

DEPARTMENT OF THE ARMY
ST. LOUIS DISTRICT, CORPS OF ENGINEERS
210 NORTH 12TH STREET
ST. LOUIS, MISSOURI 63101

IN REPLY REFER TO

LMSBD-HUD

6 July 1973

SUBJECT: Carlyle Lake, Kaskaskia River, Illinois, Report of Sedimentation, 1971 Resurvey

Division Engineer, Lower Mississippi Valley
ATTN: LMSBD-H

Inclosed subject report, prepared in compliance with EM 1110-2-406, is submitted for your review and approval.

FOR THE DISTRICT ENGINEER:

JACK R. NETH
Acting Chief, Engineering Division

1 Incl (5 pgs)
as

LMSBD-H (01 Jul 73) 1st Ind

14, Lower Mississippi Valley Division, Corps of Engineers, Wash. DC
Spec. 30160 18 Sep 73

1- (MSP- (CALN-LWI-Y) WASH DC 20334

Report is recommended.

FOR THE DISTRICT ENGINEER:

ROBERT C. ...
Acting Chief, Engineering Division

1 Incl (5 pgs)
as

REPORT ON RESURVEY OF SEDIMENTATION
 CARLYLE RESERVOIR
 KASKASKIA RIVER, ILLINOIS
 1971

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26	ENG Form 1787
27	ENG Form 1787

PERTINENT DATA SUMMARY
CARLYLE LAKE

<u>ITEM</u>	<u>UNIT</u>	
<u>DRAINAGE AREA</u>	sq. mi.	2,680
<u>INACTIVE STORAGE POOL</u>		
Elevation	m.s.l.	429.5
Area	acres	7,100
Storage	acre-feet	50,000
Storage (runoff)	inches	0.35
<u>JOINT USE POOL</u>		
Elevation	m.s.l.	429.5 - 445.0
Area	acres	24,580 (76,000)
Storage	acre-feet	233,000
Storage (runoff)	inches	1.63
Regulated Outflow (min)	c.f.s.	50
Regulated Outflow (max)	c.f.s.	4000 (7,000)
<u>FLOOD CONTROL POOL</u>		
Elevation	m.s.l.	445.0 - 462.5
Area	acres	58,440 (57,500)
Storage	acre-feet	699,900 (700,000)
Storage (runoff)	inches	4.89
Regulated Outflow (min)	c.f.s.	50
Regulated Outflow (max)	c.f.s.	10,000 (7,000)
<u>INDUCED SURCHARGE</u>		
Elevation	m.s.l.	462.5 - 465.5
Area	acres	65,000
Storage	acre-feet	184,000
Storage (runoff)	inches	1.29
Outflow (max)	c.f.s.	149,000
<u>SURCHARGE POOL (TOTAL)</u>		
Elevation	m.s.l.	462.5 - 467.2
Area	acres	69,400
Storage	acre-feet	304,000
Storage (runoff)	inches	2.13
Outflow (max)	c.f.s.	160,000
<u>FREEBOARD</u>		
Elevation	m.s.l.	467.2 - 472.0
Area	acres	111,600 82,000
Storage	acre-feet	409,000 388,000
Storage (runoff)	inches	2.71
Height	feet	4.8

REPORT ON RESURVEY OF SEDIMENTATION
CARLYLE RESERVOIR
KASKASKIA RIVER, ILLINOIS

1. INTRODUCTION.

This report is prepared according to instructions in EM 1110-2-4001, dated 29 December 1958. It presents the results of the resurvey of sediment ranges in Carlyle Reservoir and downstream retrogression ranges on the Kaskaskia River below Carlyle Reservoir. Initial operation began on 1 April 1967. The dam was completed June 1967. The purpose of the investigation was to obtain information on the amount and distribution of sediment in the reservoir and on the rate of depletion of storage.

2. LOCATION.

Carlyle Dam is located on the Kaskaskia River in Clinton County, Illinois, about 1 mile upstream of the town of Carlyle, Illinois, approximately 100 miles above the mouth of the Kaskaskia River. Carlyle Reservoir drains an area of 2,680 square miles, or about 46 percent of the total basin. The Kaskaskia River Basin is shown on Plate 1.

3. PURPOSE OF RESERVOIR.

Carlyle Reservoir is part of the Kaskaskia River Basin development plan which provides for project purposes of flood control, water supply, storage for navigation releases, recreation, and fish and wildlife conservation. Carlyle Reservoir is operated jointly with the other projects on the Kaskaskia River Basin.

4. RESERVOIR PERTINENT DATA - DAM AND APPURTENANT STRUCTURES.

The Pertinent Data Section contains pertinent information concerning the dam, outlet, and spillway structures and the elevations, areas, and capacities of the inactive joint-use, flood control, induced surcharge, and total surcharge pools.

5. WATERSHED CHARACTERISTICS.

The watershed has a total area of 2,680 square miles. The reservoir occupies about 90 square miles of this area at the top of the flood control pool EL. 462.5 m.s.l. The watershed has a median length of about 120 miles, an extreme width of 57 miles and an average width of about 30 miles. The course of the river is generally tortuous with many oxbow bends. The topography of the basin is generally flat or gently rolling, except for broken terrain near the stream.

of observing sediment distribution and the approximate rate of reservoir storage depletion. Plate 4 shows the locations of the pool sediment ranges. The cross section of the ranges are shown on Plates 5 to 13.

12. TYPE AND SCOPE OF 1971 SEDIMENT RESURVEY.

Detailed sediment surveys of the nine sediment ranges by direct leveling and by a Ratheon Recording Depth Sounder, Model EE-119 were made during the period of May - August 1971. The reservoir pool had an average elevation of about 443.0 feet, m.s.l. during the measurements.

AVE ELEV.
443.0 ft.

NOTE: Range 7c and 9c surveyed May 1961.

13. METHOD OF SEDIMENT COMPUTATIONS.

The prismoidal formula was used to compute the volume of sediment deposited. For further information on this method of computation, see USDA technical Bulletin No. 524, "Silting of Reservoirs" P 158-161.

14. SEDIMENT QUANTITIES AND RESERVOIR LIFE.

Table 3 shows summaries of the area changes of each sediment range along with the volume of sediment deposited between each range and in the entire reservoir. Calculations of initial sedimentation show about 10% filling of the inactive storage of Carlyle Lake in the 4.3 year period between the dates of initial operation in April 1967 and the first hydrographic survey of the lake in 1971. At this rate of deposition, the inactive storage would be completely filled with sediment in about 45 years. The computed rate of sediment deposition for the initial period of reservoir operation was 1186 acre ft. per year.

Table 3

X

These results compare favorably with the value of 820 Ac Ft/year which was the expected yearly sedimentation rate computed before the operation of the project. At this present rate of deposition the inactive storage pool would be filled in 45 years. It is expected that the long term rate of sedimentation would be lower than the initial rate so that the time of filling the inactive storage pool would probably be longer than that based on that initial rate.

15. TRAP EFFICIENCY OF THE RESERVOIR.

For the initial period of operation of Carlyle Lake the trap efficiency was found to be 95%. This computation was based on the method of Gunnar M. Brune as presented in transaction of the American Geophysical Union Volume 34, Number 3, June 1953.

16. DOWNSTREAM CHANNEL AND RESERVOIR OPERATION.

The course of the river downstream from Carlyle Dam is tortuous

TABLE NO. 1

MONTHLY PRECIPITATION AND RUNOFF
OVER DRAINAGE AREA ABOVE CARLYLE GAGE
(1966-1971)

<u>Month</u>	<u>Maximum Rainfall (Inches)</u>	<u>Minimum Rainfall (Inches)</u>	<u>Average Rainfall (Inches)</u>	<u>Average Runoff</u>	
				<u>(Inches)</u>	<u>(Percent)</u>
January	4.57	.44	1.94	.81	41.7
February	3.45	.97	1.84	1.66	90.2
March	3.54	1.46	2.18	.92	42.2
April	8.48	.64	4.41	1.61	36.5
May	6.97	2.23	4.20	1.29	30.7
June	5.46	1.54	3.54	1.00	28.2
July	7.41	1.49	4.46	.59	13.2
August	4.97	.57	2.31	.27	11.6
September	6.72	1.92	4.15	.13	43.1
October	5.27	.65	2.66	.29	10.9
November	5.69	1.03	2.65	.19	7.1
December	7.21	1.06	3.84	1.56	40.6
Annual	42.22	35.12	38.18	10.32	27.0

TABLE NO. 2

ANNUAL PRECIPITATION
AND RUNOFF FOR DRAINAGE AREA
ABOVE CARLYLE GAGE
1966-1971

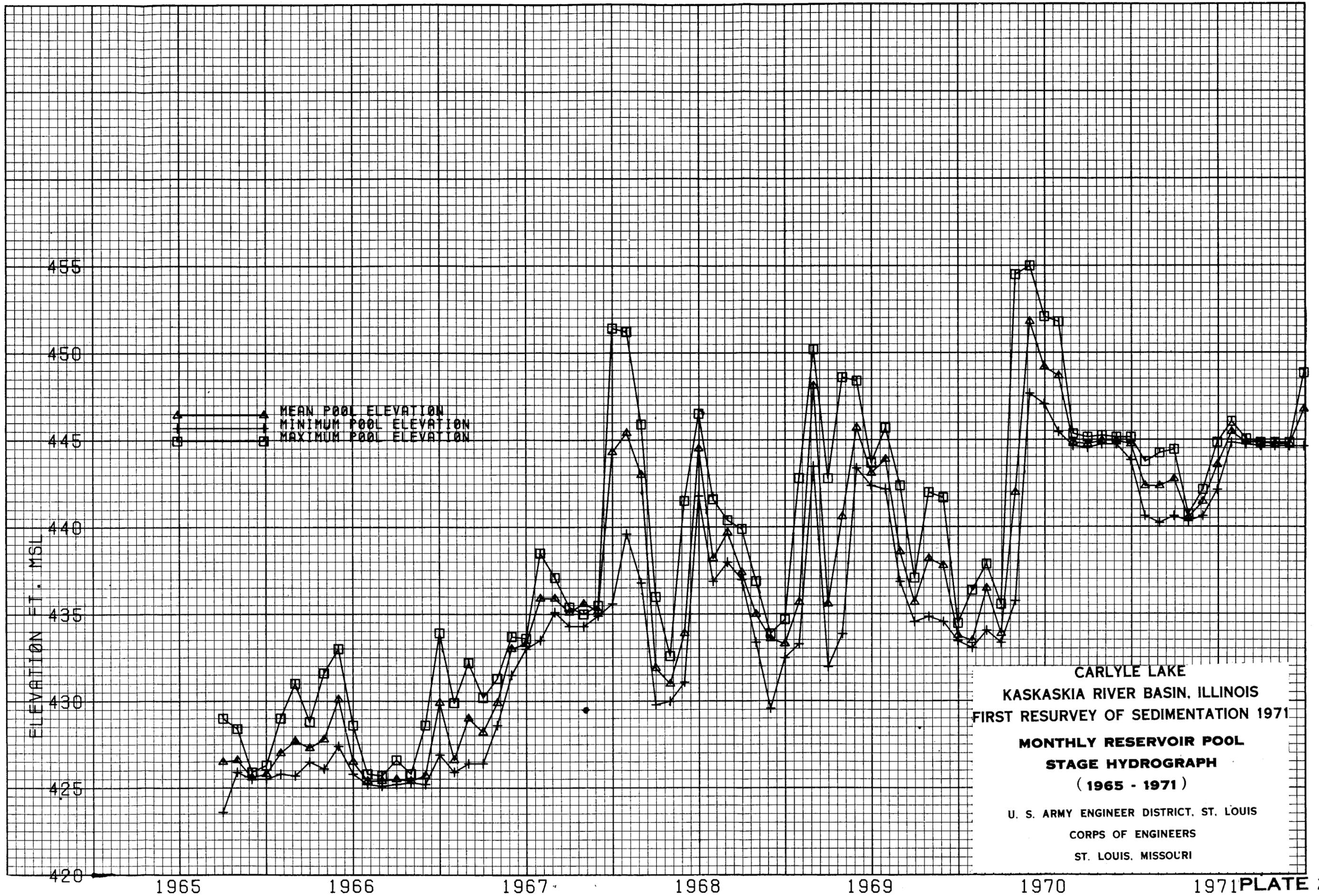
<u>Year</u>	<u>Rainfall (Inches)</u>	<u>Runoff (Inches)</u>	<u>Runoff (Percent)</u>	<u>Average Daily Runoff (CFS)</u>
1966	36.08	9.31	25.8	1838
1967	41.26	13.17	31.9	2599
1968	37.37	9.59	25.6	1894
1969	42.22	13.15	31.1	2595
1970	37.03	10.82	29.2	2137
1971	35.12	5.85	16.6	1156
Average	38.18	10.32	27.0	2036
Maximum	42.22	13.17	31.9	2599
Minimum	35.12	5.85	16.65	1156

