

INTERIM PROJECT REPORT

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Interim Report on
Water Quality Investigation
DEGRAY RESERVOIR

Arkansas

By

J. Nix

Principal Investigator

Arkansas Water Resources Research Center

University of Arkansas

Fayetteville, Arkansas

and

Ouachita Baptist University

Arkadelphia, Arkansas

July 1971



1. The first part of the document
 discusses the importance of
 maintaining accurate records
 for the purpose of the study.
 It highlights the need for
 consistency and reliability in
 data collection and reporting.

2. The second part of the document
 focuses on the methodology used
 in the research. It details the
 sampling process and the
 instruments used to gather data.
 The authors describe the steps
 taken to ensure the validity and
 reliability of the findings.

3. The final part of the document
 presents the results of the study.
 It includes a detailed analysis of
 the data and a discussion of the
 implications for practice and
 future research. The authors
 conclude with a summary of the
 key findings and their significance.

ABSTRACT

INTERIM REPORT ON WATER QUALITY INVESTIGATION DEGRAY RESERVOIR ARKANSAS

Impoundment of the Caddo River near Arkadelphia, Arkansas began in August, 1969. Detailed patterns of the dissolved oxygen distribution in this reservoir are presented for the period September, 1969 through April, 1971. Although the reservoir had not reached normal pool elevation, thermal stratification accompanied by severe hypolimnic oxygen depletion has been observed. The dissolved oxygen data show that an under flow occurs in the fall of the year and carries dissolved oxygen into the hypolimnic zone. The gradients of dissolved oxygen concentration observed during the winter indicate that the reservoir does not undergo complete mixing.

A short summary of the results of trace elements and other water quality parameters is also included.

Nix, J.

WATER QUALITY INVESTIGATION - DEGRAY RESERVOIR, ARKANSAS
B-014-ARK

Interim Project Report, July, 1971

Key Words - impoundments#/trace metals#/water quality/
dissolved oxygen#/ reservoirs

THE UNIVERSITY OF CHICAGO
DIVISION OF THE PHYSICAL SCIENCES
DEPARTMENT OF CHEMISTRY
5708 SOUTH CAMPUS DRIVE
CHICAGO, ILLINOIS 60637

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Yours truly,

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CC: [Illegible]

Yours truly,

ACKNOWLEDGEMENTS

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Other than the student technicians provided by the grant for this project, additional student help was provided through the Work-Study Program at Ouachita Baptist University.

Technicians who were employed on this project were as follows:

Lee Kuyper

John Holston

Steve West

Gary Fiser

Neil Summerlin

Mike Hurst

Ramona Rice



THE HISTORY OF THE UNITED STATES

OF THE

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FROM 1776 TO 1876

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Introduction:

The DeGray Dam has been constructed on the Caddo River approximately 7 miles north of Arkadelphia, Arkansas. This multi-purpose project will provide flood control, power generation, recreation, watersupply, and water quality control. At normal pool elevation the impoundment will have an area of 13,400 acres. There are three unique features to this project: 1) a multi-level intake structure for temperature and water quality control, 2) a small regulating dam located below the main structure to provide regulation of the downstream power wake, and 3) a pumpback facility allowing an average pumpback of 2,000 c.f.s. during periods of low power consumption. The regulating dam will also provide a pool for this pump back facility.

The impoundment of DeGray Reservoir was begun on August 8, 1969. By May 11, 1970 the elevation of the pool was at 119 M (msl) giving a maximum depth of approximately 55 M near the dam. On May 12, 1970 the gates were opened to lower the pool for tree topping. By mid-June the elevation of the pool was at 113 M (msl) and remained at this level through mid-October. During this period, the bottom of the release gates were set at elevation 113 M so that inflow approximately equaled outflow. In late October the elevation of the reservoir was increased to approximately 114 M and remained roughly at that level until the gates were closed on December 31, 1970. No discharges have been made through April 1971. The elevation of the pool on April 30, 1971 was 119 M (msl).

The regulating dam located downstream from the main structure, is nearing completion but, as yet, has impounded no sizable pool.

A study of the water quality in DeGray Reservoir has been conducted since its impoundment in August, 1969. Selected water quality parameters have^{been} determined in samples taken from various depths and locations within the reservoir. The parameters which have been followed are given below:

dissolved oxygen	iron
temperature	manganese
pH	copper
chloride	cobalt
fluoride	nickel
phosphate (ortho)	lead
nitrate	zinc
C.O.D.	cadmium
calcium	silver
magnesium	
sodium	
potassium	
alkalinity	
sulfate	

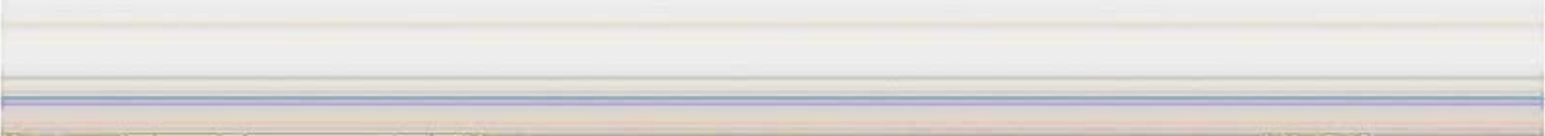
This interim report presents a summary of the dissolved oxygen data and representative temperature data for DeGray Reservoir for the period September, 1969 through April, 1971. A brief summary of the results of other water quality parameters

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is also presented. A relevant literature survey and detailed interpretation of the results of this study will be presented in the project completion report.



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Sampling stations:

The location of sampling stations on DeGray Reservoir are shown in Figure No. 1. Water samples are taken from various depths at Stations No. 1, 7, 10, 12, 13, and 17. Dissolved oxygen and temperature profiles are measured at these and other stations as needed to give a complete picture of the reservoir.



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Temperature:

Table No. 1 presents the temperature data for Station No. 1 for the period 9/26/70 through 5/15/71. During the period of stratification the hypolimnic temperatures are around 7 to 8 degrees Centigrade. Maximum epilimnic temperatures are around 28 degrees. During the months of January and February there is a slight temperature gradient in the reservoir.

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2. The second part contains a detailed analysis of the

economic development of the country during the year.

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social and cultural life of the country.

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Dissolved Oxygen:

The dissolved oxygen data is presented in Figures 2 through 25. Dissolved oxygen was measured at selected stations shown in Figure 1, using a Yellow Springs dissolved oxygen meter. The determinations were made at 2 meter intervals. In Figures 2 through 25, the reservoir is idealized as a triangle with the vertical line on the left of each figure representing the dam, the horizontal line representing the surface of the water and the diagonal line representing the drop of the river through the reservoir area. Since each station is located over the river channel, the data was recorded at the appropriate location within the triangle and the isoconcentration lines were drawn. Although the drop of the river through the reservoir area is not uniform as depicted in this graphical representation, the pattern developed by the isoconcentration lines clearly show the dissolved oxygen distribution within the different regions of the reservoir.

Shortly after beginning of impoundment, the reservoir developed a pattern of very low dissolved oxygen in the downstream section of the impoundment, gradually increasing in an upstream direction. This is shown in the profile for 9/26/69. Stocking of some fish in the downstream section of the reservoir by the Game and Fish Commission during this period resulted in considerable stress and a large mortality. Subsequently stocking operations were moved upstream. It is likely that the low dissolved oxygen reflects oxygen consumption by newly flooded organic materials. During this period of reservoir

1. The first part of the document discusses the importance of maintaining accurate records of all transactions. It emphasizes that proper record-keeping is essential for the integrity of the financial system and for the ability to detect and prevent fraud. The text also notes that records should be kept for a sufficient period to allow for a thorough audit.

2. The second part of the document outlines the specific requirements for record-keeping. It states that all transactions must be recorded in a clear and concise manner, and that the records must be accessible to all authorized personnel. The text also discusses the importance of maintaining the confidentiality of the records and the need to implement appropriate security measures to protect the information.

3. The final part of the document provides a summary of the key points discussed and offers some concluding remarks. It reiterates the importance of record-keeping and encourages all personnel to adhere to the guidelines outlined in the document.

filling the ratio of organic debris to total volume of the reservoir would be relatively large.

As shown in the dissolved oxygen profile taken on 10/18/69 the cooler fall rains underflow the reservoir bringing fresh oxygen into the lower region of the impoundment. It is interesting to note the small pocket of low dissolved oxygen which was formed near the center of the graph. By 11/8/69 the underflow had proceeded all of the way to the dam and there had been considerable increase in elevation of the pool. The cooler temperatures were causing oxygenation of the surface water while the underflow seems to be oxygenating the lower strata. The pocket of low dissolved oxygen near the center of the graph was maintained.

Although the dissolved oxygen levels were observed to be higher on 12/13/69, the pattern of high dissolved oxygen on bottom, originating from the underflow, was still present. The pocket of low dissolved oxygen was still present indicating that complete mixing of the reservoir had not occurred.

On 1/17/70 the dissolved oxygen distribution suggests that considerable mixing had occurred but that there was an increasing oxygen demand in the lower regions of the impoundment. By 3/21/70 the more classical picture of dissolved oxygen began to develop showing values of saturation in the upper 14 meters and a declining oxygen concentration in the lower region.

The elevation of the reservoir increased from 114 M to almost 120 M between 3/21/70 and 5/2/70. The large quantity

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of water which entered the reservoir during this time is probably responsible for the rather complex pattern of dissolved oxygen distribution observed on 5/2/70. The water below 100 M elevation appears to be undisturbed by the inflow since a declining dissolved oxygen concentration is observed. A pocket of zero dissolved oxygen has developed near bottom in the central portion of the impoundment.

On 6/15/70 the dissolved oxygen distribution shows the classical clinograde distribution with values near saturation on the surface and a sharply declining concentration in the thermocline region. A pocket of higher dissolved oxygen is maintained under this sharp drop in the lower regions of the impoundment. It should also be noted that the reservoir was lowered during this period for the purpose of tree topping. Releases were made from the upper elevation (approximately 114 M). The release of water from the upper elevation is probably responsible for the relatively thin layer of oxygenated water on the reservoir during this period.

The reason for the minimum in the dissolved oxygen profile at elevation 107 M in the lower portion of the reservoir is not clear. Such a minimum could be produced by the interflow of water carrying a heavy burden of organics from spring runoff. The mechanism of the development of this minimum is being investigated further.

The dissolved oxygen distribution during the period from 7/7/70 through 10/10/70 is characterized by a relatively thin

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layer of oxygenated water on the surface and an oxygen depleted zone immediately below this layer. The pocket of slightly higher dissolved oxygen below elevation 105 M was observed to gradually dissipate over this period. On 7/23/70 and again on 10/10/70 a disturbance in the even layering of the dissolved oxygen distribution was observed in the upper end of the reservoir. Such disturbances could be produced by an underflow of cooler runoff water flowing into or slightly below the thermocline causing a lifting up of some of the oxygen depleted water into the epilimnic zone. Mixing of oxygen depleted water by interflows or underflows of cooler runoff water conceivably could produce a zone of low oxygen which could be of biological significance.

On 11/7/70 the dissolved oxygen profile showed a distinct underflow in the upper end of the reservoir. The rains experienced immediately prior to this period were considerably cooler and would be expected to underflow deeper into the thermocline. By 12/2/70 the underflow has caused oxygenation of the hypolimnic water in the upper portion of the reservoir and by 12/16/70 dissolved oxygen concentrations indicative of fresh water is detectable throughout the upper half of the reservoir.

The dissolved oxygen profile observed on 1/12/71 shows that the fresh water has completely underflowed the reservoir, oxygenating the hypolimnic water throughout the reservoir. It is obvious that mixing has not taken place in the downstream section of the impoundment since a pocket of zero dissolved

1. The first part of the document discusses the importance of maintaining accurate records of all transactions. This includes not only sales and purchases but also expenses and income. Proper record-keeping is essential for determining the correct amount of tax liability.

2. The second part of the document addresses the issue of deductions. Taxpayers are allowed to deduct certain expenses from their taxable income, which can significantly reduce their tax liability. However, it is important to understand the rules governing these deductions, as not all expenses are eligible.

3. The third part of the document discusses the timing of tax payments. Taxpayers are generally required to make quarterly estimated payments if they expect to owe tax at the end of the year. Failure to make these payments can result in penalties and interest charges.

4. The fourth part of the document covers the topic of tax credits. These are amounts that can be subtracted directly from the taxpayer's tax liability. Unlike deductions, which reduce taxable income, credits reduce the actual tax owed. There are various types of credits, each with its own set of requirements.

5. The fifth part of the document discusses the importance of seeking professional advice. Tax law is complex and constantly changing. A qualified tax professional can provide personalized guidance and help taxpayers navigate the intricacies of the tax system, ensuring they take full advantage of all available opportunities.

6. Finally, the document emphasizes the importance of staying up-to-date on tax news and developments. Tax laws are subject to frequent changes, and taxpayers should be aware of any new legislation or court decisions that may affect their tax situation.

oxygen can still be detected near the dam. This intermediate pocket of oxygen depleted water is still detected on 1/30/71 even through the concentrations of dissolved oxygen have increased. By 2/20/71 dissolved oxygen concentration has increased to 7 ppm and above throughout the reservoir. Although there is a definite gradient from the lower end of the impoundment toward the upstream section, the dissolved oxygen distribution reflects as near a homogeneous state as has ever been observed in this reservoir.

The dissolved oxygen measurements observed on 3/20/71 indicate that the reservoir is beginning stratification with oxygen depletion beginning in the lower regions. As the oxygen depletion process continues, the higher oxygen demand seems to be in the central portion of the reservoir. The first stations to show a zero dissolved oxygen zone were near mid reservoir. This is shown in the profiles taken on 4/24/71 and 5/18/71.



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Other Water Quality Parameters:

The various water quality parameters which have been determined in the study of DeGray Reservoir are shown in Table No. 2 along with the results of analyses of samples taken on March 20, 1971.

During the summer of 1970 a large build up of iron and manganese was observed in the anoxic portion of the reservoir. There were indications that other trace metals were also affected by the strong reducing conditions present in the lower portion of the reservoir during this period. Cadmium has been observed to increase in the extreme lower portion of the hypolimnic zone prior to the detection of hydrogen sulfide.

A statistical evaluation of trace metal data show a trend of decreasing concentration since impoundment. Additional data will be necessary to confirm this trend. *

Water quality data indicate that there were interflows within the reservoir during the early spring of 1971. Rainfall during the spring of 1971 has been below average. These density currents are apt to be more pronounced during periods of heavy runoff.

1. Introduction

The first part of the document discusses the importance of maintaining accurate records for legal and financial purposes. It highlights the challenges faced by small businesses in this regard and offers practical solutions.

One of the key challenges is the lack of standardized software and processes. This leads to inconsistent data entry and potential errors in reporting.

Another significant issue is the time and cost associated with manual record-keeping. Many small business owners struggle to find the time to properly document their transactions, which can lead to incomplete or inaccurate records.

Despite these challenges, there are several strategies that can be implemented to improve record-keeping practices.

First, investing in reliable accounting software is a crucial step. Modern software solutions offer automation, integration, and ease of use, which can significantly reduce the burden of record-keeping.

Second, establishing a clear system for organizing and labeling records is essential. This ensures that all necessary information is captured and easily accessible when needed.

DeGray Reservoir
 Temperature (°C)
 Station No. 1

Depth (M)	1969 9/26	10/18	11/8	12/13	1/17	3/21	5/2	5/18	6/15	7/7	7/23	8/13
0	26.0	21.2	16.7	10.3	6.9	9.6	19.2	25.0	28.0	28.6	26.2	28.9
2	24.3	20.8	16.1	10.1	6.9	9.0	19.2	25.0	27.2	28.6	26.0	28.7
4	24.1	20.8	16.1	10.0	6.6	9.0	19.0	24.0	23.0	24.1	25.2	28.4
6	24.0	20.7	15.5	9.9	6.3	9.1	19.0	18.2	16.1	15.7	16.3	17.4
8	24.0	20.7	15.0	9.7	6.2	9.1	16.3	16.9	12.1	11.7	12.3	12.9
10	24.0	20.7	14.9	9.7	6.2	9.2	14.0	15.0	10.0	9.8	10.2	10.5
12	23.9	20.5	14.0	9.7	6.2	9.2	11.0	13.0	9.0	8.9	9.2	9.5
14		20.2	13.6	9.6	6.2	7.9	10.2	10.4	8.0	8.0	8.3	8.6
16		20.2	13.5	9.0	6.2	6.9	10.0	9.8	7.5	7.7	7.8	7.9
18				8.5	6.2	6.4	8.9	9.0	7.0	7.1	7.3	7.4
20				8.1	6.1	6.3	7.8	8.0	6.9	7.0	7.0	7.2
22				8.0	6.1	6.1	7.1	7.3	6.9	6.9	7.0	7.1
24				7.6	6.0	6.0	6.9	7.0	6.8	6.8	7.0	7.0
26				7.5	6.0	5.8	6.8	6.9	6.7	6.7	6.9	6.9
28				7.5	6.0		6.7	6.6	6.5	6.7	6.8	6.9
30							6.5	6.6	6.5	6.7	6.8	6.9
32							6.3	6.3	6.5	6.7	6.8	6.9
34							6.2	6.1	6.4	6.6	6.8	6.9
36							6.2	6.1	6.4	6.6	6.8	7.0
38							6.1	6.1	6.4	6.9	7.0	7.2
40							6.1	6.1	6.9	7.1	7.1	7.2
42							6.1	6.1	7.0	7.2	7.1	7.3
44							6.1	6.1	7.0	7.3	7.2	7.4
46							6.1	6.1	7.0			7.4
48							6.1	6.1	7.0			
50							6.1	6.1	7.0			



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Temperature (°C)
 Station No. 1
 (continued)

