Water for Nevada

HYDROLOGIC ATLAS

ELMO J. DeRICCO
Director

STATE OF NEVADA
DEPARTMENT OF CONSERVATION AND NATURAL RESOURCES
DIVISION OF WATER RESOURCES
201 South Fall Street, Carson City, Nevada 89701

ROLAND D. WESTERGARD
State Engineer

In reply refer to
No.

Address All Communications to the State Engineer, Division of Water Resources

TO THE CITIZENS OF THE STATE OF NEVADA

This Hydrologic Atlas is one of a continuing series of publications developed by the Division of Water Resources as a part of the comprehensive State Water Plan. It is the result of the efforts of many people. B. J. Vasey, Planning Engineer for the Division of Water Resources conceived this atlas and supervised its production. Bruce Scott, a member of the Division planning staff, was instrumental in the preparation of many of the maps. He was responsible for the coordination of the various maps and publication of this atlas. Lawrence Roach, Jr., also of the Division of Water Resources assisted in compilation and did the cartography on most of the maps. F. Eugene Rush of the U. S. Geological Survey in Carson City and the Branch of Technical Illustrations of the same agency in Menlo Park, California were also major contributors.

Several maps in this atlas are based on State Federal Comprehensive framework studies. Many of the others are results of the cooperative program between the State of Nevada and the U. S. Geological Survey.

Maps showing such information as average annual precipitation, runoff and evaporation, designated ground water areas, vegetal cover, land suitability and existing lakes and reservoirs provide general information for the state as a whole. Bathymetric surveys for some of Nevada's major lakes and reservoirs, and a map of water resources and interbasin flows, give more detailed information concerning specific areas of the state.

This atlas constitutes another portion of the inventory phase in the development of the State Water Plan. Periodically, new maps will be added to the series, both to update earlier maps and to provide additional information.

Respectfully,

Roland D. Westergard
Roland D. Westergard
State Engineer

WATER FOR NEVADA

HYDROLOGIC ATLAS

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(June 1972)

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IRRIGABILITY CLASSIFICATION OF SOILS

This classification is a rating system which indicates the potential usefulness of different kinds of soil for irrigated agriculture in Nevada. It is based on both judgments of the feasibility of initial improvements such as drainage, removing stones, leveling, ripping hardpan, or removing soluble salts and alkali, and on continuing limitations for use requiring special management, such as control of salt-buildup. It does not consider the present availability or lack of irrigation water. The classification and map are intended for general planning, rather than for location of specific fields for agriculture or for identification of specific management needs. But, it does indicate major limitations for initial improvement and major hazards to continued use.

Five major classes of potential usefulness for irrigation are presented here; these major classes are divided into subclasses to indicate the nature of the most outstanding use-limitations. Since length of growing season is so important in determining the kinds of crops which might be grown, and their economic value, the irrigability classes are subdivided again according to the freeze-free (32° F) season zone in which the various soils occur (Sakamoto *et al*, 1972).[1]

The symbols by which the soil irrigability classes of the different delineations shown on the map are identified consist of three parts:

Major irrigability class — B-2a — Irrigability subclass
Freeze-free (32° F) season zone

The five major soil irrigability classes A, B, C, D, and E are defined in Table 1 in general terms of decreasing potential usefulness and increasing limitations or hazards. Class A soils are the most valuable; class E soils have such serious limitations they can not be used for irrigated agriculture at present. The soil irrigability subclasses a, c, d, f, etc., are listed under each major class in Table 1, and a brief description of the kind of outstanding limitation is given there. The number of days' length of the five freeze-free (32° F) season zones of Nevada are also given in Table 1.

Each soil irrigability class includes many different kinds of soils with sometimes rather different properties. However, all the soils in a class offer about the same potential usefulness or degree of limitation. The soils of any one class should respond in similar manner for irrigation, but they might require somewhat different management. They are apt to be differently suitable for other uses, such as for roads, foundations, septic tank filter fields, or recreational areas. The criteria by which the soil irrigability classes were assigned to soils were adapted with limited modification from Pacific Southwest Interagency Committee criteria.[2] The soil irrigability subclasses are defined only to reflect soil and landscape conditions in Nevada. All criteria were developed jointly by the Division of Water Resources, Nevada Department of Conservation and Natural Resources, the Agricultural Experiment Station, University of Nevada Reno, and the Soil Conservation Service, U.S. Department of Agriculture.

References:

[1]Sakamoto, C. M., F. F. Peterson, E. A. Naphan, H. P. Cords, H. R. Guenthner, and R. O. Gifford, 1972. Freeze-free (32° F) seasons of the major basins and plateaus of Nevada. Water for Nevada, Hydrologic Atlas, State of Nevada Water Planning Report. Division of Water Resources, Nevada Department of Conservation and Natural Resources, Carson City, Nevada.

[2]Criteria for soil irrigability classes, Nevada Reconnaissance Soil Survey (Rev. 3/72). Division of Water Resources, Nevada Department of Conservation and Natural Resources, Agricultural Experiment Station, University of Nevada, Reno, and Soil Conservation Service, U. S. Department of Agriculture.

TABLE 1
SOIL IRRIGABILITY CLASSES AND SUBCLASSES
(Legend for use with the exploratory map of the irrigable soils of Nevada)

Irrigability class and subclasses[1]	Freeze-free (32° F) season zones (days) > 200	130–200	100–130	70–100	< 70
CLASS A — Soils that have slight or few limitations that restrict their use for irrigated agriculture	A-1	A-2	A-3	A-4	A-5
CLASS B — Soils that have moderate limitations that reduce choice of crops or require moderate conservation practices.					
Subclass a — Soils having moderately low available water-holding capacity	B-1a	B-2a	B-3a	B-4a	B-5a
Subclass c — Soils having coarse surface textures and moderately low available waterholding capacity	B-1c	B-2c	B-3c		
Subclass d — Soils having hardpan or bedrock at 30 to 40 inches			B-3d		
Subclass p — Slowly permeable soils	B-1p	B-2p	B-3p	B-4p	
Subclass k — Stony and cobbly soils			B-3k		
Subclass w — Wet soils	B-1w	B-2w	B-3w	B-4w	B-5w
Subclass x — Saline and/or alkali soils	B-1x	B-2x	B-3x	B-4x	
Subclass wx — Wet and saline and/or alkali soils	B-1wx	B-2wx	B-3wx	B-4wx	
CLASS C — Soils that have severe limitations that reduce choice of crops or require special conservation practices or both.					
Subclass a — Soils having low available waterholding capacity	C-1a	C-2a	C-3a	C-4a	C-5a
Subclass c — Soils having coarse surface textures and low available waterholding capacity	C-1c	C-2c	C-3c	C-4c	C-5c
Subclass f — Soils subject to occasional overflow		C-2f	C-3f	C-4f	
Subclass d — Soils having hardpan or bedrock at 20 to 30 inches	C-1d	C-2d	C-3d	C-4d	C-5d
CLASS C (continued)					
Subclass p — Slowly permeable soils			C-3p	C-4p	C-5p
Subclass k — Stony and cobbly soils	C-1k	C-2k	C-3k	C-4k	C-5k
Subclass s — Soils having 4 to 8 percent slopes		C-2s	C-3s	C-4s	C-5s
Subclass w — Wet soils		C-2w	C-3w	C-4w	C-5w
Subclass x — Saline and/or alkali soils		C-2x	C-3x	C-4x	
Subclass wf — Wet soils subject to occasional overflow		C-2wf			
Subclass wx — Wet and saline and/or alkali soils	C-1wx	C-2wx	C-3wx	C-4wx	C-5wx
Subclass ds — Soils having hardpan or bedrock at 20 to 30 inches and 4 to 8 percent slopes		C-2ds	C-3ds	C-4ds	C-5ds
Subclass as — Soils having low available waterholding capacity and 4 to 8 percent slopes		C-2as	C-3as	C-4as	
Subclass ps — Slowly permeable soils with 4 to 8 percent slopes			C-3ps	C-4ps	
CLASS D — Soils that have very severe limitations that restrict the choice of crops or require special practices and management, or both.					
Subclass a — Soils having very low available water holding capacity	D-1a	D-2a	D-3a	D-4a	
Subclass c — Soils having coarse surface textures and very low available waterholding capacity	D-1c	D-2c	D-3c	D-4c	
Subclass d — Soils having hardpan or bedrock at 10 to 20 inches	D-1d	D-2d	D-3d	D-4d	D-5d
CLASS D (continued)					
Subclass p — Very slowly permeable soils		D-2p	D-3p	D-4p	D-5p
Subclass k — Stony and cobbly soils	D-1k	D-2k	D-3k	D-4k	D-5k
Subclass h — Soils having surface rock outcrops				D-4h	
Subclass s — Soils having 8 to 15 percent slopes		D-2s	D-3s	D-4s	
Subclass w — Wet soils		D-2w	D-3w	D-4w	D-5w
Subclass x — Saline and/or alkali soils		D-2x	D-3x	D-4x	
Subclass f — Soils subject to frequent overflow	D-1f	D-2f	D-3f	D-4f	
Subclass r — Soils having dissected landscapes	D-1r	D-2r	D-3r	D-4r	
Subclass wx — Wet and saline and/or alkali soils	D-1wx	D-2wx	D-3wx	D-4wx	D-5wx
Subclass wf — Wet soils subject to frequent overflow		D-2wf			
Subclass ds — Soils having hardpan or bedrock at 10 to 20 inches and 4 to 15 percent slopes		D-2ds	D-3ds	D-4ds	D-5ds
Subclass ps — Very slowly permeable soils on 4 to 15 percent slopes and slowly permeable soils on 8 to 15 percent slopes				D-4ps	D-5ps
Subclass as — Soils having very low available water holding capacity and 4 to 15 percent slopes		D-2as	D-3as	D-4as	
CLASS E — Soils having properties that preclude their use for irrigated agriculture	E	E	E	E	E

[1]For specific class and subclass criteria see "Criteria for Soil Irrigability Classes" Nevada Reconnaissance Soil Survey (Rev. 3/72). Agricultural experiment Station, University of Nevada Reno, Division of Water Resources, Nevada Department of Conservation and Natural Resources, and Soil Conservation Service, U.S. Department of Agriculture.

IRRIGABILITY CLASSIFICATION OF SOILS AND SOIL RESOURCE GROUPS

Economic projections and evaluations require a system of land classification. The Economic Research Service, Soil Conservation Service, and Forest Service have established a uniform classification system termed *Soil Resource Groups* (SRGs). An SRG is defined as a group of land capability units having similar cropping patterns, yield characteristics, responses to fertilizers, and management and land treatment measures. They were developed primarily for use in USDA River basin planning.

SRG data is widely used in river basin studies and provides a comparable base for USDA agencies for evaluating agricultural production, employment and income impacts, for comparing alternative projects and programs, and for displaying location of resource base proposals.

Also, the Land Resource Task Force for the Western U.S. Water Plan has the responsibility for determining suitability and availability of land resources and determining response of the land base to alternative development, management and use, and programs and policies. SRGs are being utilized in this activity.

The IRRIGABILITY CLASSIFICATION OF SOILS can be converted to SRGs for this purpose by utilizing the following conversion table.

TABLE II
CONVERSION OF NEVADA IRRIGABILITY SUBCLASS (IS) TO SOIL RESOURCE GROUP (SRG), JANUARY 1, 1973

Irrigability Subclass	Soil Resource Group
A-1	1
A-2	4A
A-3	4B
A-4	7
A-5	7
B-1a	55
B-1c	55
B-1p	28
B-1w	82
B-1wx	84
B-1x	10
B-2a	13A
B-2c	58A
B-2p	31A
B-2w	88A1
B-2wx	92A
B-2x	67A
B-3a	13B1
B-3c	13B1
B-3d	13B1
B-3k	13B1
B-3p	31B
B-3w	88B
B-3wx	90B
B-3x	67B
B-4a	17A
B-4p	34
B-4w	94
B-4wx	96
B-4x	70
B-5a	17A
B-5w	94
C-1a	10
C-1c	10
C-1d	19
C-1k	12A
C-1wx	84
C-2a	13A
C-2as	14A1
C-2c	13A
C-2d	22A
C-2ds	24A
C-2f	14A2
C-2k	14A1
C-2s	14A1
C-2w	88A1
C-2wf	88A2
C-2wx	92A
C-2x	67A
C-3a	14B
C-3as	14B
C-3c	59B
C-3d	23B
C-3ds	23B
C-3f	13B2
C-3k	23B
C-3p	49B
C-3ps	41B
C-3s	24B1
C-3w	88B
C-3wx	88B
C-3x	22B
C-4a	17A
C-4as	17A
C-4c	70
C-4d	70
C-4ds	71
C-4f	17B
C-4k	26
C-4p	34
C-4ps	35
C-4s	26
C-4w	94
C-4wx	96
C-4x	25
C-5a	17A
C-5c	70
C-5d	70
C-5ds	71
C-5k	26
C-5p	34
C-5s	26
C-5w	94
C-5wx	96
D-1a	19
D-1c	73
D-1d	19
D-1f	14A2
D-1k	12A
D-1r	12B
D-1wx	86
D-2a	22A
D-2as	29A
D-2c	22A
D-2d	22A
D-2ds	29A
D-2f	14A2
D-2k	13A
D-2p	41A
D-2r	24B2
D-2s	33A
D-2w	88A1
D-2wf	88A2
D-2wx	90A
D-2x	22A
D-3a	22B
D-3as	23B
D-3c	76B
D-3d	23B
D-3ds	24B1
D-3f	13B2
D-3k	23B
D-3p	49B
D-3ps	50B
D-3r	24B2
D-3s	24B1
D-3w	88B
D-3wx	88B
D-3x	23B
D-4a	25
D-4as	26
D-4c	79
D-4d	25
D-4ds	27
D-4f	17B
D-4h	81
D-4k	81
D-4p	52
D-4ps	54
D-4r	80B
D-4s	27
D-4w	94
D-4wx	96
D-4x	25
D-5d	25
D-5ds	27
D-5k	81
D-5p	52
D-5ps	54
D-5w	96
D-5wx	96

TABLE III
AREA TABULATION OF IRRIGABILITY CLASSES AND SUBCLASSES
Shown by Hydrographic Region or Basin and Hydrographic Area

1. NORTHWEST REGION — TOTAL AREA 1,966,080 ACRES

1. PUEBLO VALLEY — TOTAL AREA 88,320 ACRES
A-4 1,000 acres; B-4a 2,000 acres; C-4a 12,000 acres; C-4d 3,000 acres; D-4wx 2,000 acres; E 68,960 acres

2. CONTINENTAL LAKE VALLEY — TOTAL AREA 136,960 ACRES
B-4a 500 acres; C-4d 1,000 acres; D-4d 5,000 acres; D-4p 13,000 acres; D-4wx 8,000 acres; E 109,460 acres

3. GRIDLEY LAKE VALLEY — TOTAL AREA 124,800 ACRES
D-4d 1,000 acres; D-4p 1,000 acres; D-4wx 5,000 acres; E 117,800 acres

4. VIRGIN VALLEY — TOTAL AREA 316,160 ACRES
D-5p 500 acres; D-5w 1,500 acres; E 314,160 acres

5. SAGE HEN VALLEY — TOTAL AREA 14,080 ACRES
E 14,080 acres

6. GUANO VALLEY — TOTAL AREA 94,080 ACRES
B-5a 500 acres; C-5a 1,000 acres; D-5k 2,000 acres; D-5p 5,500 acres; E 85,080 acres

7. SWAN LAKE VALLEY — TOTAL AREA 144,640 ACRES
E 144,640 acres

8. MASSACRE LAKE VALLEY — TOTAL AREA 112,640 ACRES
C-5a 2,500 acres; C-5k 500 acres; D-5p 4,500 acres; E 105,140 acres

9. LONG VALLEY — TOTAL AREA 277,120 ACRES
B-4a 17,000 acres; B-4x 6,000 acres; C-4a 2,000 acres; C-4d 5,000 acres; C-4w 1,500 acres; D-4k 3,000 acres; D-4wx 2,000 acres; D-4x 32,000 acres; C-5a 2,000 acres; C-5w 500 acres; D-5k 500 acres; E 205,620 acres