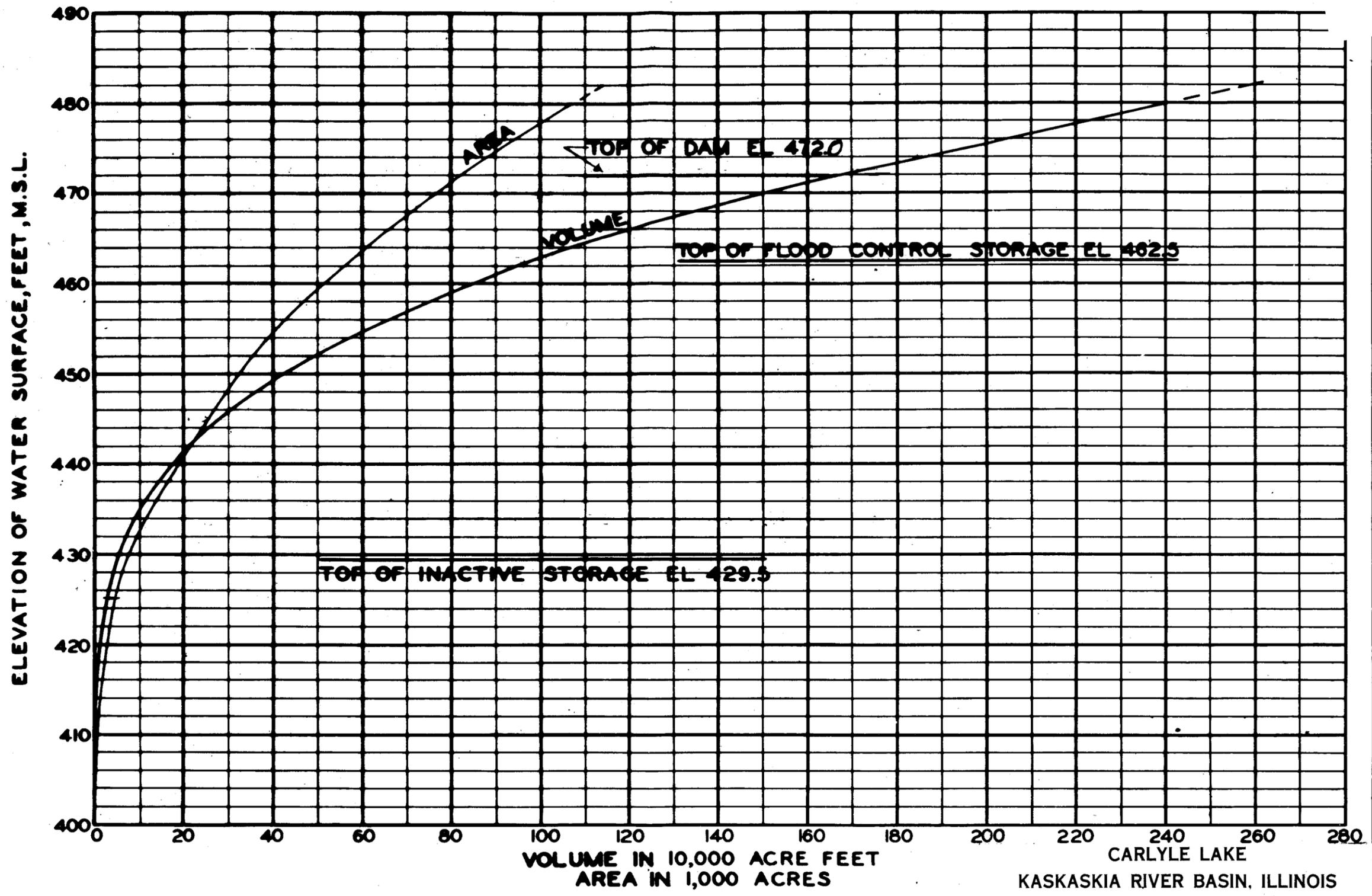
TABLE NO. 3

TABULATION OF AREA AND VOLUME
CHANGES IN CARLYLE LAKE

Dam	Area Change Range (Ft)	Volume Sediment Deposited Ac Ft
1A	2666	320
2A	879	258
3A	519	143
4A	9749	2236
7A	214	1853
9A	761	216
Top of Res		166
8B	-567	-114
6B	-420	- 90
5B	456	<u>+111</u>
	Total	5100 Ac Ft