Depth (M)	1970 (cont.)		10/10	11/7	12/2	12/16	1971					
	8/21	9/19					1/12	1/30	2/20	3/20	4/24	5/18
0	28.6	27.8	19.8	14.1	13.0	9.9	8.6	8.3	9.3	9.0	19.8	21.0
2	28.6	26.6	19.7	14.3	12.5	9.9	8.2	7.9	8.0	9.0	16.7	20.5
4	27.8	26.3	19.7	14.3	11.4	9.9	8.1	7.8	7.6	9.0	16.2	19.1
6	17.0	19.2	19.7	14.4	11.1	9.9	7.8	7.7	7.3	9.0	16.1	14.2
8	12.3	12.3	13.9	14.2	10.7	9.9	7.5	7.5	7.2	9.0	15.0	11.9
10	10.2	10.2	10.3	13.7	10.3	9.9	7.5	7.4	7.0	9.0	11.2	10.5
12	9.0	9.1	9.5	9.9	10.1	9.9	7.5	7.3	6.9	9.0	10.8	9.8
14	8.1	8.2	8.5	8.9	10.0	9.9	7.5	7.3	6.8	9.0	9.2	8.9
16	7.5	7.8	7.9	8.2	8.6	9.2	7.5	7.2	6.6	9.0	8.7	8.4
18	7.1	7.5	7.6	7.9	8.0	9.0	7.4	7.2	6.6	9.0	8.0	8.0
20	7.1	7.3	7.4	7.7	7.9	8.1	7.3	7.2	6.5	9.0	7.8	7.8
22	7.0	7.2	7.2	7.5	7.8	8.0	7.3	7.2	6.5	9.0	7.5	7.4
24	7.0	7.2	7.2	7.3	7.8	7.9	7.3	7.2	6.3	9.0	7.4	7.2
26	7.0	7.1	7.1	7.2	7.6	7.8	7.3	7.2	6.3	8.0	7.2	7.2
28	6.9	7.1	7.1	7.2	7.5	7.8	7.3	7.1	6.3	7.2	7.0	7.2
30	6.9	7.0	7.1	7.2	7.4	7.5	7.2	7.0	6.3	7.0	7.0	7.1
32	6.9	7.0	7.1	7.2	7.4	7.5	7.2	6.8	6.3	7.0	7.0	7.0
34	6.9	7.3	7.1	7.2	7.4	7.4	7.2	6.8	6.2	6.9	7.0	7.0
36	7.1	7.3	7.3	7.5	7.4	7.4	7.2	6.8	6.2	6.8	7.0	7.0
38	7.1	7.3	7.4	7.7	7.6	7.6	7.2	6.8	6.2	6.8	7.0	7.0
40	7.1	7.2	7.5	7.7	7.8	7.8	7.1	6.8	6.2	6.8	7.0	7.0
42	7.4	7.4	7.5	7.8	7.8	7.8	7.1	6.7	6.2	6.7	7.0	7.0
44	7.4	7.6	7.5	7.8	7.8	7.8	7.0	6.7	6.2	6.7	7.0	7.0
46				7.8		7.8	7.0	6.7	6.2	6.7	7.0	7.0
48							7.0	6.7		6.7	7.0	
50										6.8	7.0	



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Section 1: Introduction to the subject matter, discussing the scope and objectives of the study.

Section 2: Literature review and background information, providing context for the research.

Section 3: Methodology and data collection, detailing the research approach and sources.

Section 4: Results and analysis, presenting the findings and their implications.

Section 5: Discussion and conclusions, summarizing the key points and future directions.

Section 6: Bibliography and references, listing the sources used in the research.

Section 7: Appendix and supplementary materials, providing additional data and details.

Table No. 2

Depth (M)	Station No. 1				
	Temp. (°C)	D.O. (ppm)	pH	Alk. (ppmCaCO ₃)	C.O.D. (ppm)
0	9.0	10.7	6.9	27.1	12
5	9.0	10.2	6.9	30.8	5
10	9.0	10.3	6.8	30.0	14
15	9.0	10.2	6.8	29.6	13
20	9.0	10.1	6.7	29.9	9
30	7.0	7.6	6.7	29.0	6
40	6.8	6.2	6.6	29.5	9
50	6.8	3.3	6.6	29.1	11

Temp. (°C)	D.O. (ppm)	pH	Alk. (ppmCaCO ₃)	C.O.D. (ppm)	Station No. 7							
					(ppm)Na	K	Ca	Mg	Cl			
9.0	10.2	6.9	30.0	9	2.0	1.4	8.6	1.9	1.5	0.05	1.0	0.13
8.9	10.0	6.9	28.7	17	2.0	1.3	8.3	1.8	2.0	0.04	1.1	0.13
8.8	9.8	6.9	27.6	11	2.0	1.4	8.6	1.8	2.0	0.04	0.9	0.08
7.3	8.0	6.8	27.7	10	1.8	1.6	9.6	1.9	1.8	0.03	1.5	0.11
6.9	6.6	6.8	25.1	12	1.9	1.6	8.8	2.0	1.5	0.07	1.3	0.10
6.7	6.0	6.7	31.3	5	1.9	1.5	11.4	2.0	2.0	0.05	1.2	0.09

	(ppm)Na	K	Ca	Mg	Cl	F	NO ₃	PO ₄
0	1.9	1.6	9.6	2.0	1.5	0.04	1.1	0.10
5	1.9	1.6	7.5	2.0	1.3	0.06	1.1	0.09
10	1.9	1.6	8.3	1.9	1.5	0.04	1.0	0.10
15	1.9	1.7	7.8	1.9	1.3	0.06	0.9	0.11
20	1.9	1.6	8.2	1.9	2.0	0.04	1.4	0.12
30	1.9	1.6	7.4	2.0	1.8	0.05	1.3	0.11
40	1.9	1.6	9.1	2.0	1.8	0.05	1.8	0.09
50	1.9	1.6	8.5	2.0	1.5	0.08	1.3	0.13

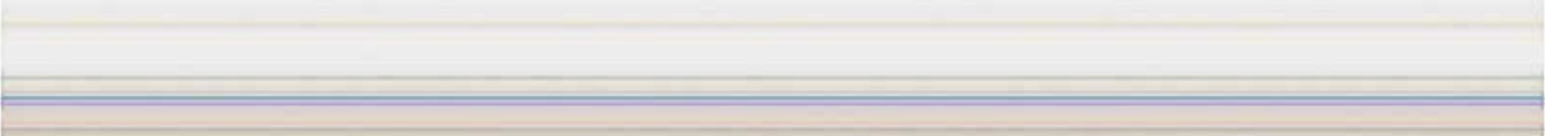
(ppm)Na	K	Ca	Mg	Cl	F	NO ₃	PO ₄
2.0	1.4	8.6	1.9	1.5	0.05	1.0	0.13
2.0	1.3	8.3	1.8	2.0	0.04	1.1	0.13
2.0	1.4	8.6	1.8	2.0	0.04	0.9	0.08
1.8	1.6	9.6	1.9	1.8	0.03	1.5	0.11
1.9	1.6	8.8	2.0	1.5	0.07	1.3	0.10
1.9	1.5	11.4	2.0	2.0	0.05	1.2	0.09

Depth (M)	Filtered								
	(ppb)Fe	Mn	Cu	Ni	Co	Pb	Zn	Ag	Cd
0	170	49	6	0	0	10	24	1	1
5	96	27	2	0	3	9	6	1	1
10	58	19	3	0	2	11	6	1	1
15	109	29	2	0	2	12	9	1	1
20	116	40	6	0	3	10	23	0	0
30	192	64	17	4	2	10	43	1	1
40	212	74	5	0	2	14	74	1	1
50	238	90	0	0	3	13	10	1	1

Depth (M)	Filtered								
	(ppb)Fe	Mn	Cu	Ni	Co	Pb	Zn	Ag	Cd
0	95	33	9	2	0	12	7	0	0
5	79	23	6	0	2	16	4	1	0
10	73	20	5	0	2	11	10	0	0
15	98	35	6	0	1	9	9	1	0
20	176	59	31	0	2	7	21	1	1
30	119	47	1	0	1	11	5	1	1

Depth (M)	Particulate								
	(ppb)Fe	Mn	Cu	Ni	Co	Pb	Zn	Ag	Cd
0	50	27	6	1	0	5	16	0	4
5	30	13	0	0	2	0	5	0	0
10	37	19	1	0	0	1	9	0	1
15	41	17	0	0	0	0	2	9	2
20	51	14	1	2	0	10	6	2	3
30	48	23	11	2	3	1	3	3	6
40	82	29	0	0	0	3	7	2	2
50	670	58	0	0	0	6	5	2	2

Depth (M)	Particulate								
	(ppb)Fe	Mn	Cu	Ni	Co	Pb	Zn	Ag	Cd
0	34	11	0	0	0	3	0	3	0
5	40	16	0	0	0	3	0	4	5
10	40	15	0	0	4	2	0	0	1
15	54	22	0	0	0	4	2	0	3
20	90	21	5	3	2	10	6	18	3
30	48	20	0	2	2	5	0	0	3



1. Introduction 2. Background 3. Methodology 4. Results 5. Conclusion

The purpose of this study is to investigate the impact of social media on the mental health of young adults. The research is based on a quantitative approach, utilizing a survey of 500 participants aged 18-25. The data was analyzed using statistical software to identify correlations between social media usage and self-reported mental health issues.

The findings of the study indicate a significant positive correlation between increased social media usage and higher levels of anxiety and depression. Specifically, participants who spent more than three hours per day on social media platforms reported higher scores on standardized mental health scales compared to those who used social media for less than an hour.

These results suggest that excessive social media use may contribute to mental health challenges in young adults. Further research is needed to explore the underlying mechanisms and to develop interventions that can mitigate these effects.

The study was conducted over a period of six months. Data collection was completed in the first three months, and the analysis phase followed. The research was supported by a grant from the National Institute of Mental Health.

The authors would like to thank the participants for their time and contribution to the study. We also acknowledge the assistance of the research assistants and the funding agency.

This study was approved by the Institutional Review Board at the University of California, Los Angeles. All procedures followed were in accordance with the ethical standards of the committee.

Correspondence: Dr. Jane Smith, Department of Psychology, UCLA, Los Angeles, CA. Email: jane.smith@ucla.edu

Table No. 2 (continued)

Depth (M)	Station No. 10				
	Temp. (°C)	D.O. (ppm)	pH	Alk. (ppmCaCO ₃)	C.O.D. (ppm)
0	10.0	10.0	7.0	24.5	5
5	9.7	9.9	6.9	25.3	10
10	8.0	8.6	6.9	26.5	2
15	7.0	7.1	6.9	29.5	14
20	7.0	7.0	6.8	29.1	15
30					
40					
50					

Temp. (°C)	D.O. (ppm)	pH	Alk. (ppmCaCO ₃)	C.O.D. (ppm)
10.8	10.4	7.0	25.4	8
9.9	9.6	6.9	25.1	6
8.6	8.1	6.9	25.9	8

Depth (M)	(ppm)Na	K	Ca	Mg	Cl	F	NO ₃	PO ₄
0	2.2	1.1	11.0	1.6	1.8	0.05	0.5	0.10
5	2.1	0.9	6.9	1.6	1.8	0.03	0.3	0.10
10	2.0	1.2	12.0	1.8	1.5	0.04	0.5	0.08
15	2.0	1.3	8.9	1.9	1.5	0.07	0.9	0.10
20	2.0	1.3	9.1	1.9	1.3	0.05	1.0	0.03
30								
40								
50								

(ppm)Na	K	Ca	Mg	Cl	F	NO ₃	PO ₄
2.2	0.9	13.3	1.6	1.8	0.04	1.1	C.0.10
2.1	0.8	7.4	1.6	1.8	0.04	0.8	0.03
2.0	0.9	23.8	1.6	1.8	0.09	0.5	C.10

Depth (M)	Filtered (ppb)								
	Fe	Mn	Cu	Ni	Co	Pb	Zn	Ag	Cd
0	10	0	1	6	3	9	13	1	0
5	14	1	0	0	2	7	0	0	0
10	59	25	5	0	2	11	7	0	0
15	70	36	7	0	1	12	7	1	1
20	83	41	6	0	1	37	10	0	1
30									
40									
50									

Depth (M)	Filtered (ppb)								
	Fe	Mn	Cu	Ni	Co	Pb	Zn	Ag	Cd
0	10	2	1	0	1	9	4	1	1
5	35	17	11	0	0	11	6	0	0
10	18	7	0	0	0	12	0	2	0

Depth (M)	Particulate (ppb)								
	Fe	Mn	Cu	Ni	Co	Pb	Zn	Ag	Cd
0	90	13	0	0	2	4	0	0	2
5	90	13	0	0	1	4	0	0	3
10	54	13	0	0	3	0	0	0	3
15	52	12	0	0	2	4	4	3	1
20	47	16	1	0	1	0	10	3	5
30									
40									
50									

Depth (M)	Particulate (ppb)								
	Fe	Mn	Cu	Ni	Co	Pb	Zn	Ag	Cd
0	102	7	0	4	4	0	0	4	1
5	118	11	1	0	0	1	0	0	1
10	170	22	0	0	1	0	0	4	2

Handwritten notes at the top of the page, including the word "Mittwoch" and some illegible scribbles.

Handwritten notes in the middle section, possibly starting with "Mittwoch" and containing some illegible text.

Handwritten notes in the lower middle section, including the word "Mittwoch" and some illegible text.

Handwritten notes at the bottom of the page, including the word "Mittwoch" and some illegible text.

Figure No. 1

Map of DeGray Reservoir showing sampling stations



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1967-1968

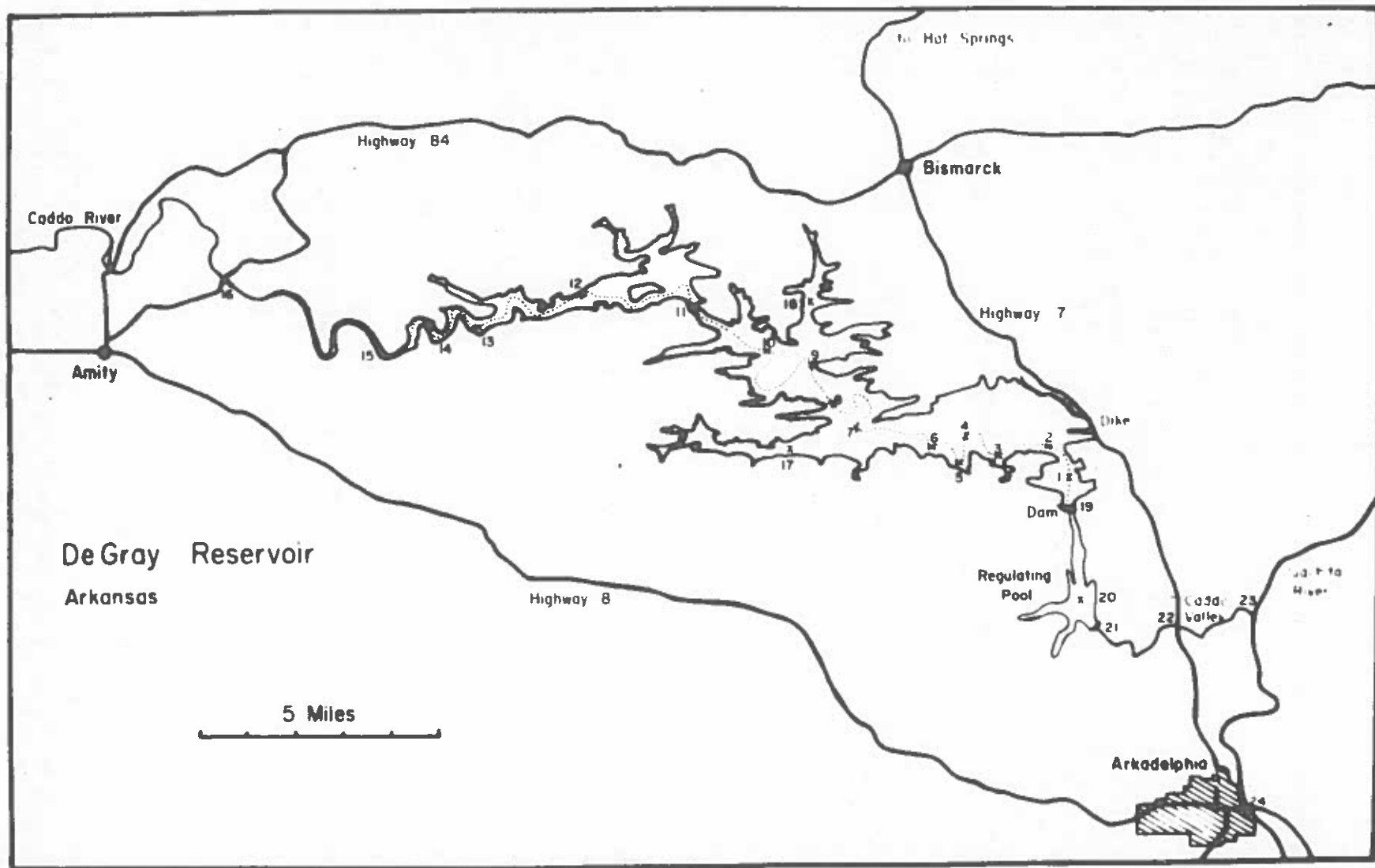
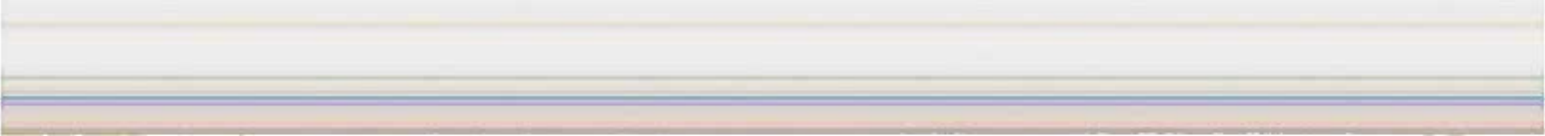




