THE MORPHOMETRY AND RECENT SEDIMENTATION OF JOE'S POND, WEST DANVILLE, VERMONT.

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ABSTRACT

Joe's Pond, which is probably of Pleistocene origin, is composed of four interconnected sub-basins possessing a maximum depth of ninety feet. Although some fine-grained material is being carried into the pond today, most of the sediments on the pond bottom have been formed through the reworking of glacial deposits. The sediments are predominantly immature sandy silts that show a decrease in particle size southward and eastward through the pond, reflecting selective transport. In addition to the inorganic constituents, the pond sediments contain between two and forty percent organic matter. Sediments with high organic content are concentrated near a densely vegetated probable source area at the northeast end of the pond and are carried to South Basin and East Basin by selective transport.

INTRODUCTION

Joe's Pond[1], which is located eleven miles west of St. Johnsbury, Vermont, is intensively developed as a recreational facility. Its shore is surrounded by about 300 camps and its waters, which are accessible through public access, are extensively utilized for fishing, boating, swimming, and camping. The pond will undoubtedly have greater recreational demands placed upon it in the future. A systematic study of the physical characteristics of the pond which has never been undertaken should contribute to a better understanding of the basin configuration, sediment characteristics, water movement, and transport of materials, all of which affect the quality of the pond's water. Because most of the material transported into a pond is ultimately chemically or physically deposited, the pond serves as a reservoir for mineral and chemical substances. The relevance between water quality and pond sediment is immediately evident when one realizes that the water and sediments are in continual contact and are constantly interacting with one another. In addition to any benefits our study might ultimately have to water conservation, we hope it leads to a better understanding of the origin and geological history of the pond.

We would like to thank the following people who have given generously of their time to the sampling and analysis of the sediments: Mr. David G. Johnson, Mr. Ronald A. Marcotte, Mr. Harold Moore, Mrs. John Pratt, Miss Lorraine Jerry, and Miss Martha Wright. Dr. W. Philip Wagner, University of Vermont, helped clarify various points concerning the probable origin of Joe's Pond basin, and Dr. David P. Bucke, University of Vermont, read the manuscript. Most of the equipment used in collecting and analyzing the samples was made available through the Lake Champlain Studies Center. The work upon

[1]According to residents the pond was named after a friendly Indian who lived in the area during colonial times. Molly's Pond, to the southwest, was named after his wife.

which this research is based was supported in part by funds provided by the U. S. Department of the Interior as authorized under the Water Resources Research Act of 1964, Public Law 88-379.

LOCATION AND TOPOGRAPHY

Joe's Pond is situated along the border of Washington and Caledonia counties in the towns of Cabot and Danville, Vermont. It is in an area characterized by low, rolling hills and lies directly west of a moderately rugged ridge that trends north to north-northeast. The ridge which consists of the Kittredge Hills, Cow Hill, Lookout Mountain, Macks Mountain, Morse Mountain, Devils Hill, Jennison Mountain, and Jerry Lund Mountain, stands in striking contrast to the low hills to the east (Hall, 1959, p. 8-10). The pond consists of four interconnecting bodies of water with an entire surface area of 375 acres and a watershed of thirty-one square miles. (Brickett, personal communication, 1969)[2]. The main stream entering and draining the pond is Joe's Brook (Figure 1) which has its origin in the Kittredge Hills to the north and drains from the eastern end of Joe's Pond into the Passumpsic River, a tributary of the Connecticut River. The outlet of the pond is controlled by a dam and bedrock falls at West Danville.

GENERAL GEOLOGY

There are three rock units in the locality of Joe's Pond; the Waits River Formation, the Gile Mountain Formation, and granite.

The Waits River Formation, of Devonian and/or Silurian age, is found to the west, south, and east of Joe's Pond and constitutes the bedrock falls along Joe's Brook in West Danville. This unit consists of interbedded calcareous granulites and quartz-mica schist. Granitic dikes are abundant in the West Danville quarry and are related to the Cow Hill intrusive. The Waits River Formation is characterized by subdued topography resulting from the susceptibility of the rocks to weathering and erosion as well as to the general low-dipping attitudes of the beds (Hall, 1959, p. 19).

The Gile Mountain Formation, also of Devonian and/or Silurian age, occurs to the northwest and north of Joe's Pond toward the Kittredge Hills. This formation consists of schist and micaceous quartzite. The northern part of Joe's Brook drains through both the Waits River and Gile Mountain formations.

Granite is the third rock unit found in the Joe's Pond area. It is considered younger than the stratified rocks in the St. Johnsbury quadrangle (Hall, 1959, p. 45).

[2]Mr. Otis Brickett, Danville, Vermont

Glacial deposits occur over much of the bedrock surrounding Joe's Pond. According to Stewart and MacClintock (1969), a till moraine exists to the north and east of Joe's Pond which is named the Danville moraine. The material is very sandy and characterized by having few boulders. To the southwest is Shelburne drift.

