For the benefit of future Lake, Beaches and Docks, and House and Grounds Chairmen, or any others entrusted with treatment of the lake water, spraying of wooded areas, etc., the following facts and figures concerning the water and land areas of Mt. Kemble Lake, gathered by experience over the years, are recorded:

The Lake itself is about 2000 ft. long, and its maximum width, on a line across almost due east from the main beach area, is 400 ft, The surface area of the water is about 12.8 acres, an acre being 43,560 sq.ft. The depth varies greatly, since the lake is the result of damming an irregular, V-shaped ravine; the subterranean trench runs down the lake nearest the east bank, as the hillside is considerably steeper on the east side than on the west. Starting at the main little dam, where the depth is only a foot or two, the lake gradually deepens down the middle, to about 7-8 ft. off Dunn and Manz, 12-15 ft. off Jacobsen-Lynch-Caruso, reaches 18-20 ft. at the widest part, then drops rapidly to its maximum depth, 28-30 ft., off Dean-Wilms-Pflum, and finally rises rapidly again along the ca. 45° slope of the main dam. These and other figures, ascertained by soundings in 1964, are recorded on the accompanying map. The lake contains approximately 60-65 million gallons.

The total land and water area of the Mt. Kemble Lake community, exclusive of the ballfield area, was calculated from I.J.Casey's survey map as being about 1,864,600 sq.ft.= 42.8 acres. It follows that the land area of roads and properties adjacent thereto is 30 acres.

An example of how a weight of algicide for a given ppm. concentration is calculated: For a concentration of 1 ppm., which is far more than enough to kill most of the common forms of algae, one needs 8.33 lb. $CuSO_4$ per million gallons. Thus if, for example, one wanted 1 ppm. in all the water of the lake, one would add about 500 lb. of material all in one shot. Another way to figure this amount is in terms of acre-ft. Using average depths of three general sections of the lake (see map) together with their respective areas, one calculates just about 190 acre-ft., and this, multiplied by the formula factor of 2.72 lb. per acre-ft., again gives about 500 lb.

For several reasons, however, no such great amount of copper sulfate as 500 lb. is ever actually used at one time. Algae grows only in the shallows and near the surface, where the water is warmed by the sun, and not at all in the depths. It in fact presents a growth problem only in the shallow, upper third of the lake, and occasionally close to the shore elsewhere, although clumps which grow in the shallow, upper lake do tend to drift down to the deep part on the current. Furthermore, a concentration of 0.1-0.3 ppm. of copper sulfate is enough to kill all but the most stubborn algal species. Thus the 500 lb. figure calculated above serves only as a rough guide to an extreme upper limit on the amount to be used. Actually, about 100 lb. at a time is adequate.

Algae is a primitive plant, aggregates of chlorophyll-containing, photo-synthesizing cells. There are a great many types, as can be seen by consulting manuals, but the commonest kinds, and the ones found growing in our lake, are the green algae, Spirogyra ("water-silk") and Hydrodictyon ("water-net"), and a few forms of blue-green algae (Cyanophyceae), bottom-growing types which however may rise in clumps in hot weather when lifted by gas bubbles of organic matter decomposition. None of these, fortunately, are notorious taste- or odor-producers. Nor do we have to worry about filter-clogging, since we are not a waterworks. In fact, it is only for aesthetic reasons and the comfort of swimmers and boaters that we kill the algae that appears; actually, some algal growth is essential for healthy lake ecology, particularly as photosynthetic process helps oxygenate the water. But the growth of the highly chlorophyllaceous species is radiation- and temperature-dependent, and