Volume
deposited
to top of
tributary
streams

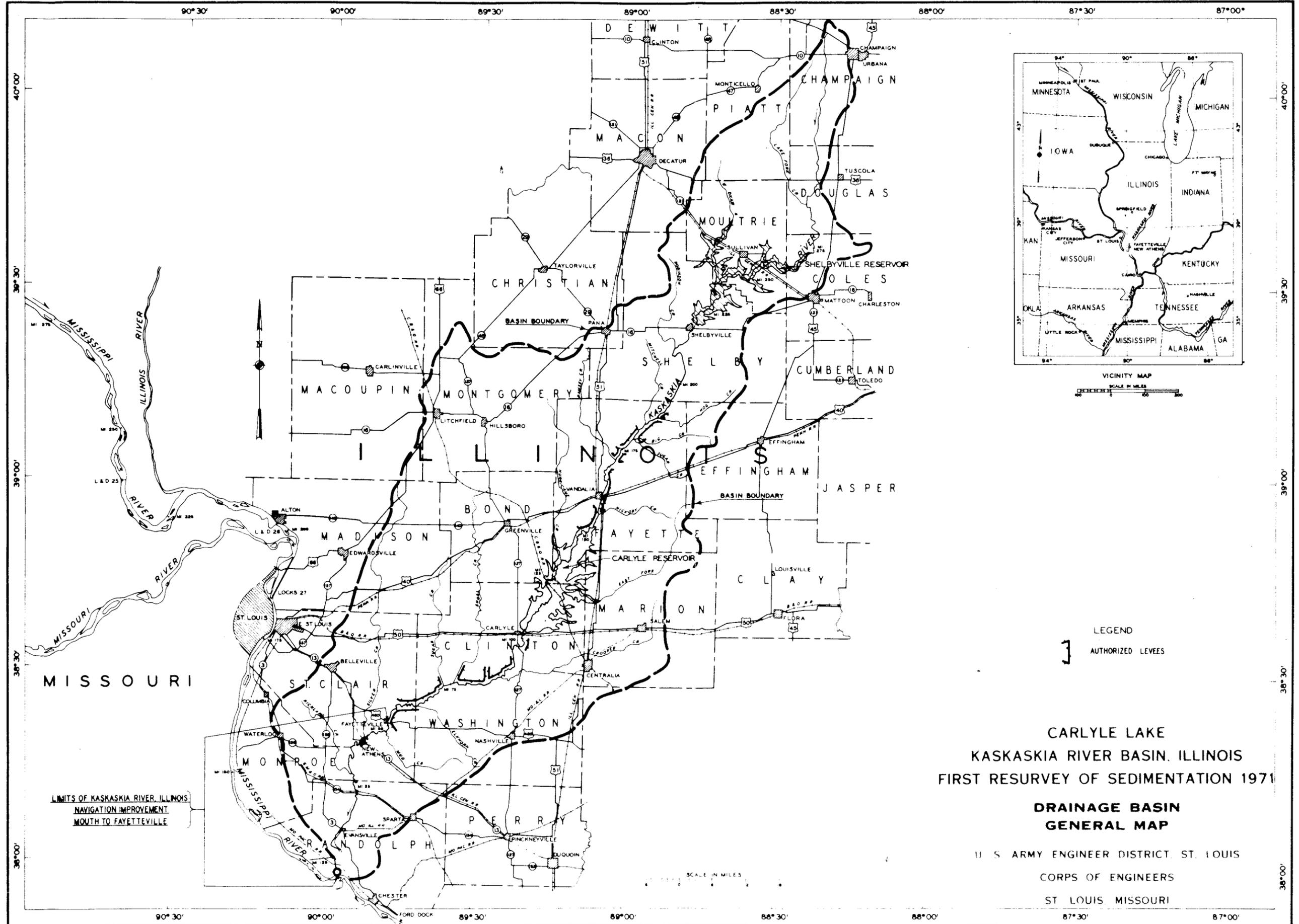




CARLYLE LAKE
KASKASKIA RIVER BASIN, ILLINOIS
FIRST RESURVEY OF SEDIMENTATION 1971

**RESERVOIR AREA AND
VOLUME CURVES**

U. S. ARMY ENGINEER DISTRICT, ST. LOUIS
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI

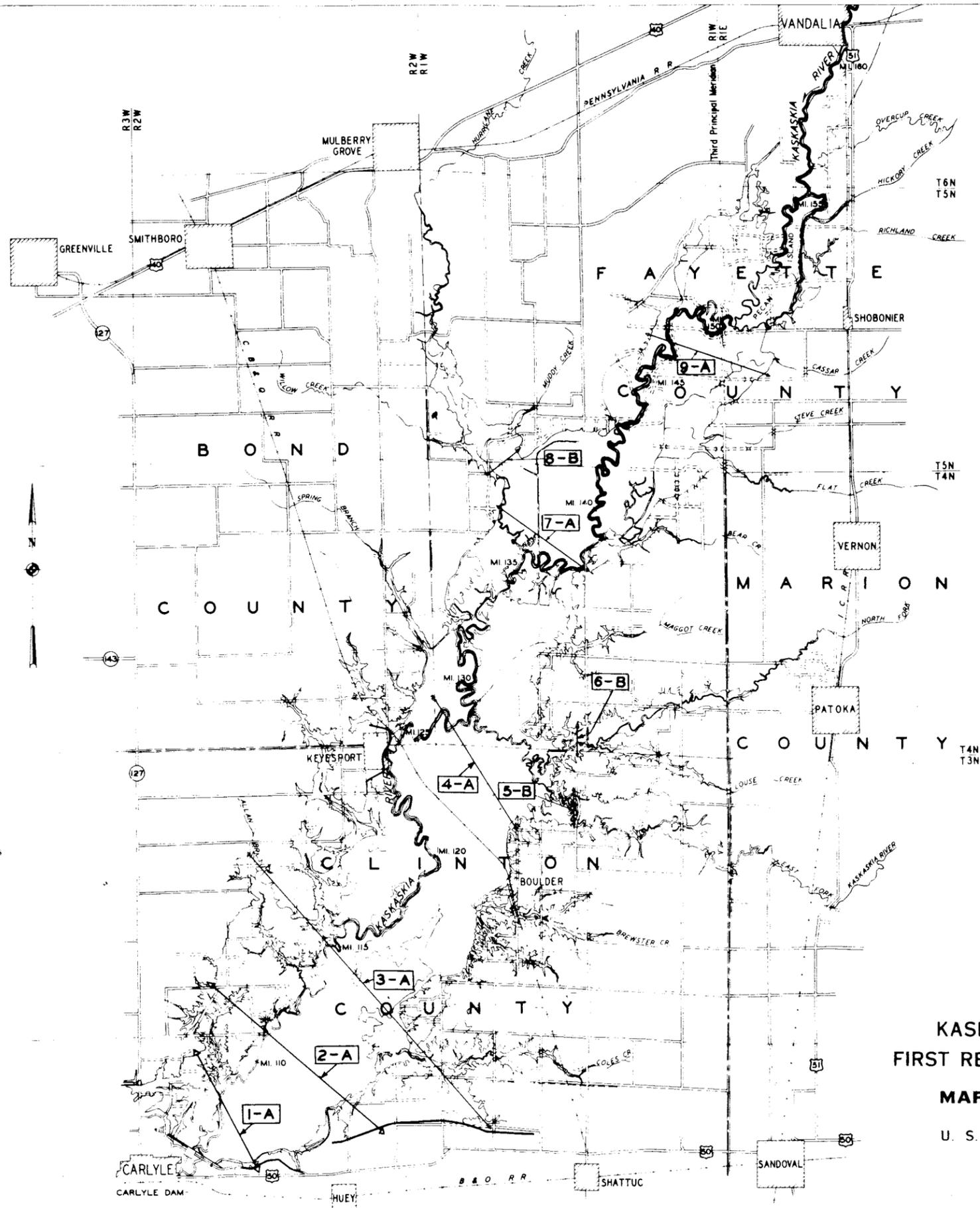


LIMITS OF KASKASKIA RIVER, ILLINOIS
 NAVIGATION IMPROVEMENT
 MOUTH TO FAYETTEVILLE

CARLYLE LAKE
 KASKASKIA RIVER BASIN, ILLINOIS
 FIRST RESURVEY OF SEDIMENTATION 1971

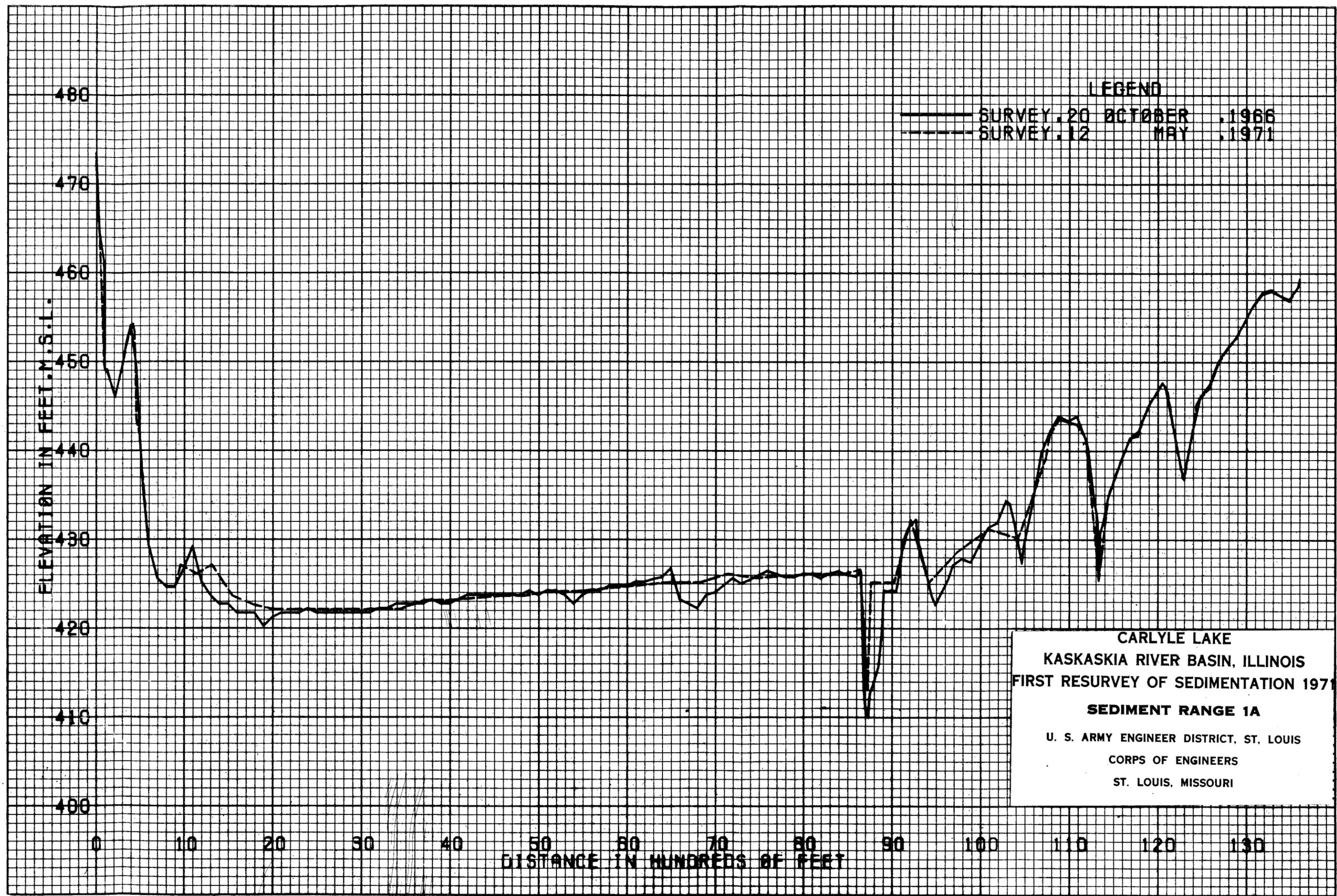
**DRAINAGE BASIN
 GENERAL MAP**

U. S. ARMY ENGINEER DISTRICT, ST. LOUIS
 CORPS OF ENGINEERS
 ST. LOUIS, MISSOURI

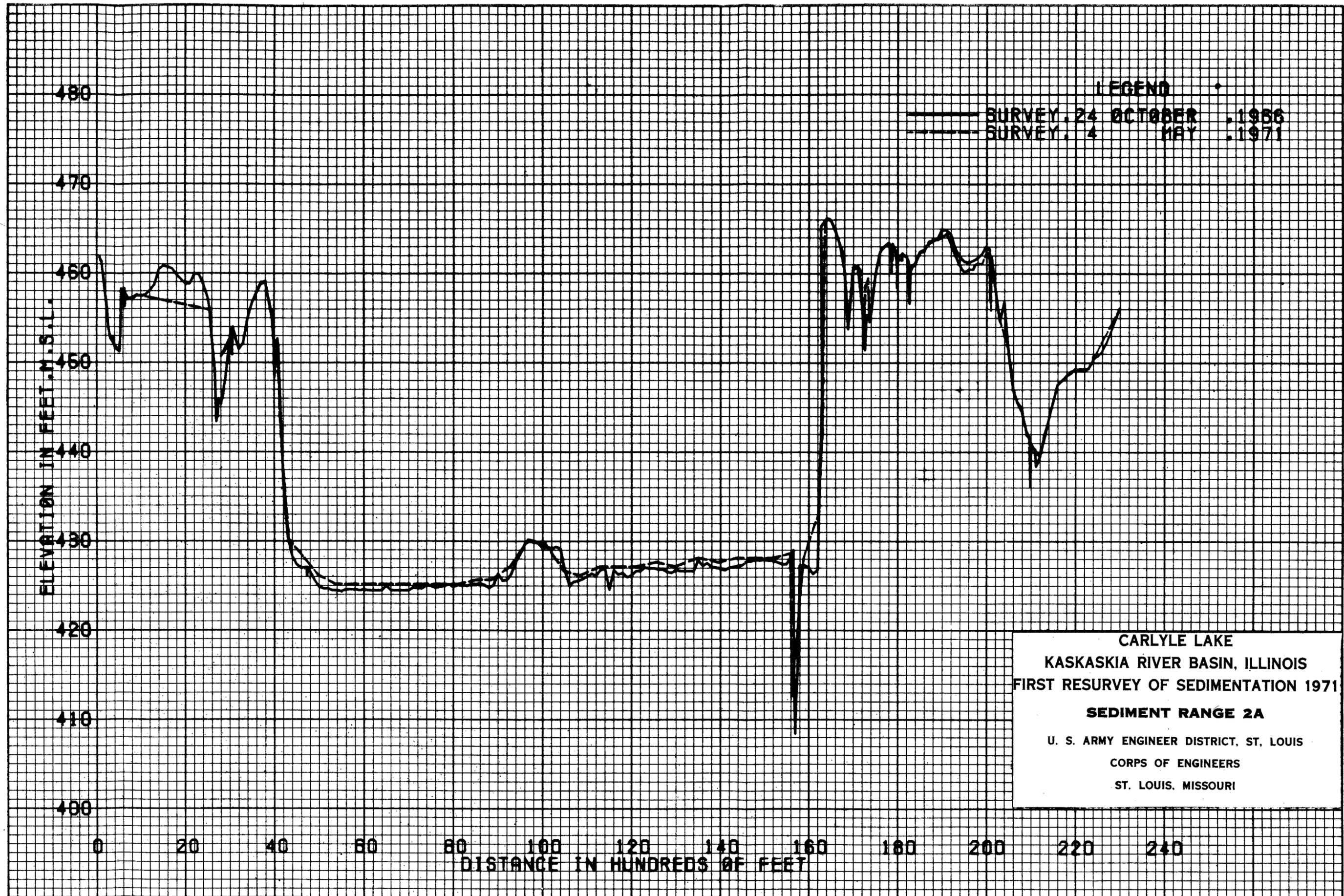


VICINITY MAP
SCALE IN MILES
0 50 100

CARLYLE LAKE
KASKASKIA RIVER BASIN, ILLINOIS
FIRST RESURVEY OF SEDIMENTATION 1971
MAP. POOL SEDIMENT RANGES
 U. S. ARMY ENGINEER DISTRICT, ST. LOUIS
 CORPS OF ENGINEERS
 ST. LOUIS, MISSOURI



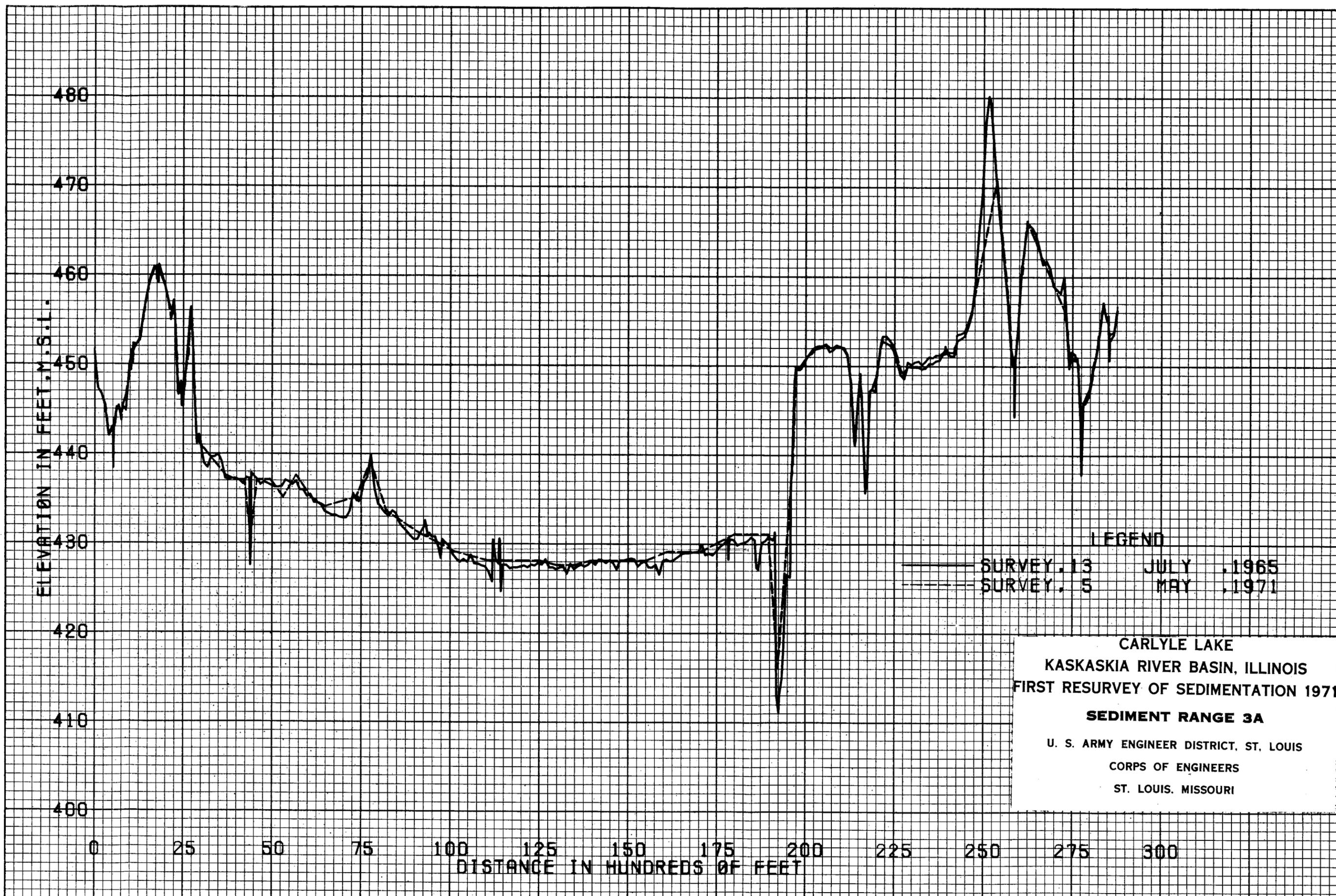
CARLYLE LAKE
KASKASKIA RIVER BASIN, ILLINOIS
FIRST RESURVEY OF SEDIMENTATION 1971
SEDIMENT RANGE 1A
 U. S. ARMY ENGINEER DISTRICT, ST. LOUIS
 CORPS OF ENGINEERS
 ST. LOUIS, MISSOURI