10. MACY FLAT — TOTAL AREA 17,280 ACRES
B-5a 1,500 acres; C-5c 500 acres; D-5k 500 acres; E 14,780 acres

11. COLEMAN VALLEY — TOTAL AREA 32,640 ACRES
B-5a 1,500 acres; C-5p 500 acres; D-5k 500 acres; E 30,140 acres

12. MOSQUITO VALLEY — TOTAL AREA 20,480 ACRES
D-5p 1,500 acres; D-5w 500 acres; E 18,480 acres

13. WARNER VALLEY — TOTAL AREA 52,480 ACRES
E 52,480 acres

14. SURPRISE VALLEY — TOTAL AREA 136,960 ACRES
C-4x 4,000 acres; D-4x 4,000 acres; D-4wx 1,500 acres; E 127,460 acres

15. BOULDER VALLEY — TOTAL AREA 56,320 ACRES
C-5d 6,600 acres; C-5s 500 acres; C-5w 500 acres; D-5d 1,000 acres; D-5k 1,000 acres; E 46,720 acres

16. DUCK LAKE VALLEY — TOTAL AREA 341,120 ACRES
B-4a 5,500 acres; B-4wx 9,500 acres; C-4c 1,500 acres; C-4p 2,000 acres; C-4k 500 acres; C-4w 2,000 acres; C-4wx 11,000 acres; D-4c 2,500 acres; D-4d 1,000 acres; D-4k 1,000 acres; E 304,620 acres

2. BLACK ROCK DESERT REGION — TOTAL AREA 5,524,480 ACRES

17. PILGRIM FLAT — TOTAL AREA 7,680 ACRES
E 7,680 acres

18. PAINTERS FLAT — TOTAL AREA 19,840 ACRES
E 19,840 acres

19. DRY VALLEY — TOTAL AREA 24,960 ACRES
D-3p 3,000 acres; D-3x 1,500 acres; E 20,460 acres

20. SAND VALLEY — TOTAL AREA 7,680 ACRES
E 7,680 acres

21. SMOKE CREEK DESERT — TOTAL AREA 627,200 ACRES
B-3wx 500 acres; D-3as 6,500 acres; D-3p 500 acres; D-3w 500 acres; D-3x 14,000 acres; E 605,200 acres

22. SAN EMIDIO DESERT — TOTAL AREA 195,200 ACRES
B-3a 2,000 acres; C-3a 3,000 acres; C-3x 5,000 acres; D-3x 30,000 acres; E 155,200 acres

23. GRANITE BASIN — TOTAL AREA 5,760 ACRES
E 5,760 acres

24. HUALAPAI FLAT — TOTAL AREA 201,600 ACRES
A-3 500 acres; B-3a 12,500 acres; C-3a 1,000 acres; C-3as 5,000 acres; C-3c 500 acres; C-3k 500 acres; D-3k 1,000 acres; D-3wx 3,500 acres; E 177,100 acres

25. HIGH ROCK LAKE VALLEY — TOTAL AREA 425,600 ACRES
C-4w 2,500 acres; D-4p 3,500 acres; B-5a 2,500 acres; D-5k 500 acres; D-5w 1,000 acres; E 415,600 acres

26. MUD MEADOW VALLEY — TOTAL AREA 316,800 ACRES
D-3wx 22,000 acres; D-3x 8,000 acres; E 286,800 acres

27. SUMMIT LAKE VALLEY — TOTAL AREA 38,400 ACRES
D-5k 1,500 acres; D-5d 1,000 acres; D-5p 3,500 acres; E 32,400 acres

28. BLACK ROCK DESERT — TOTAL AREA 1,394,560 ACRES
B-3x 5,000 acres; C-3a 21,000 acres; C-3c 5,000 acres; C-3x 5,000 acres; D-3a 120,000 acres; D-3x 5,000 acres; D-3wx 8,000 acres; E 1,230,560 acres

29. PINE FOREST VALLEY — TOTAL AREA 337,920 ACRES
A-3 5,000 acres; B-3a 8,000 acres; C-3a 17,000 acres; C-3p 42,000 acres; D-3x 35,000 acres; D-3wx 5,000 acres; E 225,920 acres

30. KINGS RIVER VALLEY
(A) RIO KING SUBAREA — TOTAL AREA 192,000 ACRES
A-3 7,000 acres; B-3a 3,000 acres; C-3a 5,000 acres; C-3x 22,000 acres; C-3wx 5,500 acres; A-4 4,000 acres; C-4a 4,000 acres; C-4d 8,000 acres; C-4w 3,500 acres; C-4wx 500 acres; E 129,500 acres
(B) SOD HOUSE SUBAREA — TOTAL AREA 72,320 ACRES
C-3x 11,000 acres; D-3x 25,000 acres; D-3wx 5,000 acres; E 31,320 acres

31. DESERT VALLEY — TOTAL AREA 673,280 ACRES
B-3x 5,000 acres; C-3a 20,000 acres; C-3as 7,500 acres; C-3x 15,000 acres; D-3c 15,000 acres; D-3x 240,000 acres; E 370,780 acres

32. SILVER STATE VALLEY — TOTAL AREA 200,320 ACRES
B-3a 3,000 acres; B-3x 3,000 acres; C-3a 29,000 acres; C-3as 5,000 acres; C-3x 6,000 acres; D-3c 24,000 acres; D-3x 25,500 acres; E 104,820 acres

33. QUINN RIVER VALLEY
(A) OROVADA SUBAREA — TOTAL AREA 404,480 ACRES
A-3 3,000 acres; B-3a 32,000 acres; C-3a 25,000 acres; C-3d 4,000 acres; C-3wx 18,000 acres; D-3ds 17,000 acres; D-3x 32,500 acres; D-3wx 7,000 acres; C-4a 10,000 acres; C-4ps 7,500 acres; C-4w 7,500 acres; D-4d 14,000 acres; E 226,980 acres
(B) McDERMITT SUBAREA — TOTAL AREA 378,880 ACRES
A-4 3,000 acres; B-4a 7,000 acres; C-4a 10,500 acres; C-4d 13,000 acres; C-4ps 38,000 acres; C-4w 8,000 acres; C-4wx 3,500 acres; D-4k 5,000 acres; E 290,880 acres

3. SNAKE RIVER BASIN — TOTAL AREA 3,347,200 ACRES

34. LITTLE OWYHEE RIVER AREA — TOTAL AREA 458,240 ACRES
C-4d 8,000 acres; D-4d 5,000 acres; D-4h 10,000 acres; D-4k 37,500 acres; E 397,740 acres

35. SOUTH FORK OWYHEE RIVER AREA — TOTAL AREA 838,400 ACRES
B-4a 3,000 acres; C-4a 5,000 acres; C-4d 5,000 acres; C-4p 14,000 acres; C-4w 15,000 acres; D-4ps 18,000 acres; D-4d 5,000 acres; D-4h 5,000 acres; D-4k 21,000 acres; E 747,400 acres

36. INDEPENDENCE VALLEY — TOTAL AREA 220,800 ACRES
B-4a 2,500 acres; C-4a 10,000 acres; C-4d 5,000 acres; C-4p 3,000 acres; C-4ps 2,500 acres; C-4w 24,000 acres; D-4p 3,500 acres; D-4w 1,500 acres; E 168,800 acres

37. OWYHEE RIVER AREA — TOTAL AREA 341,120 ACRES
C-4p 11,000 acres; C-4w 4,500 acres; D-4p 8,000 acres; C-5d 4,000 acres; C-5p 4,000 acres; C-5w 4,000 acres; D-5p 14,000 acres; D-5w 5,000 acres; E 287,120 acres

38. BRUNEAU RIVER AREA — TOTAL AREA 328,960 ACRES
C-5k 1,000 acres; C-5p 3,500 acres; D-5w 3,500 acres; D-5p 300 acres; E 320,660 acres

39. JARBIDGE RIVER AREA — TOTAL AREA 177,920 ACRES
C-5w 300 acres; E 177,620 acres

40. SALMON FALLS CREEK AREA — TOTAL AREA 779,520 ACRES
A-4 4,000 acres; B-4a 2,000 acres; C-4ds 11,000 acres; C-4w 4,000 acres; D-4ps 1,500 acres; D-4w 800 acres; B-5w 1,000 acres; C-5w 2,500 acres; C-5wx 3,500 acres; D-5ds 50,000 acres; D-5k 5,000 acres; D-5ps 1,500 acres; D-5w 2,700 acres; E 690,020 acres

41. GOOSE CREEK AREA — TOTAL AREA 202,240 ACRES
C-5w 500 acres; D-5w 2,500 acres; E 199,240 acres

4. HUMBOLDT RIVER BASIN — TOTAL AREA 10,779,520 ACRES

42. MARYS RIVER AREA — TOTAL AREA 686,720 ACRES
B-4p 19,000 acres; B-4x 4,500 acres; C-4d 4,000 acres; C-4ds 62,000 acres; C-4w 8,000 acres; D-4p 4,000 acres; D-4wx 5,000 acres; C-5ds 22,000 acres; C-5w 7,500 acres; D-5p 4,500 acres; D-5w 2,000 acres; E 544,220 acres

43. STARR VALLEY AREA — TOTAL AREA 212,480 ACRES
B-4w 2,000 acres; C-4d 20,000 acres; C-4ds 19,000 acres; C-4w 7,500 acres; D-4ps 6,000 acres; E 157,980 acres

44. NORTH FORK AREA — TOTAL AREA 710,400 ACRES
C-4ds 38,000 acres; C-4p 9,000 acres; C-4w 6,000 acres; C-4wx 9,500 acres; D-4ds 6,500 acres; D-4k 20,000 acres; C-5w 8,000 acres; D-5ds 15,000 acres; D-5p 23,000 acres; D-5k 11,000 acres; E 564,400 acres

45. LAMOILLE VALLEY — TOTAL AREA 164,480 ACRES
B-4w 14,500 acres; C-4d 17,000 acres; C-4ds 25,000 acres; C-4p 2,000 acres; C-4w 6,500 acres; D-4ps 9,000 acres; E 90,480 acres

46. SOUTH FORK AREA — TOTAL AREA 63,360 ACRES
C-4w 2,500 acres; D-4p 11,000 acres; E 49,860 acres

47. HUNTINGTON VALLEY — TOTAL AREA 503,680 ACRES
B-4w 1,500 acres; C-4d 9,000 acres; C-4ds 21,000 acres; C-4w 10,000 acres; C-4wx 8,500 acres; D-4ds 68,000 acres; D-4k 5,000 acres; D-4p 8,500 acres; D-4r 27,000 acres; D-4wx 3,000 acres; E 342,180 acres

48. DIXIE CREEK—TENMILE CREEK AREA — TOTAL AREA 250,880 ACRES
C-4ds 9,000 acres; C-4p 4,000 acres; C-4x 6,000 acres; C-4w 1,500 acres; D-4ds 19,000 acres; D-4p 1,000 acres; D-4ps 24,000 acres; D-4w 3,500 acres; E 182,880 acres

49. ELKO SEGMENT — TOTAL AREA 200,960 ACRES
B-4a 1,000 acres; B-4w 9,000 acres; C-4ds 35,000 acres; C-4w 9,500 acres; D-4ds 2,500 acres; D-4w 3,000 acres; E 151,960 acres

50. SUSIE CREEK AREA — TOTAL AREA 142,720 ACRES
C-4w 3,500 acres; C-4wx 1,000 acres; D-4w 500 acres; E 137,720 acres

51. MAGGIE CREEK AREA — TOTAL AREA 253,440 ACRES
B-4w 1,000 acres; C-4d 2,000 acres; C-4w 1,500 acres; C-4p 2,500 acres; D-4p 5,000 acres; D-4ps 4,000 acres; D-4w 3,500 acres; E 233,940 acres

52. MARYS CREEK AREA — TOTAL AREA 39,040 ACRES
C-4w 1,000 acres; D-4ps 2,500 acres; E 35,540 acres

53. PINE VALLEY — TOTAL AREA 641,280 ACRES
B-4p 7,500 acres; C-4ds 11,000 acres; C-4w 4,500 acres; C-4wx 2,000 acres; D-4ds 12,000 acres; D-4r 70,000 acres; D-4wx 7,000 acres; E 527,280 acres

54. CRESCENT VALLEY — TOTAL AREA 481,280 ACRES
A-3 5,000 acres; B-3a 40,000 acres; B-3x 21,000 acres; C-3a 15,000 acres; C-3as 6,000 acres; D-3a 16,000 acres; D-3d 25,000 acres; E 353,280 acres

55. CARICO LAKE VALLEY — TOTAL AREA 240,640 ACRES
A-3 1,500 acres; B-3a 15,000 acres; C-3a 9,000 acres; C-3p 9,000 acres; C-3s 6,000 acres; D-3r 3,000 acres; E 197,140 acres

56. UPPER REESE RIVER VALLEY — TOTAL AREA 728,320 ACRES
A-4 12,000 acres; B-4a 3,000 acres; B-4x 4,500 acres; B-4w 3,500 acres; C-4a 7,000 acres; C-4as 56,000 acres; C-4s 13,000 acres; C-4w 13,000 acres; D-4wx 12,000 acres; C-4c 1,500 acres; C-4p 2,000 acres; C-4s 5,000 acres; D-4r 3,000 acres; E 598,820 acres

57. ANTELOPE VALLEY — TOTAL AREA 289,280 ACRES
A-3 35,000 acres; B-3a 7,000 acres; C-3p 6,000 acres; C-3as 10,000 acres; C-3ps 14,000 acres; E 217,280 acres

58. MIDDLE REESE RIVER VALLEY — TOTAL AREA 204,160 ACRES
A-3 12,000 acres; B-3x 9,000 acres; C-3a 2,000 acres; C-3as 9,000 acres; C-3wx 3,000 acres; D-4r 2,000 acres; E 167,160 acres

59. LOWER REESE RIVER VALLEY — TOTAL AREA 376,320 ACRES
B-3x 22,000 acres; B-3wx 10,000 acres; C-3a 55,000 acres; C-3as 10,000 acres; C-3x 40,000 acres; C-3wx 5,000 acres; E 234,320 acres

60. WHIRLWIND VALLEY — TOTAL AREA 60,160 ACRES
B-3wx 1,000 acres; C-3wx 2,000 acres; D-3x 3,500 acres; E 53,660 acres

61. BOULDER FLAT — TOTAL AREA 348,160 ACRES
A-3 16,000 acres; B-3a 18,000 acres; B-3w 3,000 acres; B-3wx 10,000 acres; B-3x 33,000 acres; C-3a 10,000 acres; C-3w 7,000 acres; C-3wx 23,000 acres; D-3d 4,500 acres; D-3k 4,500 acres; E 219,160 acres

62. ROCK CREEK VALLEY — TOTAL AREA 284,160 ACRES
C-4d 24,000 acres; C-4ds 7,000 acres; D-4w 6,500 acres; D-4wx 2,000 acres; E 244,660 acres

63. WILLOW CREEK VALLEY — TOTAL AREA 259,200 ACRES
B-4p 4,500 acres; B-4w 7,500 acres; C-4p 7,000 acres; E 240,200 acres

64. CLOVERS AREA — TOTAL AREA 460,800 ACRES
B-3a 40,000 acres; B-3x 22,000 acres; C-3a 5,000 acres; C-3as 25,000 acres; C-3wx 26,000 acres; C-3x 83,000 acres; B-4a 10,000 acres; C-4a 14,000 acres; D-4k 10,000 acres; E 225,800 acres

64. PUMPERNICKEL VALLEY — TOTAL AREA 191,360 ACRES
B-3a 9,000 acres; B-3p 6,500 acres; C-3as 5,000 acres; D-3p 3,000 acres; D-3wx 33,000 acres; E 134,860 acres

66. KELLY CREEK AREA — TOTAL AREA 192,640 ACRES
C-3as 15,000 acres; C-3x 45,000 acres; C-3wx 1,000 acres; B-4a 500 acres; C-4a 16,000 acres; D-4k 10,000 acres; D-4p 9,000 acres; E 96,140 acres

67. LITTLE HUMBOLDT VALLEY — TOTAL AREA 624,000 ACRES
B-4a 14,000 acres; C-4as 12,000 acres; C-4w 7,000 acres; D-4d 14,000 acres; E 577,000 acres

68. HARDSCRABBLE AREA — TOTAL AREA 106,880 ACRES
E 106,880 acres

69. PARADISE VALLEY — TOTAL AREA 384,000 ACRES
A-3 10,000 acres; B-3a 14,000 acres; B-3w 15,000 acres; B-3wx 13,000 acres; B-3x 43,000 acres; C-3a 13,000 acres; C-3as 14,000 acres; C-3d 9,000 acres; C-3p 6,000 acres; C-3w 500 acres; C-3wx 20,000 acres; C-3x 9,000 acres; D-3c 6,000 acres; E 213,500 acres

70. WINNEMUCCA SEGMENT — TOTAL AREA 278,400 ACRES
A-3 3,000 acres; B-3a 3,500 acres; B-3c 11,000 acres; B-3x 8,000 acres; C-3as 2,500 acres; C-3c 30,000 acres; C-3as 4,000 acres; C-3w 12,000 acres; C-3wx 5,000 acres; C-3x 3,000 acres; E 196,400 acres