ORIGIN OF THE JOE'S POND BASIN

The hummocky topography and stratified drift, which occur along the north side of Joe's Pond and upstream from it, suggest that the Joe's Pond basin formed under stagnating ice conditions. It is likely that before the ice advanced during the Pleistocene Epoch, Joe's Pond did not exist and the streams near West Danville flowed to the southwest through what is now Molly's Brook into the present area of Molly's Pond and thence southwestward through the Winooski drainage system (See Figure 1). During glaciation, the valley now containing Joe's Pond may have been deepened by glacial scour which would have lowered the stream bed below the Molly's Brook valley. The existing divide northwest of Cow Hill, which separates Joe's Pond and Molly's Pond may be thick till. It is likely that stagnant ice conditions during deglaciation caused a blockage and prevented drainage to the southwest. Meltwater might then have been diverted to the east and cut a spillway through the ridge at West Danville. The spillway has been cut lower than the adjacent Molly's Brook valley and thus, the pond presently drains to the southeast.[3]

In 1882 a dam of planks and hemlock logs ten feet six inches high was constructed to store water for the saw mill, grist mill, stone shed, and woodworking shop in West Danville. In 1917 the log dam was replaced by a cement dam, one foot higher (eleven feet six inches) plus an additional two feet of splash board (Brickett, personal communication). The dam raised the level of the two smaller ponds to the level of the main pond creating one continuous water body. The level of the main pond was raised only two or three feet as its elevation was several feet above the preexisting ponds.

SAMPLING AND ANALYTICAL PROCEDURE

Sample stations were established on a 500-foot grid system and were located by triangulation using shore transits. Seventy-one grab samples were collected during the fall of 1968 with a Peterson dredge. The location of the sampling sites is given on Figure 2.

[3]Mr. Wayne L. Newell, Department of Geography and Environmental Engineering, The Johns Hopkins University, Baltimore, Maryland, personal communication.

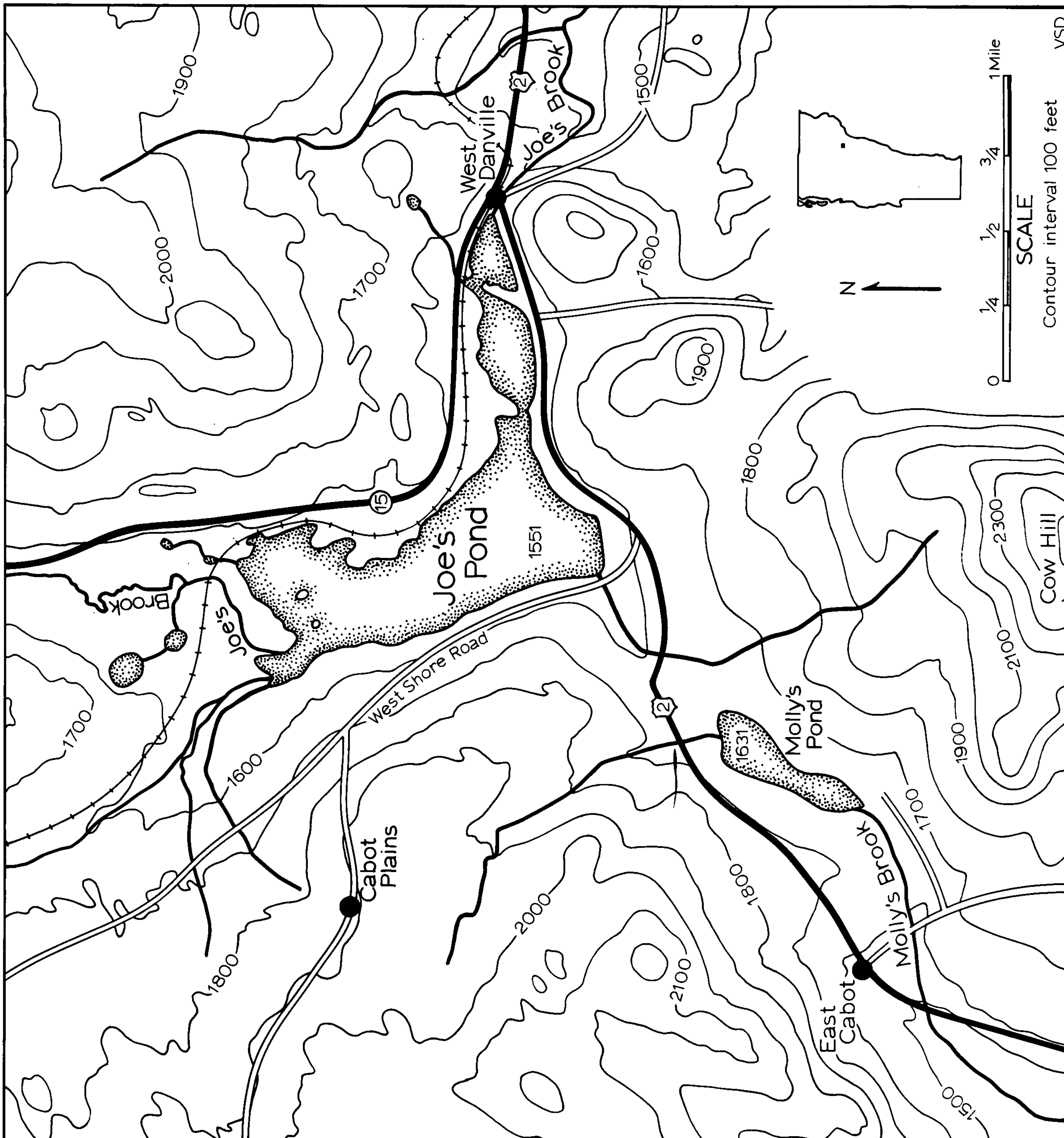

Figure 1. Index map of Joe's Pond. Base from United States Geological Survey topographic map, 1943.