LEGEND

— SURVEY, 24 OCTOBER, 1966
 - - - SURVEY, 4 MAY, 1971

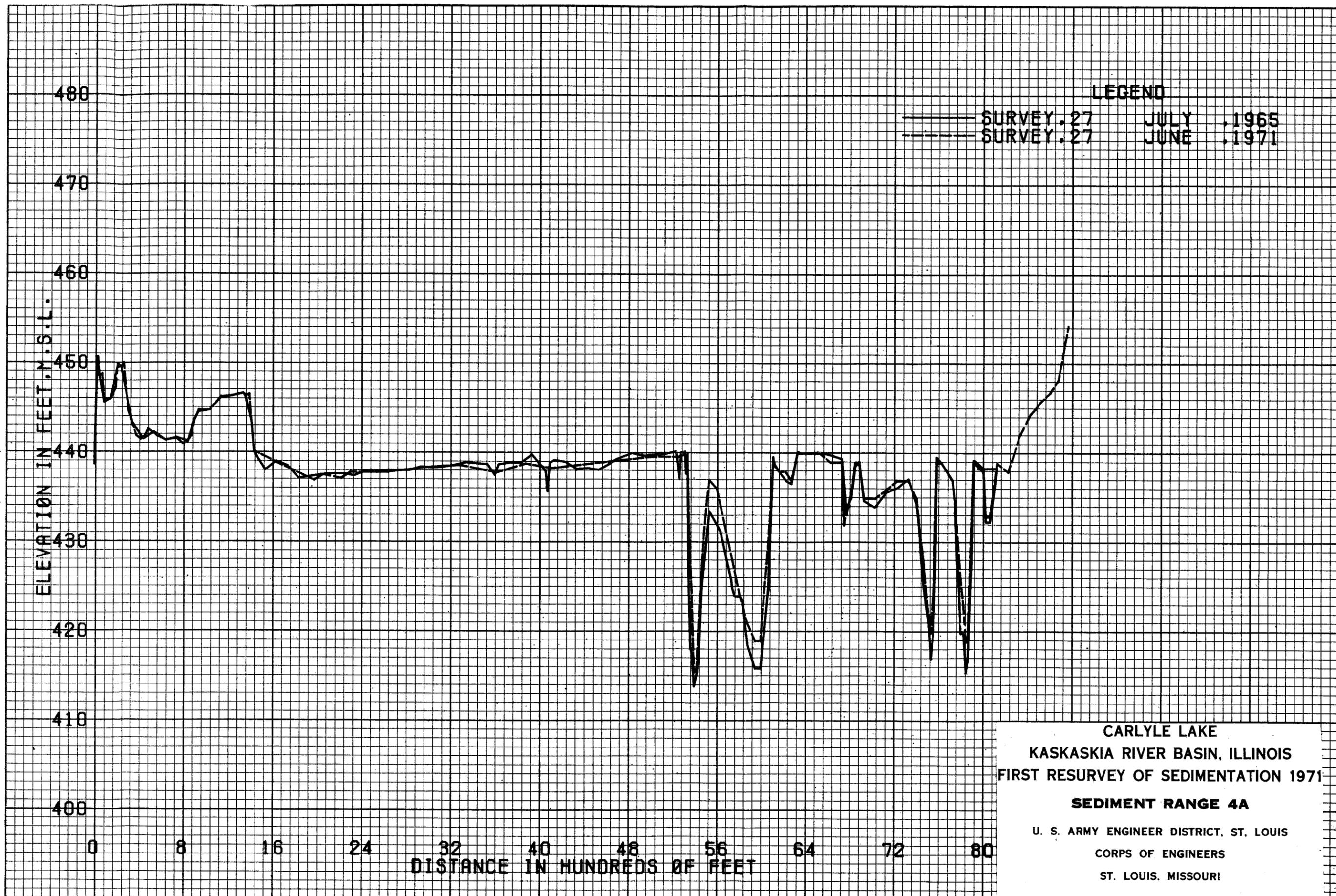
CARLYLE LAKE
 KASKASKIA RIVER BASIN, ILLINOIS
 FIRST RESURVEY OF SEDIMENTATION 1971
SEDIMENT RANGE 2A
 U. S. ARMY ENGINEER DISTRICT, ST. LOUIS
 CORPS OF ENGINEERS
 ST. LOUIS, MISSOURI



LEGEND

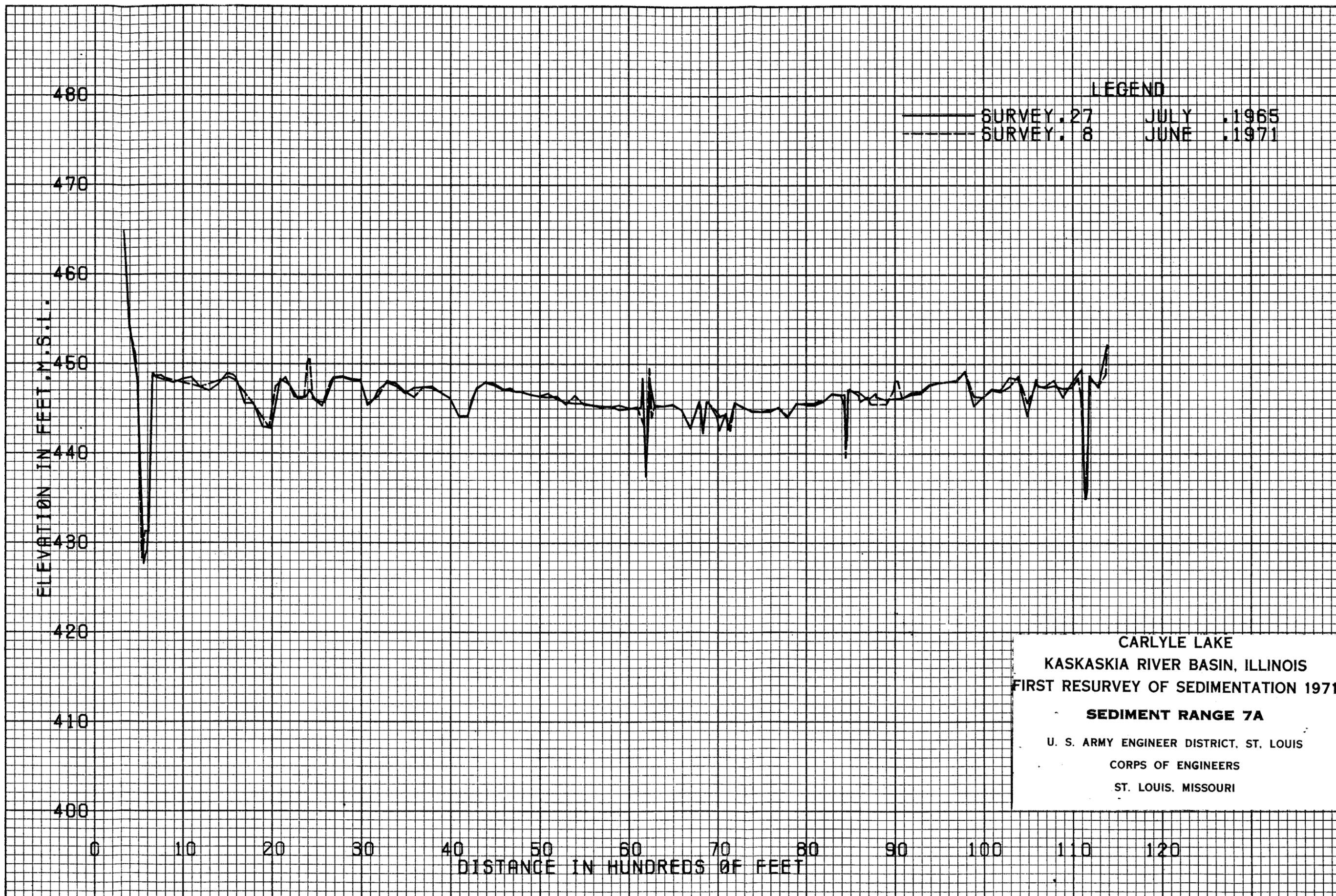
— SURVEY, 13 JULY, 1965
 - - - SURVEY, 5 MAY, 1971

CARLYLE LAKE
 KASKASKIA RIVER BASIN, ILLINOIS
 FIRST RESURVEY OF SEDIMENTATION 1971
SEDIMENT RANGE 3A
 U. S. ARMY ENGINEER DISTRICT, ST. LOUIS
 CORPS OF ENGINEERS
 ST. LOUIS, MISSOURI



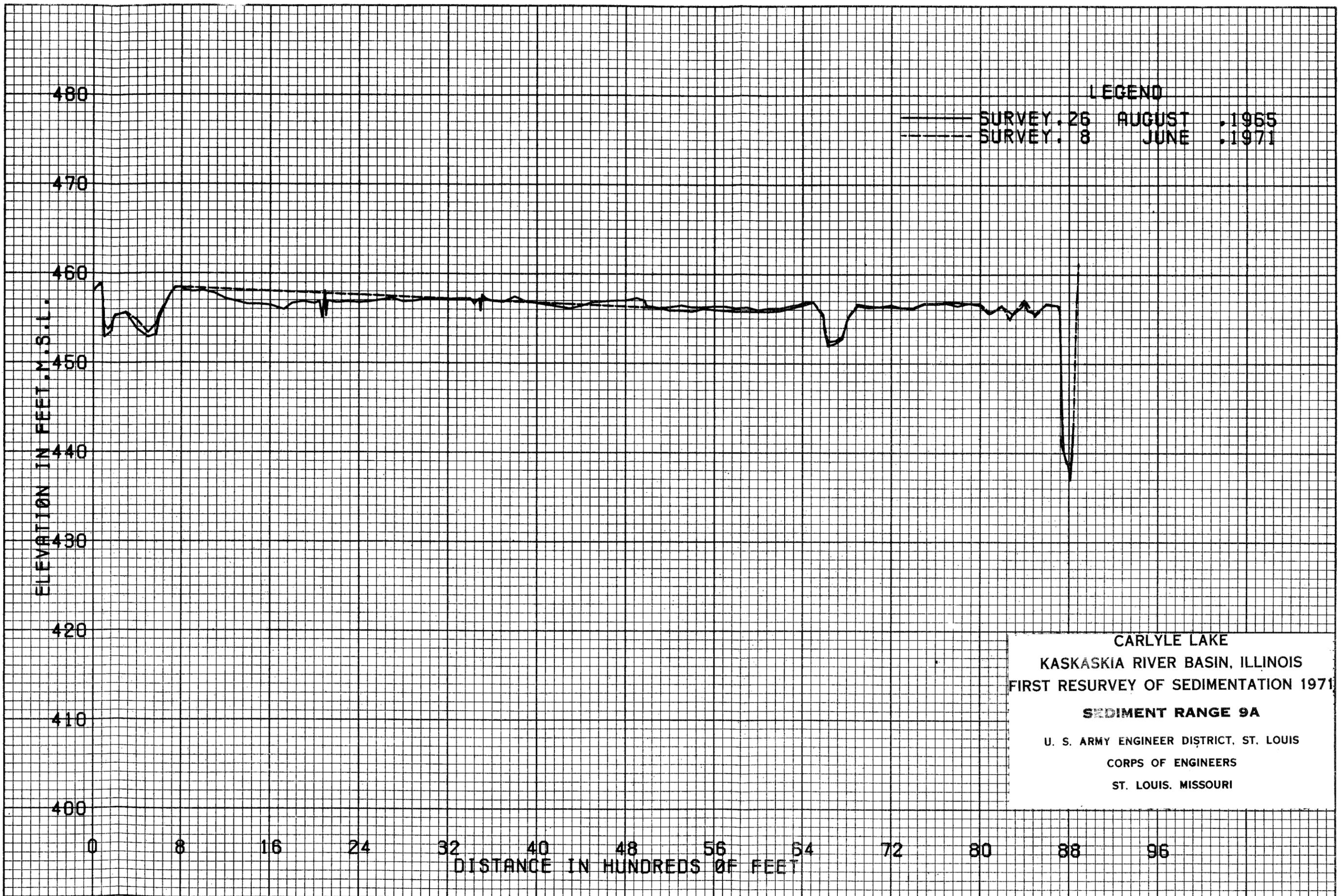
LEGEND
 — SURVEY .27 JULY 1965
 - - SURVEY .27 JUNE 1971