71. GRASS VALLEY — TOTAL AREA 332,800 ACRES
A-3 18,000 acres; B-3wx 10,000 acres; C-3d 33,000 acres; C-3as 1,500 acres; D-3as 7,000 acres; D-3k 9,000 acres; D-3p 11,000 acres; E 243,300 acres

72. IMLAY AREA — TOTAL AREA 493,440 ACRES
A-3 65,000 acres; B-3c 4,000 acres; C-3as 55,000 acres; C-3c 5,000 acres; C-3ds 10,000 acres; C-3x 8,000 acres; C-3wx 7,000 acres; D-3k 5,000 acres; E 334,440 acres

73. LOVELOCK VALLEY — TOTAL AREA 406,400 ACRES
A-2 12,000 acres; B-2w 16,000 acres; B-2wx 2,500 acres; C-2a 2,500 acres; C-2as 7,500 acres; C-2w 22,000 acres; C-2wx 3,500 acres; D-2a 16,000 acres; D-2wx 3,500 acres; A-3 16,000 acres; C-3as 10,000 acres; E 294,900 acres
(A) OREANA SUBAREA — TOTAL AREA 62,720 ACRES
A-3 15,000 acres; C-3as 4,000 acres; D-3k 500 acres; E 43,220 acres

74. WHITE PLAINS — TOTAL AREA 104,960 ACRES
C-2a 3,500 acres; C-3a 3,000 acres; D-2a 2,000 acres; D-3k 1,000 acres; E 95,460 acres

5. WEST CENTRAL REGION — TOTAL AREA 1,059,840 ACRES

75. BRADYS HOT SPRINGS AREA — TOTAL AREA 113,920 ACRES
B-3a 5,000 acres; C-3a 5,000 acres; D-3k 4,000 acres; E 99,920 acres

76. FERNLEY AREA — TOTAL AREA 76,800 ACRES
B-3a 8,000 acres; C-3c 2,000 acres; C-3wx 1,500 acres; D-3c 7,000 acres; E 58,300 acres

77. FIREBALL VALLEY — TOTAL AREA 37,120 ACRES
A-3 6,000 acres; B-3a 2,000 acres; C-3a 2,000 acres; E 27,120 acres

78. GRANITE SPRINGS VALLEY — TOTAL AREA 618,880 ACRES
A-3 3,000 acres; B-3a 50,000 acres; C-3a 115,000 acres; C-3d 5,000 acres; C-3c 3,000 acres; C-3x 6,000 acres; D-3k 5,000 acres; D-3r 9,000 acres; E 422,880 acres

79. KUMIVA VALLEY — TOTAL AREA 213,120 ACRES
B-3a 32,000 acres; C-3as 7,000 acres; C-3c 3,000 acres; D-3a 4,000 acres; D-3k 15,000 acres; E 152,120 acres

6. TRUCKEE RIVER BASIN — TOTAL AREA 1,472,000 ACRES

80. WINNEMUCCA LAKE VALLEY — TOTAL AREA 237,440 ACRES
B-3a 3,000 acres; D-3c 2,000 acres; D-3k 5,000 acres; D-3x 2,500 acres; E 224,940 acres

81. PYRAMID LAKE VALLEY — TOTAL AREA 430,080 ACRES
C-3a 9,000 acres; C-3w 1,000 acres; D-3c 1,500 acres; D-3p 500 acres; D-3k 5,000 acres; E 413,080 acres

82. DODGE FLAT — TOTAL AREA 58,880 ACRES
B-3a 500 acres; B-3w 1,000 acres; C-3c 1,000 acres; D-3a 4,500 acres; D-3c 1,000 acres; D-3k 1,500 acres; D-3p 1,500 acres; D-3r 500 acres; E 47,380 acres

83. TRACY SEGMENT — TOTAL AREA 182,400 ACRES
B-3a 500 acres; B-3w 1,000 acres; C-3a 500 acres; C-3k 1,000 acres; D-3w 1,500 acres; E 177,900 acres

84. WARM SPRINGS — TOTAL AREA 158,080 ACRES
B-3a 2,000 acres; C-3a 3,000 acres; C-3c 10,000 acres; C-3wx 5,000 acres; D-3c 500 acres; D-3k 4,000 acres; D-3p 5,500 acres; E 128,080 acres

85. SPANISH SPRINGS VALLEY — TOTAL AREA 48,640 ACRES
B-3a 4,500 acres; C-3c 5,000 acres; C-3w 2,500 acres; D-3k 2,000 acres; E 34,640 acres

86. SUN VALLEY — TOTAL AREA 6,400 ACRES
B-3a 500 acres; D-3k 1,500 acres; D-3p 500 acres; E 3,900 acres

87. TRUCKEE MEADOWS — TOTAL AREA 129,920 ACRES
B-3a 2,000 acres; C-3a 1,000 acres; C-3as 2,000 acres; C-3d 8,000 acres; C-3p 11,000 acres; C-3w 4,500 acres; C-3wx 3,500 acres; D-3k 5,500 acres; D-3p 2,000 acres; E 90,420 acres

88. PLEASANT VALLEY — TOTAL AREA 24,960 ACRES
C-3w 1,000 acres; D-3k 500 acres; E 23,460 acres

89. WASHOE VALLEY — TOTAL AREA 52,480 ACRES
C-3c 2,500 acres; C-3w 4,500 acres; D-3c 3,000 acres; D-3p 500 acres; E 41,980 acres

90. LAKE TAHOE BASIN — TOTAL AREA 88,960 ACRES
D-4c 2,000 acres; D-4as 2,000 acres; E 84,960 acres

91. TRUCKEE CANYON SEGMENT — TOTAL AREA 53,760 ACRES
D-3k 3,000 acres; D-3w 1,000 acres; E 49,760 acres

7. WESTERN REGION — TOTAL AREA 369,280 ACRES

92. LEMMON VALLEY
(A) WESTERN PART — TOTAL AREA 33,920 ACRES
B-3a 500 acres; B-3x 1,000 acres; C-3p 6,500 acres; C-3ps 500 acres; D-3x 2,000 acres; E 23,420 acres
(B) EASTERN PART — TOTAL AREA 25,600 ACRES
B-3x 2,000 acres; C-3c 2,500 acres; C-3x 500 acres; D-3p 5,000 acres; E 15,600 acres

93. ANTELOPE VALLEY — TOTAL AREA 11,520 ACRES
C-3c 3,500 acres; D-3p 2,000 acres; E 6,020 acres

94. BEDELL FLAT — TOTAL AREA 33,920 ACRES
C-3c 6,000 acres; C-3p 5,000 acres; C-3wx 500 acres; E 22,420 acres

95. DRY VALLEY — TOTAL AREA 51,200 ACRES
C-3c 1,000 acres; D-3p 5,000 acres; D-3w 500 acres; D-3wx 1,000 acres; E 43,700 acres

96. NEWCOMB LAKE VALLEY — TOTAL AREA 5,760 ACRES
E 5,760 acres

97. HONEY LAKE VALLEY — TOTAL AREA 123,520 ACRES
D-3a 5,000 acres; D-3x 18,000 acres; E 100,520 acres

98. SKEDADDLE CREEK VALLEY — TOTAL AREA 27,520 ACRES
E 27,520 acres

99. RED ROCK VALLEY — TOTAL AREA 37,120 ACRES
C-3c 5,000 acres; C-3wx 3,000 acres; E 29,120 acres

100. COLD SPRING VALLEY — TOTAL AREA 19,200 ACRES
C-3p 3,000 acres; D-3x 500 acres; E 15,700 acres

8. CARSON RIVER BASIN — TOTAL AREA 2,252,160 ACRES

101. CARSON DESERT — TOTAL AREA 1,283,480 ACRES
B-2a 5,000 acres; B-2c 4,000 acres; B-2w 42,000 acres; C-2a 18,000 acres; C-2c 22,000 acres; C-2w 3,000 acres; C-2wx 10,000 acres; D-2a 15,000 acres; D-2c 6,000 acres; D-2k 28,000 acres; D-2s 1,000 acres; D-2x 5,000 acres; D-2wx 30,000 acres; B-3a 3,500 acres; C-3a 500 acres; D-3s 500 acres; E 1,103,180 acres
(A) PACKARD VALLEY — TOTAL AREA 113,000 ACRES
D-2a 7,000 acres; D-2k 8,000 acres; D-3k 200 acres; E 97,800 acres

102. CHURCHILL VALLEY — TOTAL AREA 307,200 ACRES
B-2a 6,000 acres; B-2w 3,500 acres; C-2c 3,000 acres; D-2a 3,000 acres; D-2c 15,000 acres; D-2k 2,000 acres; D-2wx 1,000 acres; C-3w 1,500 acres; C-3wx 1,000 acres; E 271,200 acres

103. DAYTON VALLEY — TOTAL AREA 236,160 ACRES
B-2a 3,000 acres; B-2w 6,000 acres; C-2a 2,000 acres; C-2c 2,500 acres; D-2c 3,500 acres; D-2k 2,000 acres; B-3w 1,000 acres; D-3p 2,000 acres; E 214,160 acres

104. EAGLE VALLEY — TOTAL AREA 44,160 ACRES
B-3a 6,500 acres; B-3w 2,000 acres; C-3c 500 acres; D-3k 1,500 acres; E 33,660 acres

105. CARSON VALLEY — TOTAL AREA 268,160 ACRES
B-3a 6,000 acres; B-3p 6,000 acres; B-3w 11,000 acres; C-3c 4,500 acres; C-3w 10,000 acres; C-3wx 8,000 acres; D-3c 3,000 acres; D-3ds 500 acres; D-3k 22,000 acres; D-3w 2,000 acres; D-3wx 3,000 acres; E 192,160 acres

9. WALKER RIVER BASIN — TOTAL AREA 1,949,440 ACRES

106. ANTELOPE VALLEY — TOTAL AREA 73,600 ACRES
B-3p 4,000 acres; C-3w 2,500 acres; D-3k 1,000 acres; E 66,100 acres

107. SMITH VALLEY — TOTAL AREA 306,560 ACRES
A-3 1,500 acres; B-3a 15,000 acres; B-3p 9,000 acres; B-3w 9,500 acres; C-3w 4,500 acres; C-3wx 7,500 acres; D-3c 3,500 acres; D-3k 2,000 acres; D-3w 500 acres; C-4as 4,500 acres; E 249,060 acres

108. MASON VALLEY — TOTAL AREA 330,240 ACRES
B-3a 4,000 acres; B-3w 31,000 acres; B-3wx 7,000 acres; C-3c 9,500 acres; C-3w 8,000 acres; C-3wx 12,000 acres; D-3a 500 acres; D-3c 9,500 acres; D-3k 10,500 acres; D-3wx 3,500 acres; E 234,740 acres

109. EAST WALKER AREA — TOTAL AREA 375,040 ACRES
D-3k 500 acres; D-3w 5,500 acres; C-4a 1,000 acres; C-4as 4,000 acres; C-4w 2,000 acres; D-4k 500 acres; E 361,540 acres

110. WALKER LAKE VALLEY
(A) SCHURZ SUBAREA — TOTAL AREA 321,280 ACRES
B-2p 12,000 acres; C-2a 15,000 acres; C-2c 40,000 acres; C-2w 3,000 acres; D-2c 6,500 acres; D-2w 1,500 acres; D-2wx 11,500 acres; D-2x 2,500 acres; D-3c 16,000 acres; D-3c 2,000 acres; D-3wx 2,500 acres; E 208,780 acres
(B) LAKE SUBAREA — TOTAL AREA 196,480 ACRES
C-2c 3,500 acres; D-2a 500 acres; D-2c 6,500 acres; E 185,980 acres
(C) WHISKEY FLAT—HAWTHORNE SUBAREA — TOTAL AREA 346,240 ACRES
B-2a 15,000 acres; C-2c 5,500 acres; D-2a 8,500 acres; D-2c 18,500 acres; D-2d 10,000 acres; D-2k 5,000 acres; B-3a 4,000 acres; C-3as 11,000 acres; D-3k 12,000 acres; E 256,740 acres

10. CENTRAL REGION — TOTAL AREA 29,941,120 ACRES

111. ALKALI VALLEY (Mineral)
(A) NORTHERN PART — TOTAL AREA 11,520 ACRES
E 11,520 acres
(B) SOUTHERN PART — TOTAL AREA 41,600 ACRES
D-4k 500 acres; D-4x 500 acres; E 40,600 acres

112. MONO VALLEY — TOTAL AREA 17,280 ACRES
E 17,280 acres

113. HUNTOON VALLEY — TOTAL AREA 62,080 ACRES
C-3c 1,000 acres; D-3a 2,000 acres; D-3c 4,000 acres; E 55,080 acres

114. TEELS MARSH — TOTAL AREA 206,720 ACRES
D-3c 4,500 acres; D-3k 1,500 acres; D-3x 4,500 acres; E 196,220 acres

115. ADOBE VALLEY — TOTAL AREA 9,600 ACRES
E 9,600 acres

116. QUEEN VALLEY — TOTAL AREA 41,600 ACRES
C-3ps 4,500 acres; E 37,100 acres

117. FISH LAKE VALLEY — TOTAL AREA 451,840 ACRES
A-1 1,000 acres; B-1c 5,000 acres; C-1c 33,000 acres; C-3k 12,000 acres; C-3wx 9,000 acres; E 391,840 acres

118. COLUMBUS SALT MARSH VALLEY — TOTAL AREA 236,800 ACRES
C-2a 2,500 acres; D-2a 6,000 acres; E 228,300 acres

119. RHODES SALT MARSH VALLEY — TOTAL AREA 127,360 ACRES
B-2a 3,000 acres; C-2c 9,000 acres; E 115,360 acres

120. GARFIELD FLAT — TOTAL AREA 58,880 ACRES
C-3a 1,000 acres; D-3a 3,000 acres; D-3k 1,000 acres; D-3x 2,000 acres; E 51,880 acres

121. SODA SPRING VALLEY
(A) EASTERN PART — TOTAL AREA 157,440 ACRES
B-2a 3,000 acres; C-2a 10,500 acres; C-2as 2,000 acres; D-2x 1,000 acres; E 140,940 acres
(B) WESTERN PART — TOTAL AREA 83,200 ACRES
B-2a 1,000 acres; C-2a 4,000 acres; C-2as 3,000 acres; D-2x 2,000 acres; E 73,200 acres

122. GABBS VALLEY — TOTAL AREA 817,280 ACRES
B-3p 3,000 acres; C-3a 5,000 acres; C-3as 3,500 acres; C-3c 49,000 acres; C-3x 14,500 acres; D-3a 5,000 acres; D-3as 20,000 acres; D-3c 5,500 acres; D-3k 3,500 acres; D-3r 22,000 acres; D-3s 500 acres; D-3x 8,000 acres; E 677,780 acres

123. RAWHIDE FLATS — TOTAL AREA 145,280 ACRES
B-2c 1,000 acres; C-2a 500 acres; D-2c 500 acres; A-3 1,500 acres; C-3c 24,000 acres; D-3c 5,000 acres; D-3s 4,000 acres; E 108,780 acres

124. FAIRVIEW VALLEY — TOTAL AREA 182,400 ACRES
B-2a 12,500 acres; B-3a 1,500 acres; C-2a 19,000 acres; C-2as 25,000 acres; C-3a 1,500 acres; C-3as 23,000 acres; D-2p 3,000 acres; D-2s 900 acres; D-3p 200 acres; D-4s 2,000 acres; E 93,800 acres

125. STINGAREE VALLEY — TOTAL AREA 27,520 ACRES
B-2a 2,500 acres; B-3a 900 acres; C-3as 8,000 acres; D-3a 200 acres; D-4s 1,000 acres; E 14,920 acres

126. COWKICK VALLEY — TOTAL AREA 70,400 ACRES
B-3a 1,500 acres; C-3as 13,000 acres; D-3d 2,000 acres; D-3p 4,800 acres; E 49,100 acres

127. EASTGATE VALLEY AREA — TOTAL AREA 138,240 ACRES
B-3a 6,000 acres; C-3as 6,000 acres; D-3p 23,000 acres; D-4p 3,000 acres; E 100,240 acres

128. DIXIE VALLEY — TOTAL AREA 833,920 ACRES
B-2a 74,000 acres; B-2p 21,500 acres; B-3a 1,500 acres; C-2a 30,000 acres; C-2as 103,000 acres; C-2wx 9,000 acres; C-2x 4,000 acres; D-2p 6,000 acres; D-2s 7,200 acres; D-2wx 49,000 acres; D-2x 9,000 acres; D-3a 21,000 acres; D-3p 11,000 acres; D-4s 1,800 acres; E 485,920 acres