The basin bathymetry was determined by taking soundings at each sample site, and at additional locations.

Sediments were analyzed for grain size using the hydrometer method. The hydrometer data for each sample was then processed using a computer program which determined the cumulative percent curve, percentages of gravel, silt, sand, and clay; and the statistical parameters of mean, median, standard deviation, skewness, and kurtosis.

An estimate of the percent of organic matter was made by heating a portion of each sample to determine weight loss on ignition. Although this method is subject to several sources of error, the greater accuracy which might be attained by more laborious procedures is not justified in a preliminary study.

BASIN BATHYMETRY AND HYDROLOGY

The bathymetry of Joe's Pond as shown on Figure 2, reveals four sub-basins. "Main Pond", as it is referred to locally, has a shallower northern basin, with a maximum observed depth of thirty-three feet, and a deeper southern basin with a depth of at least eighty-seven feet. They have been here designated as North and South Basin, respectively. These two basins are separated by a broad sill, characterized by water less than eighteen feet deep.

The basin east of Main Pond, designated Middle Basin, is separated from South Basin by a narrow shallow sill. The maximum depth observed in Middle Basin is twenty-eight feet. A point of land from which a spit has formed separates Middle Basin from East Basin. East Basin is the shallowest of the four basins, with a maximum measured depth of twenty-one feet.

The general circulation of water through the pond is from the inlet of Joe's Brook southward through Main Pond and then eastward through the two smaller basins to the outlet. Winds in the region are predominantly from the west and northwest. Because the current velocity is low, wave energy must account for much of the water turbulence which ultimately affects the characteristics of the sediments.

SEDIMENT CHARACTERISTICS

Particle Size

Statistical Parameters—A detailed discussion of the statistical parameters of the sediments of Joe's Pond has not been included though a summary seems justified, because some statistical parameters were found to be useful for general interpretation. Statistical data are given in Table 1.

The coarsest mean sediment grain sizes (3 phi or less) occur: 1) at the inlet of Joe's Brook; 2) at the sill between the North and South basins of Main Pond; and 3) at the spit between Middle Pond and East Pond. The finest grained sediments (9 phi or greater) occur near the center of South Basin which is the deepest area of the pond. There is a very high positive correlation between increasing depth and decreasing mean particle size, which reflects decreasing wave and current activity in deeper water. All basins were found to contain finer grained sediments than the shelves which surround them. A relationship between increasing mean grain size and increasing current velocity is also evident in several areas of the pond. At the mouth of Joe's Brook, for example, where higher current velocities might be predicted, grain size increases.

The sorting of sediments is poor (1.0-2.0 phi standard deviation) to very poor (2.0-4.0 phi standard deviation) throughout the basin. A cursory comparison of the standard deviation values with basin bathymetry has shown, in general, that sorting becomes poorer as water depth and distance from shore increase. A contour line drawn on 2 phi standard deviation would nearly parallel the ten-foot depth contour. Sediments shallower than ten feet are poorly sorted whereas those in water depths greater than ten feet are very poorly sorted. The highest standard deviation values found in the lake occur in the deep water of South Basin, and in East Basin, behind the dam.

Joe's Pond shows only broad trends with respect to skewness and, with few exceptions, the sediments are near-symmetrical to fine-skewed. Near-shore areas tend to be fine skewed whereas the deep basins of each pond typically have near-symmetrical sediment distributions. Where aquatic plants occur, sediments tend to be fine to strongly fine skewed. Rarely are plants associated with coarse skewed sediments.

Sediment Classes—Figure 3 shows the distribution of five sediment classes (from Folk, 1954, p. 349) based upon particle size. In general the classes which contain coarser sediments occur in the northern portion of the pond and sediments become finer south and eastward through the pond. Sediments which can be classified as sand occur only at the sill between North and South basins and at the spit between Middle and East basins. The dominant sediment class in the pond is silt which covers fifty-six percent of the entire pond bottom today. Sand covers twenty-five percent and clay nineteen percent.

Particle Size Distribution—The particle size distribution, based upon sediment classes and grain size statistics, is given below for the four basins of Joe's Pond.

North Basin—Silt is accumulating in the deeper water and sandy silt is present on three sides of the basin. The profuse growth of pond vegetation in the shallow water appears to be trapping silt- and clay-sized material. This supposition is supported by the

