pattern was the same. The milfoil grew from the bottom at depths between seven feet and fourteen feet.



SLIDE #10 - TRAVERSE ACROSS
OLD DAM (SHALLOW SECTION)

Using a depth chart of the lake to determine the area between the 7' and 14' depth contour lines, we determined that milfoil infested more than one hundred acres of our lake -- 20 to 25% of the area. The milfoil field is indicated here in orange.

Most significant was the regularity of the pattern. Based on the information that we had gathered, we concluded that in the deep water the milfoil growth had been limited by light penetration, while the upper boundary was a consequence of freezing due to winter exposure at our normal winter drawdown level. We realized that we were looking at very persuasive direct evidence that freeze-out was effective at our lake. The lower our winter level, the lower the milfoil boundary would be. What if the entire milfoil field were exposed over the winter?



SLIDE #11 - MILFOIL FIELD

Together with the continued inability to obtain substantive reports and documents regarding safety of chemical control means in long-term use, and the eventual need for a deep drawdown to facilitate work on the outlet control system at the dam, this insight imparted momentum to a plan to freeze out the milfoil by drawing down to below the lower growth line for the winter. The lake would not have to be completely drained.

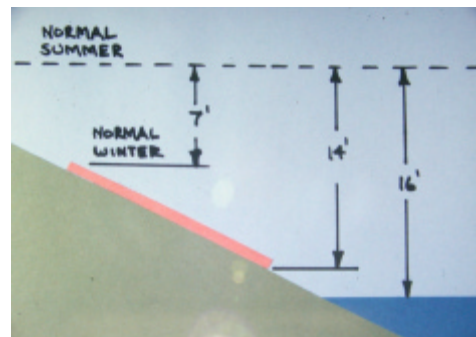
Information that we had gathered indicated that to kill the milfoil the frost penetration had to be at least four inches below the surface.

We recognized that the effectiveness of the drastic drawdown would be influenced by factors beyond our control -- the severity of the winter and the amount of snow cover -- and by unknown factors of bottom conditions and water flow. We realized that if we did not get it all it was likely to reestablish quickly. Halfway measures were not likely to be effective.

FREEZE-OUT

- Frost needed to at least 4" below surface
- Cold Winter?
- Effect of Snow Cover?
- Drying? Seepage? Springs?
- Re-Growth?

SLIDE #12 - FREEZE-OUT



Allowing for some drying out, plus a margin of safety so as to kill random plants that may have been growing a bit below our observed lower depth boundary, we decided to develop a plan to drain the lake to more than one foot below the observed lower boundary.

SLIDE #13 - DEEP DRAWDOWN



The plan would result in all of the milfoil at Galway Lake, the orange zone, being exposed as the water area was reduced to the blue zone on this map. There was truly an opportunity to get it all.

SLIDE #14 - MILFOIL BAND AND REMAINING WATER

Many details had to be worked out. We wanted to avoid a fish kill. The water volume would be about 5% of normal summer volume, and aeration might be necessary. Stranded fish would have to be moved.

We needed to estimate how long would it take to recover to normal level?

Would the ecological system be damaged? No, we concluded, since the system that we had enjoyed for years had developed in part from periodic deep drawdowns over the lake's hundred-year plus history, most recently in the late 1940's.

CONCERNS AND PRECAUTIONS

- fish preservation
- refill recovery
- ecological damage/recovery
- safety
- effectiveness
- regrowth

SLIDE #15 - CONCERNS AND PRECAUTIONS

Safety was a serious concern. People wandering around on the muck could get trapped, it could be like quicksand. Danger warnings would have to be posted.

Would it be effective? We hoped so, but could not predict for sure. The results were projected as: best case, all gone; worst case no change; and most probable case, some reduction for some time.

How fast would it re-establish? Depended on the effectiveness. Re-infestation prevention plans had to be considered, both short and long range.

Benchmark observations were made on water quality, plant population, etc.

The bathymetric chart was updated by new soundings, and a drainage analysis was made.

An engineering analysis was made of the refill process, based on the hydraulics of the system and historical precipitation data. This indicated that there was better than 50% probability of having the lake at a near-normal level for the following summer.

ACTION PLAN

- benchmark observations
- update bathymetric map
- refill analysis
- establish winter level
- fish preservation
- eliminate ponds

SLIDE #17 - ACTIONS REQUIRED

We had to decide on the drawdown level and timing.

We recruited volunteers to handle various tasks, particularly with respect to fish preservation of ponding.

Here is an example - the elimination of ponding, where fish could be trapped and milfoil could survive to re-infest. A channel (far right) was cut by a volunteer to assure drainage of the pond that was forming, and the area was checked for stranded fish. It was necessary to use boards to get out on the muddy bottom.

The exposed milfoil has a somewhat orange appearance in this photo. You can clearly see the upper (shallow depth) boundary of the infested area.



SLIDE #17 - EXAMPLE OF POND FORMING

To give you a comparison between full and almost empty, here again is a view of Galway Lake in the summer.



SLIDE #18 - SUMMER SAILING

Now here are some views of what Galway Lake looked like in late fall of '89 when almost down to the target drawdown level. It's quite a contrast!



SLIDE #19 - DEEP DRAWDOWN (#1)

Note again the well-defined upper boundary of milfoil growth, approximately following the seven-foot depth contour line on both the near and far shores.



SLIDE #20 - DEEP DRAWDOWN (#2)

The lake level was below the lower milfoil growth boundary when the first deep freezes and snows came.

Winter of '89 was favorable for this operation, being severely cold and having less-than-normal snow cover. The result was virtually complete elimination of the milfoil at Galway lake for the Summer of '90.



SLIDE #21 - DEEP DRAWDOWN (#3)

Here we are with water again, summer of '90. The milfoil is gone. Although many people around the lake were looking for it, only one sighting of two isolated milfoil plants had been reported by the end of summer 1990. So far this season, the second summer after the deep drawdown, the lake is clear of milfoil. Quite an improvement from summer of '89, when 100+ acres were infested.



SLIDE #22 - SUMMER '90, NO MILFOIL!

(lights on - no more slides)

There have been no adverse side effects evident from our deep drawdown, and the cost was minimal. The normal indigenous plants are apparently doing well. There was no abnormal fish kill. Fishing in summer of '90, immediately after the deep drawdown, was reported to be essentially normal.

We expect milfoil to reappear and re-infest, and when it gets bad enough we will have to consider another deep drawdown to freeze it out. Meanwhile, more attention is being paid to water quality and other important factors that must be understood and managed, if possible, to preserve our lake for the future.

We were extremely successful, virtually eliminating milfoil for the time being. I would urge others with this type of problem to seriously consider whether this type of control procedure can be applied to their particular situation

Thank you for your attention, and please feel free to call us for additional information.

(Questions?)

Follow-up Comments, as of October 2005

It is now 15 years since the deep drawdown of the winter of '89-90. Milfoil plants remained few and far between for several years after the deep drawdown. No adverse side effects from the deep drawdown were noted.

After about 5 years it was clear that a re-infestation was under way. Nevertheless, for the most part, recreational use of our lake has not been significantly hampered by the milfoil for the 15 seasons since the deep drawdown. We coexisted with milfoil at the infestation levels that occurred during this period.

The infestation is now back to the level it was just before the summer of '89, however, and we are now in the process of lowering the lake to 10' below summer level to reduce the milfoil that is growing from the shallow through intermediate depths.

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