129. BUENA VISTA VALLEY — TOTAL AREA 474,880 ACRES
A-3 3,000 acres; B-3a 21,000 acres; B-3p 35,000 acres; C-3a 10,000 acres; C-3as 35,000 acres; D-3a 3,000 acres; D-3k 7,000 acres; D-3x 3,000 acres; E 357,880 acres

130. PLEASANT VALLEY — TOTAL AREA 182,400 ACRES
B-3a 2,000 acres; B-3p 7,000 acres; D-3p 58,000 acres; D-4p 4,000 acres; E 111,400 acres

131. BUFFALO VALLEY — TOTAL AREA 322,560 ACRES
B-3a 3,000 acres; B-3p 6,000 acres; C-3a 40,500 acres; D-3a 2,500 acres; D-3as 41,000 acres; D-3k 28,000 acres; D-3x 20,000 acres; E 181,560 acres

132. JERSEY VALLEY — TOTAL AREA 90,880 ACRES
B-2a 2,000 acres; B-2p 2,500 acres; D-2a 500 acres; B-3a 900 acres; C-3as 3,500 acres; D-3p 14,000 acres; D-4s 1,200 acres; E 66,280 acres

133. EDWARDS CREEK VALLEY — TOTAL AREA 266,240 ACRES
B-3a 5,000 acres; B-3p 8,500 acres; B-3x 5,000 acres; C-3a 13,000 acres; C-3as 12,000 acres; C-3s 6,000 acres; D-3k 6,000 acres; D-3p 4,000 acres; E 206,740 acres

134. SMITH CREEK VALLEY — TOTAL AREA 372,480 ACRES
A-4 55,000 acres; B-4a 10,000 acres; B-4p 1,500 acres; B-4x 12,500 acres; C-4a 18,000 acres; C-4as 22,000 acres; D-4ds 3,000 acres; E 250,480 acres

135. IONE VALLEY — TOTAL AREA 294,400 ACRES
A-3 3,500 acres; D-3a 5,000 acres; D-3ds 41,000 acres; D-3k 5,000 acres; A-4 10,000 acres; C-4as 3,500 acres; D-4ds 3,000 acres; E 223,400 acres

136. MONTE CRISTO VALLEY — TOTAL AREA 181,760 ACRES
A-3 5,000 acres; B-3a 1,500 acres; C-3a 3,000 acres; C-3c 2,000 acres; D-3d 14,000 acres; E 156,260 acres

137. BIG SMOKY VALLEY
(A) TONOPAH FLAT — TOTAL AREA 1,025,920 ACRES
A-2 27,000 acres; B-2a 19,000 acres; C-2a 38,000 acres; C-2c 22,000 acres; C-2d 17,000 acres; C-2x 1,000 acres; D-2a 14,000 acres; D-2d 26,000 acres; D-2f 9,000 acres; A-3 14,500 acres; B-3c 2,000 acres; C-3a 12,000 acres; D-3a 2,000 acres; D-3d 10,500 acres; D-3f 4,500 acres; E 807,420 acres
(B) NORTHERN PART — TOTAL AREA 846,720 ACRES
A-3 80,000 acres; B-3a 3,500 acres; B-3wx 16,500 acres; C-3a 41,000 acres; C-3c 5,000 acres; C-3d 8,000 acres; D-3d 4,000 acres; D-3f 2,000 acres; D-3k 5,000 acres; D-3r 3,000 acres; C-4d 1,500 acres; C-4x 500 acres; D-4r 500 acres; D-4x 500 acres; E 675,720 acres

138. GRASS VALLEY — TOTAL AREA 380,800 ACRES
B-4a 9,000 acres; C-4a 45,000 acres; C-4as 7,500 acres; C-4wx 2,500 acres; D-4k 5,000 acres; D-4r 11,000 acres; D-4x 32,500 acres; E 268,300 acres

139. KOBEH VALLEY — TOTAL AREA 555,520 ACRES
A-4 500 acres; B-4p 6,500 acres; C-4a 54,000 acres; C-4d 9,000 acres; C-4as 2,000 acres; C4ds 47,000 acres; D-4d 29,000 acres; D-4x 36,500 acres; D-4wx 3,000 acres; D-4r 55,000 acres; E 313,020 acres

140. MONITOR VALLEY
(A) NORTHERN PART — TOTAL AREA 338,560 ACRES
A-4 20,000 acres; C-4a 12,000 acres; C-4ds 5,000 acres; D-4d 4,000 acres; D-4k 5,000 acres; D-4r 54,000 acres; D-4wx 1,000 acres; E 237,560 acres
(B) SOUTHERN PART — TOTAL AREA 325,760 ACRES
A-4 6,500 acres; B-4a 11,000 acres; B-4p 2,000 acres; C-4a 28,000 acres; C-4w 1,000 acres; C-4x 1,000 acres; D-4d 12,000 acres; D-4k 5,000 acres; D'4x 6,000 acres; D-4wx 10,000 acres; D-4r 20,000 acres; E 223,260 acres

141. RALSTON VALLEY — TOTAL AREA 621,440 ACRES
B-2a 13,000 acres; C-2a 29,000 acres; C-2c 4,000 acres; D-2wf 1,000 acres; A-3 42,000 acres; B-3a 9,000 acres; C-3a 2,000 acres; C-3d 4,000 acres; D-3r 11,000 acres; D-4r 1,000 acres; E 505,440 acres

142. ALKALI SPRING VALLEY — TOTAL AREA 200,320 ACRES
A-2 2,000 acres; B-2a 500 acres; C-2a 35,000 acres; C-2c 16,500 acres; D-2a 10,000 acres; E 136,320 acres

143. CLAYTON VALLEY — TOTAL AREA 355,200 ACRES
C-2a 2,000 acres; C-2c 6,000 acres; D-2a 19,000 acres; E 328,200 acres

144. LIDA VALLEY — TOTAL AREA 342,400 ACRES
C-2a 61,500 acres; D-2d 22,000 acres; D-2r 500 acres; E 258,400 acres

145. STONEWALL FLAT — TOTAL AREA 243,840 ACRES
B-2c 8,500 acres; C-2a 8,000 acres; C-2c 10,000 acres; D-2r 16,000 acres; E 201,340 acres

146. SARCOBATUS FLAT — TOTAL AREA 519,680 ACRES
C-2a 11,000 acres; D-2a 1,000 acres; D-2d 28,000 acres; E 479,680 acres

147. GOLD FLAT — TOTAL AREA 437,760 ACRES
B-2a 6,000 acres; B-2c 15,500 acres; C-2a 30,000 acres; C-2c 8,000 acres; D-2a 18,000 acres; D-2r 12,000 acres; E 348,260 acres

148. CACTUS FLAT — TOTAL AREA 257,920 ACRES
B-2a 9,000 acres; C-2a 26,000 acres; C-2c 19,000 acres; C-2k 5,000 acres; D-2a 6,000 acres; D-2r 24,000 acres; E 168,920 acres

149. STONE CABIN VALLEY — TOTAL AREA 630,400 ACRES
A-2 4,000 acres; B-2a 15,000 acres; C-2a 6,000 acres; D-2f 5,000 acres; D-2r 9,500 acres; A-3 57,000 acres; B-3a 33,000 acres; B-3d 3,500 acres; B-3p 9,000 acres; C-3a 7,500 acres; C-3c 35,000 acres; D-3d 3,000 acres; D-3f 3,500 acres; D-3r 3,000 acres; A-4 3,000 acres; C-4k 19,000 acres; D-4d 10,500 acres; E 403,900 acres

150. LITTLE FISH LAKE VALLEY — TOTAL AREA 277,760 ACRES
A-4 500 acres; C-4ds 2,000 acres; D-4d 6,000 acres; D-4f 1,000 acres; D-4wx 2,000 acres; D-4r 8,000 acres; E 258,260 acres

151. ANTELOPE VALLEY (Eureka & Nye) — TOTAL AREA 284,160 ACRES
B-4a 4,500 acres; C-4a 30,000 acres; C-4as 22,000 acres; C-4x 2,000 acres; D-4d 25,000 acres; D-4k 5,000 acres; D-4r 17,000 acres; D-4wx 1,000 acres; E 177,660 acres

152. STEVENS BASIN — TOTAL AREA 10,880 ACRES
E 10,880 acres

153. DIAMOND VALLEY — TOTAL AREA 481,280 ACRES
A-4 7,500 acres; B-4a 20,500 acres; B-4w 7,000 acres; C-4a 86,500 acres; C-4wx 3,500 acres; D-4r 11,500 acres; E 344,780 acres

154. NEWARK VALLEY — TOTAL AREA 512,640 ACRES
B-4a 5,000 acres; B-4p 33,000 acres; C-4a 6,000 acres; C-4c 32,000 acres; C-4d 8,000 acres; D-4a 5,000 acres; D-4d 10,000 acres; D-4ds 25,000 acres; D-4w 12,500 acres; D-4x 58,000 acres; E 318,140 acres

155. LITTLE SMOKY VALLEY
(A) NORTHERN PART — TOTAL AREA 378,240 ACRES
A-4 15,000 acres; B-4a 50,000 acres; C-4a 4,000 acres; C-4c 2,500 acres; C-4wx 3,000 acres; D-4f 500 acres; D-4k 8,000 acres; D-4r 50,000 acres; D-4x 3,000 acres; E 242,240 acres
(B) CENTRAL PART — TOTAL AREA 36,480 ACRES
A-4 2,000 acres; E 34,480 acres
(C) SOUTHERN PART — TOTAL AREA 326,400 ACRES
A-3 50,000 acres; B-3a 48,000 acres; B-3c 1,500 acres; B-3k 1,000 acres; B-3p 20,000 acres; C-3a 7,000 acres; C-3s 3,000 acres; D-3d 8,000 acres; D-3f 2,000 acres; E 185,900 acres

156. HOT CREEK VALLEY — TOTAL AREA 663,040 ACRES
A-2 68,000 acres; B-2a 8,000 acres; B-2c 1,500 acres; B-2x 1,000 acres; C-2a 3,500 acres; C-2k 2,000 acres; D-2f 7,000 acres; D-2k 3,000 acres; A-3 15,000 acres; B-3a 5,500 acres; B-3d 2,500 acres; C-3a 12,000 acres; D-3d 26,000 acres; D-3r 5,500 acres; D-4d 7,000 acres; D-4f 2,000 acres; E 493,540 acres

157. KAWICH VALLEY — TOTAL AREA 224,000 ACRES
B-2c 12,000 acres; C-2a 35,000 acres; C-2c 8,000 acres; E 169,000 acres

158. EMIGRANT VALLEY
(A) GROOM LAKE V. — TOTAL AREA 424,320 ACRES
B-2a 5,500 acres; C-2a 34,000 acres; C-2c 19,000 acres; D-2a 38,000 acres; E 327,820 acres
(B) PAPOOSE LAKE V. — TOTAL AREA 66,560 ACRES
B-2a 1,000 acres; C-2a 4,500 acres; C-2c 500 acres; D-2f 1,000 acres; E 59,560 acres

159. YUCCA FLAT — TOTAL AREA 195,200 ACRES
B-2a 12,000 acres; B-2c 3,000 acres; C-2a 3,000 acres; C-2k 8,000 acres; E 169,200 acres

160. FRENCHMAN FLAT — TOTAL AREA 296,320 ACRES
C-2a 12,000 acres; C-2c 4,000 acres; C-2k 1,000 acres; D-2f 500 acres; E 278,820 acres

161. INDIAN SPRINGS VALLEY — TOTAL AREA 419,200 ACRES
B-2a 2,500 acres; B-2p 2,000 acres; C-2a 4,000 acres; C-2c 2,000 acres; D-2d 1,500 acres; D-2f 1,000 acres; E 406,200 acres

162. PAHRUMP VALLEY — TOTAL AREA 504,960 ACRES
A-1 15,000 acres; B-1a 3,000 acres; C-1c 1,500 acres; C-1d 8,000 acres; C-1k 2,500 acres; D-1f 500 acres; D-1wx 9,000 acres; E 465,460 acres

163. MESQUITE VALLEY (Sandy V.) — TOTAL AREA 151,040 ACRES
B-1a 5,000 acres; B-1p 2,000 acres; C-1a 500 acres; C-1k 500 acres; E 143,040 acres

164. IVANPAH VALLEY
(A) SOUTHERN PART — TOTAL AREA 161,920 ACRES
B-1a 500 acres; C-1a 500 acres; C-1d 500 acres; C-1k 5,000 acres; D-1r 1,500 acres; E 153,920 acres
(B) NORTHERN PART — TOTAL AREA 46,720 ACRES
E 46,720 acres

165. JEAN LAKE VALLEY — TOTAL AREA 61,440 ACRES
A-1 2,500 acres; B-1a 4,000 acres; B-1c 3,000 acres; C-1a 500 acres; C-1k 1,000 acres; E 50,440 acres

166. HIDDEN VALLEY (South) — TOTAL AREA 21,760 ACRES
B-1a 3,000 acres; B-1c 2,000 acres; C-1k 500 acres; E 16,260 acres

167. ELDORADO VALLEY — TOTAL AREA 339,200 ACRES
B-1c 4,000 acres; B-1p 3,000 acres; C-1a 6,000 acres; C-1c 8,000 acres; D-1d 2,000 acres; D-1k 3,000 acres; E 313,200 acres

168. THREE LAKES VALLEY (Northern Part) — TOTAL AREA 190,720 ACRES
B-2a 1,500 acres; C-2a 6,000 acres; C-2k 1,500 acres; E 181,720 acres

169. TIKAPOO VALLEY (TIKABOO V.)
(A) NORTHERN PART — TOTAL AREA 395,720 ACRES
C-2a 24,000 acres; D-2d 54,000 acres; E 317,720 acres
(B) SOUTHERN PART — TOTAL AREA 243,000 ACRES
C-2a 30,000 acres; C-2c 15,000 acres; E 198,000 acres

170. PENOYER VALLEY (Sand Springs V.) — TOTAL AREA 448,000 ACRES
B-2a 1,500 acres; B-2c 11,000 acres; C-2a 46,000 acres; C-2x 14,000 acres; D-2c 6,000 acres; D-2d 18,000 acres; E 351,500 acres

171. COAL VALLEY — TOTAL AREA 294,400 ACRES
A-2 1,000 acres; B-2a 31,000 acres; C-2a 30,000 acres; C-2wx 3,000 acres; D-2a 17,000 acres; E 212,400 acres

172. GARDEN VALLEY — TOTAL AREA 315,520 ACRES
B-2a 2,000 acres; C-2a 22,000 acres; C-2c 2,000 acres; D-2a 33,000 acres; D-2c 3,000 acres; D-2f 4,500 acres; D-2ds 14,500 acres; E 234,520 acres

173. RAILROAD VALLEY
(A) SOUTHERN PART — TOTAL AREA 385,920 ACRES
C-2a 76,900 acres; C-2as 3,000 acres; C-2c 3,000 acres; C-2wx 5,000 acres; D-2a 15,800 acres; D-2as 13,000 acres; C-3a 47,000 acres; D-3a 3,000 acres; E 219,220 acres
(B) NORTHERN PART — TOTAL AREA 1,375,360 ACRES
A-2 300 acres; B-2a 1,500 acres; C-2a 70,300 acres; C-2c 5,000 acres; C-2f 3,000 acres; C-2wf 5,000 acres; A-3 500 acres; B-3a 2,600 acres; C-3a 59,000 acres; C-3f 7,500 acres; C-3w 5,000 acres; C-4a 10,500 acres; C-4f 4,500 acres; D-2a 6,500 acres; D-2as 103,600 acres; D-2wx 42,000 acres; D-5ps 2,000 acres; E 1,046,560 acres

174. JAKES VALLEY — TOTAL AREA 270,080 ACRES
A-4 1,000 acres; B-4a 22,000 acres; C-4d 6,500 acres; D-4d 28,000 acres; D-4ds 6,000 acres; D-4f 13,000 acres; E 193,580 acres

175. LONG VALLEY — TOTAL AREA 416,640 ACRES
B-4a 43,000 acres; B-4p 5,000 acres; C-4a 15,000 acres; C-4d 7,000 acres; D-4ds 12,000 acres; D-4p 3,000 acres; E 331,640 acres

176. RUBY VALLEY — TOTAL AREA 642,560 ACRES
C-4a 12,000 acres; C-4ds 11,500 acres; C-4w 22,000 acres; C-4wx 13,000 acres; D-4a 35,000 acres; D-4wx 2,000 acres; D-4x 70,000 acres; E 477,060 acres