Figure 2 through 25

Dissolved Oxygen (ppm) profiles of DeGray Reservoir

Figure No.	Date
2	9/26/69
3	10/18/69
4	11/8/69
5	12/13/69
6	1/17/70
7	3/21/70
8	5/2/70
9	6/15/70
10	7/7/70
11	7/23/70
12	8/13/70
13	8/21/70
14	9/19/70
15	10/10/70
16	11/7/70
17	12/2/70
18	12/16/70
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20	1/30/71
21	2/20/71
22	3/20/71
23	4/24/71
24	5/18/71

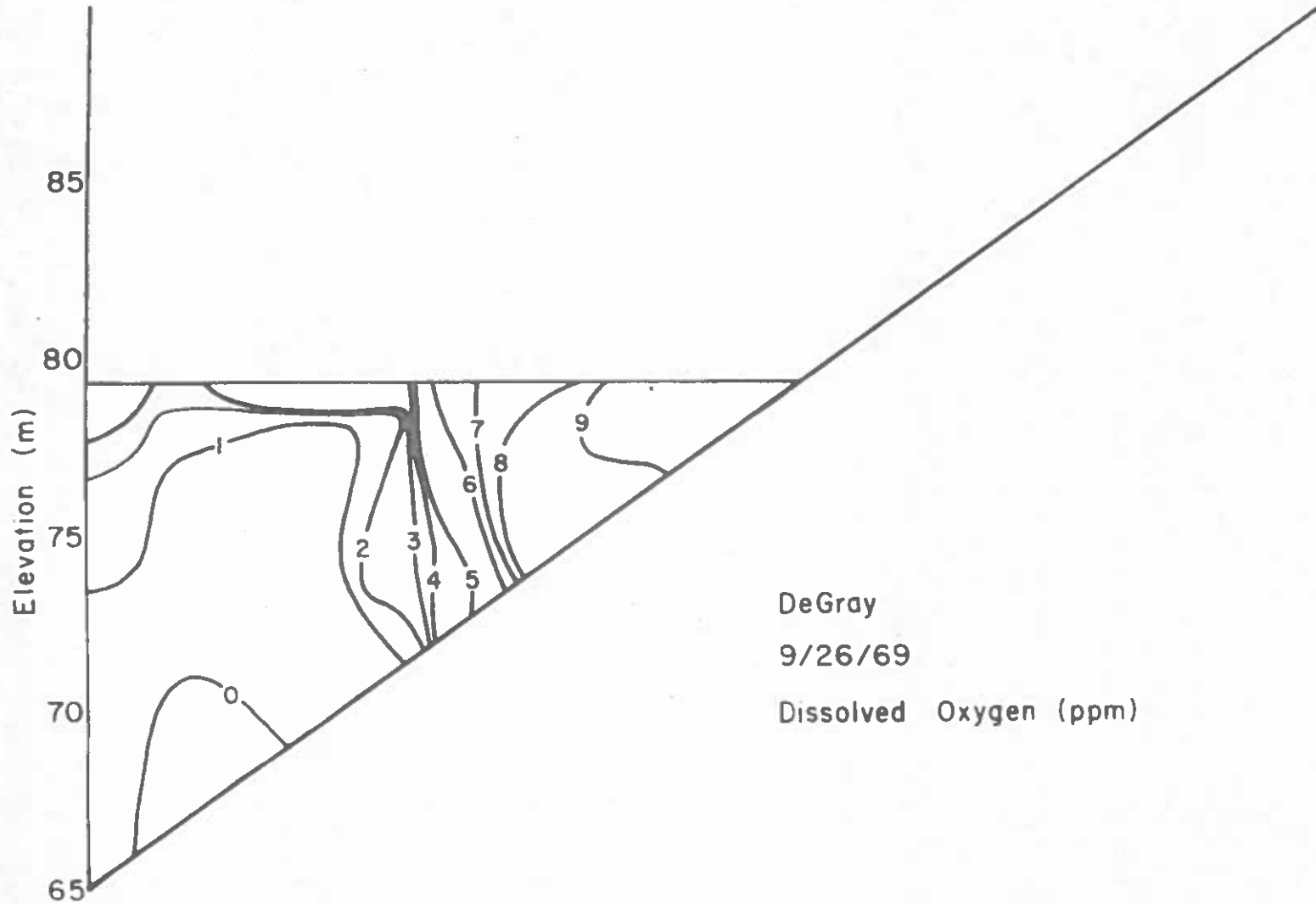


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Handwritten text, possibly a name or title, located in the middle of the page.

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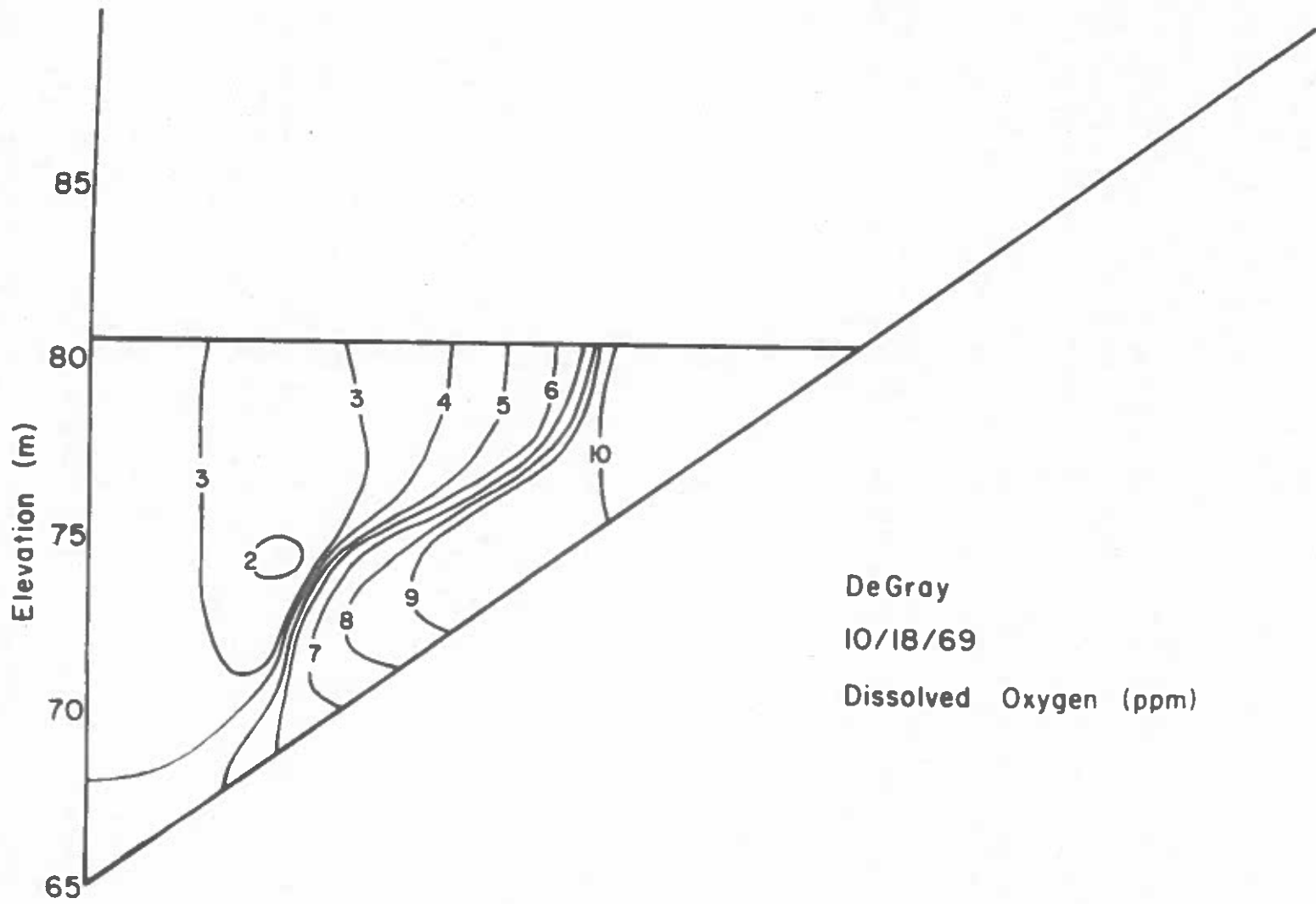
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DeGray
9/26/69
Dissolved Oxygen (ppm)

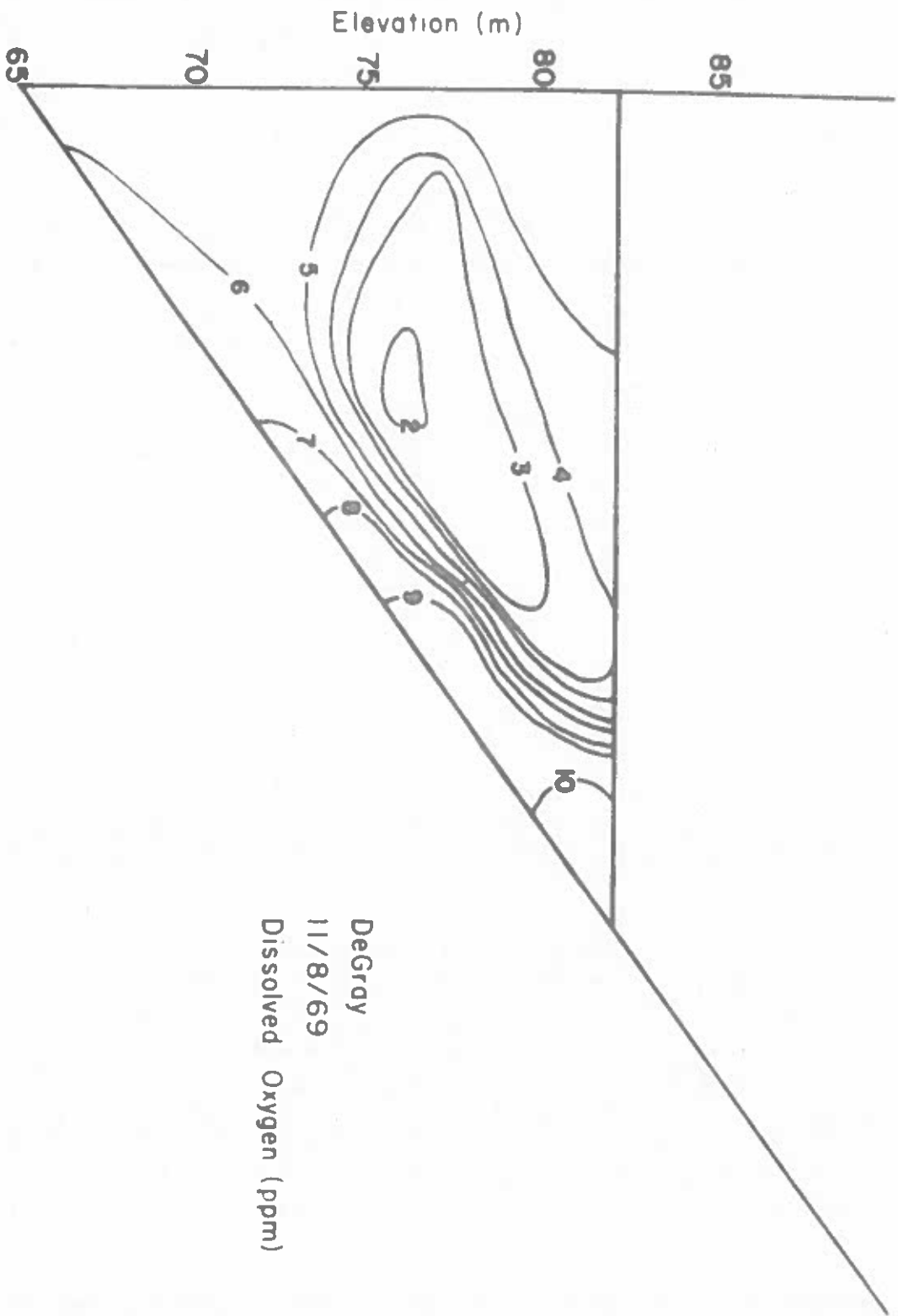


Geological cross-section showing topographic profile and subsurface layers. The topographic surface is a straight line sloping downwards from right to left. Below it, several irregular, wavy lines represent different geological strata. A horizontal line at the top is labeled 'Elevation (ft)' with values 200, 300, 400, and 500. The subsurface layers are labeled 'Mudstone', 'Sandstone', and 'Shale'.



DeGray
10/18/69
Dissolved Oxygen (ppm)



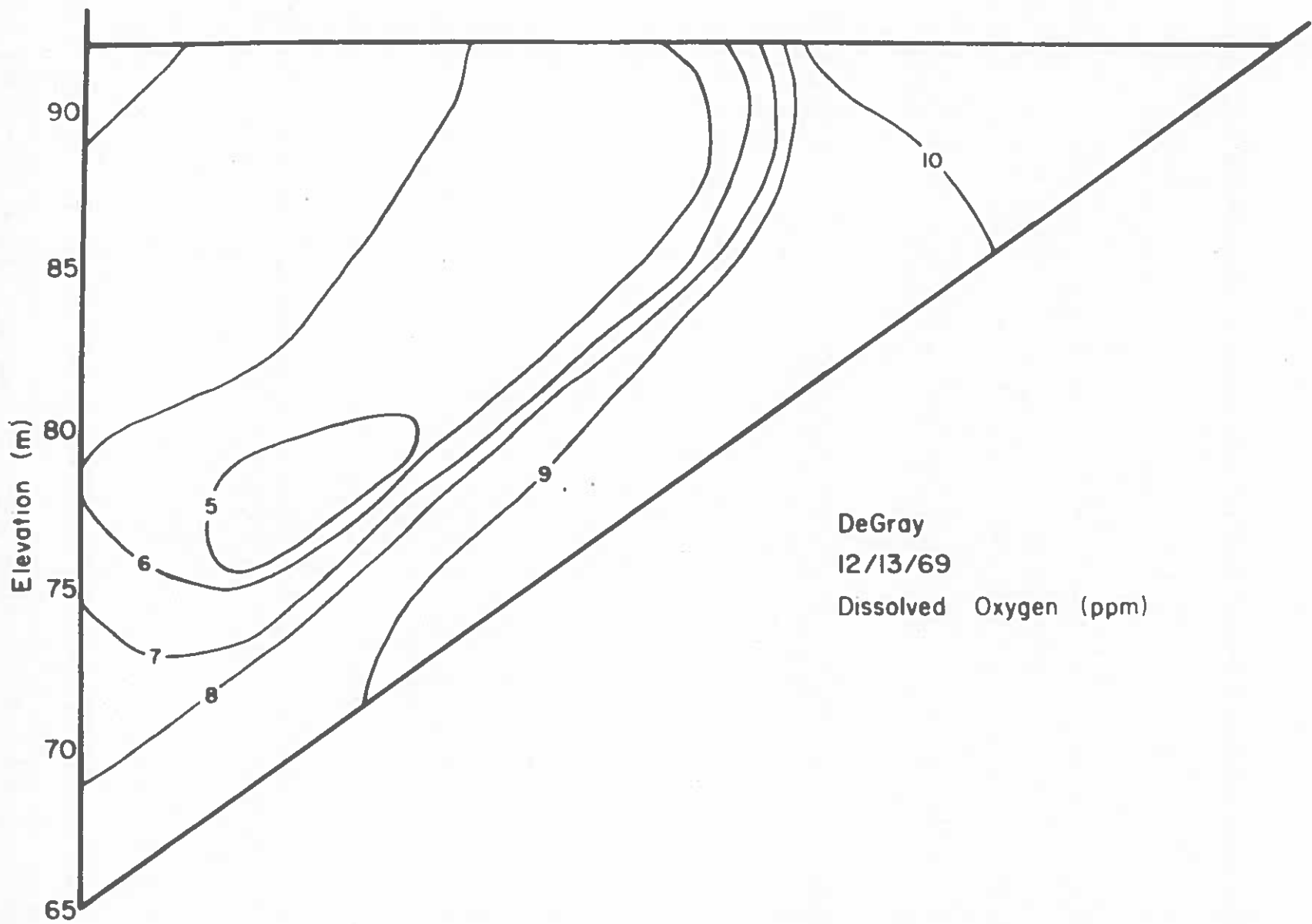


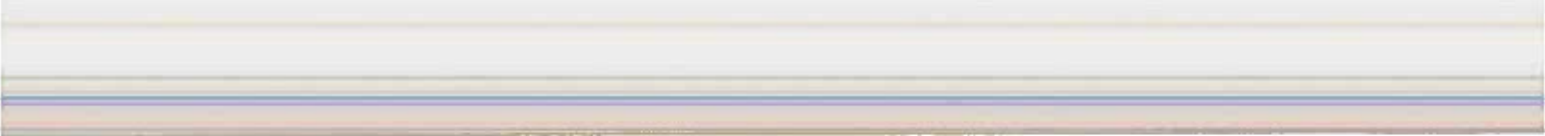
DeGray
11/8/69
Dissolved Oxygen (ppm)



