

Chicago Drainage Canal.

Taking 85 per cent of this discharge as the outflow of Lake Huron in its normal condition, it becomes $263,000 \times .85 = 223,550$ cubic feet per second.

The discharge by the Chicago drainage channel at this elevation as computed above (p. 33), is 17,540 cubic feet per second, diminishing in its abnormal condition the efflux of Lake Huron.

This gives $223,550 - 17,540 = 206,000$ cubic feet per second.

As above

$$D = 8.025c \times \frac{2}{3}bh_1^{\frac{3}{2}} = 5.35 \times .5 \times 2000h_1^{\frac{3}{2}}$$

$$= 5350h_1^{\frac{3}{2}}$$

$$\therefore h_1^{\frac{3}{2}} = \frac{D}{5350} = \frac{223,550}{5350} = 41.785$$

Squaring both sides—

$$h_1^3 = 41.785^2; \text{ and } h_1 = 41.785.5^{\frac{2}{3}}$$

$$\log. 41.785 = 1.6200204 \times \frac{2}{3}$$

$$12.023 = 1.0800136$$

the natural number corresponding to this log.

2nd. What will be the depth when the efflux is reduced to 206,000 cubic feet per second.

In the same manner as above—

$$h_1^{\frac{3}{2}} = \frac{D}{5350} = \frac{206,000}{5350} = 38.5$$

$$\therefore h_1^3 = 38.5^2; \text{ and } h_1 = 38.5^{\frac{2}{3}}$$

$$\log. 38.5 = 1.5854607 \times \frac{2}{3}$$

$$11.402 = 1.0569738$$

the corresponding natural number.

Height or head of water on outlet at foot of Lake Huron, discharging, at high stage, 223,550 cubic feet per second.....	12.023 feet.
Height or head of water on outlet at foot of Lake Huron, discharging 206,000 cubic feet per second, the outflow as reduced by the Chicago drainage channel.....	11.402 "

0.621 "
12

Depression of lake surface.....	7.452 inches.
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RECAPITULATION.

Depression of lake surface at lowest stage.....	4.892 inches.
" " mean ".....	6.444 "
" " highest ".....	7.452 "

It is not probable that these quantities respectively will vary one inch either way. It is scarcely necessary to add that, of all the lakes, the maximum effect will be felt in Lake Huron-Michigan.

THE TIME TAKEN TO DEPRESS THE SURFACE OF LAKE.

The combined area of Lakes Huron-Michigan is 46,250 square miles. This is equal to $46,250 \times 27,878,400 = 1,289,376,000,000$ square feet. With a depth of one inch this area will contain 107,448,000,000 cubic feet of water.

Assuming a mean average abstraction of 15,000 cubic feet per second from Lake Michigan by the Chicago drainage channel, it will take $107,448,000,000 \div 15,000 = 7,163,200$ seconds to lower the surface of Lake Huron-Michigan one inch.

$7,163,200 \div 3,600 = 2,000$ hours, nearly = 83 days.
For a depression of 3 inches gives $83 \times 3 = 249$ "

Assuming that, in a lowering of 3 inches, the surface area will be contracted about 1 : 1000 part of its original size, we have approximately a water area of 46,200 square miles. $46,200$ square miles = $46,200 \times 278,784,000 = 1,287,982,080,000$ square feet.