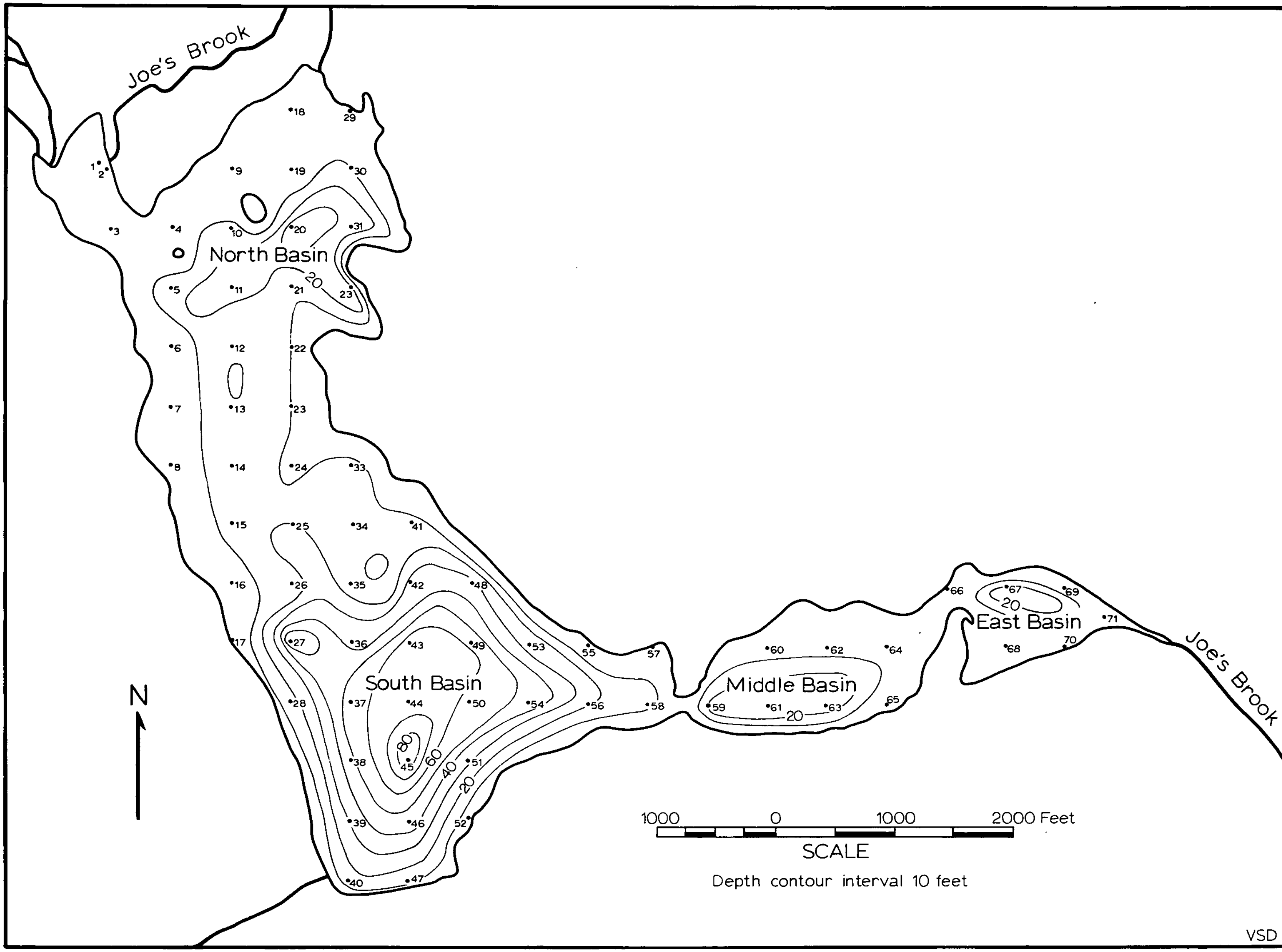

Figure 2. Bathymetry and sample location map of Joe's Pond. The dots represent sample sites, the accompanying numbers the sample designation.