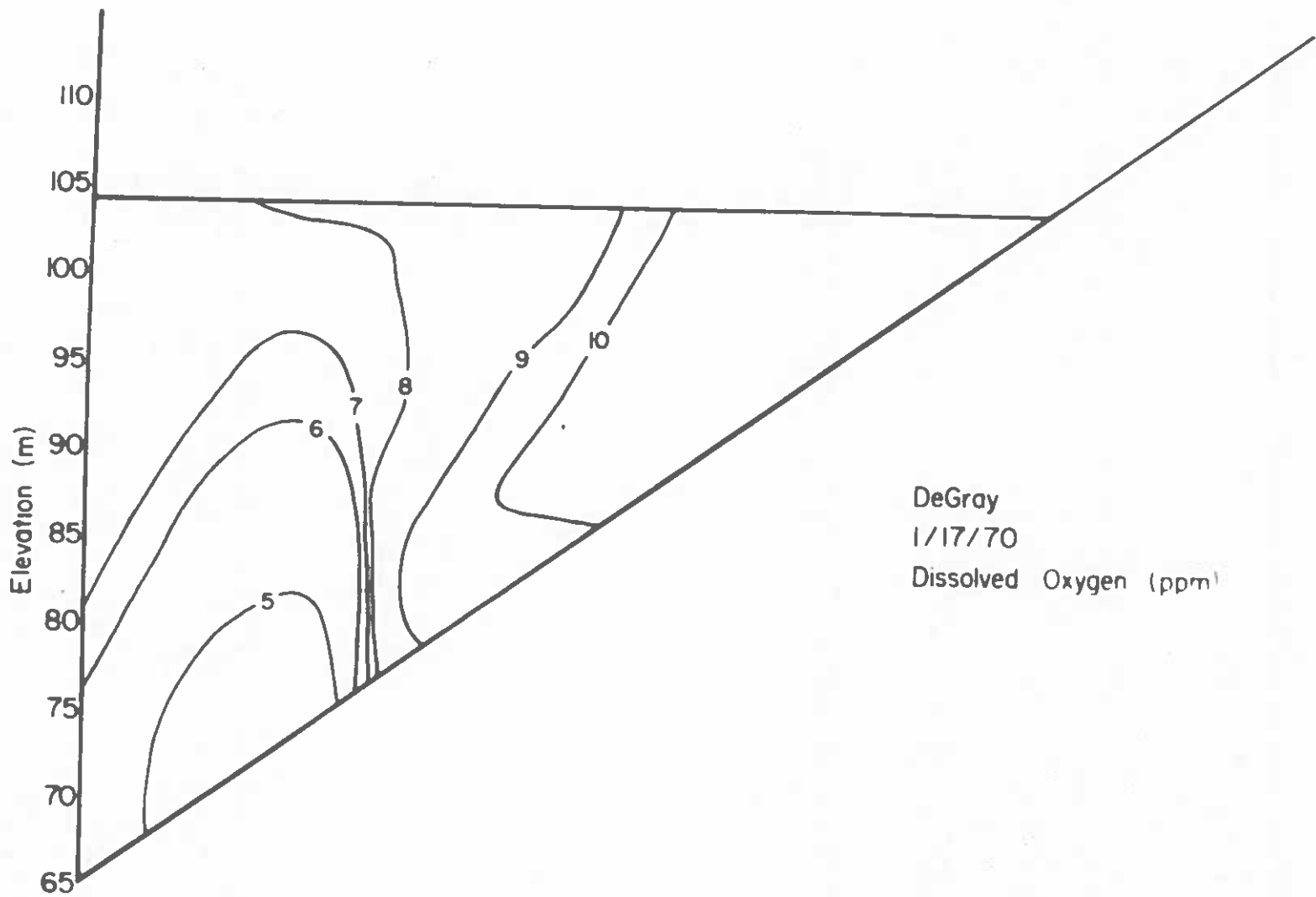
100
90
80
70
60
50
40
30
20
10

Hand-drawn contour map showing a hill with a peak of 100 units. The map includes a horizontal axis with labels 10, 20, 30, 40, 50 and a vertical axis with labels 10, 20, 30, 40, 50. Contour lines are drawn at intervals of 10 units, with the highest contour labeled '100'. A shaded area represents the hill's slope, and a path is drawn from the bottom left towards the peak.



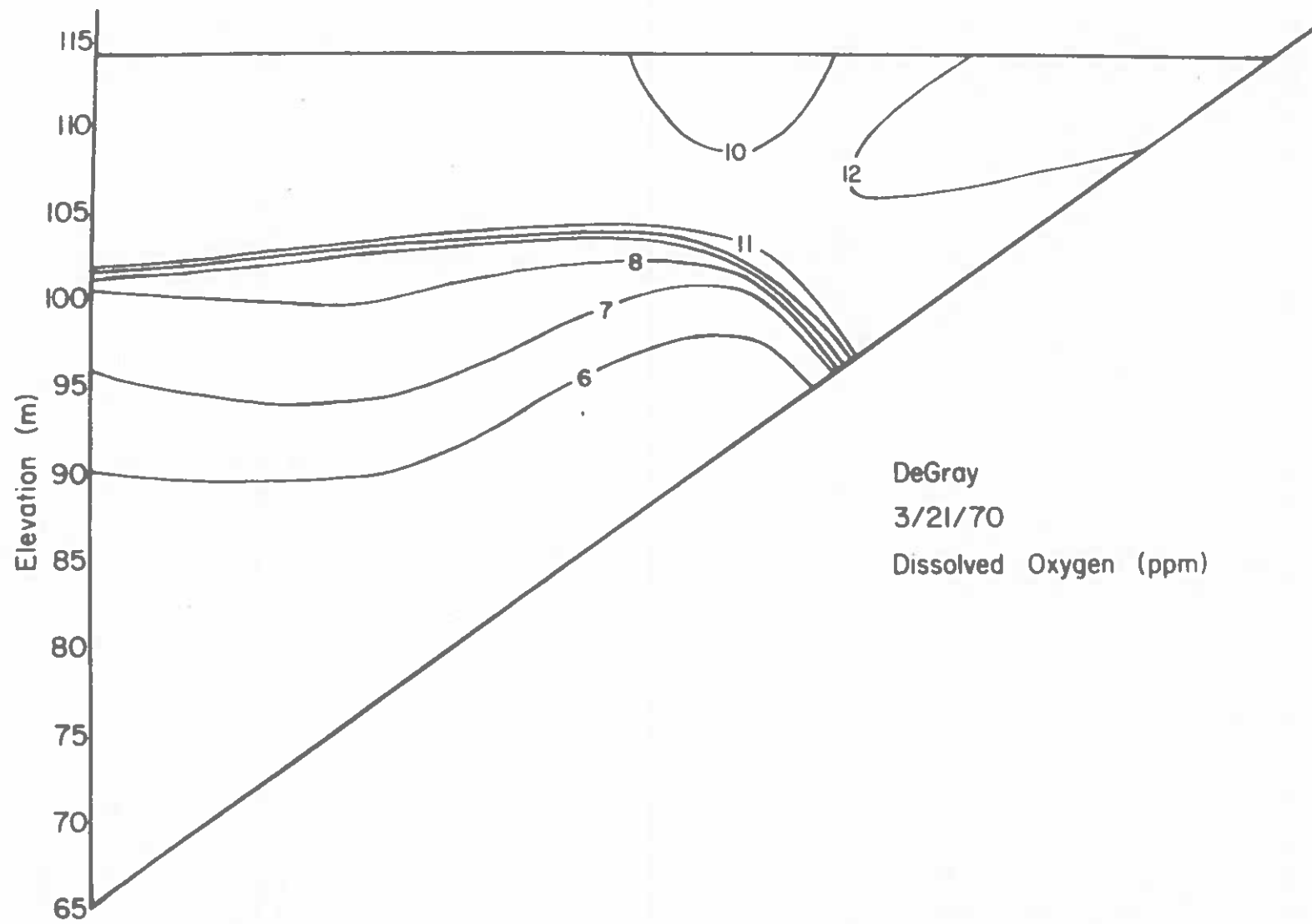


Pressure Order (bar)
Temperature
Density

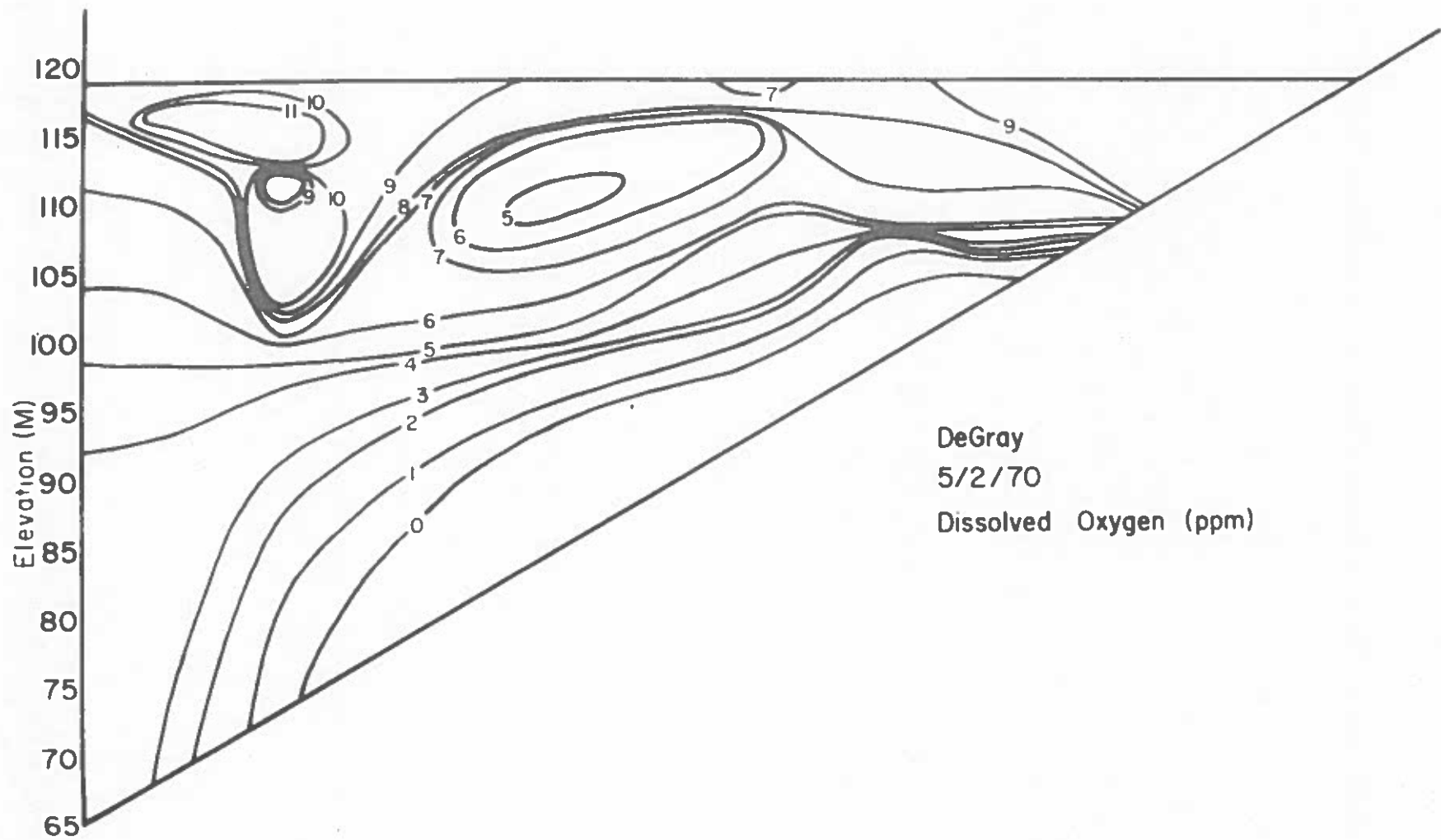




Contour Lines
 Elevation (m)
 Distance (m)





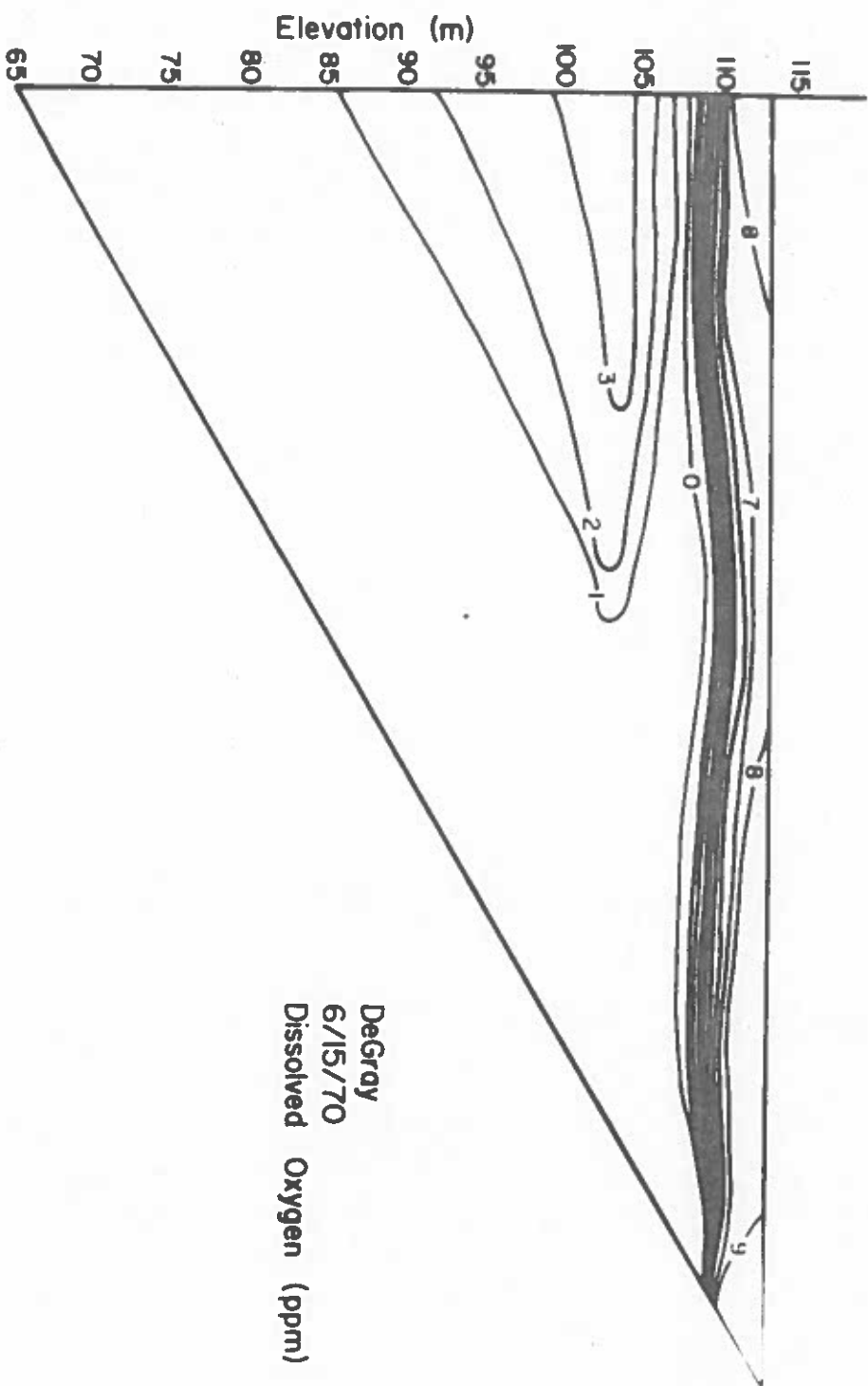




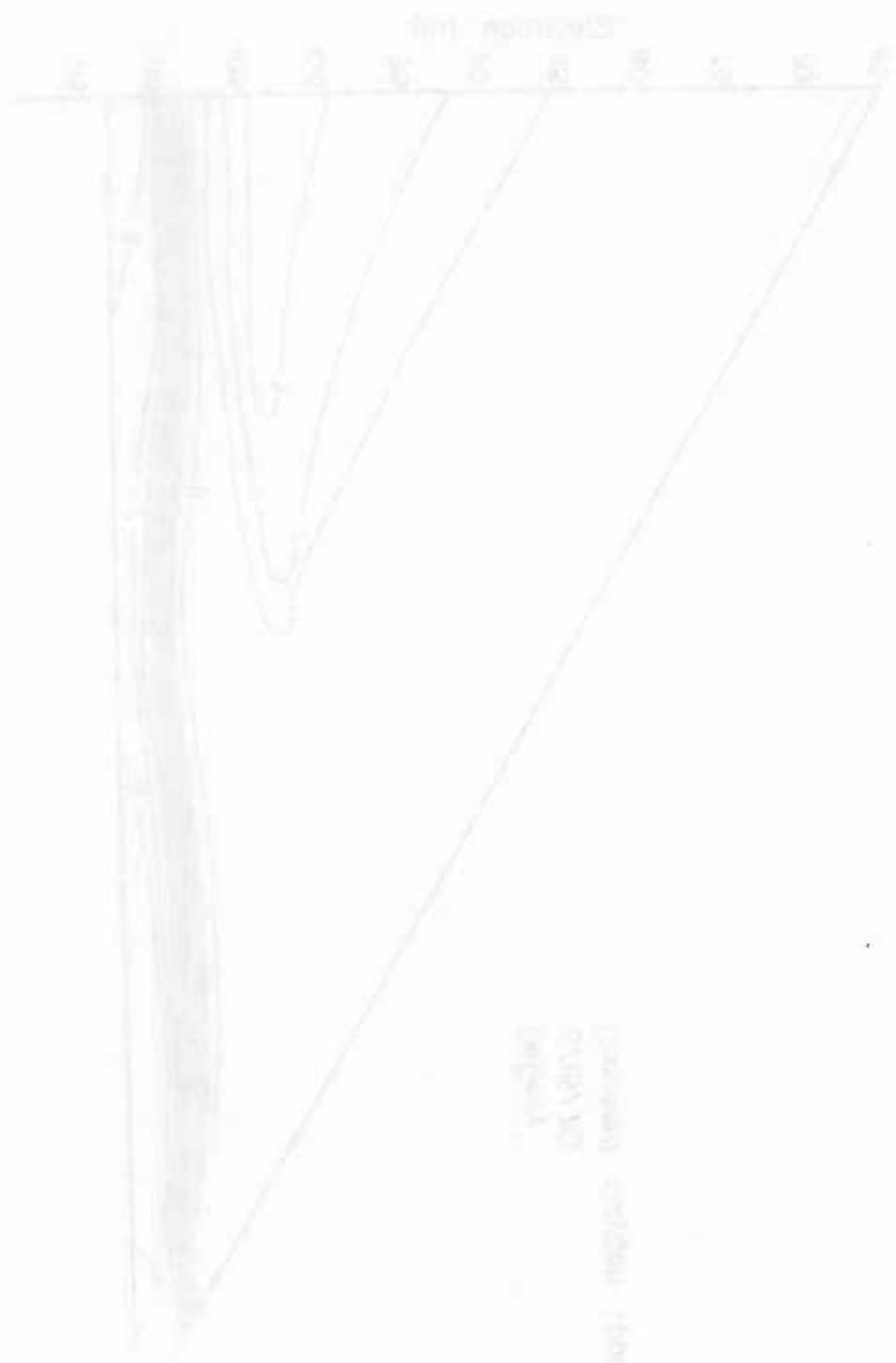
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Handwritten Title: *Handwritten text, possibly a title or description of the plot.*