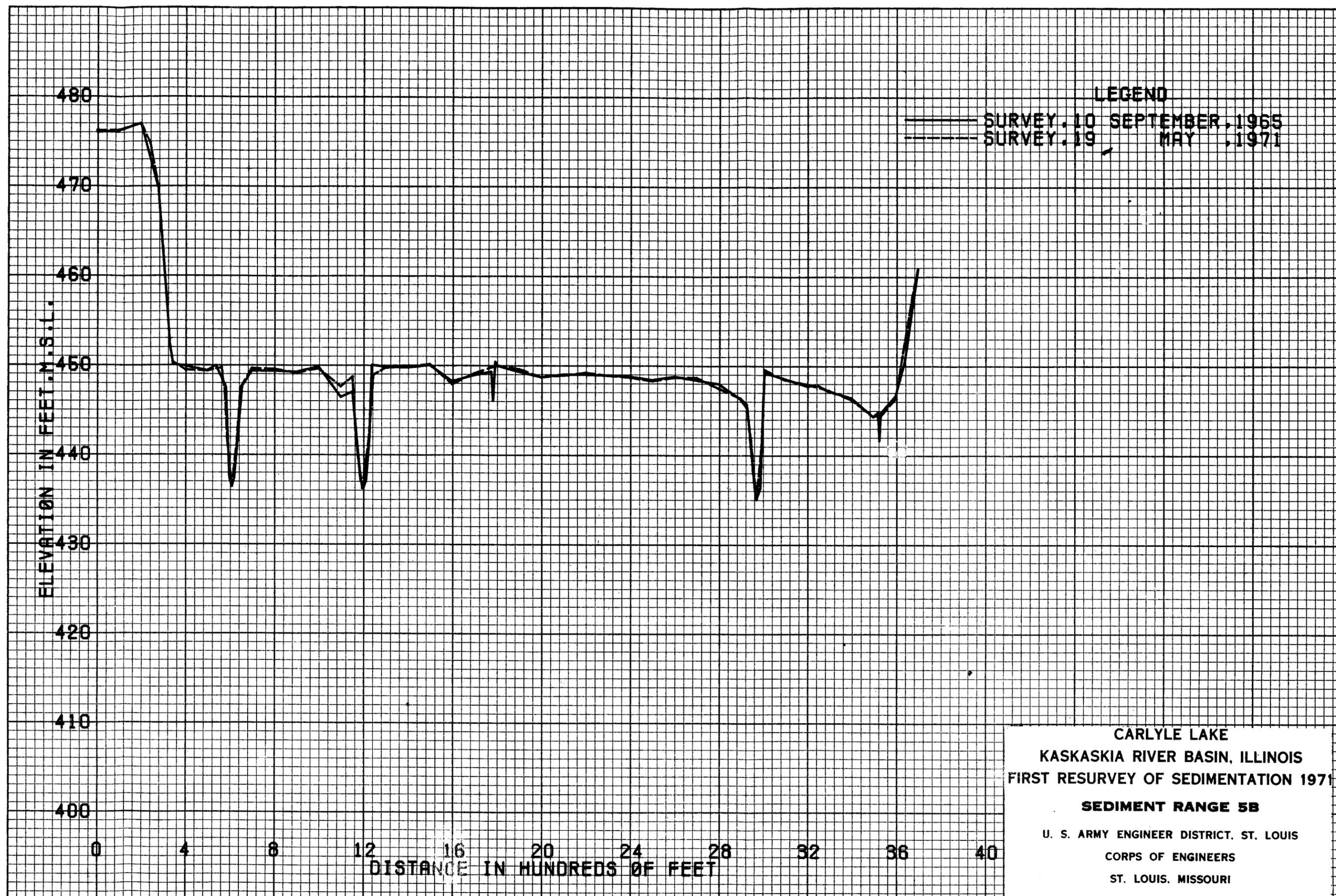
CARLYLE LAKE
KASKASKIA RIVER BASIN, ILLINOIS
FIRST RESURVEY OF SEDIMENTATION 1971
SEDIMENT RANGE 4A
 U. S. ARMY ENGINEER DISTRICT, ST. LOUIS
 CORPS OF ENGINEERS
 ST. LOUIS, MISSOURI



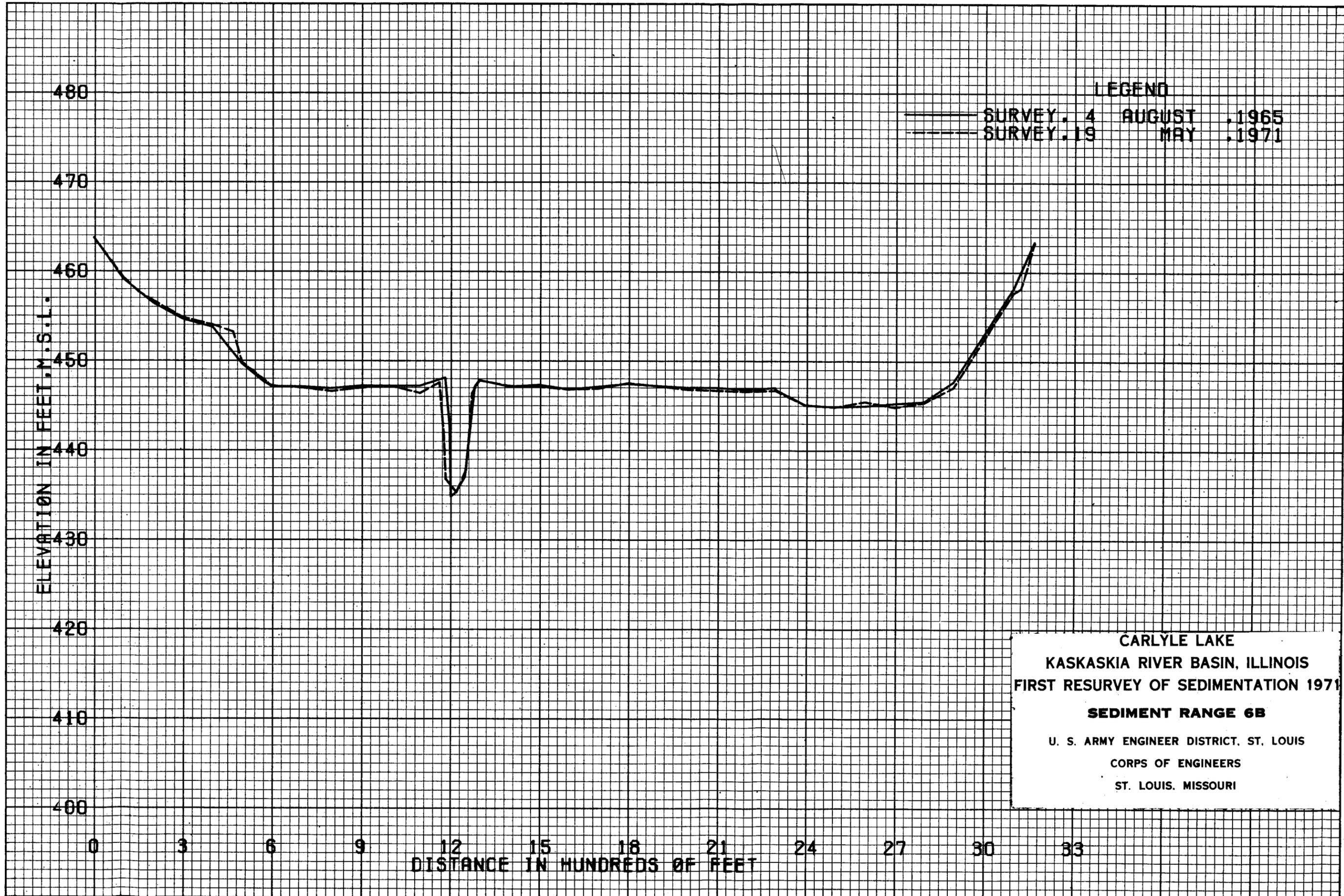
LEGEND
 — SURVEY . 27 JULY . 1965
 - - SURVEY . 8 JUNE . 1971

CARLYLE LAKE
KASKASKIA RIVER BASIN, ILLINOIS
FIRST RESURVEY OF SEDIMENTATION 1971
SEDIMENT RANGE 7A
 U. S. ARMY ENGINEER DISTRICT, ST. LOUIS
 CORPS OF ENGINEERS
 ST. LOUIS, MISSOURI





CARLYLE LAKE
KASKASKIA RIVER BASIN, ILLINOIS
FIRST RESURVEY OF SEDIMENTATION 1971
SEDIMENT RANGE 5B
 U. S. ARMY ENGINEER DISTRICT, ST. LOUIS
 CORPS OF ENGINEERS
 ST. LOUIS, MISSOURI

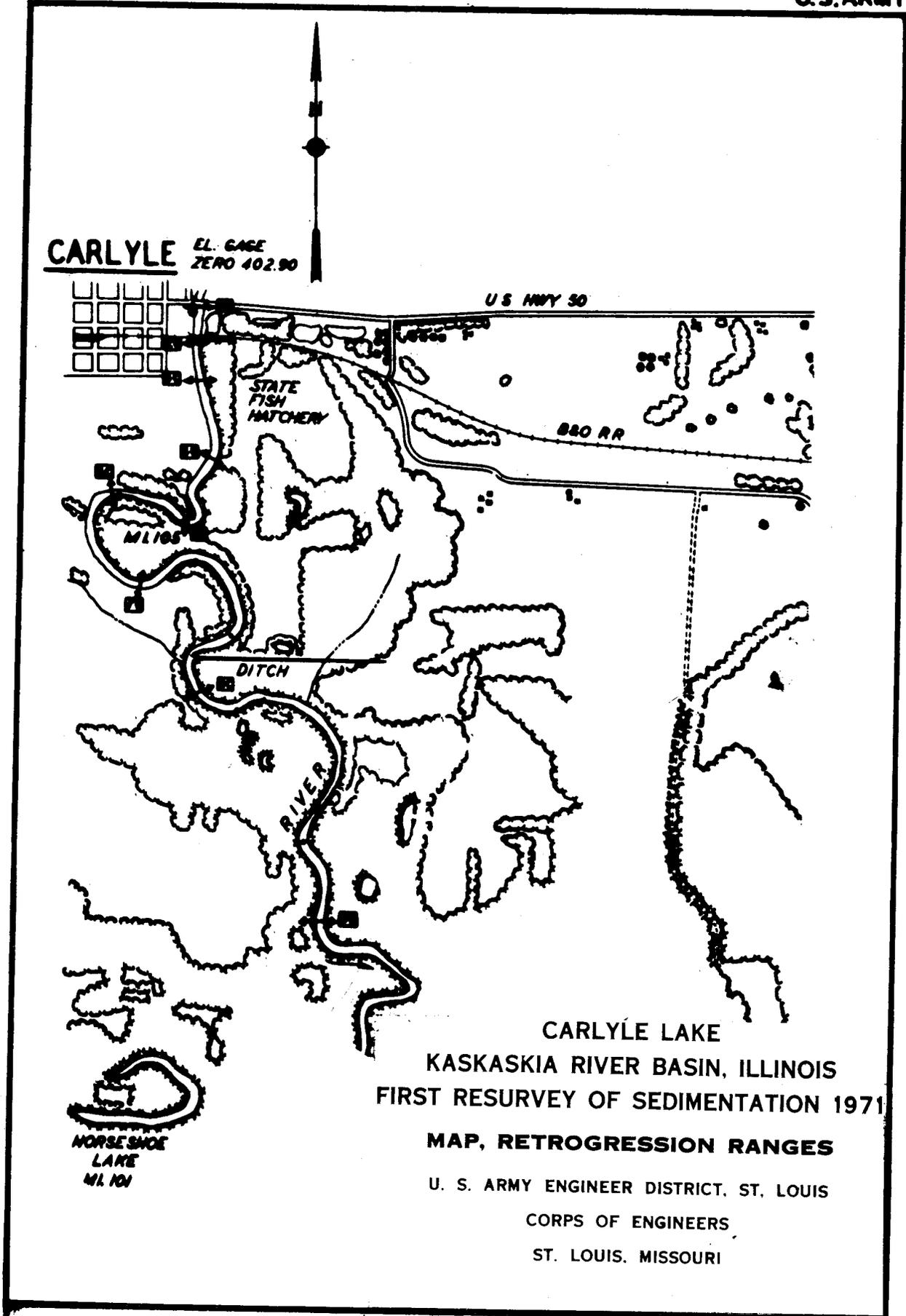


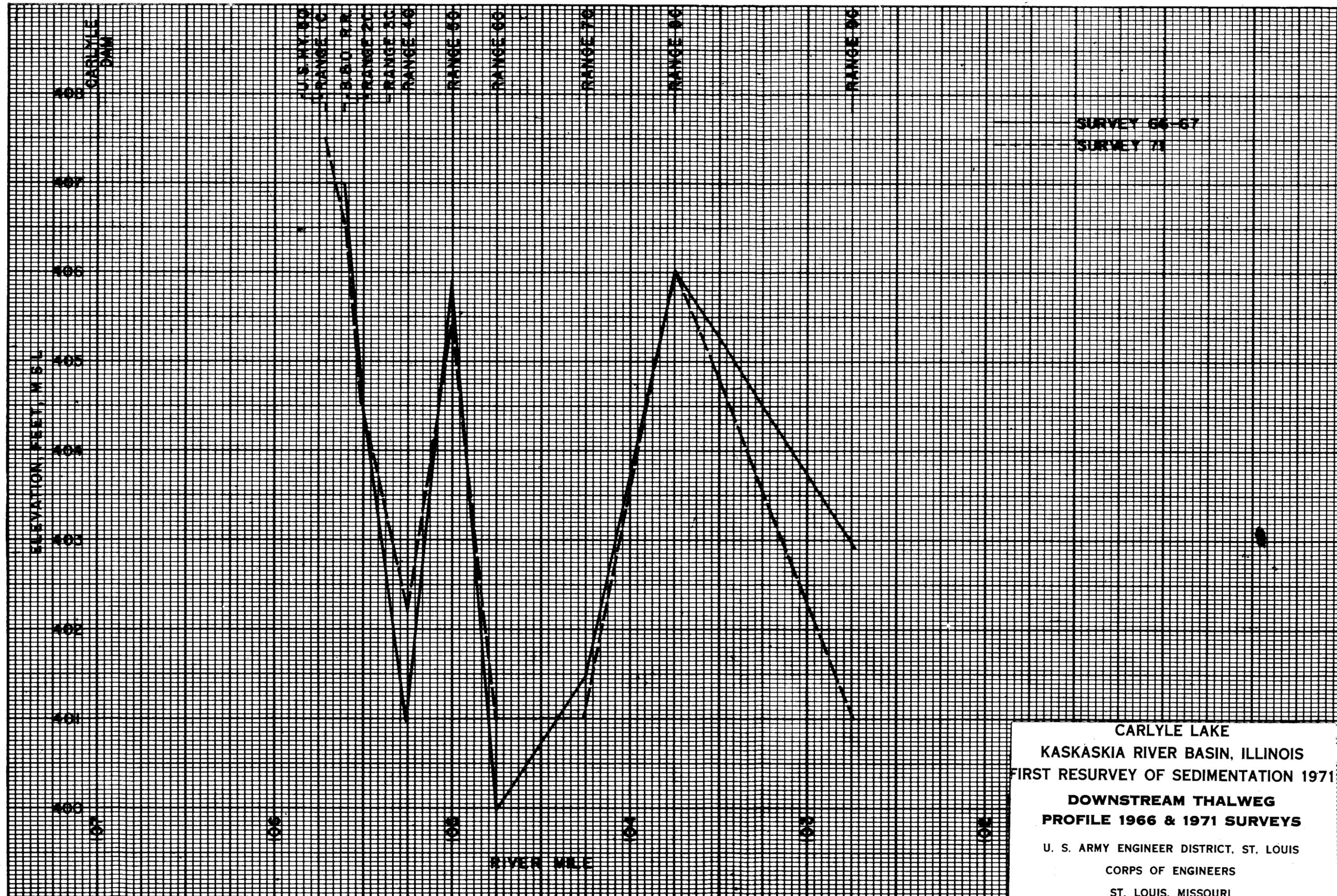
ELEVATION IN FEET, M.S.L.