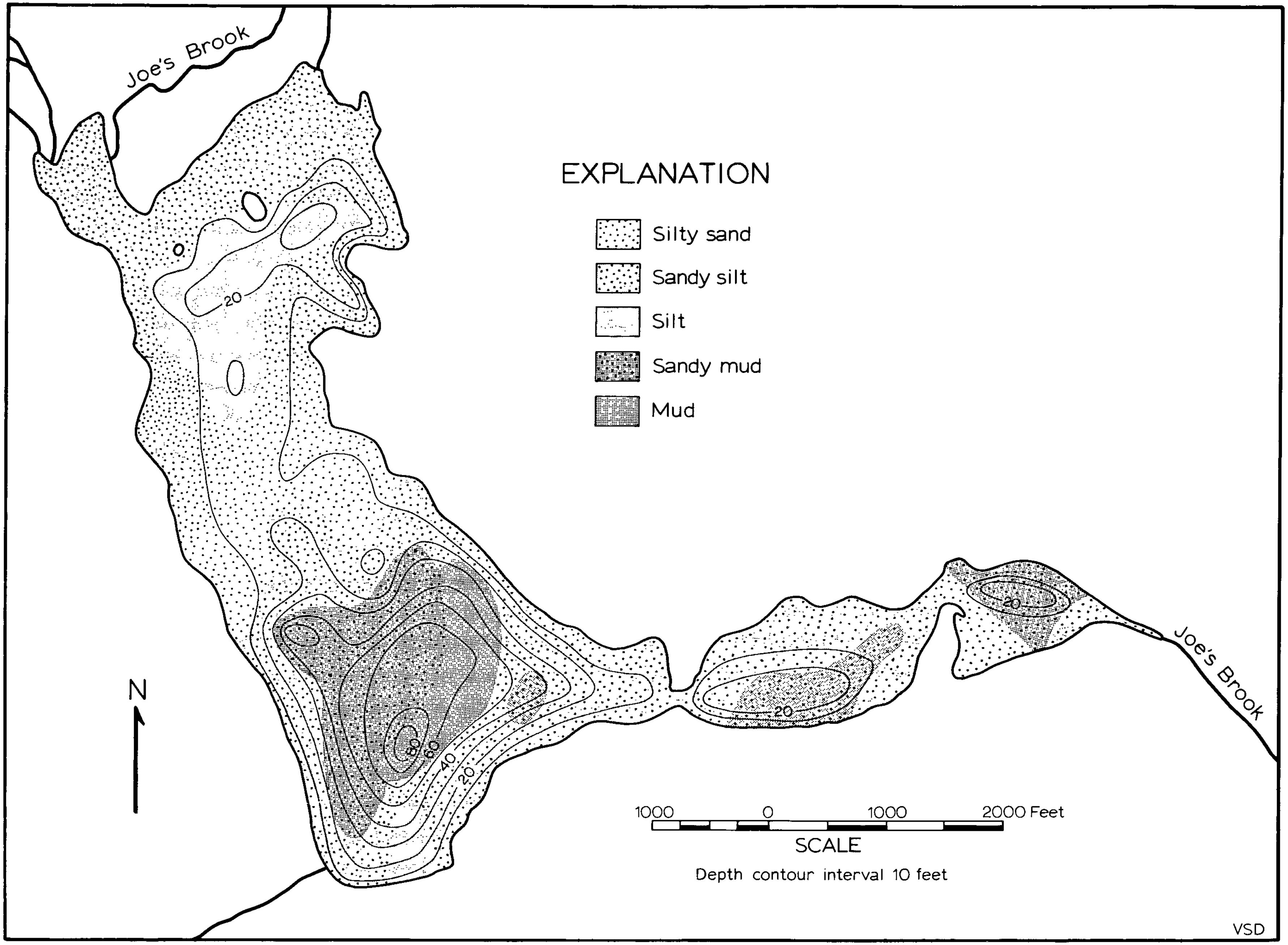

Figure 3. Facies map of Joe's Pond. Sediment classes based upon Folk, 1954.

Table 1. Statistical Data on Samples from Joe's Pond.

Samp. refers to sample number; Depth to water depth; Org. to total organic matter; St. D. to standard deviation, Skew. to skewness, and Kurt. to kurtosis of particle size distribution. Class terminology is from Folk (1954).

Samp.	Depth	Class	Gravel	Sand	Silt	Clay	Org.	Mean	St. D.	Skew.	Kurt.
1	1'	Silty sand	0%	58%	39%	3%	7.8%	3.5	1.72	.14	1.25
2	2'	Sandy silt	0	34	61	4	12.5	4.5	1.88	.11	1.17
3	4'	Sandy silt	0	21	70	9	24.2	5.0	1.85	.43	1.74
4	3'	Sandy silt	0	12	74	14	24.4	5.7	1.91	.37	1.10
5	16'	Silt	0	5	78	18	27.8	6.2	1.66	.28	0.89
6	7'	Silt	0	4	71	25	25.8	7.1	1.94	-.10	0.84
7	3'	Silty sand	1	79	15	5	2.5	2.7	1.90	.44	1.54
8	3'	Sandy silt	0	19	71	10	12.7	5.2	1.74	.43	1.32
9	7'	Sandy silt	0	14	66	20	30.7	5.9	2.05	.41	0.98
10	13'	Silt	0	9	71	20	24.3	6.4	1.74	.21	0.90
11	23'	Silt	0	11	70	19	29.5	6.3	1.77	.11	0.95
12	16'	Silt	0	17	66	17	22.0	5.9	2.08	.03	1.36
13	18'	Silt	0	13	73	15	23.2	6.2	1.90	.06	1.48
14	18'	Silty sand	0	57	35	8	32.3	3.8	2.67	.50	0.80
15	13'	Silty sand	0	52	44	4	17.9	3.6	2.17	.14	0.78
16	1'	Silty sand	0	84	13	3	2.5	2.8	1.29	.17	1.17
17	2'	Sandy silt	0	36	58	6	10.9	4.5	1.77	.22	1.58
18	3'	Sandy silt	0	15	72	13	43.1	5.5	1.91	.45	1.01
19	4'	Sandy silt	0	17	64	18	37.4	6.0	2.28	.29	1.02
20	33'	Silt	0	5	69	26	27.2	6.7	2.00	.13	0.93
21	13'	Sandy silt	1	19	71	10	13.2	5.2	2.32	.11	1.57
22	10'	Sandy silt	0	13	75	11	26.0	6.0	1.70	.17	1.30
23	10'	Silty sand	3	52	39	6	9.0	3.6	2.47	.08	1.14
24	3'	Silty sand	1	86	10	3	1.7	2.6	1.40	.14	1.14
25	20'	Sandy silt	0	33	54	15	36.6	5.2	2.77	-.06	0.94
26	16'	Sandy silt	0	12	69	19	32.3	6.9	1.54	.55	1.39
27	51'	Sandy mud	0	26	39	36	25.9	6.7	3.33	-.22	0.69
28	16'	Sandy silt	0	15	78	7	23.7	5.8	1.69	.30	1.76
29	2'	Sandy silt	0	18	68	13	31.9	5.5	2.12	.37	1.41
30	10'	Sandy silt	0	18	60	23	28.9	6.1	2.45	.28	1.13