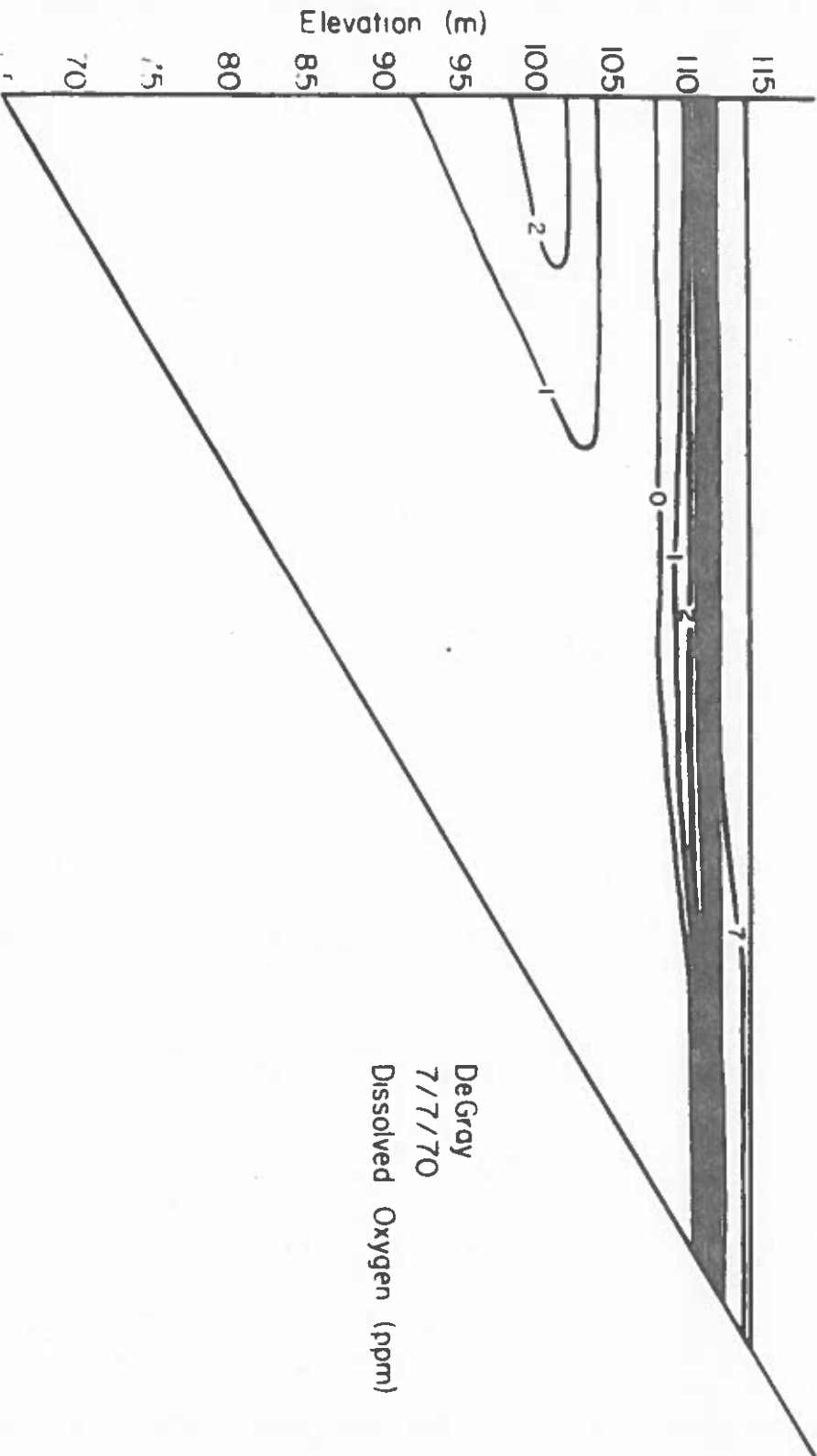
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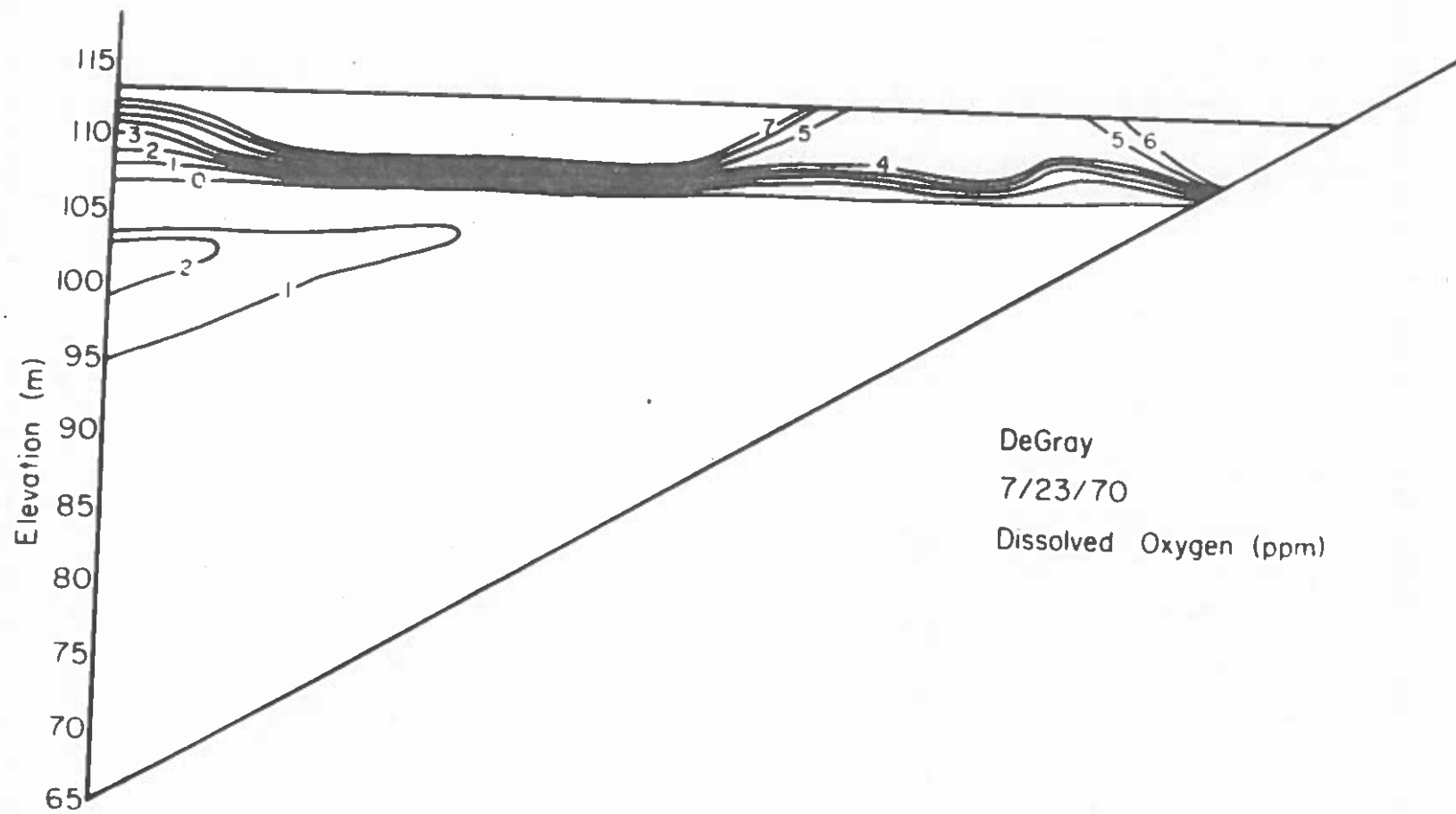
DeGray
6/15/70
Dissolved Oxygen (ppm)



" " " " " "
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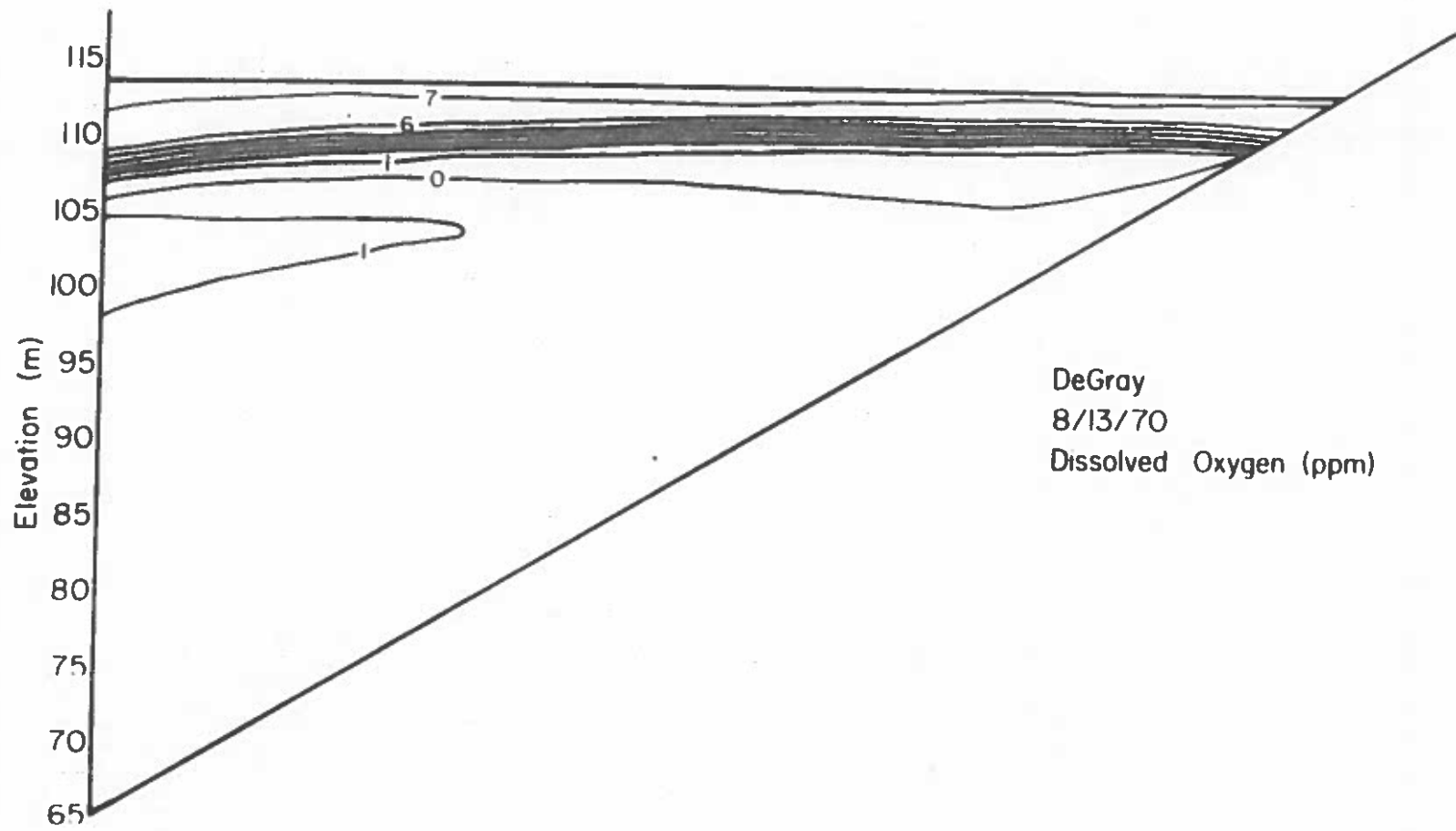
DeGray
 7/7/70
 Dissolved Oxygen (ppm)



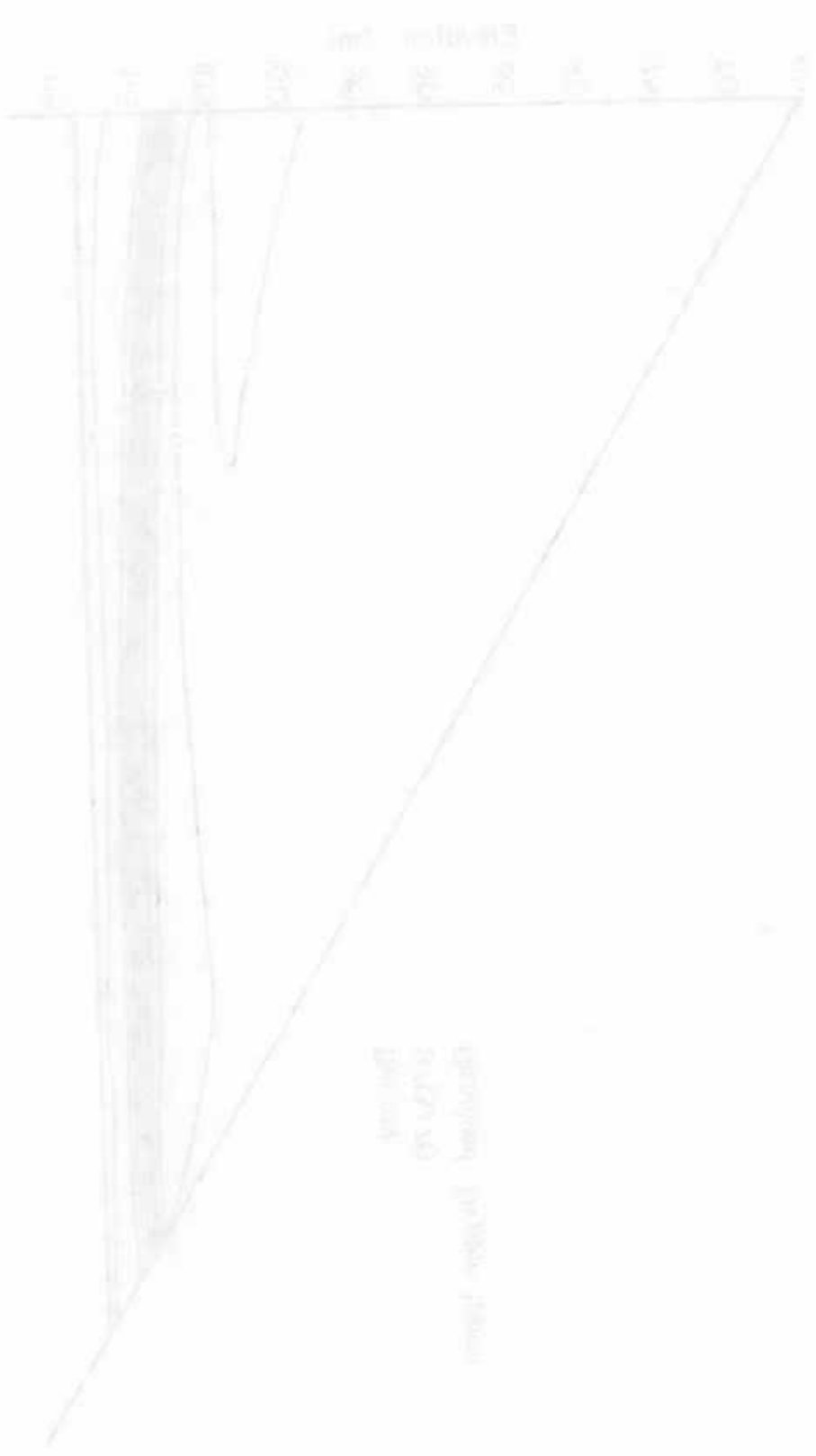
DeGray
7/23/70
Dissolved Oxygen (ppm)