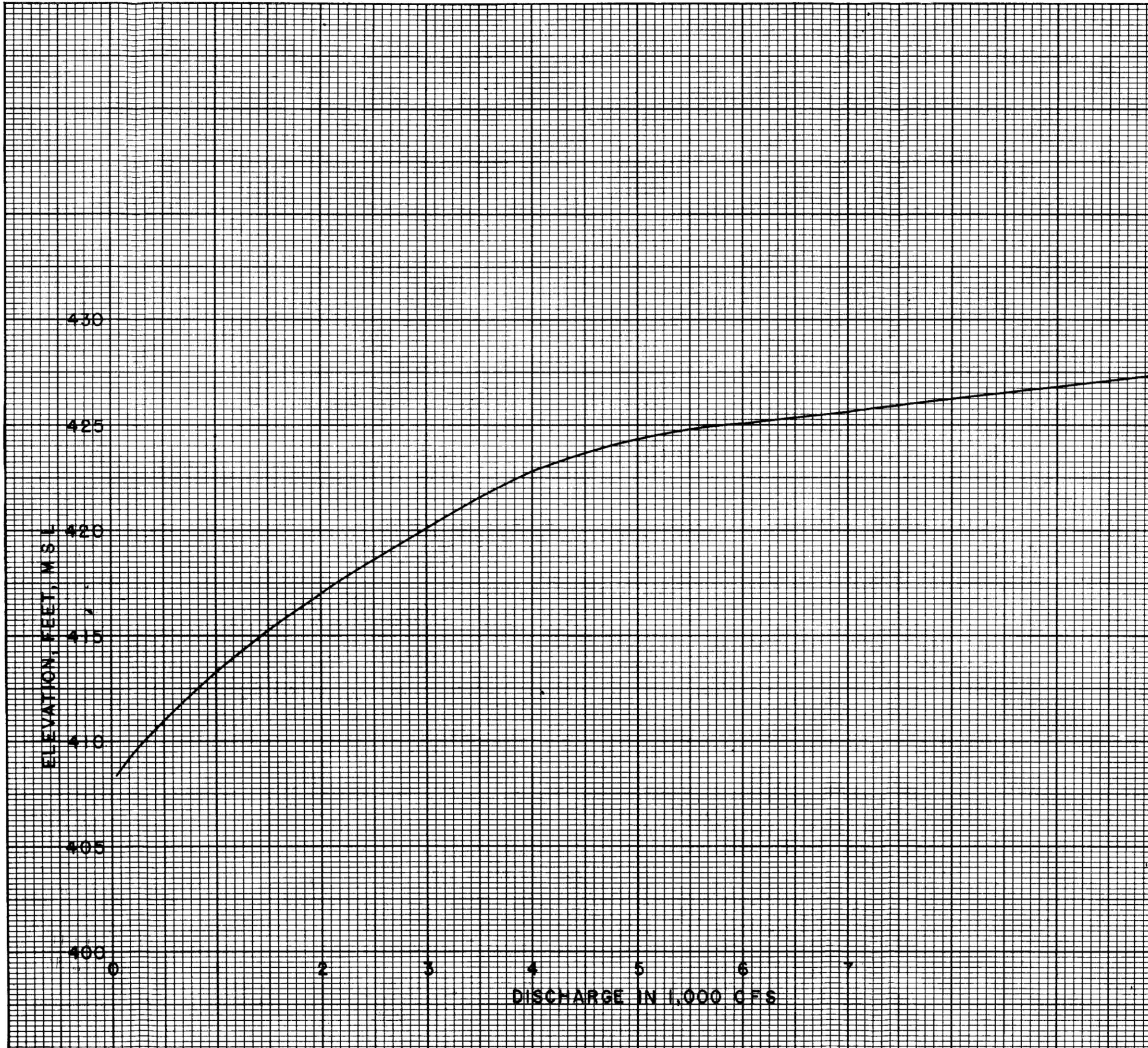


LEGEND
—— SURVEY, 3 SEPTEMBER, 1965
- - - SURVEY, 3 JUNE, 1971

CARLYLE LAKE
KASKASKIA RIVER BASIN, ILLINOIS
FIRST RESURVEY OF SEDIMENTATION 1971
SEDIMENT RANGE 8B
U. S. ARMY ENGINEER DISTRICT, ST. LOUIS
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI



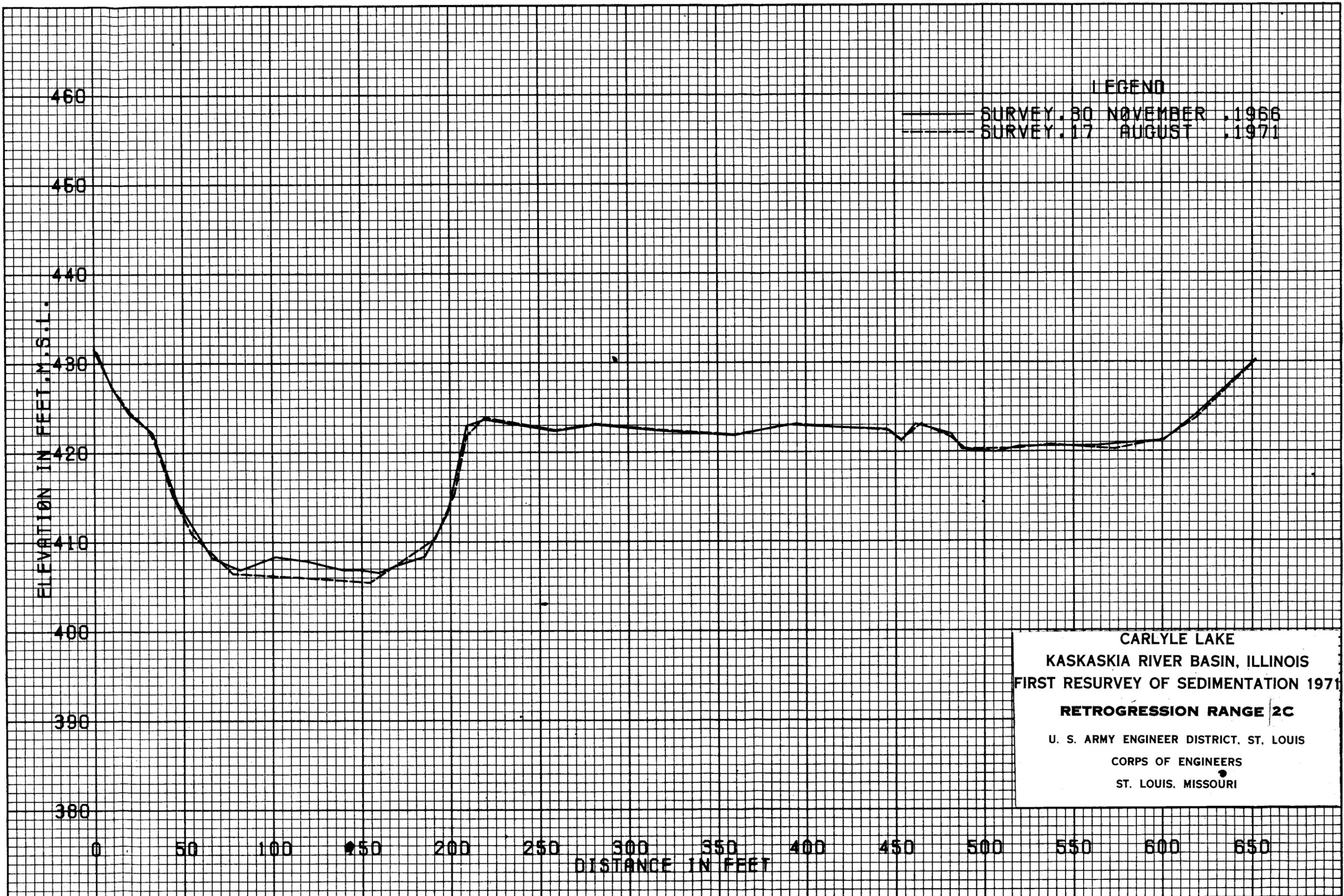




CARLYLE LAKE
KASKASKIA RIVER BASIN, ILLINOIS
FIRST RESURVEY OF SEDIMENTATION 1971
TAILWATER RATING CURVE
(1966 & 1971)
U. S. ARMY ENGINEER DISTRICT, ST. LOUIS
CORPS OF ENGINEERS
ST. LOUIS, MISSOURI



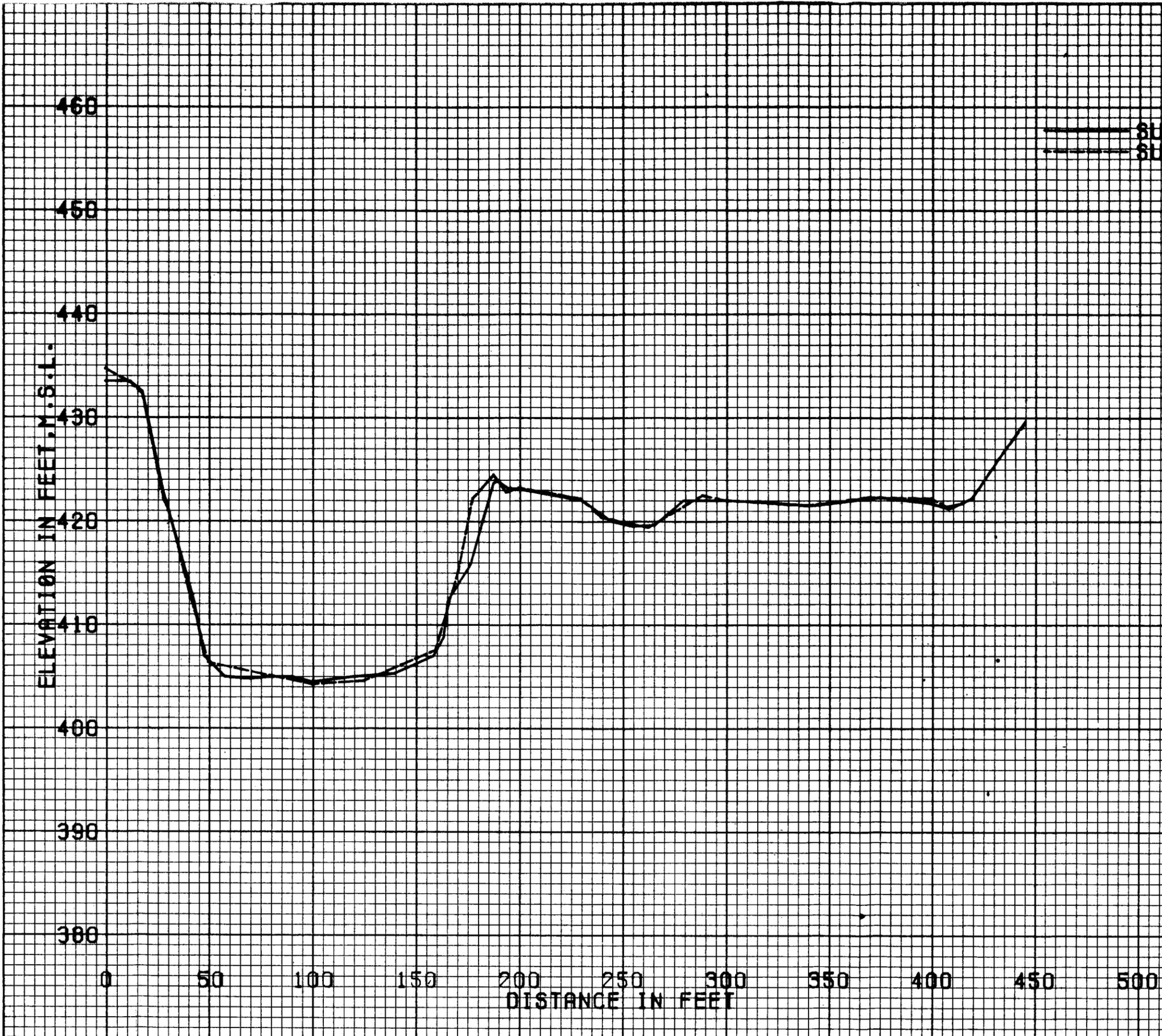
CARLYLE LAKE
KASKASKIA RIVER BASIN, ILLINOIS
FIRST RESURVEY OF SEDIMENTATION 1971
RETROGRESSION RANGE 1C
 U. S. ARMY ENGINEER DISTRICT, ST. LOUIS
 CORPS OF ENGINEERS
 ST. LOUIS, MISSOURI