Table 1. (Continued)

Samp.	Depth	Class	Gravel	Sand	Silt	Clay	Org.	Mean	St. D.	Skew.	Kurt.
31	26'	Silt	0 %	8%	63%	29%	30.4%	7.1%	2.43	.16	0.92
32	23'	Sandy silt	0	11	74	15	24.8	6.0	2.00	.30	1.30
33	13'	Silty sand	0	72	25	3	4.3	3.4	1.84	.37	1.21
34	15'	Silty sand	0	16	75	8	13.5	5.5	1.92	.28	1.40
35	16'	Sandy silt	0	14	75	11	23.6	5.9	1.85	.10	1.67
36	39'	Sandy mud	0	13	40	47	26.4	7.3	2.67	-.04	0.63
37	51'	Sandy mud	0	10	52	38	26.3	7.2	2.58	-.01	0.75
38	49'	Sandy mud	0	11	50	39	25.9	7.1	2.55	-.01	0.79
39	30'	Sandy mud	0	16	54	29	23.5	6.8	2.86	-.04	0.93
40	18'	Sandy silt	0	10	75	16	20.7	6.0	2.07	.25	1.20
41	13'	Sandy silt	0	48	43	10	6.0	4.6	2.09	.39	1.80
42	31'	Sandy mud	0	11	54	36	22.4	7.0	2.47	-.09	0.96
43	62'	Sandy mud	0	11	53	36	26.7	7.3	2.92	.19	0.86
44	67'	Sandy mud	0	15	41	44	28.1	7.8	3.43	.02	1.35
45	87'	Mud	0	0	48	52	30.1	9.0	2.54	.24	0.74
46	49'	Silt	0	8	63	29	24.9	7.0	2.27	.19	1.03
47	13'	Silt	0	6	84	10	27.2	5.7	1.62	.50	0.96
48	36'	Mud	0	5	51	44	23.6	7.6	2.73	.00	0.81
49	59'	Mud	0	2	55	43	27.0	7.9	2.89	.16	1.09
50	56'	Mud	0	0	57	43	26.4	7.9	2.86	.25	0.88
51	31'	Sandy silt	0	12	61	27	24.4	6.5	2.12	.21	0.92
52	3'	Sandy silt	0	37	57	5	28.2	4.2	1.58	-.08	1.61
53	26'	Sandy silt	0	17	60	24	20.9	6.1	2.41	-.09	1.06
54	46'	Sandy mud	0	11	51	38	26.6	7.6	2.70	-.05	0.64
55	3'	Silty sand	0	72	24	4	3.9	3.6	1.90	.32	0.73
56	20'	Sandy silt	0	16	76	8	14.9	5.4	1.57	.22	1.45
57	3'	Sandy silt	0	19	69	12	21.8	5.2	2.05	.41	1.60
58	12'	Sandy silt	0	11	77	12	19.7	5.8	1.75	.20	1.04
59	20'	Sandy silt	0	43	46	11	14.7	4.6	2.49	.25	1.13
60	8'	Sandy silt	0	25	61	13	24.0	5.5	2.18	-.11	0.90
61	28'	Sandy mud	0	17	47	36	28.5	6.8	2.64	-.06	0.84
62	7'	Sandy silt	0	48	41	11	7.6	4.4	2.10	.40	2.50

Table 1. (Continued)

Samp.	Depth	Class	Gravel	Sand	Silt	Clay	Org.	Mean	St. D.	Skew.	Kurt.
63	26'	Sandy mud	0%	22%	51%	27%	28.1%	5.9	3.23	-.01	1.12
64	7'	Sandy mud	0	40	36	25	21.5	5.3	2.88	.28	0.77
65	2'	Sandy silt	0	26	61	13	20.0	4.9	2.27	.32	1.55
66	2'	Silty sand	0	56	37	6	11.4	3.7	1.52	.05	2.14
67	21'	Sandy mud	0	19	49	32	33.8	6.7	2.73	.07	0.75
68	3'	Silty sand	0	57	38	6	7.8	3.5	1.88	.12	1.17
69	7'	Sandy mud	0	23	47	30	38.3	6.1	3.26	-.17	0.98
70	8'	Sandy silt	0	19	56	24	28.1	5.6	3.04	.04	1.22
71	5'	Sandy silt	0	17	80	3	36.0	4.8	2.09	.07	1.22

fact that the mean grain size is finer here, the sorting is poorer, and the sediments are strongly fine-skewed.

Because the deep water of North Basin does not contain sand, it is unlikely that the sand on the sill between North and South basins is being transported from Joe's Brook. A more probable explanation is that the fines have been winnowed from the sill and deposited in the basin to the south. This sill contains large boulders which suggests it to be of glacial origin. A long gravelly sand bar, whose orientation has been influenced by the southerly water movement, is present at the eastern end of the sill.

