

HOUSE . . . . . No. 544

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The Commonwealth of Massachusetts.

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OFFICE OF STATE BOARD OF HEALTH.  
STATE HOUSE, BOSTON, Jan. 14, 1911.

*To the General Court of Massachusetts.*

I have the honor to transmit to the Legislature the report required by the provisions of chapter 88 of the Resolves of the year 1910, entitled "Resolve relative to Sandy Pond in the Town of Lincoln."

By order of the Board,

MARK W. RICHARDSON,  
*Secretary.*



# REPORT.

BOSTON, Jan. 10, 1911.

*To the General Court of Massachusetts.*

In accordance with the requirements of chapter 88 of the Resolves of the year 1910, the State Board of Health has examined Sandy Pond in the town of Lincoln to ascertain what circumstances, if any, exist detrimental to the interests of the towns or persons using said pond or its waters, by reason of any excessive or unnecessary lowering of the water therein, and presents herewith its report.

Sandy Pond is the source of water supply of the towns of Lincoln and Concord, the former of which had a population in 1910 of 1,175, and the latter, 6,421. These towns were authorized to take water from Sandy Pond for domestic and other purposes by the provisions of chapter 188 of the Acts of the year 1872, sections 11 and 12 of which are as follows:—

SECTION 11. All provisions of this act concerning the town of Concord, shall apply to the town of Lincoln; and if, in the future, the water of said pond shall prove insufficient for both, the town of Lincoln shall be first supplied.

SECTION 12. This act shall be void, as regards either town of Concord or Lincoln, unless accepted by a majority of legal voters of such town present and voting thereon, at a legal meeting held for the purpose within one year from the time this act goes into effect.

Works for supplying water to the town of Concord were built in 1874, and a system of water supply was built in Lincoln in the years 1874 and 1875. The town of Concord is supplied by gravity from an intake at the northerly end of the pond, situated 5.5 feet below the former high-water level and 7 feet below the present high-water level, the pond having been raised by the town of Concord about 1.5 feet several years ago. When the water fell to a very low level, early in the year 1909, the town of Concord set up a pump at the intake, and pumped water into the intake gatehouse in order to maintain the supply to the town.

In the very dry season of 1883 Sandy Pond was drawn down considerably, and the town of Concord obtained the right to take water from Nagog Pond, in the towns of Acton and Littleton. The act was accepted by the town and works were built for introducing a gravity supply from that source in 1909, water from Nagog Pond being first supplied in September of that year. Nagog Pond has an area of 287 acres and a drainage area, including the pond, of 1.52 square miles, and is capable of supplying a much larger quantity of water than Sandy Pond.

The town of Lincoln obtains its supply by pumping from the extreme southerly end of Sandy Pond, and on account of the low level to which the water has been drawn of late years the intake has been extended, and provision has been made for a further extension if necessary.

An examination of such information as is available as to the consumption of water from Sandy Pond by Concord and Lincoln indicates that the amount used has been increasing in recent years. Early in 1908 the actual measurement of the water drawn from the pond was begun by the town of Concord, and in the latter part of 1908 a Venturi meter was introduced by the town of Lincoln, to measure more accurately than was practicable by pumping records the quantity of water supplied to that town. From these measurements it appears that the quantity of water used in the town of Lincoln from May to December, 1909, averaged 173,000 gallons per day, or 194 gallons per inhabitant, and the quantity used in 1910 up to the end of November averaged 194,000 gallons per day, or 165 gallons per inhabitant. In the town of Concord the quantity of water used in 1909 was 452,000 gallons per day, or 73 gallons per inhabitant, and in the first eleven months of 1910, 487,000 gallons per day, or 76 gallons per inhabitant.

The actual quantity drawn from Sandy Pond by each town during these years, by months, so far as is shown by the records kept by the towns, is as follows:—

MONTH.	Concord (Gallons).	Lincoln (Gallons).	Total (Gallons).
<b>1909.</b>			
January, . . . . .	420,000	- <sup>1</sup>	-
February, . . . . .	404,000	- <sup>1</sup>	-
March, . . . . .	496,000	- <sup>1</sup>	-
April, . . . . .	330,000	- <sup>1</sup>	-
May, . . . . .	400,000	146,000	546,000
June, . . . . .	438,000	165,000	603,000
July, . . . . .	824,000	220,000	1,044,000
August, . . . . .	627,000	199,000	826,000
September, . . . . .	366,000 <sup>2</sup>	165,000	531,000
October, . . . . .	168,000	177,000	345,000
November, . . . . .	173,000	153,000	326,000
December, . . . . .	39,000	159,000	198,000
Average for year, . . . . .	391,000	-	-
Average for eight months, . . . . .	379,000	173,000	552,000
<b>1910.</b>			
January, . . . . .	36,000	154,000	190,000
February, . . . . .	50,000	- <sup>1</sup>	-
March, . . . . .	92,000	- <sup>1</sup>	-
April, . . . . .	40,000	162,000	202,000
May, . . . . .	34,000	173,000	207,000
June, . . . . .	52,000	216,000	268,000
July, . . . . .	61,000	276,000	337,000
August, . . . . .	15,000	209,000	224,000
September, . . . . .	15,000	197,000	212,000
October, . . . . .	16,000	182,000	198,000
November, . . . . .	27,000	175,000	202,000
Average for eleven months, . . . . .	40,000	-	-
Average for nine months, . . . . .	33,000	194,000	227,000