177. CLOVER VALLEY — TOTAL AREA 296,960 ACRES
C-4a 28,000 acres; C-4d 17,000 acres; C-4w 11,000 acres; C-4wx 22,000 acres; C-4ds 20,000 acres; D-4ds 10,000 acres; E 188,960 acres

178. BUTTE VALLEY
(A) NORTHERN PART — TOTAL AREA 173,440 ACRES
C-4p 7,000 acres; C-4d 2,500 acres; C-4x 6,000 acres; D-4x 12,000 acres; E 145,940 acres
(B) SOUTHERN PART — TOTAL AREA 472,960 ACRES
B-4a 47,000 acres; C-4a 28,000 acres; C-4d 17,000 acres; C-4p 8,000 acres; D-4d 10,000 acres; D-4k 5,000 acres; E 357,960 acres

179. STEPTOE VALLEY — TOTAL AREA 1,242,880 ACRES
B-4p 16,000 acres; C-4a 60,000 acres; C-4d 24,500 acres; C-4ds 6,000 acres; C-4w 3,500 acres; C-4wx 5,000 acres; D-4a 24,000 acres; D-4d 4,000 acres; D-4ds 93,000 acres; D-4r 20,000 acres; D-4w 6,500 acres; D-4wx 62,000 acres; D-5k 3,000 acres; D-5p 3,000 acres; E 912,380 acres

180. CAVE VALLEY — TOTAL AREA 231,680 ACRES
B-3a 14,000 acres; D-3d 7,000 acres; D-3k 18,000 acres; E 192,680 acres

181. DRY LAKE VALLEY — TOTAL AREA 564,480 ACRES
B-2a 29,500 acres; C-2a 28,000 acres; D-2d 23,000 acres; C-2f 1,500 acres; D-2r 15,500 acres; D-3r 7,000 acres; E 459,980 acres

182. DELMAR VALLEY — TOTAL AREA 245,120 ACRES
B-2a 7,500 acres; C-2a 18,000 acres; C-2f 7,500 acres; D-2d 6,000 acres; E 206,120 acres

183. LAKE VALLEY — TOTAL AREA 356,480 ACRES
B-3a 30,000 acres; C-3a 3,000 acres; D-3a 4,500 acres; D-3d 23,000 acres; D-3ds 62,000 acres; D-3w 2,500 acres; D-3wx 20,000 acres; E 211,480 acres

184. SPRING VALLEY — TOTAL AREA 1,063,040 ACRES
B-3a 24,000 acres; B-3x 3,500 acres; B-3wx 10,000 acres; C-3a 36,000 acres; C-3as 1,500 acres; C-3d 10,000 acres; C-3ds 22,000 acres; C-3w 8,000 acres; D-3a 20,000 acres; D-3ds 75,000 acres; D-3r 25,000 acres; D-3w 24,000 acres; D-3wx 40,000 acres; D-4ds 35,000 acres; E 729,040 acres

185. TIPPETT VALLEY — TOTAL AREA 220,800 ACRES
B-4p 4,000 acres; C-4a 17,000 acres; C-4ds 25,000 acres; C-4x 18,000 acres; D-4a 2,000 acres; D-4ds 5,000 acres; E 149,800 acres

186. ANTELOPE VALLEY (White Pine & Antelope)
(A) SOUTHERN PART — TOTAL AREA 80,000 ACRES
C-4a 17,000 acres; D-4d 2,000 acres; E 61,000 acres
(B) NORTHERN PART — TOTAL AREA 172,800 ACRES
B-4a 42,000 acres; C-4a 4,000 acres; D-4d 15,000 acres; E 111,800 acres

187. GOSHUTE VALLEY — TOTAL AREA 610,560 ACRES
B-4a 20,000 acres; B-4x 95,000 acres; C-4a 20,000 acres; C-4d 17,000 acres; D-4d 10,000 acres; D-4ds 18,000 acres; D-4x 5,000 acres; D-4w 2,500 acres; E 423,060 acres

188. INDEPENDENCE VALLEY (Pequop V.) — TOTAL AREA 359,680 ACRES
C-4a 32,000 acres; C-4d 9,000 acres; C-4x 50,000 acres; D-4a 5,000 acres; D-4ds 10,500 acres; D-4w 1,000 acres; E 253,180 acres

11. GREAT SALT LAKE BASIN — TOTAL AREA 2,436,480 ACRES

189. THOUSAND SPRINGS VALLEY
(A) HERRILL SIDING—BRUSH CREEK AREA — TOTAL AREA 104,320 ACRES
C-4ds 10,000 acres; C-4w 2,000 acres; D-5ds 6,000 acres; E 86,320 acres
(B) TOANO—ROCK SPRING AREA — TOTAL AREA 395,520 ACRES
C-4w 3,500 acres; C-4d 8,000 acres; D-4a 4,500 acres; D-4r 12,000 acres; E 367,520 acres
(C) ROCKY BUTTE AREA — TOTAL AREA 117,120 ACRES
B-4w 2,000 acres; C-4p 1,000 acres; E 114,120 acres
(D) MONTELLO—CRITTENDEN CREEK AREA (Montello V.) — TOTAL AREA 308,480 ACRES
B-4p 11,000 acres; C-4a 29,000 acres; C-4w 500 acres; C-4wx 1,500 acres; D-4x 4,000 acres; D-4wx 2,000 acres; E 260,480 acres

190. GROUSE CREEK VALLEY — TOTAL AREA 35,200 ACRES
E 35,200 acres

191. PILOT CREEK VALLEY — TOTAL AREA 208,640 ACRES
B-3a 14,000 acres; C-3as 20,000 acres; D-3a 2,000 acres; B-4p 6,500 acres; C-4a 7,000 acres; E 159,140 acres

192. GREAT SALT LAKE DESERT — TOTAL AREA 324,480 ACRES
D-3a 6,500 acres; D-3r 8,000 acres; E 309,980 acres

193. DEEP CREEK VALLEY — TOTAL AREA 133,120 ACRES
C-4a 500 acres; E 132,620 acres

194. PLEASANT VALLEY — TOTAL AREA 48,000 ACRES
C-3a 1,000 acres; E 47,000 acres

195. SNAKE VALLEY — TOTAL AREA 497,280 ACRES
B-3a 15,000 acres; B-3w 5,000 acres; C-3a 4,000 acres; C-3k 12,000 acres; D-3wx 5,000 acres; E 456,280 acres

196. HAMLIN VALLEY — TOTAL AREA 264,320 ACRES
B-3w 1,000 acres; C-3a 15,000 acres; D-3r 30,000 acres; D-3s 17,000 acres; E 201,320 acres

12. ESCALANTE DESERT BASIN — TOTAL AREA 67,840 ACRES

197. ESCALANTE DESERT — TOTAL AREA 67,840 ACRES
D-2f 1,000 acres; D-3ds 15,000 acres; E 51,840 acres

13. COLORADO RIVER BASIN — TOTAL AREA 7,920,640 ACRES

198. DRY VALLEY — TOTAL AREA 72,320 ACRES
B-2a 2,500 acres; D-2ds 7,500 acres; E 62,320 acres

199. ROSE VALLEY — TOTAL AREA 7,680 ACRES
B-2a 500 acres; D-2ds 3,500 acres; E 3,680 acres

200. EAGLE VALLEY — TOTAL AREA 33,280 ACRES
B-2a 1,000 acres; D-2ds 1,500 acres; E 30,780 acres

201. SPRING VALLEY — TOTAL AREA 183,680 ACRES
B-4a 4,500 acres; C-4w 1,500 acres; C-4s 3,000 acres; D-4f 3,500 acres; E 171,180 acres

202. PATTERSON VALLEY — TOTAL AREA 267,520 ACRES
B-2a 500 acres; D-2ds 5,000 acres; B-3a 8,000 acres; D-3r 32,000 acres; D-3d 11,000 acres; D-3ds 17,000 acres; E 194,020 acres

203. PANACA VALLEY — TOTAL AREA 213,760 ACRES
B-2a 10,000 acres; B-2w 4,500 acres; D-2ds 29,000 acres; E 170,260 acres

204. CLOVER VALLEY — TOTAL AREA 232,960 ACRES
D-2f 300 acres; D-3ds 43,000 acres; D-3f 500 acres; E 189,160 acres

205. LOWER MEADOW VALLEY WASH — TOTAL AREA 626,560 ACRES
B-1c 500 acres; B-1wx 2,500 acres; D-1f 200 acres; D-2f 1,000 acres; E 622,360 acres

206. KANE SPRINGS VALLEY — TOTAL AREA 149,760 ACRES
E 149,760 acres

207. WHITE RIVER VALLEY — TOTAL AREA 1,028,480 ACRES
D-2wf 1,500 acres; D-2ds 2,000 acres; A-3 6,000 acres; B-3a 55,000 acres; B-3w 500 acres; B-3wx 30,000 acres; C-3a 105,000 acres; C-3as 11,000 acres; C-3wx 15,000 acres; D-3ds 18,000 acres; D-3wx 18,000 acres; D-4d 1,000 acres; D-4ds 13,000 acres; E 752,480 acres

208. PAHROC VALLEY — TOTAL AREA 325,120 ACRES
C-2f 6,000 acres; D-2ds 19,500 acres; D-2wf 1,000 acres; E 298,620 acres

209. PAHRANAGAT VALLEY — TOTAL AREA 491,520 ACRES
A-2 1,500 acres; B-2w 6,500 acres; B-2wx 2,500 acres; C-2a 1,500 acres; C-2ds 22,000 acres; E 457,520 acres

210. COYOTE SPRING VALLEY — TOTAL AREA 420,480 ACRES
D-1a 1,000 acres; D-1f 500 acres; E 418,980 acres

211. THREE LAKES VALLEY (Southern Part) — TOTAL AREA 199,040 ACRES
B-2a 1,000 acres; C-2a 3,500 acres; C-2k 1,000 acres; E 193,540 acres

212. LAS VEGAS VALLEY — TOTAL AREA 1,000,960 ACRES
A-1 3,000 acres; B-1p 1,500 acres; B-1wx 5,000 acres; C-1a 1,000 acres; C-1c 2,500 acres; E 987,960 acres

213. COLORADO VALLEY — TOTAL AREA 360,320 ACRES
A-1 3,000 acres; B-1w 3,000 acres; D-1a 2,000 acres; E 352,320 acres

214. PIUTE VALLEY — TOTAL AREA 216,320 ACRES
A-1 5,000 acres; B-1a 8,000 acres; B-1c 3,500 acres; C-1k 47,000 acres; E 152,820 acres

215. BLACK MOUNTAINS AREA — TOTAL AREA 403,200 ACRES
E 403,200 acres

216. GARNET VALLEY — TOTAL AREA 99,840 ACRES
B-1p 500 acres; C-1d 500 acres; C-1k 500 acres; D-1f 3,500 acres; E 94,840 acres

217. HIDDEN VALLEY (North) — TOTAL AREA 51,200 ACRES
D-1f 2,500 acres; C-1k 500 acres; E 48,200 acres

218. CALIFORNIA WASH — TOTAL AREA 203,520 ACRES
B-1wx 500 acres; E 203,020 acres

219. MUDDY RIVER SPRINGS AREA (Upper Moapa V.) — TOTAL AREA 58,240 ACRES
A-1 200 acres; B-1wx 1,500 acres; C-1wx 200 acres; E 56,340 acres

220. LOWER MOAPA VALLEY — TOTAL AREA 161,280 ACRES
A-1 1,000 acres; B-1wx 2,500 acres; C-1c 3,500 acres; C-1wx 1,500 acres; E 152,780 acres

221. TULE DESERT — TOTAL AREA 122,880 ACRES
D-2k 4,500 acres; D-2r 3,000 acres; E 115,380 acres

222. VIRGIN RIVER VALLEY — TOTAL AREA 580,480 ACRES
B-1x 1,500 acres; B-1c 500 acres; D-1f 3,500 acres; E 574,980 acres

223. GOLD BUTTE AREA — TOTAL AREA 341,120 ACRES
E 341,120 acres

224. GREASEWOOD BASIN — TOTAL AREA 69,120 ACRES
E 69,120 acres

14. DEATH VALLEY BASIN — TOTAL AREA 1,659,520 ACRES

225. MERCURY VALLEY — TOTAL AREA 70,400 ACRES
E 70,400 acres

226. ROCK VALLEY — TOTAL AREA 52,480 ACRES
C-1c 1,500 acres; D-2k 1,500 acres; E 49,480 acres

227. FORTYMILE CANYON
(A) JACKASS FLATS — TOTAL AREA 178,560 ACRES
B-1c 4,000 acres; C-1c 16,000 acres; C-1k 12,000 acres; D-1c 5,000 acres; E 141,560 acres
(B) BUCKBOARD MESA — TOTAL AREA 153,600 ACRES
E 153,600 acres

228. OASIS VALLEY — TOTAL AREA 294,400 ACRES
D-2c 2,000 acres; D-2d 500 acres; D-2wx 3,000 acres; E 288,900 acres

229. CRATER FLAT — TOTAL AREA 116,480 ACRES
D-1k 8,000 acres; D-1r 4,000 acres; E 104,480 acres

230. AMARGOSA DESERT — TOTAL AREA 573,440 ACRES
B-1a 5,000 acres; B-1wx 2,500 acres; C-1c 137,000 acres; C-1d 10,000 acres; C-1k 12,000 acres; D-1a 22,000 acres; D-1c 6,000 acres; D-1d 5,000 acres; D-1f 11,000 acres; D-1wx 15,000 acres; E 347,940 acres

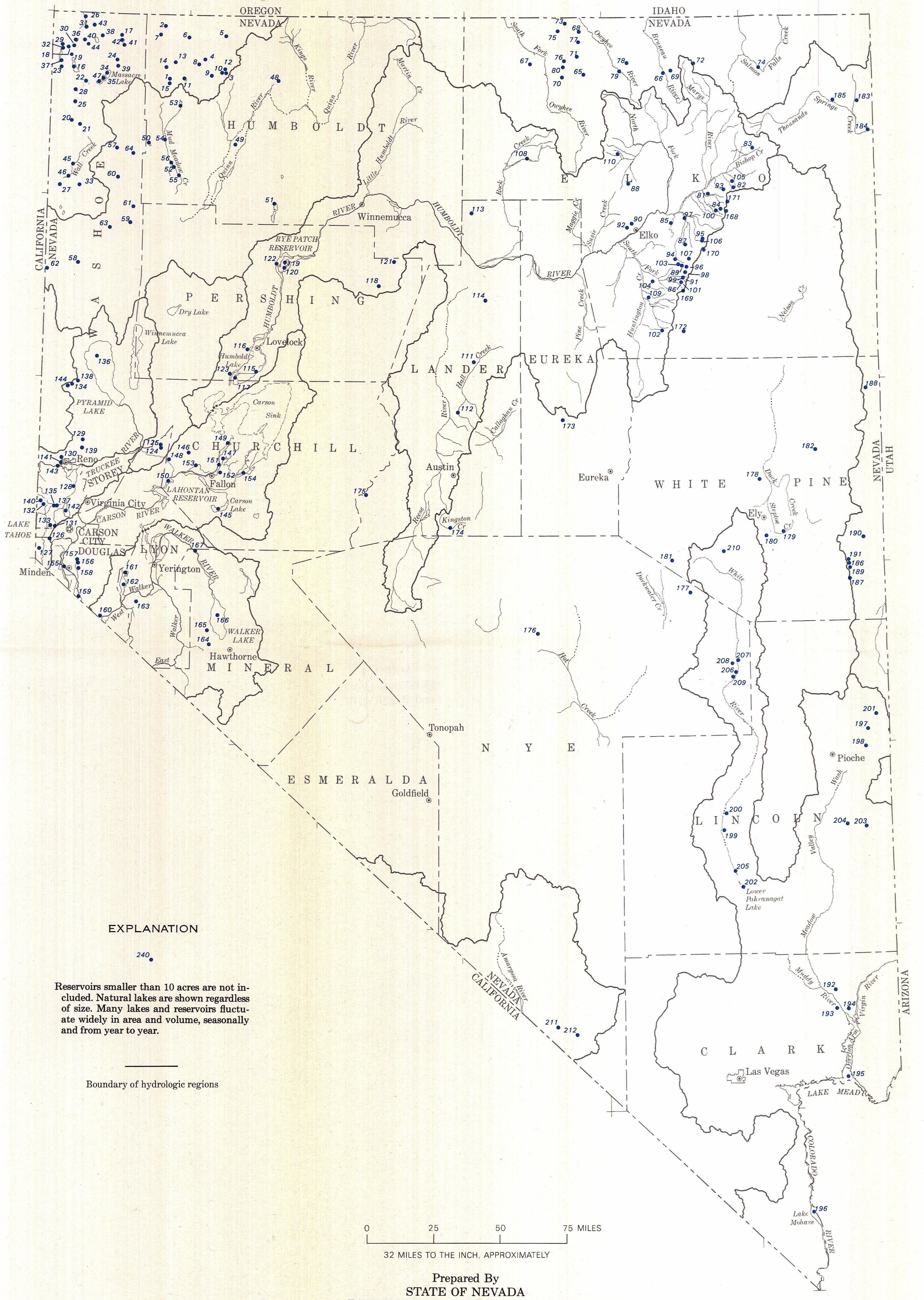
231. GRAPEVINE CANYON — TOTAL AREA 103,680 ACRES
D-2a 26,000 acres; E 77,680 acres