South Basin – South of the sill discussed above, the sediments grade into sandy silt, sandy mud, and on the east side of the basin, mud. The fact that sand does not occur in the mud at the southeast side of the basin suggests that only mud-size particles are being transported from the north and deposited in this area. The sediments in the southeastern neck of South Basin have some sand associated with the mud and silt. The source of this sand is probably the adjacent shoreline and not the sill separating North and South Basin.

Middle and East Basins – The narrow sill between South Basin and Middle Basin contains boulders well over a meter in diameter. This sill material is most certainly of glacial origin. The north side of the Middle Basin is sandy silt which becomes progressively finer as the water depth increases. The current in the narrow channel between Middle and East basins has been sufficient to develop a spit.

Sandy mud is the dominant sediment in the deeper part of East Basin. However, the sediments grade into sandy silt at the narrow mouth of the pond.

Organic Content

Organic constituents of sediments, like inorganic constituents, reflect the physical conditions under which they were laid down and, in addition, they may be affected by the chemical environment. The settling properties of organic detritus is much like that of fine-grained particles. In regions where sands are deposited, currents and wave activity are usually sufficiently strong to remove most organic material. The distribution of percent organic matter is shown on Figure 4. High organic concentrations (greater than thirty percent) occur in the following areas: (1) in the northernmost area of Joe's Pond (the organic content here is as great as forty-three percent); (2) in the narrow trough on the shelf separating North and South basins; (a high organic concentration would not have been predicted here because the sediments are relatively coarse grained and the water is shallow); (3) in the center of the deepest basin and (4) in East Basin near the exit of Joe's Pond. The concentration here cannot be accounted for by an increase in depth for this is the shallowest of the four basins.

INTERPRETATION AND DISCUSSION

For purposes of discussion two sedimentary models can be assumed for Joe's Pond. In one, the sediments of the basin initially consist of uniformly distributed, poorly sorted glacial deposits and subsequent wave and current action redistribute this material. In the second model, sediments are transported into the pond basin by streams, and are sorted and distributed by currents and wave action. Neither of these models fully accounts for the sediment distribution of Joe's

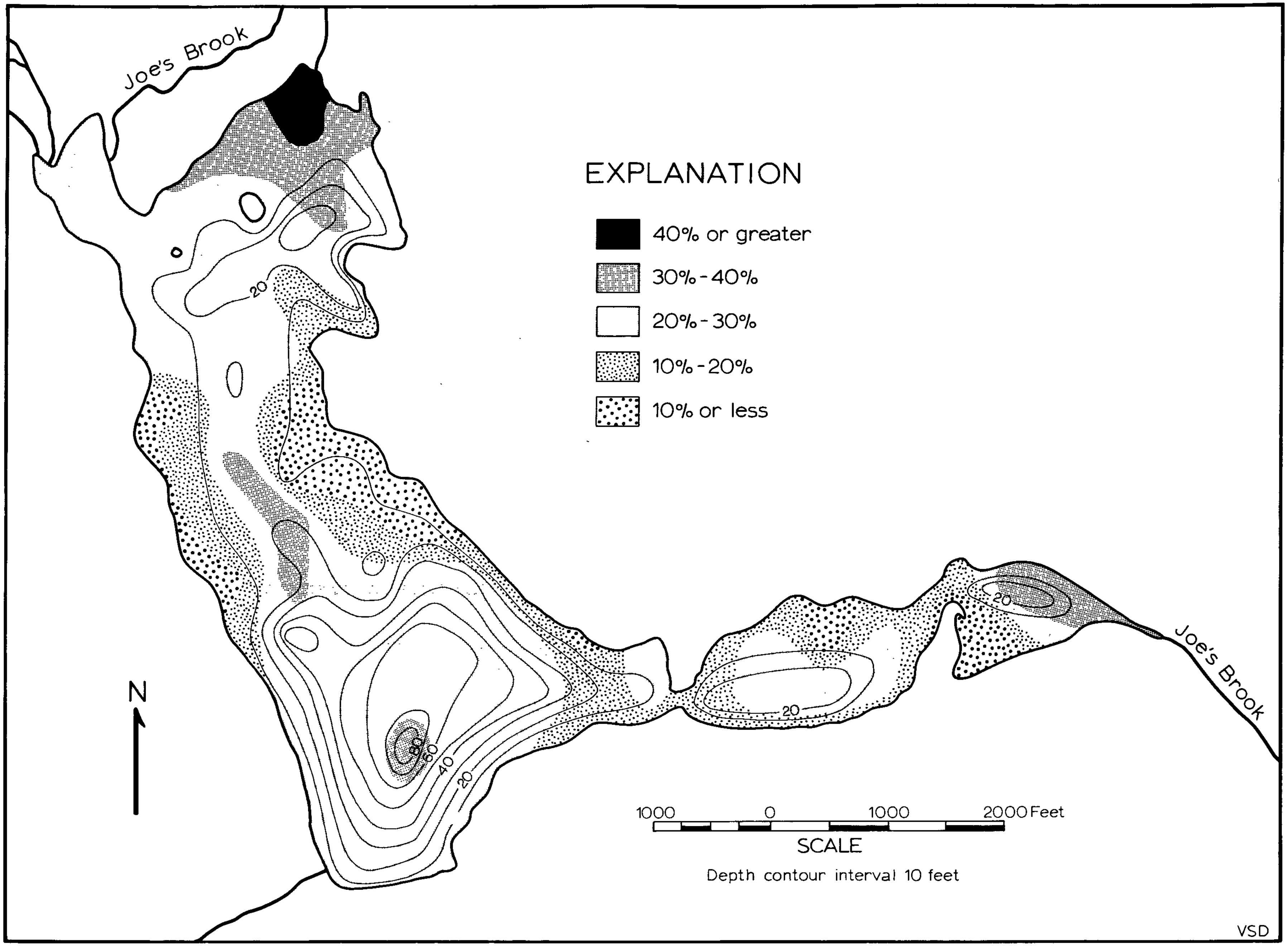

Figure 4. Organic distribution of sediments of Joe's Pond.