Dip-slip fault
Limestone
Fault

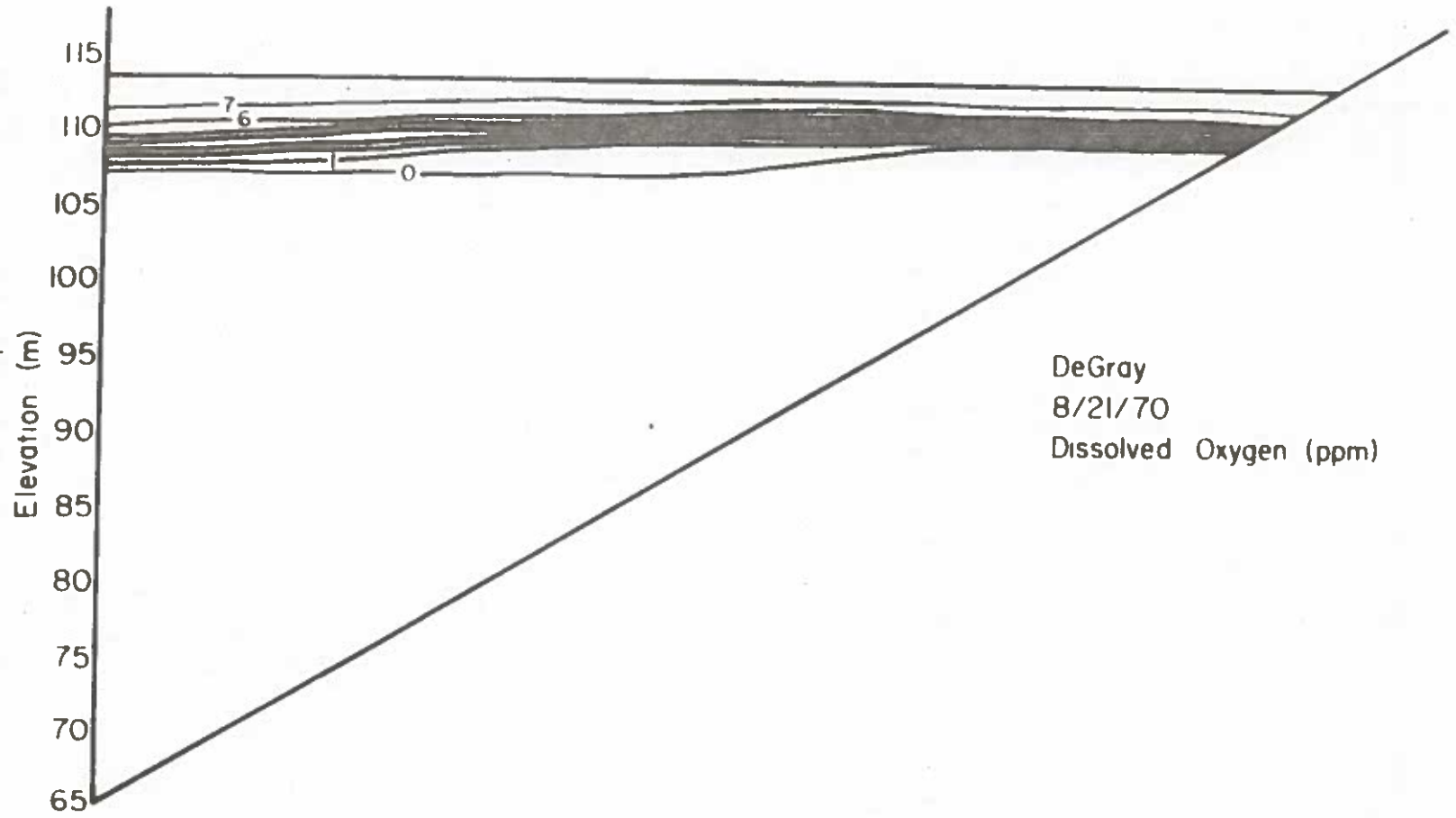


DeGray
8/13/70
Dissolved Oxygen (ppm)

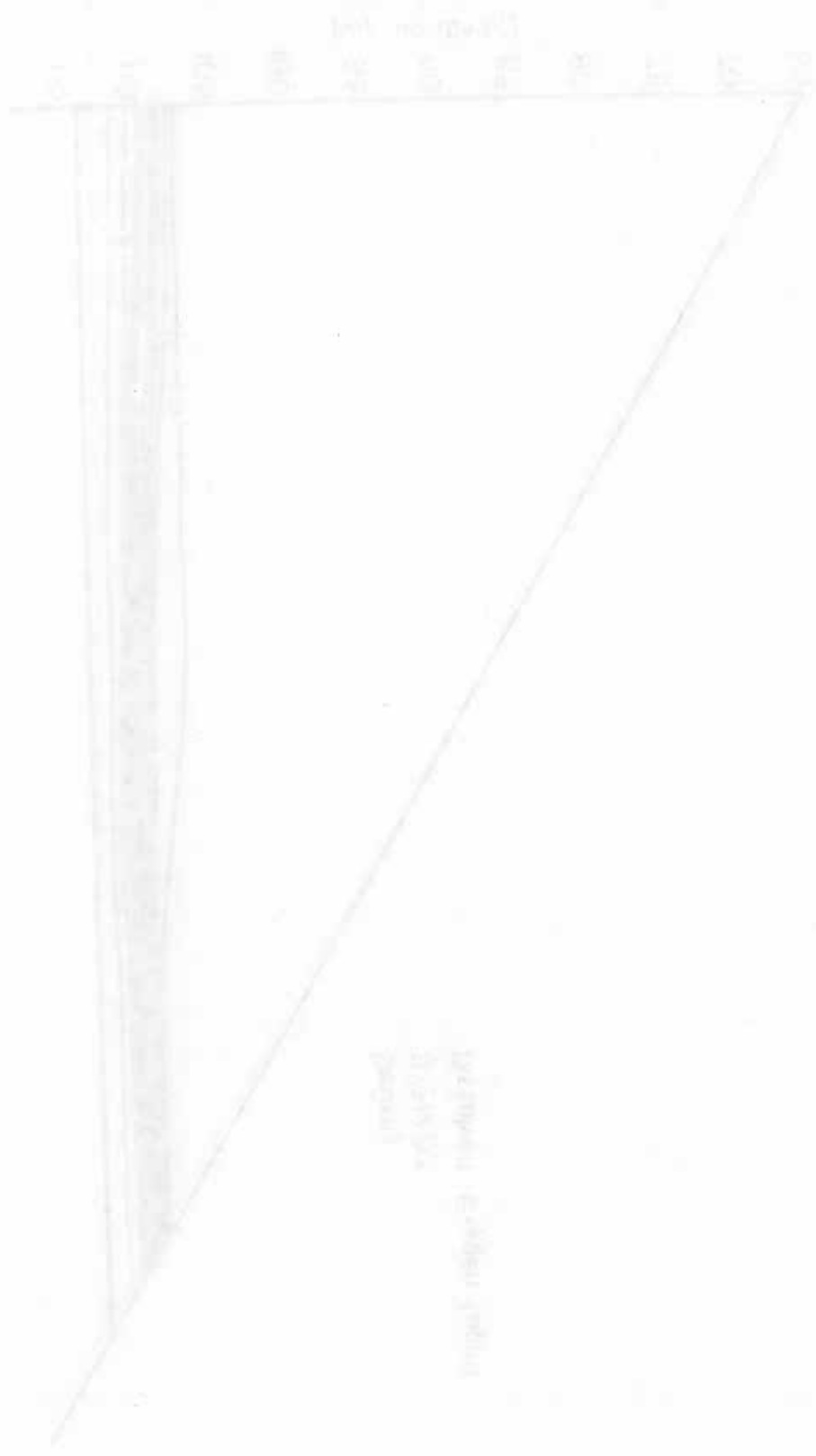


Time (min)

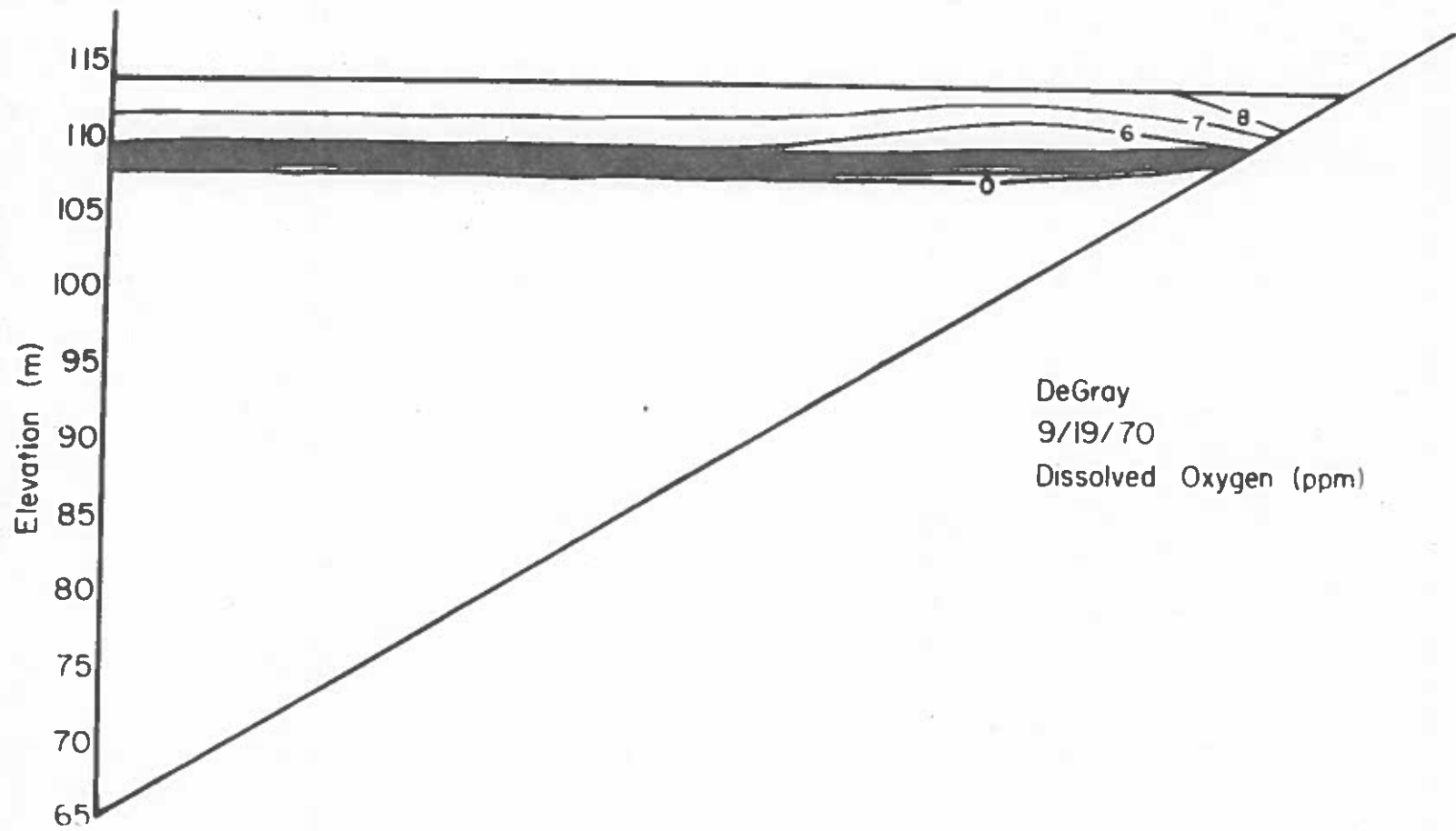
Distance (m)



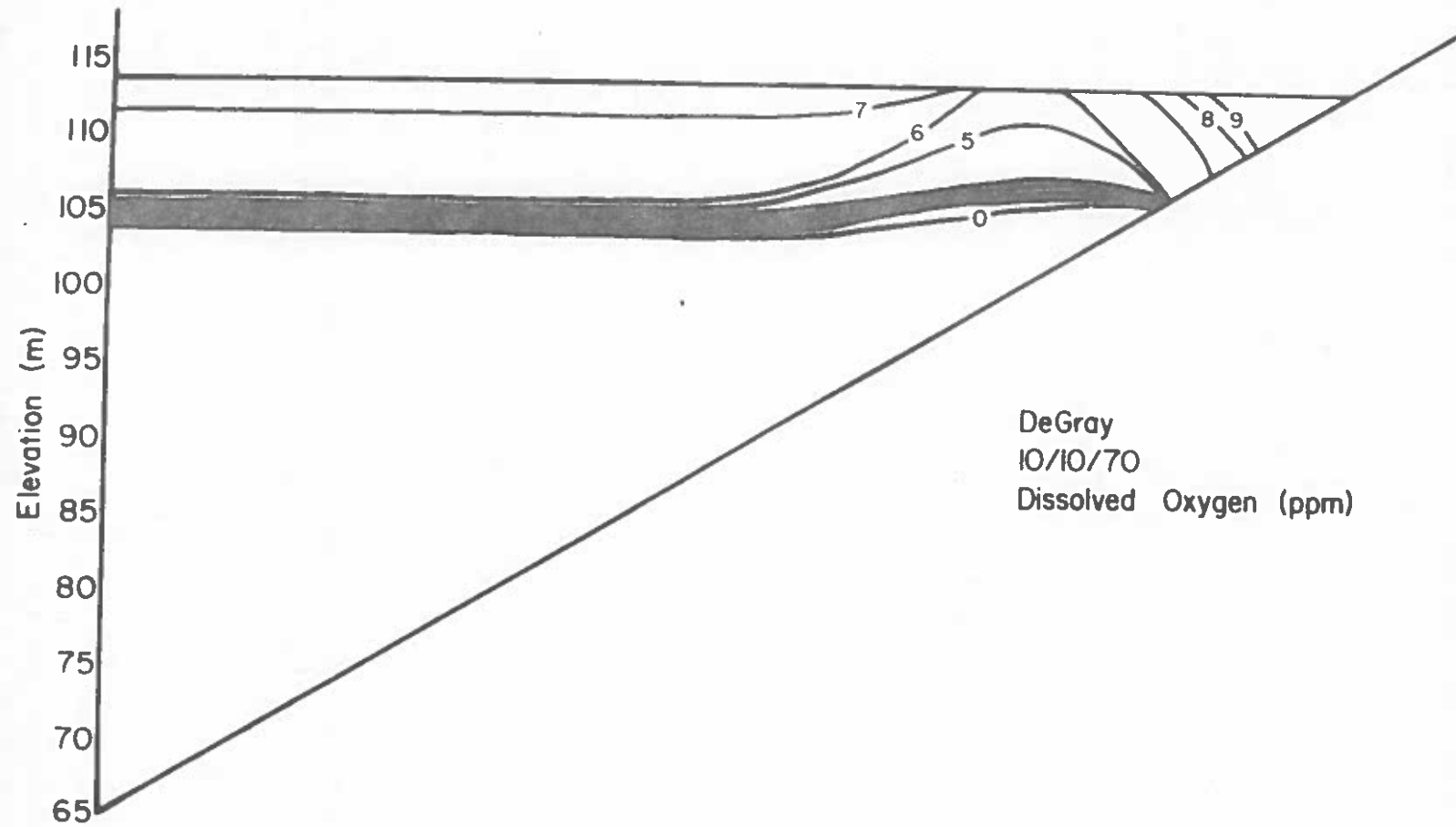
DeGray
8/21/70
Dissolved Oxygen (ppm)