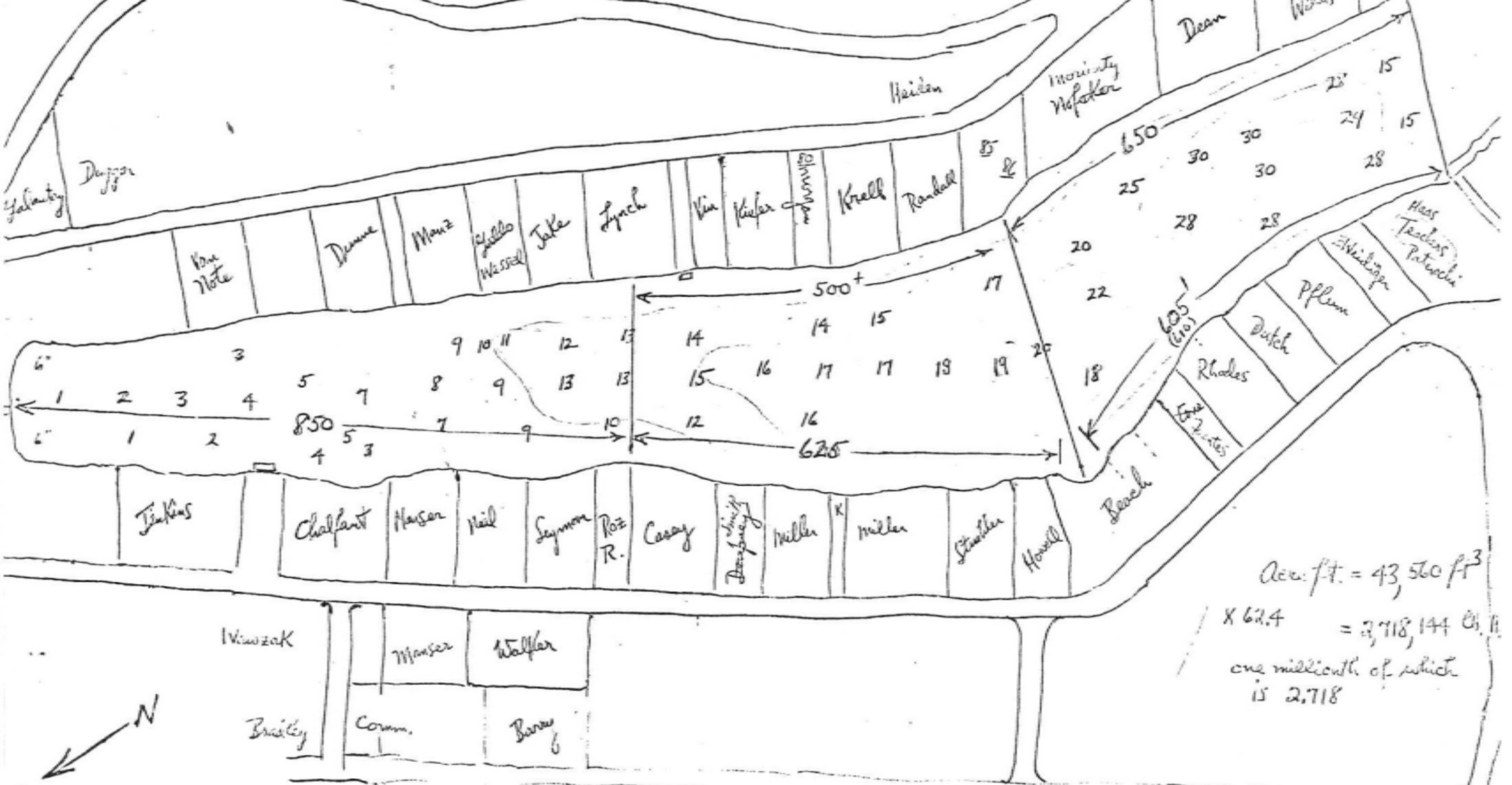
in hot, bright weather it can suddenly become so rapid as to seem almost explosive, in the shallow waters. This simply means that the copper sulfate man must be right on the ball in July and August, and had better patrol by boat frequently in those months, keeping an eye on the situation.

The usual treatment practice , early in the summer, is to circumnavigate the whole shore, dragging the burlap bag of copper sulfate slowly through the water, and refilling it as needed, and then to pay a little extra attention to the shallow, upper third of the lake, crisscrossing it several times to treat it completely. About 80-90 lb. is used in this operation. Also the breeder pond is done in the same way, using one or two small bags (about 20 lb.). One must be very careful not to put too much in the breeder pond, since its water volume is relatively small and it would be all too easy to introduce a concentration which would be quite hard on the young fish and tadpoles. Treatment in this manner is carried out at least once and sometimes several times early in the summer, according to need. When the really hot weather arrives, the need becomes more frequent, but it is still done according to that need. When you see it starting to grow all around, you treat it, but not before. It is wasteful to jump the gun. During the time when growth is rapid, most of the 80-100 lb. administered at a time is dissolved in the upper, shallow third of the lake where it is really needed, and not wasted in deeper waters except perhaps for spot treatment of any particularly messy places along shore. It is, generally speaking, a waste of time and material to try and pursue algae all over the lake. Experience has shown that treatment of the upper third with a good dose results, after a few days, in the clearing up of the whole lake. The exact reasons for this, whether diffusion, drift, or what, are something of a mystery, but it works. At the height of the season (August) it may be necessary to use up to 150 lb. at a time in the main lake to get good results. Avoid partial treatments, i.e. dabbling in a little now and then... it does no good. To be effective, the whole job has to be done in one shot and the bulk of the agent has to land in the shallow water right along with the algae it is going to kill.

Upon dissolving, copper sulfate diffuses rapidly through the water and is soon spread and diluted quite uniformly.. However, you might ask, after all these years and many treatments, why isn't the routine copper sulfate concentration in the lake usually any greater, on testing, than about 0.04 ppm.? The answer is, part of it goes to react with, kill, and flocculate the floating growths, but much more of it is precipitated directly by the lake's alkalinity as insoluble copper carbonate and hydrate, within a day or so after its addition, and so is inevitably lost. The summer pH of the lake now runs about 8.0-8.5, a fairly high basicity. Alkaline phosphates in detergent effluents may be largely responsible for this. The lake's balance of factors has inevitably changed gradually over the years in the direction of higher basicity and a larger percentage of so-called polluted water algae (anabaenae, oscillaria, aphanazomenon, nodularia, arthrospira), as the number of dwellings surrounding the lake has increased. We are very slowly approaching that which has been given the fancy name, eutrophication, meaning increased fertilization of the lake water by phosphates, nitrogen compounds, etc. and attendant increase in growth of what is lumped all together in the term algae, and in short, treatment of the lake becomes a little more difficult all the time. Actually, it is high time this community had a modern sewage and laundry-effluent disposal system, and all home effluents into the lake really ought to be halted, if we want a lake suitable for recreational purposes for many more years.

Gordon N. Walker
House + Grounds Chairman,
1969-1970

Mar., 1970



I	II	III
3.9 4 acre × 6-7'	4 acre × 17	4½ acre × 22
(~25) acrefeet	(~68) acrefeet	(~100) acrefeet
28	60	~110

1/4" = 50'

1/2" = 100'

Σ = 190 × 2.7 /acft. ≃ (500) lbs. (460 – 540) 50¢/lb for 1 ppm. throug