232. ORIENTAL WASH — TOTAL AREA 116,480 ACRES
D-2a 6,000 acres; E 110,480 acres

LAKES & RESERVOIRS

Name of Reservoir	Map Number	Surface Area (Ac.)[1]	Capacity (Ac. Ft.)[1]
NORTHWEST REGION			
Humboldt County			
Alkali Reservoir	1	97	1,233
Big Spring Reservoir	2	480	1,680
Blue Lakes	3	20	(120)
Bog Hot Reservoir	4	38	154
Continental Lake	5	500	(4,250)
Dufurrena Ponds	6	25	150
Gooch Lake	7	154	(154)
Gridley Lake	8	320	(320)
Knott Creek Reservoir	9	98	1,620
Little Onion Reservoir	10	30	325
Onion Lake	11	774	(774)
Onion Valley Reservoir	12	101	1,500
Rock Springs Table Reservoir	13	40	500
Smith Lake	14	5)	(10)
Virgin Valley Reservoir	15	20	50
Washoe County			
Alkali Lake	16	3750	(3,750)
Bald Mountain Lake	17	216	(216)
Big Holy Lake	18	500	(1000)
Broyles Reservoir	19	78	(510)
Boulder Lake	20	15	(78)
Boulder Reservoir	21	10	40
Cap Johnson Reservoir	22	160	1,500
Carter Reservoir	23	222	935
Catnip Reservoir	24	55	220
Central Lake	25	321	(150)
Coleman Reservoir	26	40	500
Duck Lake	27	3000	(3,000)
Forty-nine Lake	28	352	(200)
Frog Pond Dam	29	92	395
Hill Dam	30	77	396
Little Valley Reservoir	31	80	400
Little Holy Lake	32	30	(30)
Lost Creek Reservoir	33	12	98
Massacre Lake	34	2,532	(3,000)
Middle Lake	35	1,198	(900)
Mosquito Lake	36	935	(400)
New Years Lake	37	1,500	6,000
Racetrack Reservoir	38	32	75
Rye Gross Reservoir	39	200	498
Mud Lake	40	900	(1,200)
Swan Lake	41	130	(300)
Swan Lake Reservoir	42	500	1,000
Toney Reservoir	43	15	(85)
Wimer Reservoir	44	70	(350)
Wall Creek Dam	45	182	400
Wall Creek Dam #2	46	133	2,200
West Lake	47	1,248	(900)
BLACK ROCK DESERT REGION			
Humboldt County			
Bilk Creek Reservoir	48	110)	800
Delong Reservoir	49	500	2,275
High Rock Lake	50	650	(500)
Jungo Flat Lake	51	10	25
Mud Meadows Reservoir	52	80	215
Summit Lake	53	560	(5,000)
Van Vleck Reservoir	54	250	2,750
Weiss & Vogel Reservoir	55	150	450
Wheeler Reservoir (Donnley Creek)	56	154	1,100
Washoe County			
Denio Camp Reservoir	57	30	110
Dewey Parker Reservoir	58	156	428
Fly Reservoir	59	40	350
Grass Valley Reservoir	60	10	50
Negro Creek Dam	61	50	497
Smoke Creek Reservoir[2]	62	90	1200
Squaw Valley Reservoir	63	47	1,200
Woodruff Reservoir	64	128	(500)
SNAKE RIVER BASIN			
Elko County			
Bull Run Reservoir	65	106	1,246
Charleston Reservoir	66	40	200
Chimney Creek Reservoir	67	928	9,950
Coyote Hole Reservoir	68	18	(36)
Coyote Lake	69	25	(50)
Deep Creek Reservoir	70	136	1,410
Dry Creek Reservoir	71	110	1,910
Emerald Lake	72	1	(4)
Groundhog Reservoir	73	16	(32)
Jakes Creek Reservoir	74	62	472
Josephine Reservoir	75	250	1,250
Rawhide Reservoir	76	147	1,540
Sheep Creek Reservoir	77	850	7,500
Sunflower Reservoir	78	60	(120)
Wildhorse Reservoir	79	3,000	72,000
Wilson Reservoir	80	828	10,468
HUMBOLDT RIVER BASIN			
Elko County			
Ackler Lake	81	10	(54)
Angel Lake	82	13	(70)
Bishop Creek Reservoir	83	782	30,000
Boulder Lake	84	6	(30)
Boyd Reservoir	85	120)	830
Castle Lake	86	9	(48)
Cold Lake	87	6	(30)
Dorsey Creek Reservoir	88	14	150
Echo Lake	89	29	(175)
Eight Mile Creek Reservoir	90	45	944
Favre Lake	91	19	(110)
Fifth St. Wash Reservoir	92	10	94
Greys Lake	93	5	(25)
Griswold Lake	94	15	(85)
Hidden Lake	95	9	(48)
Island Lake	96	7	(35)
John Day Reservoir	97	127	561
Lamoille Lake	98	13	(70)
Liberty Lake	99	21	(125)
Lost Lake	100	3	(14)
North Furlong Lake	101	8	(40)
Pearl Lake	102	5	(25)
Seitz Lake	103	3	(14)
Sleeman Ponds	104	12	20
Smith Lake	105	3	(14)
Soldier Lake	106	6	(30)
Verdi Lake	107	5	(25)
Willow Creek Reservoir	108	761	18,064
Zunino Reservoir	109	30	(180)
Saval Reservoir	110	10	15
Lander County			
Carico Lake	111	1,032	1,550
Iowa Canyon Reservoir	112	28	437
Izzenhood Ranch Reservoir	113	10	50
Nelson Reservoir	114	13	100
Pershing County			
Big Five Dam	115	787	1,720
Graveyard Slough	116	80	100
Humboldt Lake	117	4,200	(46,000)
Mud Springs Dam	118	70	(490)
Upper Pitt-Taylor	120	(1,700)	20,200
Lower Pitt-Taylor	120	(1,700)	20,200
Pumpernickel Reservoir	121	37	236
Rye Patch	122	10,800	179,000
Toulon Lake	123	3,500	(38,000)
WESTERN CENTRAL REGION			
Lyon County			
Fernley Dam #1	124	276	910
Fernley Dam #3	125	95	476
TRUCKEE RIVER BASIN			
Douglas County			
Sqooner Lake	126	69	(400)
Lake Tahoe	127	121,000[3]	745,000[4]
Washoe County			
Lake Alexander	128	58	(250)
Gasperi	129	30	90
Highland	130	10	(54)
Hobart Creek Reservoir	131	10	110
Incline Lake	132	30	157
Marlette Lake	133	350	10,400
Milk Ranch Reservoir	134	23	252
Price Lake	135	10	(54)
Pyramid Lake	136	108,000	20,510,000
Rock Lake	137	20	(105)
Spanish Flat Reservoir	138	236	1,000
Spanish Springs	139	30	(185)
Tamarack Lake	140	10	(54)
Virginia Lake	141	24	140
Washoe Lakes	142	4,100	20,400
Wheeler Reservoir (Evans Creek)	143	46	948
Winnemucca Ranch Reservoir	144	22	60
CARSON RIVER BASIN			
Churchill County			
Carson Lake	145	2,000	(4,000)
Desert Gun Club Reservoirs	146	100	500
Harmon Lake	147	200	400
Hazen Reservoir	148	10	20
Indian Lakes	149	400	(3,500)
Lahontan Reservoir	150	10,000	273,600
Old River Reservoir	151	270	500
Ollies Pond "S"	152	350	700
Soda Lake	153	600	(5,300)
Stillwater Point Reservoir	154	1,900	19,000
Douglas County			
Bose Reservoir	155	30	90
Dangberg Reservoir #1 & 2	156	45	375
Dangberg Reservoir #3	157	80	500
Dangberg Reservoir #4	158	150	1,000
Mud Lake	159	300	1,800
WALKER RIVER BASIN			
Douglas County			
Topaz Lake	160	2,300[5]	59,400[5]
Lyon County			
Artesia Lake	161	1,000	1,000
Beaman Lake	162	80	480
Nuti Reservoir	163	10	(54)
Mineral County			
Cat Creek Reservoir	164	25	1,155
Rose Creek Reservoir	165	32	656
Walker Lake	166	38,800	2,990,000
Weber Reservoir	167	950	(13,000)
CENTRAL REGION			
Elko County			
Steele Lake/Gibbs Lake	168	6	(30)
Overland Lake	169	20	(120)
Robinson Lake	170	17	(95)
Winchell Lake	171	2	(9)
Ruby Lake	172	9,000	(30,000)
Eureka County			
Roberts Creek Reservoir	173	10	117
Lander County			
Grove Lake	174	17	190
Smith Creek Reservoir	175	25	350
Nye County			
Fish Lake	176	80	(160)
Manzonie Reservoir	177	40	250
White Pine County			
Bassett Lake	178	120	(1,300)
Cave Creek	179	32	784
Comins Lake	180	40	290
Bull Creek #2	181	10	51
Spring Valley Wash Dam	182	64	121
GREAT SALT LAKE BASIN			
Elko County			
Crittenden Reservoir	183	230	4,300
Daek Reservoir	184	2,909	5,340
23 Mile Reservoir	185	652	7,457
White Pine County			
Baker Lake	186	10	(50)
Dead Lake	187	3	(10)
Goshute Reservoir	188	200	300
Johnson Lake	189	5	(25)
Silver Creek Reservoir	190	13	200
Stella Lakes	191	5	(25)
COLORADO RIVER BASIN			
Clark County			
Bowman Reservoir	192	165	4,000
Glassand Pond	193	16	(53)
Honey Bee Pond	194	32	(100)
Lake Mead	195	164,000	29,700,000
Lake Mohave	196	28,200	1,820,000
Lincoln County			
Eagle Valley Reservoir	197	59	640
Echo Reservoir	198	64	1,400
Frenchy Lake	199	74	(150)
Hiko Lake	200	246	(500)
Hollinger Debris Basin	201	90	640
Lower Pahranagat Lake	202	583	(1000)
Mathews Canyon Reservoir	203	420	12,420
Pine Canyon Reservoir	204	354	12,470
Upper Pahranagat Lake	205	370	3,580
Nye County			
Dacey Reservoir	206	215	784
Hay Meadow Reservoir	207	203	1,120
Sunnyside Reservoir	208	791	3,330
Tule Field Reservoir	209	218	507
White Pine County			
Preston Reservoir	210	109	1,271
DEATH VALLEY BASIN			
Nye County			
Lake #1	211	69	243
Lake "C"	212	70	618

[1]Values in parentheses are estimates
[2]More than 90% in California
[3]Total Area—36,400 Acres in Nevada, remainder in California
[4]Total within the 6-foot operating range.
[5]Total Area and Capacity—1250 acres in Nevada, remainder in California



EXPLANATION

240

Reservoirs smaller than 10 acres are not included. Natural lakes are shown regardless of size. Many lakes and reservoirs fluctuate widely in area and volume, seasonally and from year to year.

Boundary of hydrologic regions

0 25 50 75 MILES

32 MILES TO THE INCH, APPROXIMATELY

Prepared By
STATE OF NEVADA
DIVISION OF WATER RESOURCES
STATE ENGINEER'S OFFICE

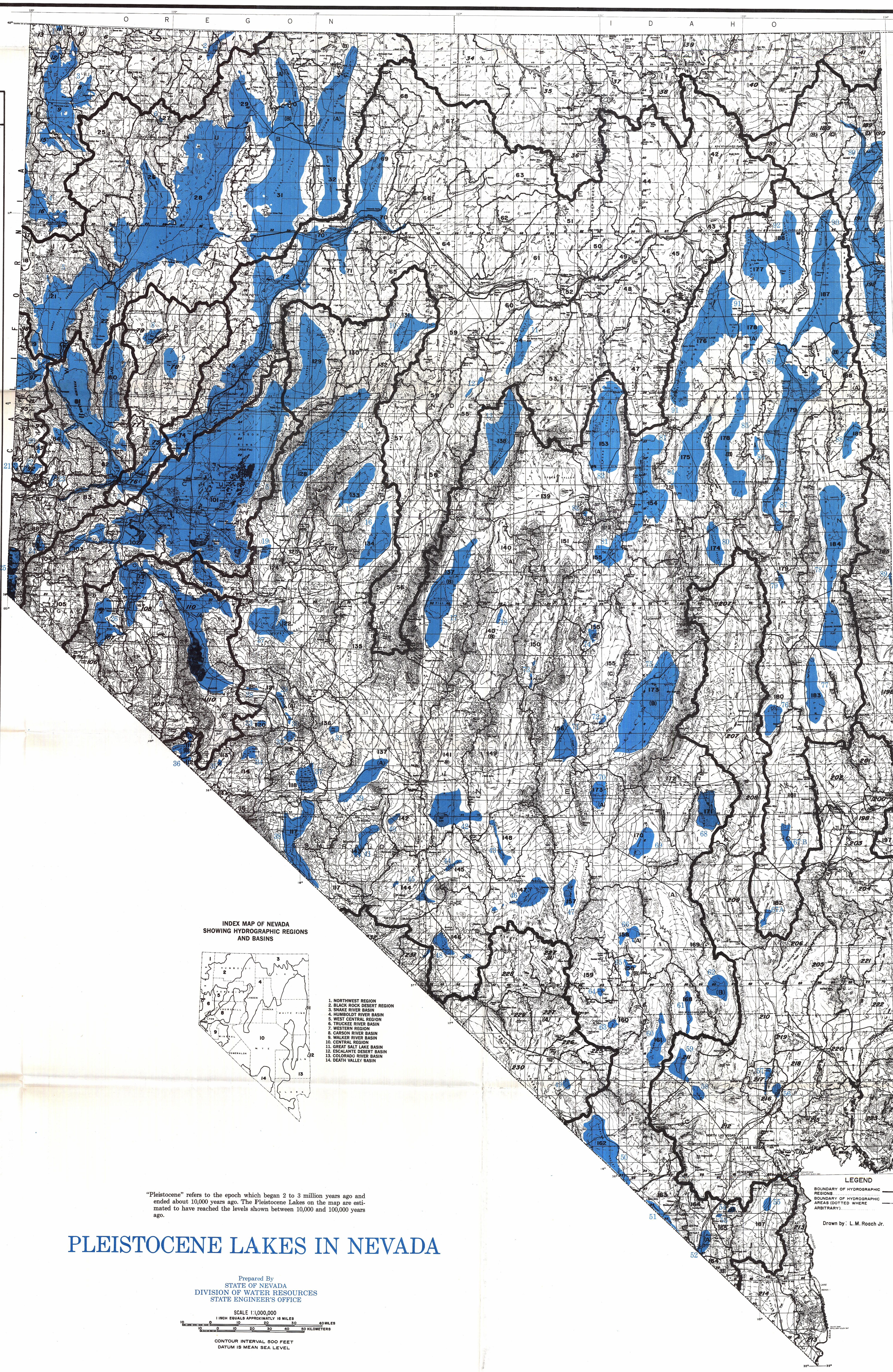
Compiled by T.J. Smales
Cartography by L.M. Roach Jr.