Pond. Evidence favoring the first model is found in the distribution of sands which occur on the south side of the sill between North and South basins and not to the north as would be expected if the sands had been transported into the pond from Joe's Brook. The sands on the sill, therefore, are believed to have formed from residual glacial deposits from which the fines have been winnowed. The second hypothesis, that sediments have been transported into the pond basin by streams, finds support in the general gradient of coarser material in the northern portion of Joe's Pond to finer material in the southern, which suggests that selective transport has taken place. However, as indicated by the nature of sediments surrounding the mouth of Joe's Brook, and those of the other brooks entering the pond, very little if any sand-sized material is being transported into the pond today and virtually none of it is being transported southward. We are led to the conclusion that the recent bottom sediments have had a compound history in that they represent reworked *in situ* glacial deposits from which fine-grained material has been winnowed and transported southward through the basins.

An estimate of percent of organic matter compared to total sediment gives some indication of the quantity of organic substances that are accumulating in the pond. The average organic percent of Joe's Pond is quite high compared, for example, with Lake Champlain where the percent organic matter rarely exceeds twenty percent. Organic material has two possible sources—mechanical transport by streams into the water body and genesis within the pond by organic activity stimulated through nutrients received from stream water, surface water, runoff, and ground water.

In the basins of Joe's Pond the organic percent increases as the water depth increases. The amount of organic matter is greater in deeper water because its lower specific gravity allows it to be more readily transported than the denser inorganic substances. Hence, it is removed from sediments surrounding the basins and deposited in the deeper water. Once it reaches the basins it may accumulate due to a chemical environment which is favorable for its preservation. Furthermore, where detrital material is not accumulating, the percent of organic material relative to inorganic substances increases. In this circumstance it is a deficiency in inorganic material that makes the organic percent high.

Three areas previously mentioned where the organic percent is anomalously high are in the northern area east of Joe's Brook, the trough within the sill between North and South basins of Main Pond, and the easternmost portion of Joe's Pond behind the dam. The northern area is one of low relief, shallow water, and was submerged only after the construction of the dam in West Danville. The northern shore today is covered with dense marshy vegetation. The high organic values in this area suggest that organic matter is being transported into the pond from the swamps to the north. The accumulation at the mouth of the unnamed creek east of Joe's Brook, but not at the mouth of Joe's Brook, is thought to be a consequence of lower transport velocities near the unnamed brook which would decrease the winnowing effect. Sediments are strongly fine-skewed which indicates that the currents here are not sufficient to remove the finer material being transported into the pond. In addition, the prevailing westerly wind may have an impounding effect and in this way may contribute to the high organic concentration in this area.

The available sample data from the trough on the sill between North Basin and South Basin indicate this area to be high in organic content. The organic percent on the shelves on either side of the trough, however, is very low which suggests that organic material is being winnowed from the shelves and deposited in the trough of the sill. This hypothesis finds further support in measured sorting values which are lower east and west of the trough than in the trough itself (suggesting a winnowing process). The high organic values found in East Basin indicate that this area may be acting as a catchment basin for fine organic material which is being transported through the pond but not beyond the quiet water behind the dam.

CONCLUSIONS

Joe's Pond, which today consists of three interconnected water bodies with four sub-basins, probably had its origin during the Pleistocene glaciation. Glacial boulders on the sills suggest that glacial drift was deposited in the pond basin. This material acted as a source of sediments within the pond itself. The main source of sediments from outside the basin is Joe's Brook which today contributes mostly silt. Analysis of the particle size of sediments distributed on the pond bottom has revealed that silt comprises fifty-six percent, sand twenty-five percent, and clay nineteen percent of the total. The sand occurs mainly on shallow sills and in near-shore shallow water. Coarser material is more abundant in the northern portion of the pond and sediments become finer southward and eastward even though the pond water depth shows a general decrease eastward. This suggests that finer material is being selectively transported through the pond. The sediments in general are immature and reflect the short duration which wave and current activity have been effective as well as the low-energy environment under which the deposits are forming.

The relative organic content of the pond sediments is dependent upon the rate of supply of organic material and the rate of deposition of inorganic material. The organic fraction within Joe's Pond is accumulating primarily in three areas: in the northern portion of the pond where aquatic plants are a source; in the basins where current and wave activity are reduced and deposition of inorganic material is low; and in the eastern end of the pond near the public swimming area where fine-grained organic particles which have been transported through the pond are accumulating behind the dam. As organic matter is added to the pond in the future, it will continue to accumulate in these three areas.

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