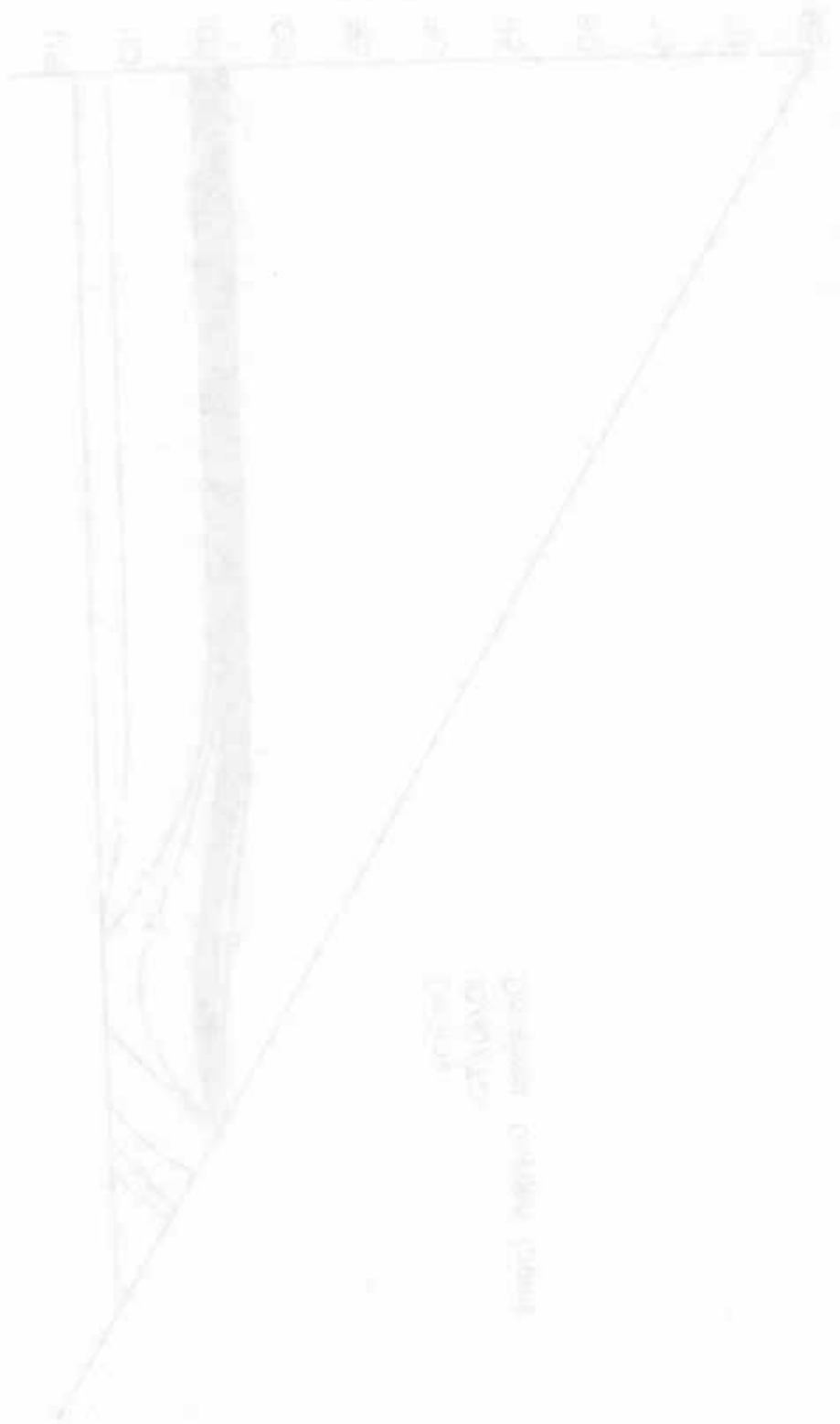
Integral of the curve
 from 0 to 1

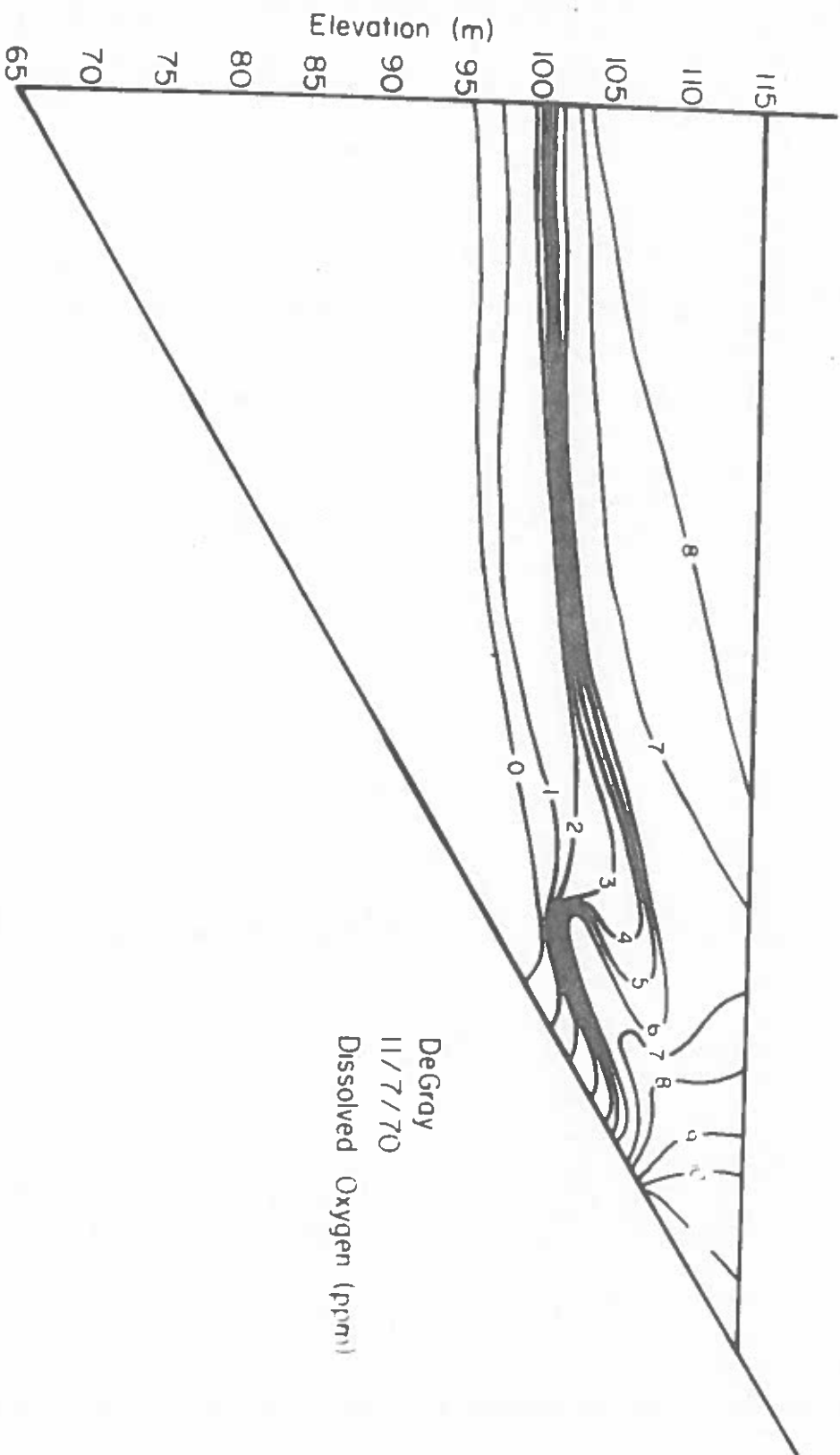


DeGray
9/19/70
Dissolved Oxygen (ppm)

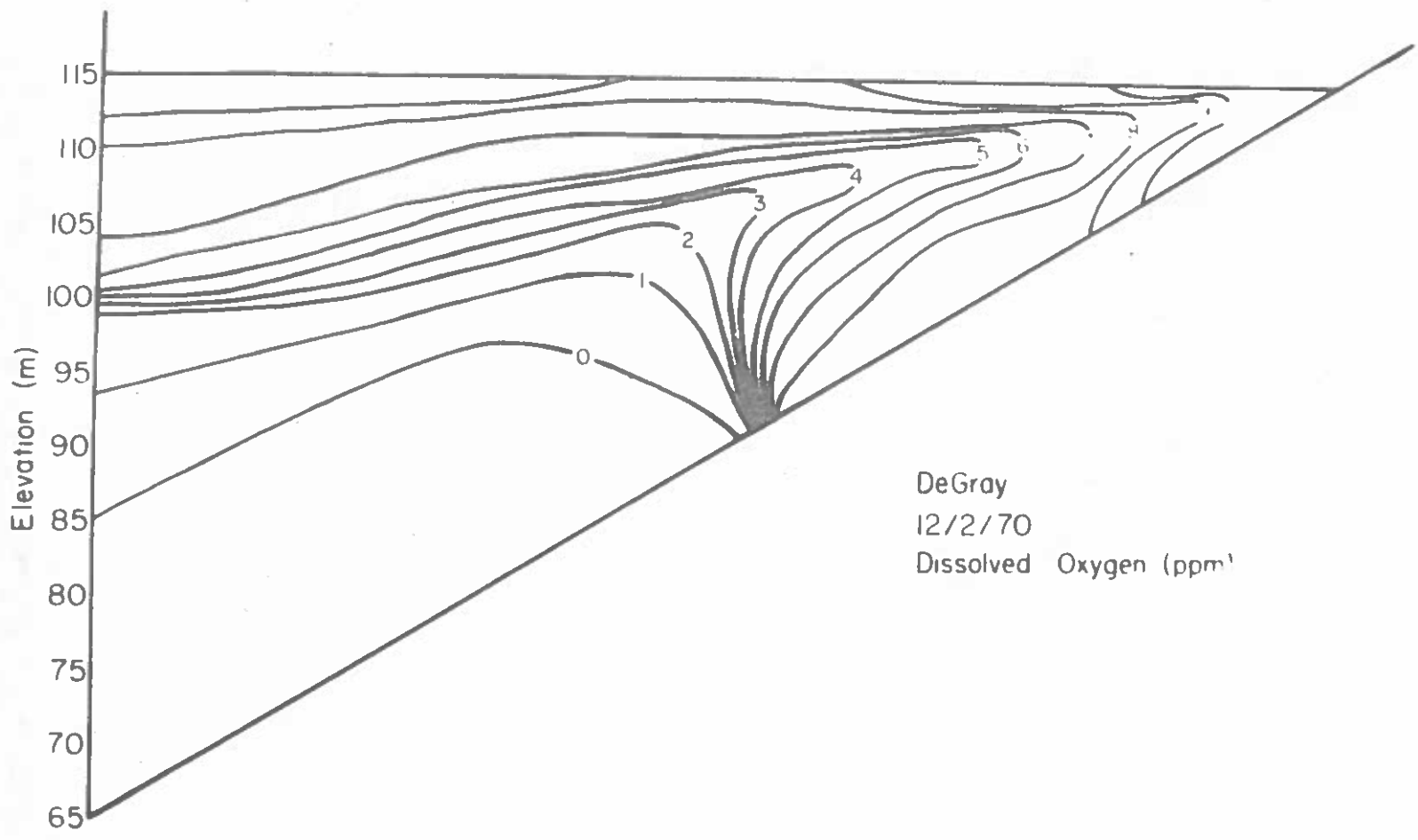


DeGray
10/10/70
Dissolved Oxygen (ppm)





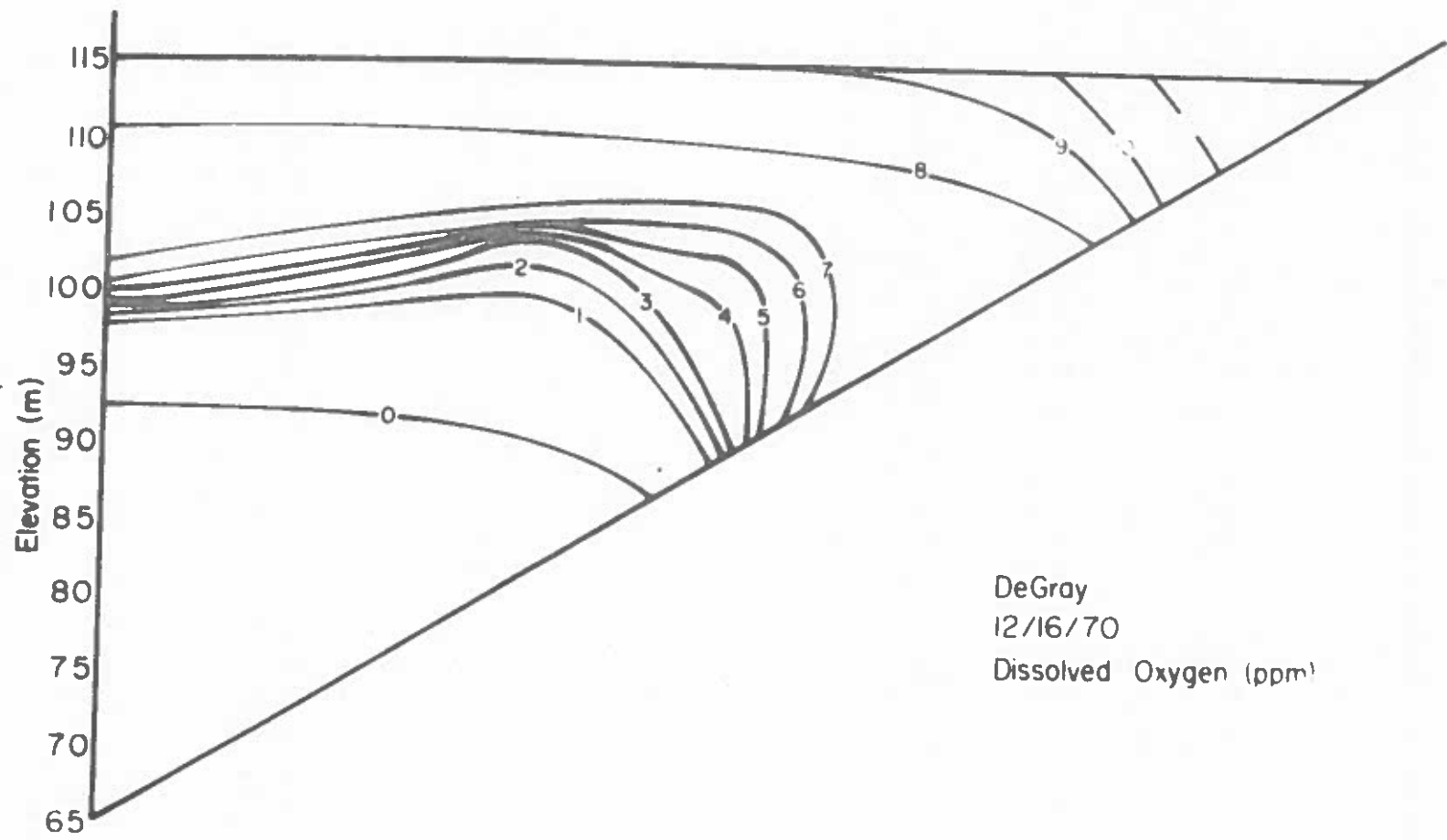
DeGray
11/7/70
Dissolved Oxygen (ppm)



DeGray
12/2/70
Dissolved Oxygen (ppm)



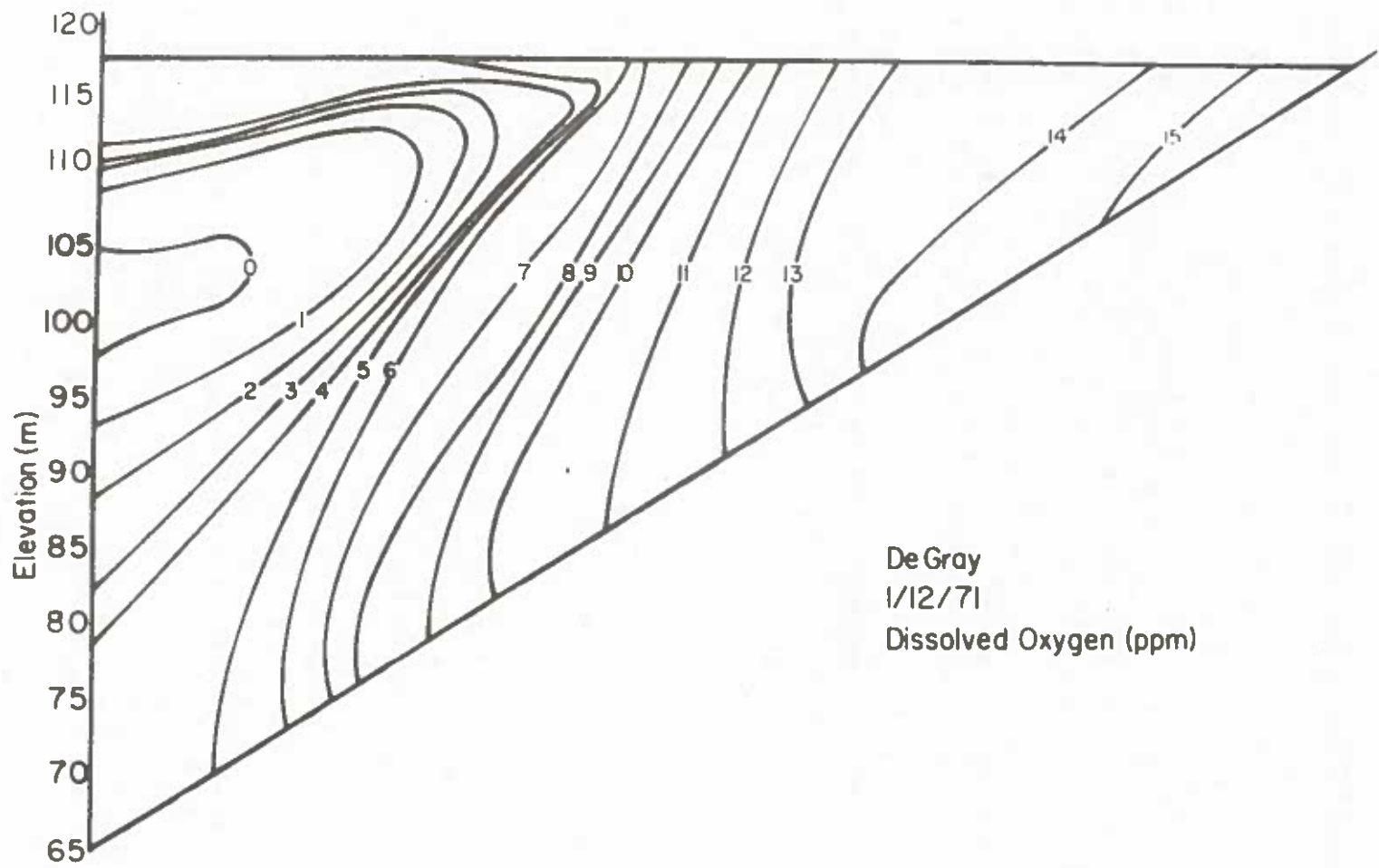
(1) 100m
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 (3) 100m
 (4) 100m
 (5) 100m
 (6) 100m
 (7) 100m
 (8) 100m
 (9) 100m
 (10) 100m
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 (100) 100m



DeGray
12/16/70
Dissolved Oxygen (ppm)



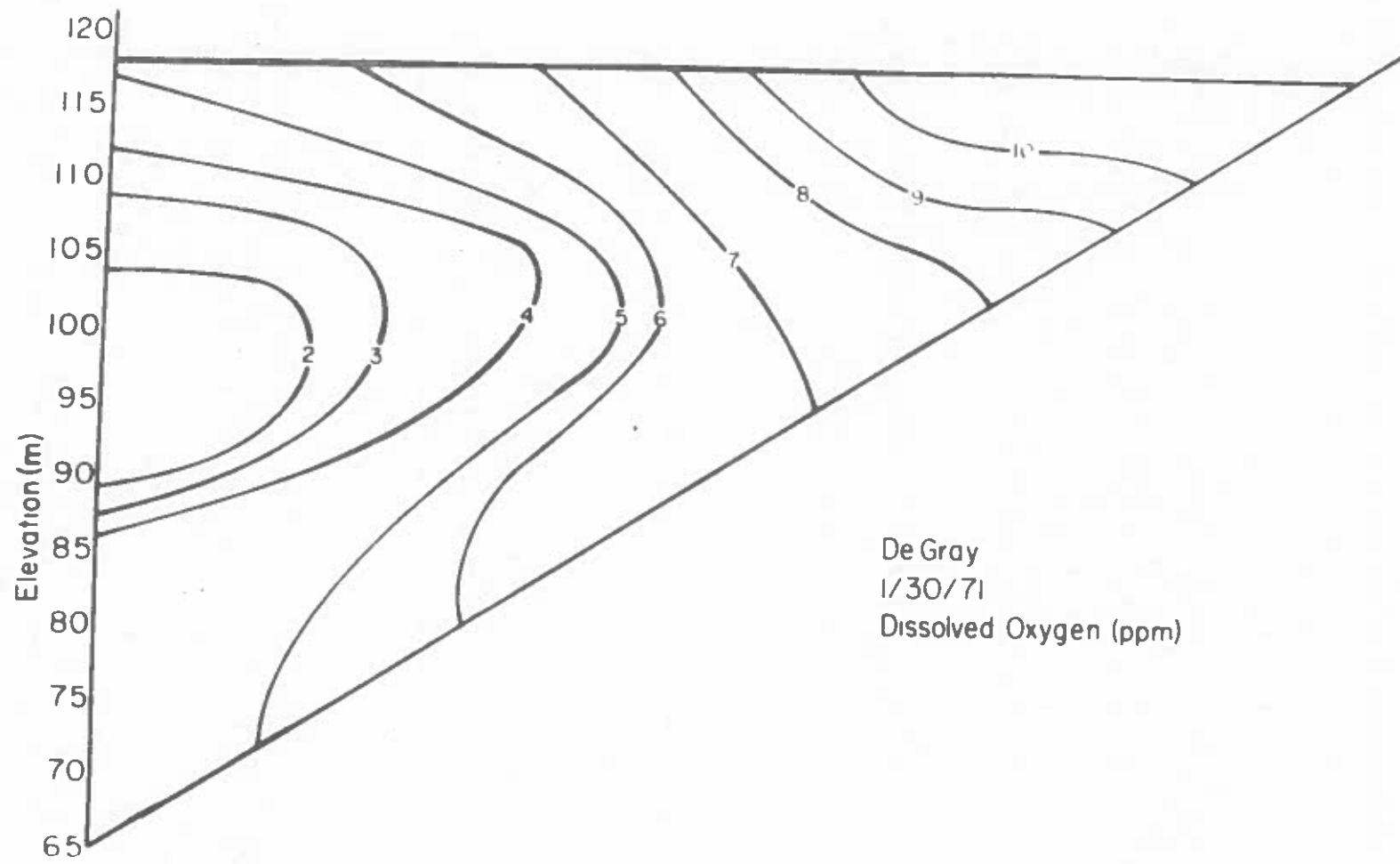
Handwritten text, possibly a title or description, located below the graph. The text is partially obscured and difficult to read, but appears to contain the words "Handwritten", "Graph", and "Distribution".