LEGEND

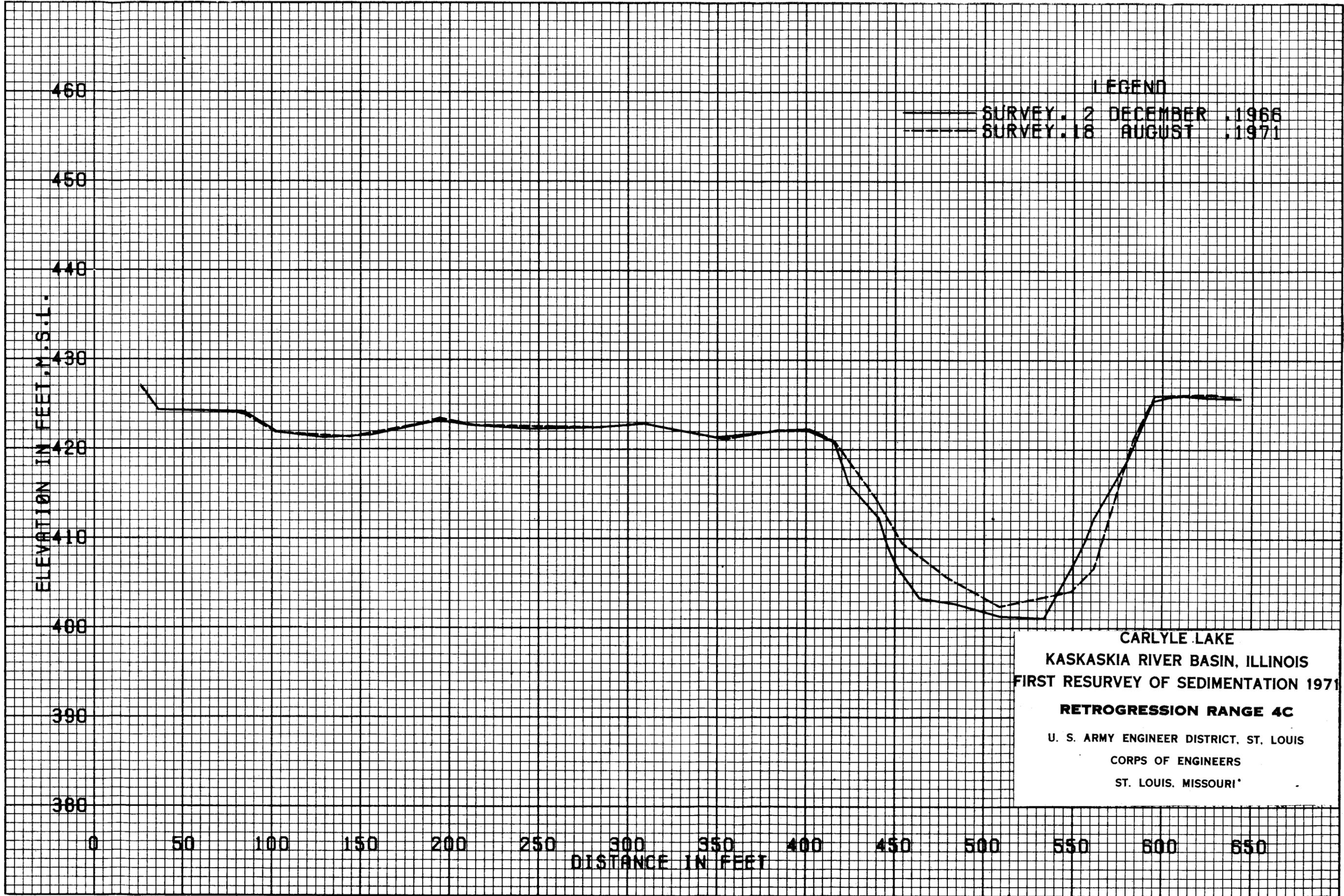
— SURVEY, 30 NOVEMBER, 1966
 - - - SURVEY, 17 AUGUST, 1971

CARLYLE LAKE
 KASKASKIA RIVER BASIN, ILLINOIS
 FIRST RESURVEY OF SEDIMENTATION 1971
RETROGRESSION RANGE 2C
 U. S. ARMY ENGINEER DISTRICT, ST. LOUIS
 CORPS OF ENGINEERS
 ST. LOUIS, MISSOURI



LEGEND
 — SURVEY 1 DECEMBER 1966
 - - SURVEY 86 AUGUST 1971

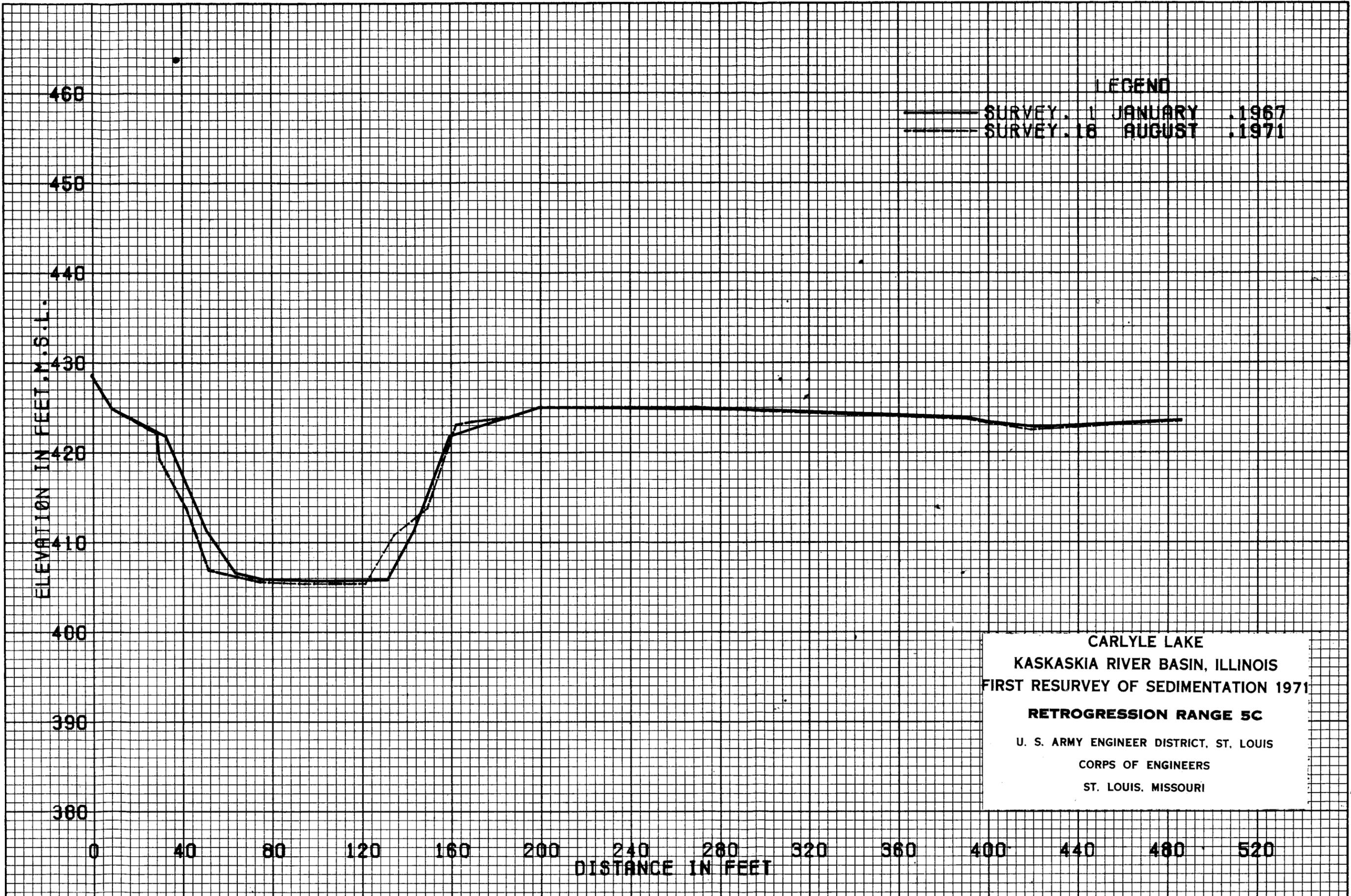
CARLYLE LAKE
KASKASKIA RIVER BASIN, ILLINOIS
FIRST RESURVEY OF SEDIMENTATION 1971
RETROGRESSION RANGE 3C
 U. S. ARMY ENGINEER DISTRICT, ST. LOUIS
 CORPS OF ENGINEERS
 ST. LOUIS, MISSOURI



LEGEND

— SURVEY, 2 DECEMBER, 1966
 - - - SURVEY, 18 AUGUST, 1971

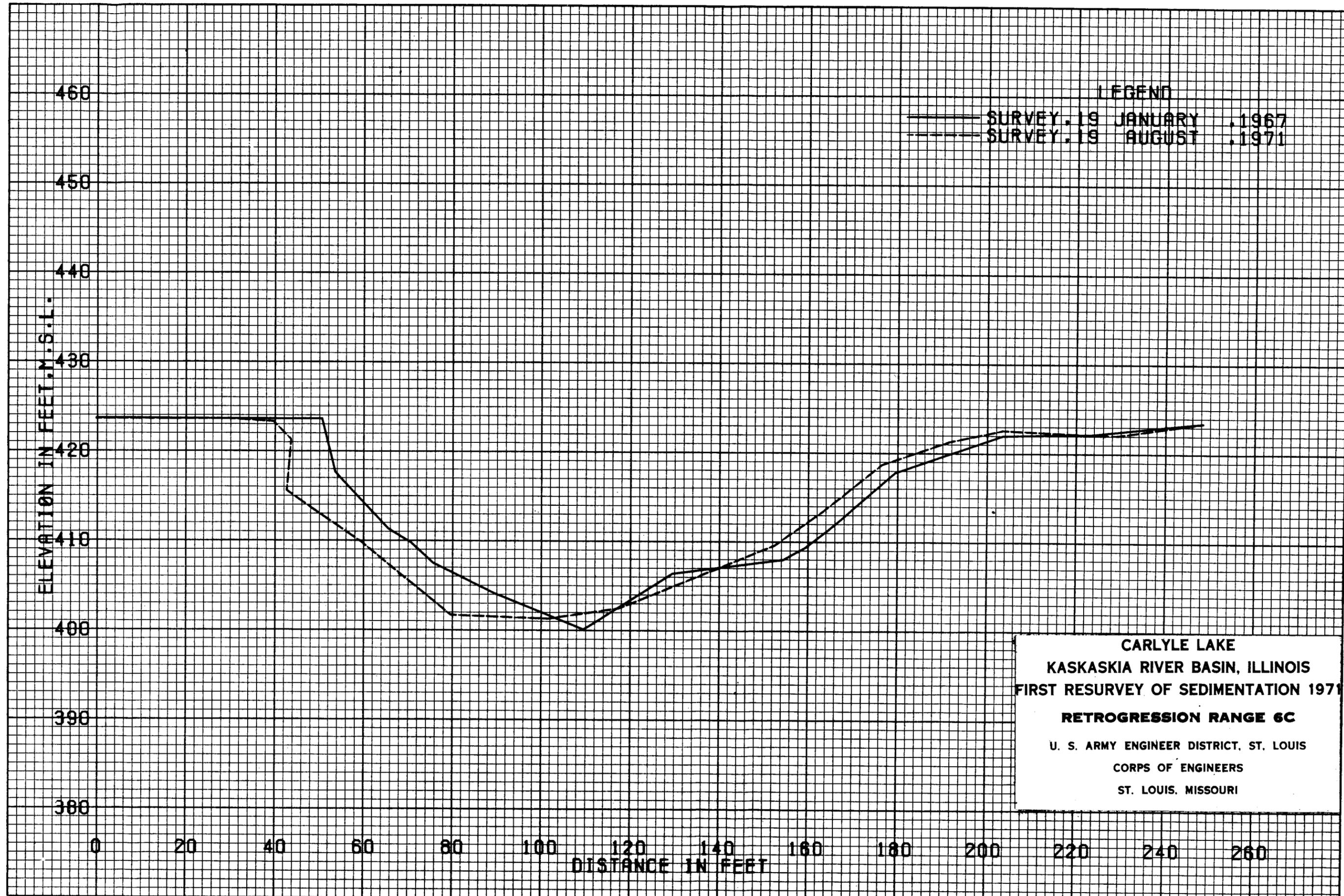
CARLYLE LAKE
KASKASKIA RIVER BASIN, ILLINOIS
FIRST RESURVEY OF SEDIMENTATION 1971
RETROGRESSION RANGE 4C
 U. S. ARMY ENGINEER DISTRICT, ST. LOUIS
 CORPS OF ENGINEERS
 ST. LOUIS, MISSOURI