EXISTING LAKES AND RESERVOIRS

Lake Name	Lake Area (sq. mi.)	Drainage Basin Area (sq. mi.)	Max. Depth of Water (Feet)	Spilled	Spilled To	Valleys Covered by Lake Area
1. Warner	483*	2,548*	225	No		11. Coleman V.
2. Alvord	491*	2,342*	200	No		1. Pueblo V. 2. Continental Lake V.
3. Meinzer	742	300±		Yes	Warner V.	8. Mass Acre Lake V. 9. Long V. 10. Macy Flat 12. Mosquito V. 13. Warner V.
4. Surprise	506*	1,481*	650	No		14. Surprise V. 16. Duck Lake V.
5. Lahontan	8,665*	42,322*		No		19. Dry V. 20. Sano V. 21. Smoke Creek Desert 22. San Emidio Desert 24. Hualapai Flat 26. Mud Meadow 28. Black Rock Desert 29. Pine Forest V. 30. Kings River V. (A) Rio King Subarea (B) Sod House Subarea 31. Desert V. 32. Silver State V. 33. Quinn River V. (A) Orovada Subarea (B) McDermitt Subarea 69. Paradise V. 70. Winnemucca Segment 71. Grass V. 72. Imlay Area 73. Lovelock V. (A) Oreana Subarea 74. White Plains 75. Bradys Hot Springs Area 76. Fernley Area 80. Winnemucca Lake V. 81. Pyramid Lake V. 82. Dodge Flat 83. Tracy Segment 84. Spanish Springs V. 97. Honey Lake V. 101. Carson Desert 102. Churchill V. 103. Dayton V. 108. Mason V. 110. Walker Lake V. (A) Schurz Subarea (B) Lake Subarea (C) Whiskey Flat–Hawthorne Subarea 123. Rawhide Flats 129. Buena Vista V.
6. Unnamed	4	38		Yes	L. Lahontan	27. Summit Lake V.
7. High Rock	11	700		Yes	do	25. High Rock Lake V.
8. Kumiva	22	354		No		79. Kumiva V.
9. Granite Sprs.	41	956	50	No		78. Granite Sprs. V.
10. Buffalo	45	509		Yes	L. Lahontan	131. Buffalo V.
12. Carico	6	373		Yes	L. Crescent	54. Crescent V.? 55. Carico Lake V.
13. Gilbert	209	543	250	Yes	L. Lahontan	138. Grass V.
14. Dixie	420	2,438	235	No		128. Dixie V.
15. Edwards	98	396	150	No		133. Edwards Creek V.
16. Desatoya	140	590		No		134. Smith Creek V.
17. Toiyabe	250	1,295	170	No		137. Big Smoky V. (B) Northern Part
18. Diana	6	527		Yes	Diamond V.	140. Monitor V. (B) Southern Part
19. Labou	15	300		Yes	Lake Dixie	124. Fairview V.
20. Fred	4	22		No		93. Antelope V.
21. Laughton	5	50		No		100. Cold Spring V.
22. Lemmon	15	93	80+	Yes	L. Lahontan	92. Lemmon Valley (A) Western Part (B) Eastern Part
23. Unnamed	7	72		Yes	L. Lahontan	85. Spanish Springs V.
24. Washoe	25	97		Yes	do	89. Washoe V.
25. Tahoe	211*	551*		Yes	do	90. Lake Tahoe Basin
26. Wellington	90	920	300	Yes	do	107. Smith V.
27. Gabbs	120	1,280		No		122. Gabbs V.
28. Acme	170	Shallow		No		121. Soda Spring V. (B) Western Part
29. Luning	10	160		No		121. Soda Spring V. (A) Eastern Part
30. Mina	2	30		No		do
31. Monte Cristo	8	227		No		136. Monte Cristo V.
32. Rhodes	15	170		No		119. Rhodes Salt Marsh V.
33. Garfield	3	93		No		120. Garfield Flat
34. Teel	18	278		No		114. Teels Marsh V.
35. Huntoon	3	106		No		113. Huntoon V.
36. Russell	267*	794*	750	Yes	Owens River	111. Alkali V. (Min) (A) Northern Part (B) Southern Part 112. Mono V.
37. Columbus	60	1,400		No		118. Columbus Salt Marsh V.
38. White Mt.	185*	1,073*		Yes	Columbus Salt Marsh	117. Fish Lake V.
39. Tonopah	95	3,035	80	No		137. Big Smoky V. (A) Tonopah Flat
40. Goldfield	7	300		No		142. Alkali Spring (Esm.)
41. Clayton	39	547	Shallow	No		143. Clayton V.
42. Mud	165	2,346		No		141. Ralston V. 149. Stone Cabin V.
43. Cactus Flat						148. Cactus Flat
44. Stonewall	9	358	Shallow	No		145. Stonewall Flat
45. Lida	20	535		Yes	Sarcobatus	144. Lida V.
46. Gold Flat	81	682	Shallow	No		147. Gold Flat
47. Kawich	33	353	100	No		157. Kawich V.
48. Bonnie Claire	57	1,488	Shallow	No		146. Sarcobatus Flat
49. Ash Meadows	6	292		Yes	Death Valley	230. Amargosa Desert
50. Pahrump	242*	992*		Yes	do	162. Pahrump V.
51. Mesquite	94*	440*		No		163. Mesquite V. (Sandy V.)
52. Ivanpah	67*	888*		No		164. Ivanpah V. (A) Northern Part
53. Jean	2	94		No		165. Jean Lake V.
54. East Jean	3	34		No		166. Hidden V. (South)
55. Eldorado	11	525		No		167. Eldorado V.
56. Apex	25	215		Yes		216. Garnet V.
57. Apex North		110		Yes	Apex	217. Hidden V. (North)
58. Corn Creek	20	380		Yes	Colorado R.	212. Las Vegas V.
59. East	43	625		Yes	Lake Corn Cr.	211. Three Lakes (Southern Part)
60. Indian Springs	62	641		No		161. Indian Springs V.
61. Morman	21	380		Yes	Lake East	168. Three Lakes V. (Northern Part)
62. Unnamed	51	974		No		169. Tikapoo V. (B) Southern Part
63. Frenchman	9	455		No		160. Frenchman Flat
64. Yucca	7	300		No		159. Yucca Flat
65. Papoose	9	160	Shallow	Yes	Possibly into Groom Lake	158. Emigrant V. (B) Papoose Lake V.
66. Groom	25	790		No		158. Emigrant V. (A) Groom Lake V.
67A. Delamar	10	385		No		182. Delamar
67B. Bristol	25	1,150		No		181. Dry Lake V.
68. Coal	83	981	40	No		171. Coal V.
69. Penoyer	60	663		No		170. Penoyer V. (Sand Spring V.)
70. Reveille	50	2,138		Yes	Lake Railroad	173. Railroad V. (A) Southern Part
71. Hot Creek	88	1,437		Yes	Railroad V.	156. Hot Creek V.
72. Unnamed	4	491	Shallow	No		155. Little Smoky V. (C) Southern Part
73. Unnamed	4	467		Yes	Hot Creek V.	150. Little Fish Lake V.
74. Unnamed	10	69	Shallow	No		155. Little Smoky V. (B) Central Part
75. Railroad	525	3,565	315	No		173. Railroad V. (B) Northern Part
76. Cave	51	356	140	Yes	White River	180. Cave V.
77. Carpenter	107	553		No		183. Lake V.
78. Spring	332	1,641	265	No		184. Spring V.
79. Unnamed	10	358		Yes	Lake Steptoe	179. Steptoe V.
80. Jakes	67	429	65	No		174. Jakes V.
81. Newark	357	1,386	285	No		154. Newark V. 155. Little Smoky (A) Northern Part
82. Yahoo	3	19		Yes	Lake Diamond	152. Stevens Basin
83. Diamond	294	3,163	130	Yes	Lake Lahontan	153. Diamond V.
84. Hubbs	205	635	250	No		175. Long V.
85. Gale	181	745	150	Yes	Ruby Valley (Lake Franklin)	178. Butte V. (B) Southern Part
86. Unnamed	10	62		Yes	Steptoe V.	179. Steptoe V.
87. Steptoe	459	1,785	350	Yes	Goshute V.	179. Steptoe V.
88. Antelope	47	335	75	No		185. Tippett V.
89. Bonneville	19,940*	53,325*		Yes	Snake River	189. Thousand Springs (C) Rocky Butte Area (D) Montello–Crittenden Creek (Montello V.) 190. Grouse Creek V. 191. Pilot Creek V. 192. Great Salt Lake Desert 195. Snake V.
90. Waring	478	3,290	175	No		186. Antelope V. (B) Northern Part
91. Franklin	471	1,897	210	Yes	Lake Clover	187. Goshute V. 176. Ruby V. 178. Butte V. (A) Northern Part
92. Clover	342	1,016		No		177. Clover V. 188. Independence V. (Pequop V.)

*Lakes whose areas and/or drainage areas are only partially in Nevada.

Adapted from: "Pleistocene Lakes in the Great Basin," by Snyder, Hardman and Zdenek



"Pleistocene" refers to the epoch which began 2 to 3 million years ago and ended about 10,000 years ago. The Pleistocene Lakes on the map are estimated to have reached the levels shown between 10,000 and 100,000 years ago.

PLEISTOCENE LAKES IN NEVADA

Prepared By
STATE OF NEVADA
DIVISION OF WATER RESOURCES
STATE ENGINEER'S OFFICE

SCALE 1:1,000,000
1 INCH EQUALS APPROXIMATLY 16 MILES
10 0 10 20 30 40 MILES
10 0 10 20 30 40 50 KILOMETERS

CONTOUR INTERVAL 500 FEET
DATUM IS MEAN SEA LEVEL

BASE: 50% Reduction of the U.S.G.S. TOPOGRAPHIC MAP OF NEVADA, EDITION OF 1965.

PREPARED WITH THE COOPERATION OF THE GEOLOGICAL SURVEY, U.S. DEPARTMENT OF INTERIOR

RECONNAISSANCE BATHYMETRIC MAP AND GENERAL HYDROLOGY OF LAHONTAN RESERVOIR, NEVADA

By T. L. Katzer

Introduction

Lahontan Reservoir is about 35 miles east of Carson City and 15 miles west of Fallon, Nev. (fig. 1). This report redefines the altitude-area-capacity relations of Lahontan Reservoir, and describes the general hydrology of the reservoir. The field work was done under the supervision of E. E. Harris, U.S. Geological Survey, and in cooperation with the U.S. Bureau of Reclamation and the Nevada Department of Fish and Game.

Historical Sketch

The Federal Reclamation Act of 1902 authorized construction of irrigation projects in the 17 Western States (U.S. Bureau of Reclamation, 1961, p. 534-542). The Newlands Project, of which Lahontan Reservoir is a part, was authorized by Congress in 1903 and first phase construction began that same year. The project was originally named the Truckee-Carson Project, but was renamed the Newlands Project in 1919 in honor of the late U.S. Senator Francis G. Newlands of Nevada.

Construction on Lahontan Dam did not start until January 1911 and was completed in June 1915. The dam is a zoned, earthfill structure, 162 feet high, and has a volume of 733,000 cubic yards. The spillway-crest altitude is 4,162 feet above sea level (1917 datum). Operating criteria allow the provisional installation of 20-inch-high flashboards on the spillway crest, which brings the maximum storage altitude to about 4,164 feet. The altitude of the outlet invert is 4,070 feet.

Precautionary reservoir drawdowns, based on basin runoff forecasts, have limited the reservoir to several spills during the 54 years of operation. The minimum reservoir stage of 4,070.0 feet was reached in September 1929 during a prolonged drought. The lowest stage during recent years was 4,096.6 feet in October 1961. Figure 2 shows the maximum and minimum stages and volumes of stored water in Lahontan Reservoir for the period of record.

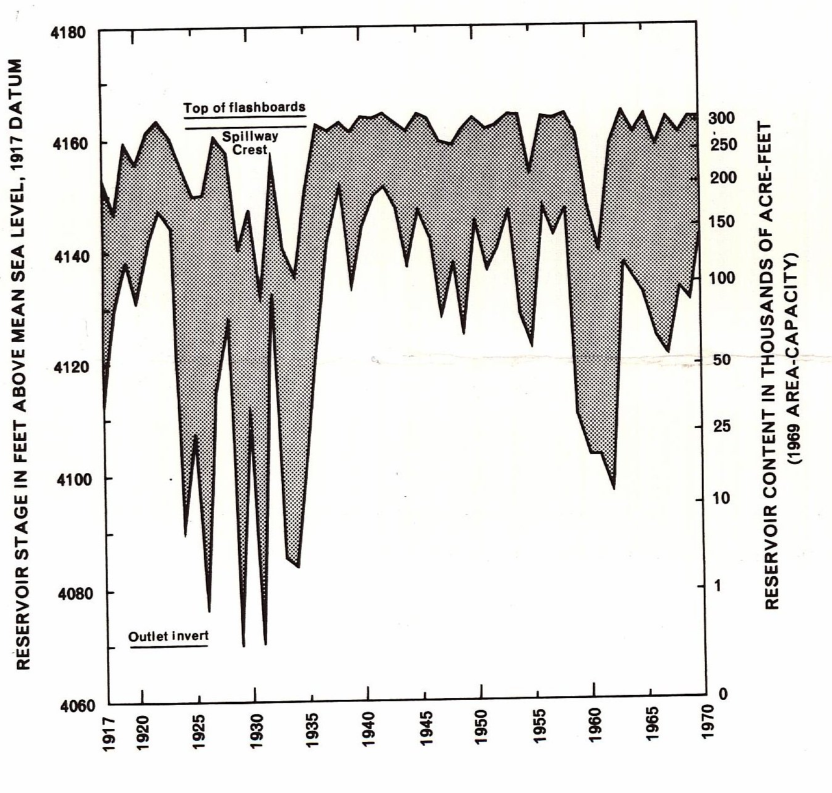


Figure 2.—Annual maximum and minimum stages and volume of stored water of Lahontan Reservoir, 1917-70 calendar years

The Truckee-Carson Irrigation District was formed on December 19, 1926 to be the legal operating agency for the project works, and on December 31, 1926, the Department of the Interior transferred the operation and maintenance of the project from the U.S. Bureau of Reclamation to the Irrigation District; however, the U.S. Bureau of Reclamation is still responsible for setting certain operational and maintenance standards.

Project features now (1971) include Lahontan Dam and Reservoir on the Carson River, a dam and outlet works on the Truckee River at Lake Tahoe (fig. 1), three diversion dams, and nearly 900 miles of canals, laterals, and drains. Also included are two hydroelectric power plants with accessory substations and transmission lines.

Water Sources

The principal sources of water for Lahontan Reservoir are the drainages of the Carson and Truckee Rivers (about 3,120 square miles), whose headwaters are in the high Sierra Nevada where precipitation is much greater than in the eastern parts of the basins. The waters of the two rivers are partly depleted prior to reaching Lahontan Reservoir principally by diversion for irrigation and public supply, seepage loss to ground-water systems, and evapotranspiration by native vegetation.

The Carson River system flows northeast from the Sierra Nevada to Lahontan Reservoir, irrigating about 51,000 acres upstream from the reservoir, and then through the Fallon farming area downstream from the reservoir and terminates in the Carson Sink about 20 miles northeast of Fallon. Several small surface-water reservoirs provide about 15,000 acre-feet of storage upstream from the reservoir. The river is gaged near Fort Churchill (fig. 1), approximately 10 miles upstream from the reservoir, and the flow has averaged about 264,000 acre-feet per year for the past 58 years. Figure 3 shows the monthly flow distribution at the Fort Churchill gage.

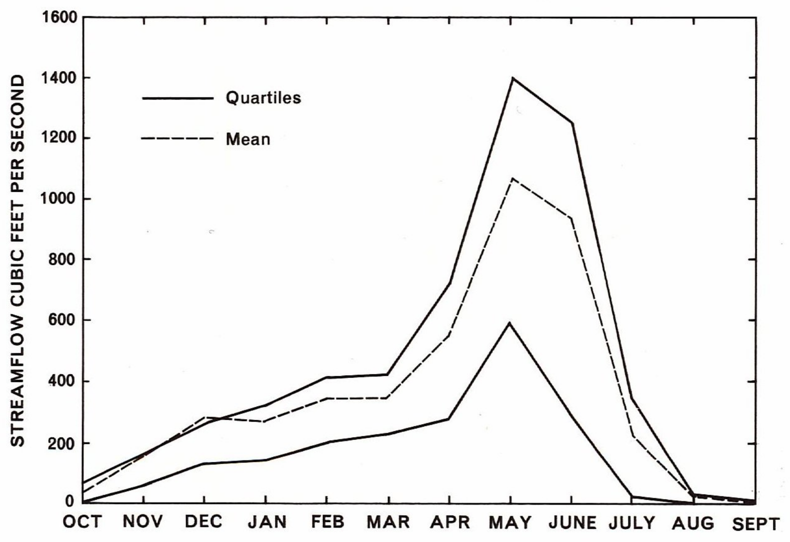


Figure 3.—Mean monthly flow distribution, Carson River near Fort Churchill, 1919-69 water years. Quartiles show 25 percent of the monthly flows were higher and lower than indicated.