De Gray
1/12/71
Dissolved Oxygen (ppm)



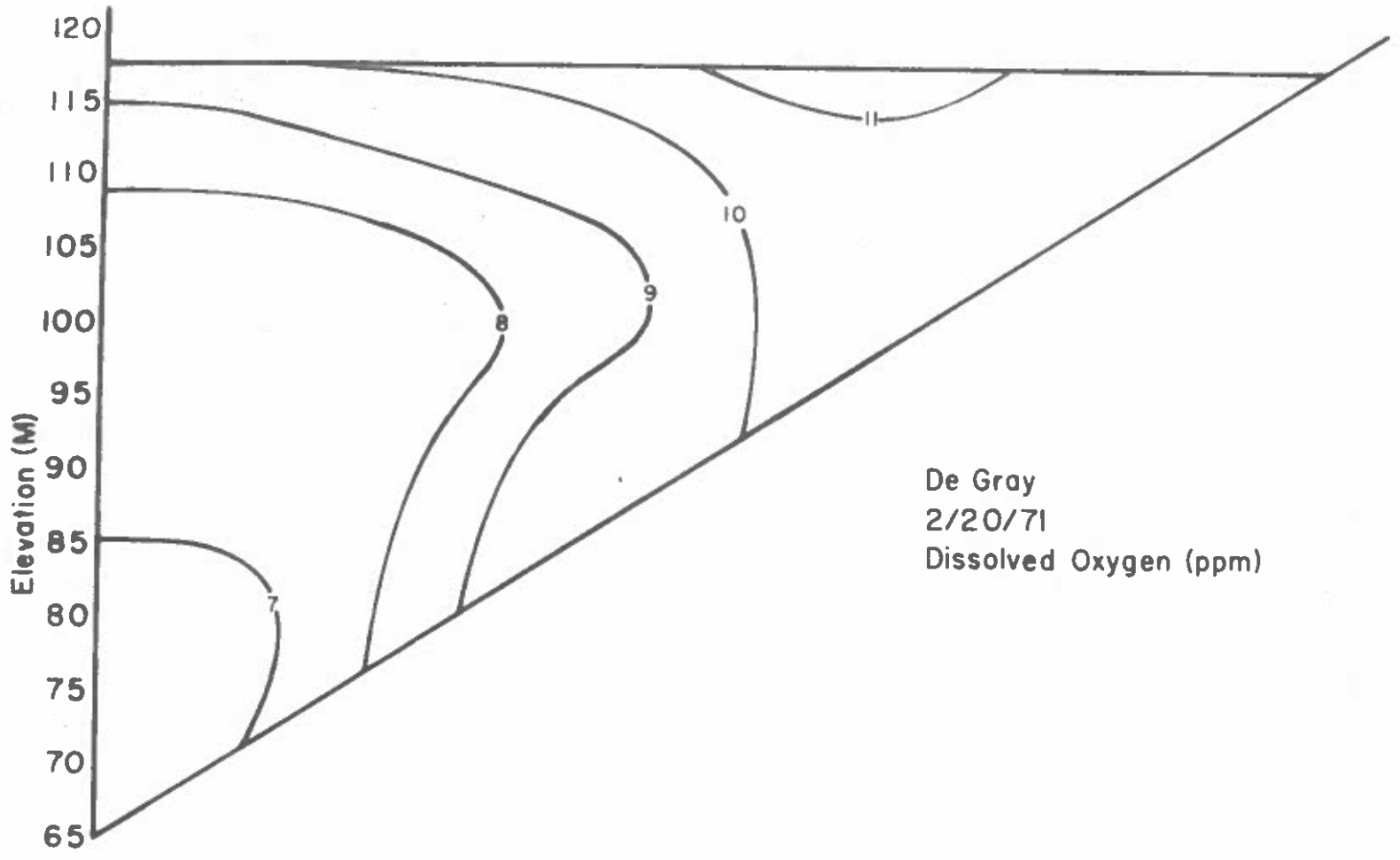
The contour plot shows monthly precipitation (mm) for the years 1972 to 1978. The x-axis represents months (July to June) and the y-axis represents years (1972 to 1978). The contours represent monthly precipitation in millimeters, with values ranging from 100 to 500 mm. The plot shows a clear seasonal pattern, with precipitation generally increasing from July to January and decreasing from February to June. There is also a significant inter-annual variability, with 1973 showing a particularly high peak in precipitation (around 500 mm) and 1977 showing a low (around 100 mm).



De Gray
1/30/71
Dissolved Oxygen (ppm)



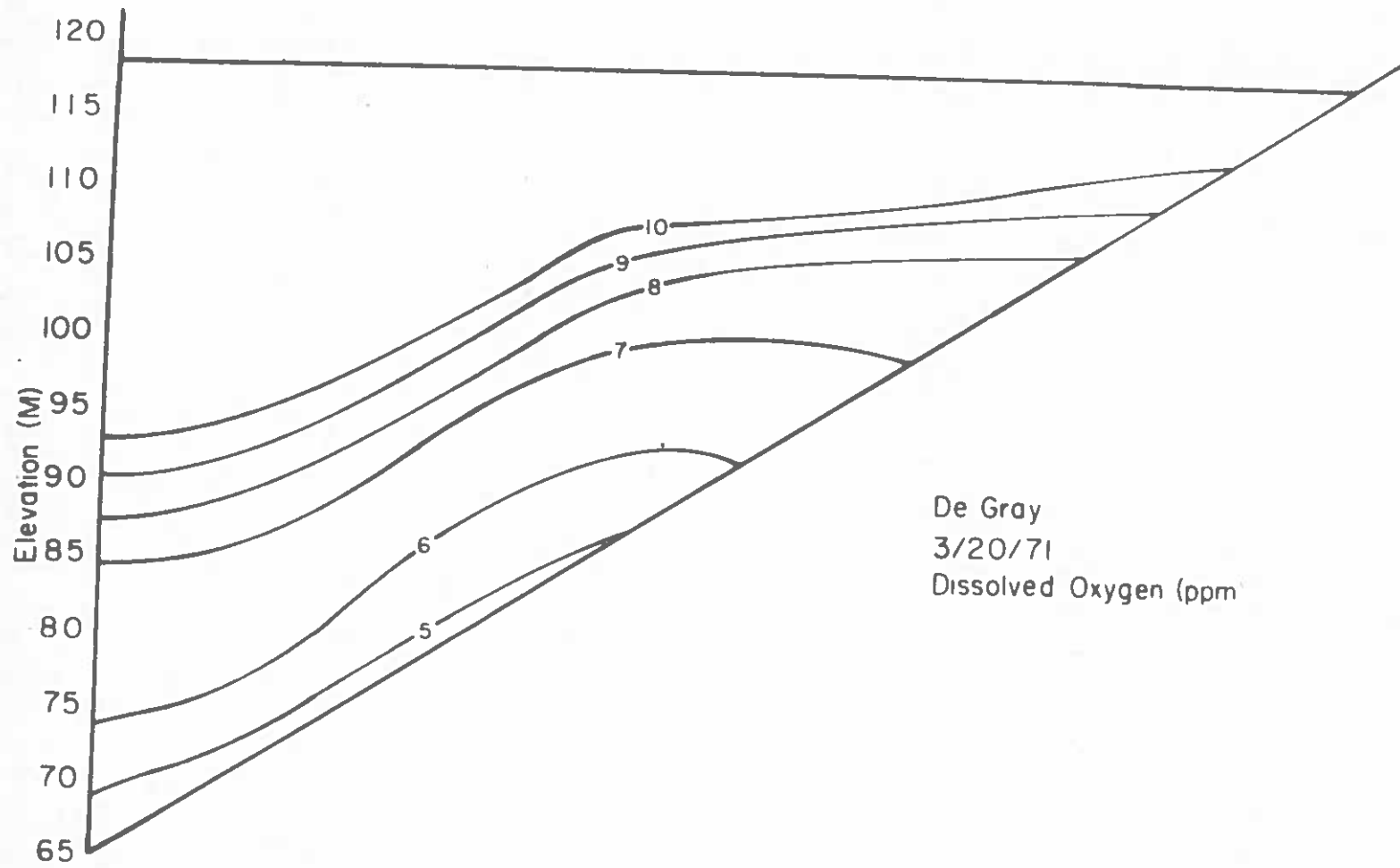
Contour plot
of $\log_{10} K$
values ranging from 10.0 to 12.0



De Gray
2/20/71
Dissolved Oxygen (ppm)



Diagrama geologică
 în secțiune transversală
 (planșă nr. 1)

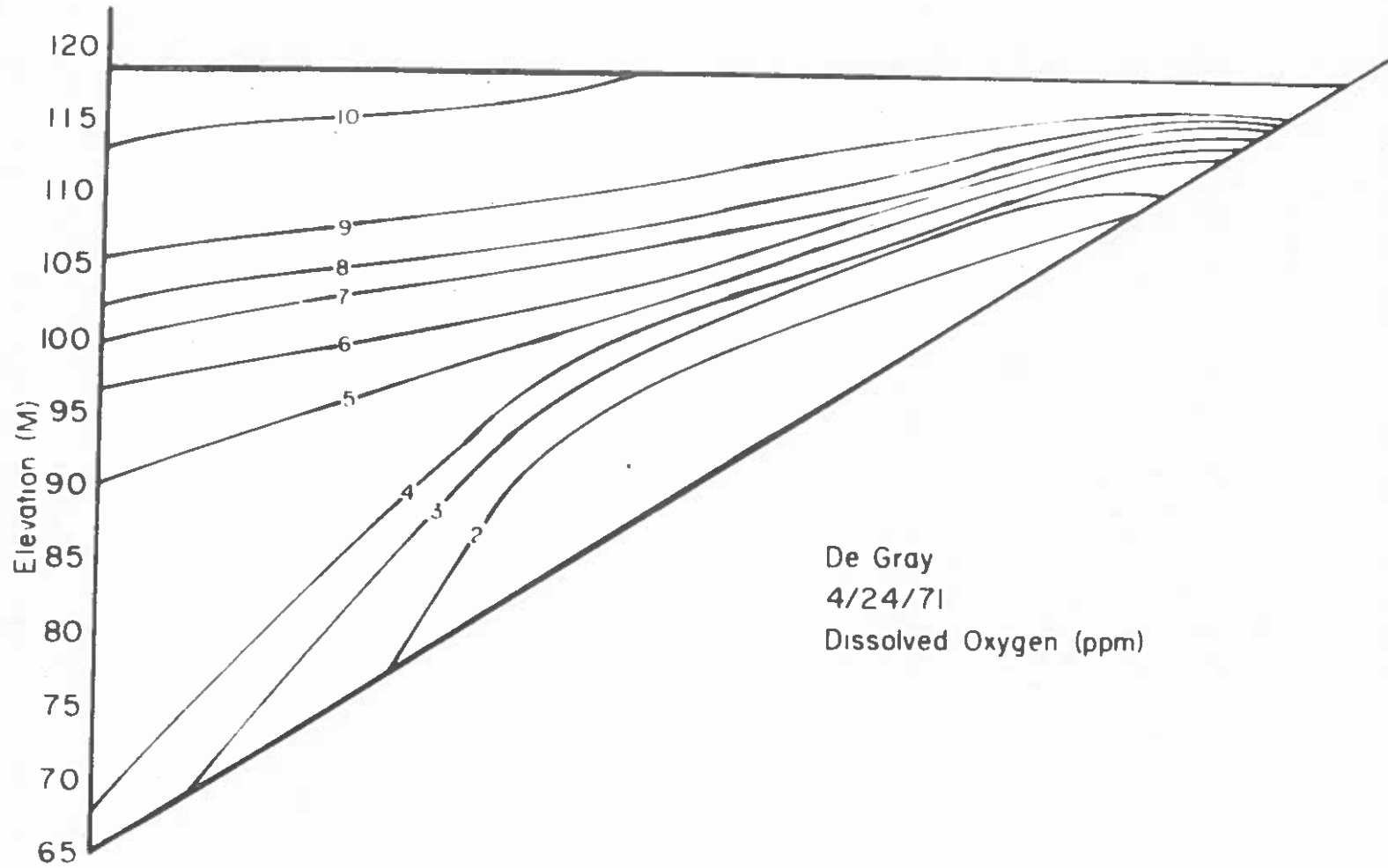


De Gray
3/20/71
Dissolved Oxygen (ppm)



100
 110
 120
 130
 140
 150
 160
 170
 180
 190
 200

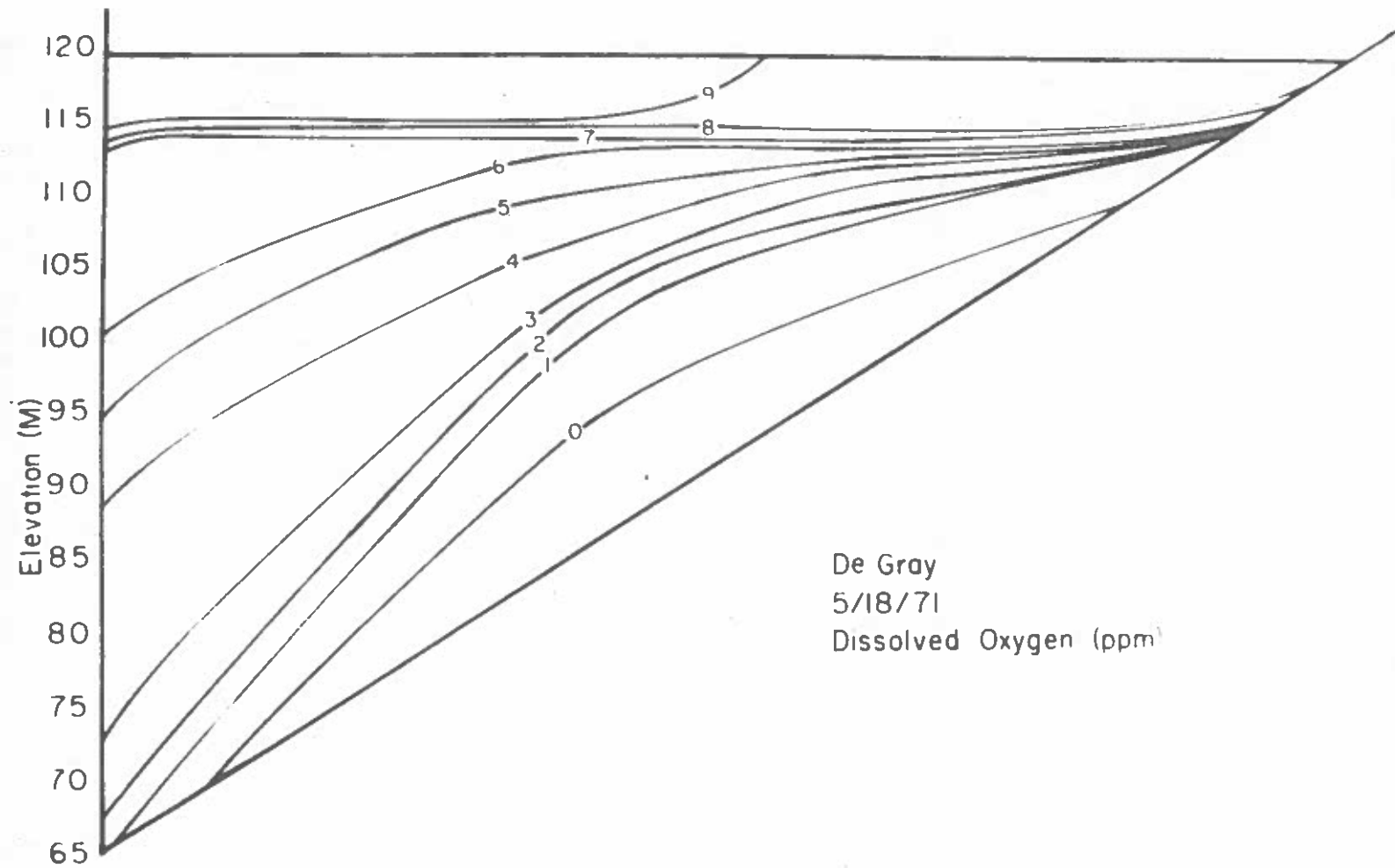
100
 110
 120
 130
 140
 150
 160
 170
 180
 190
 200



De Gray
4/24/71
Dissolved Oxygen (ppm)



0.00
 0.10
 0.20
 0.30
 0.40
 0.50
 0.60
 0.70
 0.80
 0.90
 1.00



De Gray
5/18/71
Dissolved Oxygen (ppm)



growth vs
 time
 - 100% growth = 100 min