<sup>1</sup> No records.<sup>2</sup> Nagog Pond turned on September 15.

It will be seen from the above table that the total quantity of water drawn by the town of Concord from Sandy Pond, after the supply from Nagog Pond became available, on Sept. 15, 1909, was rapidly reduced, and in 1910 the quantity drawn from Sandy Pond has averaged only about 40,000 gallons per day. The quantity used by the town of Lincoln has apparently amounted to about 194,000 gallons per day, making the total quantity drawn from the pond in 1910 about 234,000 gallons per day. It has been estimated that the pond is capable of yielding,

in a series of dry years, about 600,000 gallons per day, so that the rate of consumption of water from the pond during the past year has been a little less than 40 per cent. of the quantity that it is capable of yielding continuously. Previous to September, 1909, the two towns together used from Sandy Pond a quantity amounting probably to as much as 600,000 gallons of water per day, and possibly more, and the level of the pond has been gradually sinking since May, 1904, when the water last ran over the dam at the outlet. The height of water has fluctuated with the seasons, rising in the spring and falling during the summer and fall to a minimum level in the late fall and early winter. The maximum and minimum level reached by the water in each season since water last ran from the outlet of the pond in 1904 has been as follows:—

YEAR.	MAXIMUM HEIGHT OF WATER.		MINIMUM HEIGHT OF WATER.	
	Date.	Feet below Full Pond.	Date.	Feet below Full Pond.
1904.	May 2,	0.30 <sup>1</sup>	December 12,	2.10
1905.	April 14,	1.15	December 16,	4.15
1906.	June 15,	2.34	December 28,	4.80
1907.	June 20,	3.52	September 22,	5.73
1908.	May 23,	2.66	February 6, <sup>2</sup>	6.75
1909.	May 18,	4.78	November 18,	5.03
1910.	June 13,	4.96	November 21,	6.85

<sup>1</sup> Above full pond.

<sup>2</sup> 1909.

Under present conditions, with the pond drawn down from 3 to 7 feet or more, a large area around the shores has been exposed continuously for several years, particularly near the upper end, where the water at full pond is comparatively shallow. Examinations by the Board show that an extensive growth of weeds and grasses, with occasional small bushes, has sprung up upon the exposed shores of the pond, especially over this shallow area, where the soil consists largely of fine sand or silt. In places where the exposed areas are covered with coarse gravel the amount of vegetation is less.

In the opinion of the Board the contact of the water with these organic growths on the shores and bottom of the pond is likely to be detrimental to its quality when it again rises and overflows these shallow areas.

The drawing down of the pond to the low level which it has reached recently is also objectionable, in that it reduces considerably the head available for the supply of the town of Concord and increases the lift of the pumps supplying the town of Lincoln. Since September, 1909, the

town of Concord has been able to supply itself very largely with water from Nagog Pond, and has limited itself to a very small draft upon Sandy Pond, so that the use of the water from the latter source has been reduced, as already stated, to less than 40 per cent. of the amount used in the previous year. The capacity of the pond in a series of dry years is probably more than two and a half times the quantity drawn in 1910, and under the circumstances, at the rate at which water has been drawn during the past year, the pond is certain to fill rapidly and again overflow in the spring of nearly every year. In view of the present very limited draft of water from the pond by the town of Concord, it appears to the Board unnecessary to limit the use of water from the pond while the present reasonable use continues. There will, of course, be an increase in the requirements of the town of Lincoln, and much more water can be used, if required, by the town of Concord than has been drawn in the last few months; but the town of Concord having provided itself with an auxiliary source of water supply, there will now be no need of drawing the water of Sandy Pond to the former low levels for a long time in the future. At some future time, when it becomes necessary to use greater quantities of water from the pond, restrictions may become necessary or desirable, but in the opinion of the Board it is not for the best interests of either town to limit the quantity of water that may be drawn from the pond, or to fix a low-water mark, or place other limit as to the height at which the water must be maintained.

In view of the circumstances, the Board finds no necessity at the present time for regulating the draft of water from Sandy Pond or the height of the same, or for the establishment of a low-water mark.