LEGEND

— SURVEY. 1 JANUARY .1967
 - - - SURVEY. 18 AUGUST .1971

CARLYLE LAKE
 KASKASKIA RIVER BASIN, ILLINOIS
 FIRST RESURVEY OF SEDIMENTATION 1971
RETROGRESSION RANGE 5C
 U. S. ARMY ENGINEER DISTRICT, ST. LOUIS
 CORPS OF ENGINEERS
 ST. LOUIS, MISSOURI



LEGEND

— SURVEY, 19 JANUARY, 1967
 - - - SURVEY, 19 AUGUST, 1971

CARLYLE LAKE
KASKASKIA RIVER BASIN, ILLINOIS
FIRST RESURVEY OF SEDIMENTATION 1971
RETROGRESSION RANGE 6C
 U. S. ARMY ENGINEER DISTRICT, ST. LOUIS
 CORPS OF ENGINEERS
 ST. LOUIS, MISSOURI



LEGEND
 — SURVEY 2 MAY 1951
 - - - SURVEY 19 AUGUST 1971

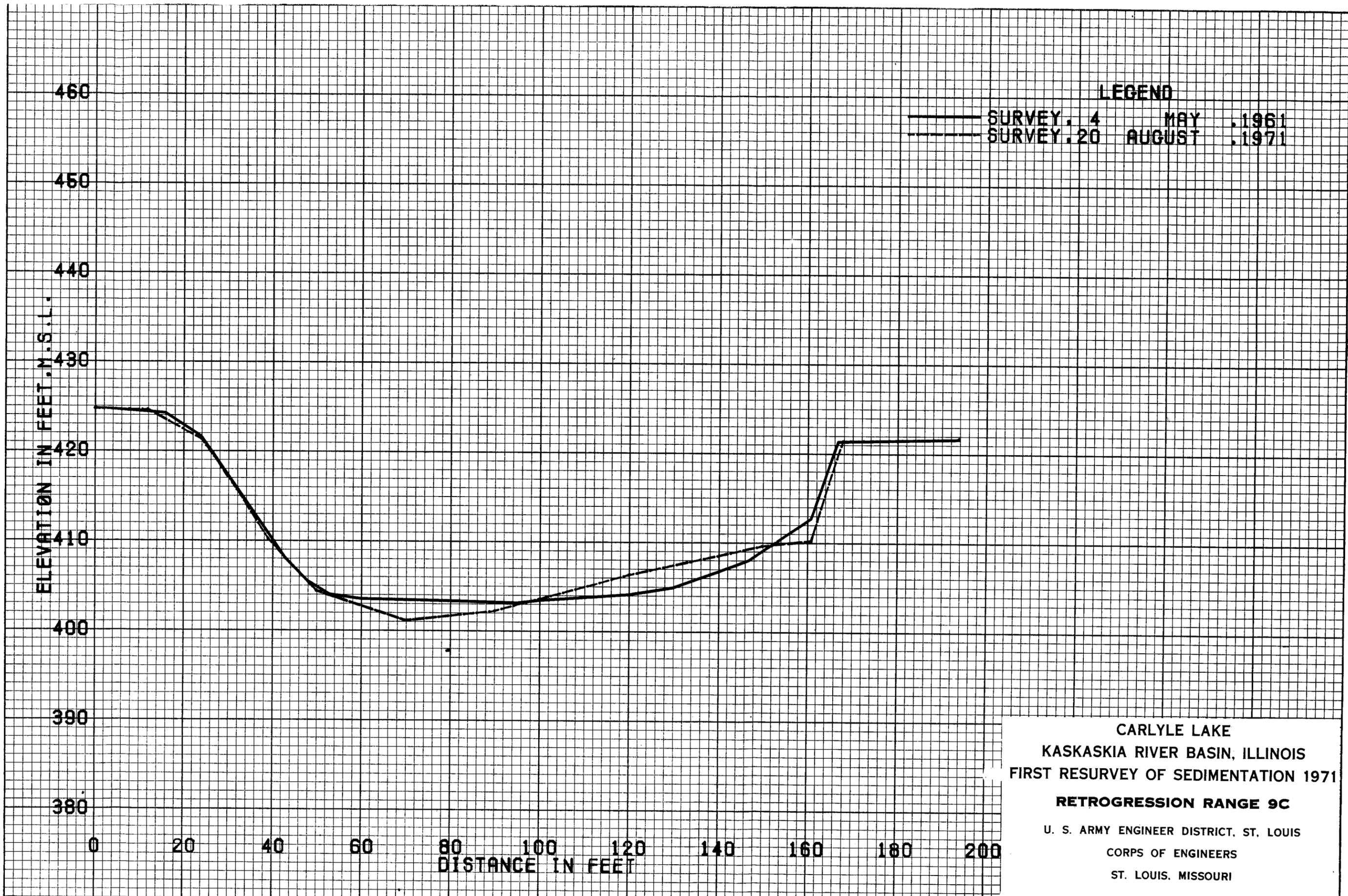
CARLYLE LAKE
KASKASKIA RIVER BASIN, ILLINOIS
FIRST RESURVEY OF SEDIMENTATION 1971
RETROGRESSION RANGE 7C
 U. S. ARMY ENGINEER DISTRICT, ST. LOUIS
 CORPS OF ENGINEERS
 ST. LOUIS, MISSOURI



LEGEND

— SURVEY, 20 JANUARY, 1967
 - - - SURVEY, 19 AUGUST, 1971

CARLYLE LAKE
KASKASKIA RIVER BASIN, ILLINOIS
FIRST RESURVEY OF SEDIMENTATION 1971
RETROGRESSION RANGE 8C
 U. S. ARMY ENGINEER DISTRICT, ST. LOUIS
 CORPS OF ENGINEERS
 ST. LOUIS, MISSOURI



CARLYLE LAKE
 KASKASKIA RIVER BASIN, ILLINOIS
 FIRST RESURVEY OF SEDIMENTATION 1971
RETROGRESSION RANGE 9C
 U. S. ARMY ENGINEER DISTRICT, ST. LOUIS
 CORPS OF ENGINEERS
 ST. LOUIS, MISSOURI

**RESERVOIR SEDIMENT
DATA SUMMARY**

Carlyle Lake

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS

NAME OF RESERVOIR

DATA SHEET NO.

DAM	1. OWNER Dept. of Army Corps of Eng.			2. STREAM Kaskaskia River		3. STATE Illinois		
	4. SEC 17-18 TWP. 2N RANGE 2W			5. NEAREST TOWN Carlyle, Ill.		6. COUNTY Clinton		
	7. STREAM BED ELEVATION 405.0			8. TOP OF DAM ELEVATION 472.0		9. SPILLWAY CREST ELEV. 425.0		
RESERVOIR	10. STORAGE ALLOCATION		11. ELEVATION TOP OF POOL	12. ORIGINAL SURFACE AREA ACRES	13. ORIGINAL CAPACITY ACRE-FEET	14. GROSS STORAGE ACRE-FEET	15. DATE STORAGE BEGAN	
	a. MULTIPLE USE						2 Apr. 1 (3) 1967	
	b. FLOOD CONTROL		462.5	57,500	700,000	983,000		
	c. POWER						16. DATE NORMAL OPER. BEGAN 1 Aug 1970	
	d. WATER SUPPLY							
	e. IRRIGATION							
	f. CONSERVATION		445.0	26,000	223,000	283,000		
	g. SEDIMENT							
h. INACTIVE		429.5	7,100	50,000	44,900			
17. LENGTH OF RESERVOIR at joint use pool 15.1 (4) MILES; AV. WIDTH OF RESERVOIR at joint use 2.5 MILES								
WATERSHED	18. TOTAL DRAINAGE AREA 2680 (4) SQ. MI.				22. MEAN ANNUAL PRECIPITATION 38.22 (34) INCHES			
	19. NET SEDIMENT CONTRIBUTING AREA 1650 SQ. MI.				23. MEAN ANNUAL RUNOFF 9.34 (34) INCHES			
	20. LENGTH 120 MILES		AV. WIDTH 30 MILES		24. MEAN ANNUAL RUNOFF 1,334,994 (34) AC.-FT.			
	21. MAX. ELEV. 725 msl		MIN. ELEV. 405 msl		25. CLIMATIC CLASSIFICATION humid			
SURVEY DATA	26. DATE OF SURVEY	27. PERIOD YEARS	28. ACCL. YEARS OF SURVEY	29. TYPE OF SURVEY	30. NO. OF RANGES OR CONTOUR INT.	31. SURFACE AREA ACRES	32. CAPACITY ACRE-FEET	33. C/W RATIO AC.-FT. PER SQ. MI.
	April 1967				9	3,851	27,970	
	August 1971	4.3	4.3	Range (D)	9	3,850	22,870	See 2
	26. DATE OF SURVEY	34. PERIOD ANNUAL PRECIPITATION		35. PERIOD WATER INFLOW ACRE-FEET			36. WATER INFL. TO DATE AC.-FT.	
		a. MEAN ANNUAL		b. MAX. ANNUAL	c. PERIOD TOTAL	a. MEAN ANNUAL	b. TOTAL TO DATE	
	August 1971	36.9		1,533,058	1,881,729	8,846,120	1,533,058	8,846,120
	26. DATE OF SURVEY	37. PERIOD SEDIMENT DEPOSITS ACRE-FEET			38. TOTAL SED. DEPOSITS TO DATE ACRE-FEET.			
		a. PERIOD TOTAL	b. AV. ANNUAL	c. PER SQ. MI.-YEAR	a. TOTAL TO DATE	b. AV. ANNUAL	c. PER SQ. MI.-YEAR	
	August 1971	5100	1186	.718	5100	1186	.718	
	26. DATE OF SURVEY	39. AV. DRY WGT. LBS. PER CU. FT.	40. SED. DEP. TONS PER SQ. MI.-YR.		41. STORAGE LOSS PCT.		42. SED. INFLOW PPM	
		a. PERIOD	b. TOTAL TO DATE	a. AV. AN.	b. TOT. TO DATE	a. PERIOD	b. TOT. TO DATE	
				.0008	.0052			

26. DATE OF SURVEY	43. DEPTH DESIGNATION RANGE IN FEET ABOVE, AND BELOW, CREST ELEVATION													
	PERCENT OF TOTAL SEDIMENT LOCATED WITHIN DEPTH DESIGNATION													
26. DATE OF SURVEY	44. REACH DESIGNATION PERCENT OF TOTAL ORIGINAL LENGTH OF RESERVOIR													
	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100	-105	-110	-115	-120
August 1971	PERCENT OF TOTAL SEDIMENT LOCATED WITHIN REACH DESIGNATION													
	9.4	3.8	14.8	18.8	17.9	16.8	11.9	1.8	1.9	2.9				
45. RANGE IN RESERVOIR OPERATION														
WATER YEAR	MAX. ELEV.	MIN. ELEV.	INFLOW AC.-FT.	WATER YEAR	MAX. ELEV.	MIN. ELEV.	INFLOW AC.-FT.							
1966	433.0	425.1	945,058											
1967	435.9	425.2	1,584,998											
1968	451.2	429.8	1,975,800											
1969	450.2	429.6	1,607,628											
1970	455.0	433.1	1,861,421											
1971	446.12	440.3	655,461											
46. ELEVATION-AREA-CAPACITY DATA														
ELEVATION	AREA	CAPACITY	ELEVATION	AREA	CAPACITY	ELEVATION	AREA	CAPACITY						
415	1,146	8,093	450	32,397	419,932									
420	2,181	22,872	455	41,548	605,354									
425	3,851	49,185	460	52,398	839,427									
430	7,109	96,971	465	65,113	1,132,070									
435	12,115	171,689	470	84,360	1,497,230									
440	17,990	277,909												
445	24,583													
47. REMARKS AND REFERENCES														
<ol style="list-style-type: none"> 1. Beginning of storage April 1967. 2. Omitted because of effect of Lake Shelbyville on amount of sediment trapped at Carlyle Lake. 3. Date of initial impoundment. 4. Reference Master Regulation Manual Kaskaskia River Basin, Illinois; Dept. of the Army, CE St. Louis District. 														
48. AGENCY MAKING SURVEY														
49. AGENCY SUPPLYING DATA														
50. DATE March 1973														