Truckee River water is stored in six main reservoirs (fig. 1) upstream from the diversion to Lahontan Reservoir and is used to irrigate approximately 23,000 acres (U.S. Bur. Reclamation, oral commun., 1969). Water is transferred from the Truckee River basin to Lahontan Reservoir in the Carson River basin through the Truckee Canal, which heads at Derby Dam (fig. 1). The inflow to Lahontan Reservoir is measured at a gage on the Truckee Canal near Hazen. There is one diversion from the canal, the KX Lateral (fig. 1), between the gage near Hazen and Lahontan Reservoir.

Table 1 shows the total surface-water inflow to Lahontan Reservoir for 1964-69 water years.

Table 1.—*Surface-water inflow to Lahontan Reservoir, 1964-69*

(Inflow in acre-feet, rounded)

Water year[1]	Carson River[2]	Truckee Canal[3]	Total
1964	136,000	[4]255,000	391,000
1965	382,000	244,000	626,000
1966	171,000	289,000	460,000
1967	449,000	209,000	658,000
1968	162,000	114,000	276,000
1969	561,000	107,000	668,000
Average, 1964-69	310,000	203,000	513,000
Average, 1919-69	252,000	[5]180,000	[5]430,000

[1] October 1 to September 30.
[2] Excludes return flow from the Buckland Ditch.
[3] Excludes diversions to KX Lateral canal.
[4] First year of measured flow in Truckee canal below turnouts to the Truckee River.
[5] Estimated (Lamke, R. D., oral commun., 1970).

Stage data for Lahontan Reservoir have been collected since January 1917 by the U.S. Bureau of Reclamation and the Truckee-Carson Irrigation District and are published as follows:

Period	*U.S. Geological Survey publication*
1917-60	Water-Supply Paper 1734
1961-65	Water-Supply Paper 1927
1966-70	Water Resources Data for Nevada, 1965, 1966, 1967, 1968, 1969, 1970 (annual reports).

Summaries of flows for the Carson River and Buckland Ditch also are published in the above reports. Records for Truckee Canal near Hazen have been published by the U.S. Geological Survey since October 1966. Prior records are unpublished, but are available from the Carson City office of the U.S. Bureau of Reclamation. The KX Lateral records of diversions are also available from the same source.

The Buckland Ditch (fig. 1), which diverts flow from the Carson River just upstream from the Fort Churchill gage, provides irrigation water for about 2,100 acres. The average annual diversion by this ditch for the past 7 years has been 16,400 acre-feet. Return flow to the river from this diversion may average about 50 percent.

The water from Lahontan Reservoir is used to irrigate about 57,000 acres of farmland in the Fallon area (U.S. Bur. Reclamation, oral commun., 1969). Figure 4 shows the annual releases from the reservoir for the period of record. In addition to the irrigated land, approximately 25,000 acres in the Stillwater Wildlife Area and 28,000 acres in Carson Lake Pasture receive streamflow, return flow from irrigated lands, and flow from reservoir spills.

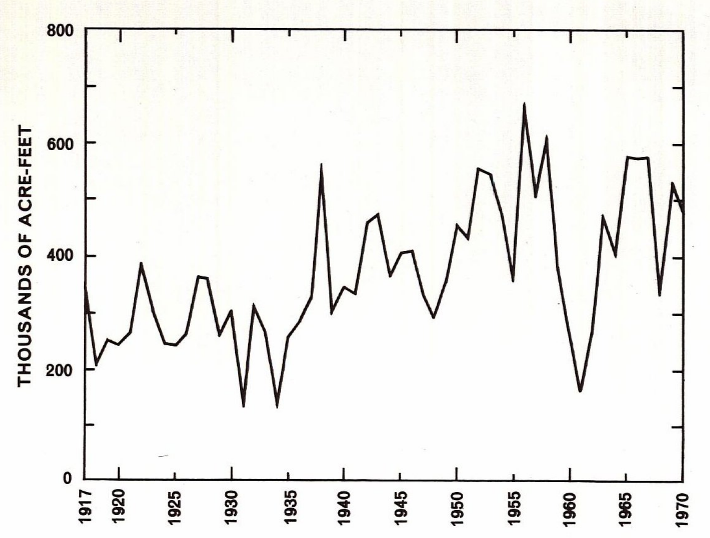


Figure 4.—Lahontan Reservoir releases to the Carson River, 1917-70 calendar years

General Reservoir Hydrology

The reservoir pool mainly overlies Quaternary lake deposits of ancient Lake Lahontan, younger fan gravels, and fluvial deposits. In the general vicinity of the reservoir, Quaternary basalt crops out and consists of thin lava flows with interbeds of scoriaceous basalt breccia and diatomaceous deposits. Also cropping out are older Tertiary andesite, dacite, and rhyolite interbedded with breccia and agglomerate (Morrison, 1964, and Speed and Willden, 1966).

Construction of Lahontan Dam changed the ground-water system of the surrounding area. As the reservoir filled, water seeped into the ground-water system, causing a rise in nearby ground-water levels. Some water probably is seeping from the reservoir through the volcanic rocks and sediments that are present in the eastern subsurface of the reservoir in the vicinity of the dam. Ground-water levels measured in June 1970 in the vicinity of the reservoir were all within a few feet of the reservoir surface. These high ground-water levels indicate that reservoir water recharges the local ground-water system. As Lahontan Reservoir changes stage, a corresponding change probably occurs in the surrounding ground-water reservoir. The magnitude of the response of ground-water levels to changes in reservoir stage varies inversely with distance from the reservoir.

The average annual precipitation on the reservoir is about 5 inches, and the average pan evaporation rate adjusted to Lahontan free water surface is about 54 inches (U.S. Bur. Reclamation, oral commun., 1970). At a spillway crest altitude of 4,162 feet, the reservoir has a surface area of about 11,200 acres (table 3). Thus, when the reservoir is full, the average inflow from precipitation is about 4,700 acre-feet, and the loss from evaporation is about 50,000 acre-feet. About 22,000 acres of phreatophytes surrounding the reservoir are estimated by the author and P. A. Glancy, U.S. Geological Survey, to use an average of about 8,000 acre-feet of ground water per year.

For irrigation use, the quality of surface water in Lahontan Reservoir has been generally satisfactory at the time of sampling. The abundance of the biologic nutrients, orthophosphate, nitrate, and the relatively low values for dissolved oxygen, are of primary concern to the esthetic and fishery quality of the reservoir. Table 2 summarizes the results of chemical analyses of water samples collected at four different locations on Lahontan Reservoir (fig. 1).

Sedimentation data are limited to one sample taken by the U.S. Geological Survey on the Carson River at Weeks (fig. 1), which is about 10 miles upstream from the reservoir. During the period May 11 to June 10, 1969, the mean daily flow was between 3,000 and 4,000 cfs (cubic feet per second), which represents a runoff value of about 210,000 acre-feet, or 37 percent of the flow for the 1969 water year. The sediment sample, collected on June 1 during the spring-flow recession, had a suspended-sediment concentration of 622 milligrams per liter. River flow at the Fort Churchill gage at this time was 3,400 cfs, when considered with the sediment concentration, represents a suspended-sediment load of about 5,700 tons per day moving past the sampling site.

Some material probably is being deposited between the sampling site and the reservoir, and some in the reservoir, slowly reducing its water-storage capacity. Some very fine suspended sediment moves out of the reservoir, but no data are available to determine this amount. Lack of extensive sedimentation in the reservoir downstream from the river delta is shown by the trace of the old river channel, labeled thalweg on the bathymetric map (fig. 5). The prereservoir channel is still prominent, showing only minimal effects of sedimentation.

Table 2.—*Water-quality data for four sites in Lahontan Reservoir*

[Data from Nevada State Health Division][1]

Sampling sites, in downstream order (shown in fig. 1)	1	2	3	4
Temperature (°C)				
Maximum	27	24	24	22
Average	20	18	18	16
Minimum	10	12	10	11
pH				
Maximum	8.6	8.3	8.3	8.6
Average	7.8	8.0	8.1	7.9
Minimum	7.5	7.6	7.6	7.5
Dissolved oxygen (mg/l)				
Maximum	15	9.1	9.7	9.2
Average	8.2	7.7	7.8	7.7
Minimum	5.4	6.1	6.4	5.1
Orthophosphate (PO_4, in mg/l)				
Maximum	0.73	0.85	1.0	1.6
Average	.42	.49	.52	.86
Minimum	.28	.20	.20	.30
Nitrate (NO_3, in mg/l)				
Maximum	1.2	4.8	4.8	10
Average	.6	1.5	1.8	2.4
Minimum	.0	.0	.0	.0
Dissolved solids (residue on evaporation at 105°C, in mg/l)				
Maximum	200	233	238	183
Average	161	168	167	152
Minimum	121	129	116	119

[1] Based on samples collected during spring and summer, 1966-69. Samples were collected from a boat, at about 0-1 foot depth.

Reservoir Area and Capacity

Fathometer soundings, topographic maps, and a series of aerial photographs taken by the U.S. Bureau of Reclamation, showing the surface area of the reservoir at various stages, were used to develop the reconnaissance bathymetric map (fig. 5) and stage-area-capacity relations (table 3 and fig. 6). A more detailed stage-capacity table is available, and shows reservoir stage to 0.1 foot (U.S. Bur. Reclamation, Carson City project office, written commun., 1970).

Forty-nine continuously recording-fathometer traverses were made by boat across Lahontan Reservoir. Two transit teams on opposite shores were used to maintain directional control. Contour lines were fitted to the data. The areas between the contours were planimetered and the area and volume of the reservoir computed. The overall limit of error of the bathymetric data is considered to be less than 5 percent.

The 1929 datum is 3.73 feet higher than the 1917 datum, but for simplicity and continuity, the new area and capacity table is based on the 1917 datum, which is in common usage.

Prior to October 1970, the so-called 1917 area-capacity relations were in use (table 3); however, beginning in October 1970, all concerned water agencies started using the new (1969) area-capacity relations. The differences between the 1917 and 1969 area-capacity relations are variable, and at an altitude of 4,070 feet, the 1969 area-capacity table shows only about 24 percent of the volume of the 1917 area-capacity table. This percentage difference decreases at increasing reservoir stage until at altitude 4,089 feet the relation is virtually the same. Above this altitude, the 1969 capacity data are as much as 13 percent but generally 6 to 8 percent larger than the 1917 capacity data. The large shallow area in the southeast part of the reservoir, designated area A in figure 5, is now used for storage and was not included in the 1917 calculations. This area has a minimum altitude of 4,147 feet and contains about 10,600 acre-feet of water and has a surface area of about 3,740 acres when filled to altitude 4,164 feet. Even if area A is deleted from the 1969 capacity data, the reservoir contains 16,000 acre-feet more storage than was originally calculated in 1917.

Table 3.—*Lahontan Reservoir area and capacity data for 1917 and 1969*

Reservoir stage in feet above sea level (1917 datum)[1]	Water-surface area (acres, rounded) 1917 rating	Water-surface area (acres, rounded) 1969 rating	Water in storage (acre-feet, rounded) 1917 rating	Water in storage (acre-feet, rounded) 1969 rating
4,060		0		0
4,065		7		17
[2]4,070	100	30	385	91
4,075	145	94	960	368
4,080	255	263	1,990	1,170
4,085	420	505	3,640	3,080
4,090	555	743	6,070	6,210
4,095	755	950	9,440	10,500
4,100	985	1,130	13,900	15,700
4,105	1,240	1,360	19,600	21,800
4,110	1,500	1,720	26,500	29,500
4,115	1,840	2,140	34,900	39,100
4,120	2,420	2,610	45,800	50,900
4,125	3,000	3,170	59,800	65,300
4,130	3,600	3,820	76,400	82,700
4,135	4,500	4,510	97,300	104,000
4,140	4,800	5,190	121,000	128,000
4,145	5,200	5,880	146,000	155,000
4,150	6,400	6,960	175,000	187,000
4,155	7,700	8,470	211,000	226,000
4,160	9,200	10,700	254,000	273,000
[3]4,162	9,800	12,100	274,000	295,000
[4]4,164	10,600	[5]14,800	294,000	[5]322,000

[1] The 1917 datum is 3.73 feet lower than the 1929 datum.
[2] Outlet invert altitude.
[3] Spillway crest altitude.
[4] Approximate altitude of top of flashboards.
[5] Includes extensive shallow-water area in southeast part of reservoir (area A in fig. 5).

References

Morrison, R. B., 1964, *Lake Lahontan: Geology of the southern Carson Desert:* U.S. Geol. Survey Prof. Paper 401, 156 p.

Speed, R. C., and Willden, Ronald, 1966, *Preliminary geologic map of Churchill County, Nevada:* U.S. Geol. Survey open-file map.

U.S. Bureau of Reclamation, 1961, *Reclamation project data:* Washington, U.S. Govt. Printing Office, 890 p.

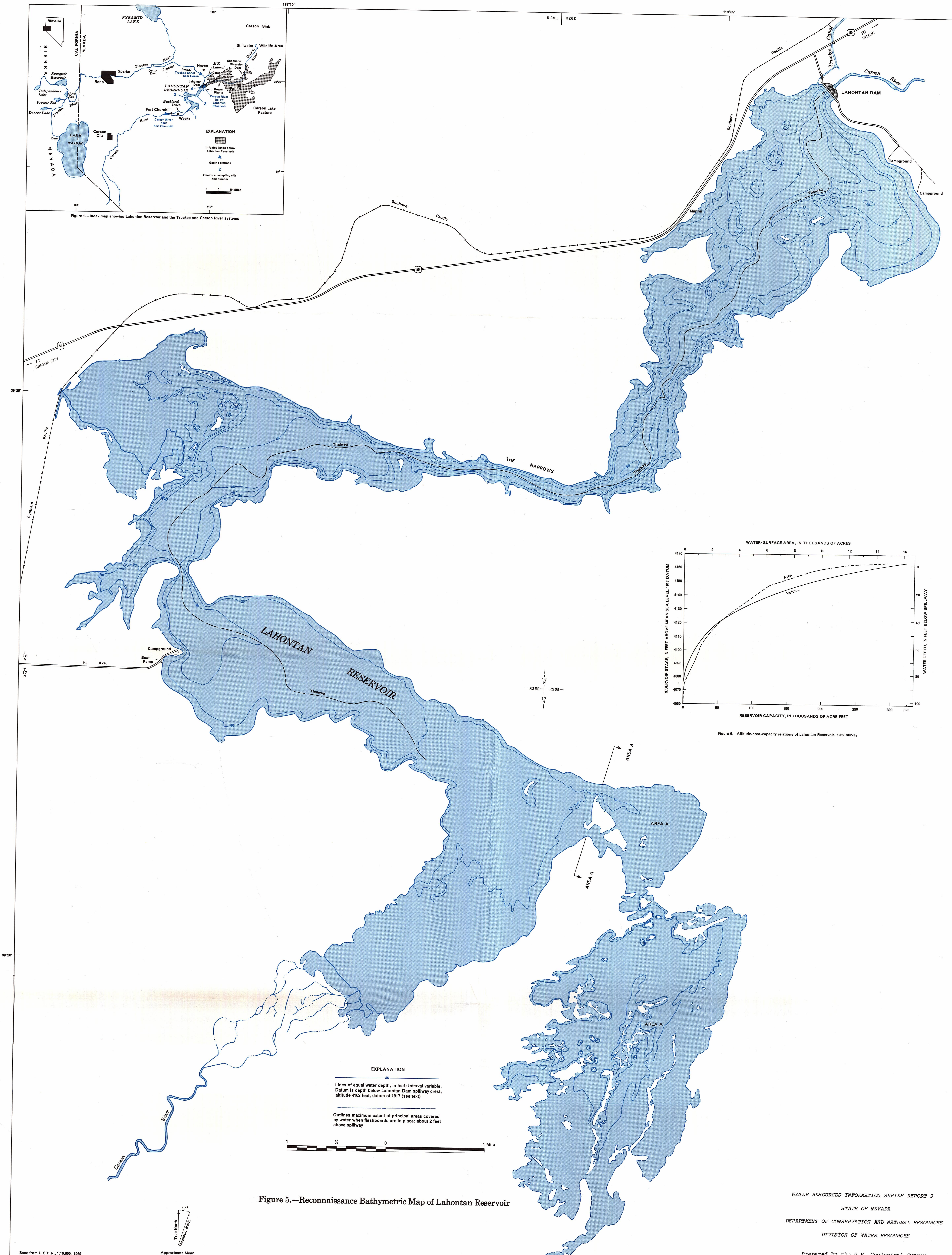


Figure 1.—Index map showing Lahontan Reservoir and the Truckee and Carson River systems

Figure 6.—Altitude-area-capacity relations of Lahontan Reservoir, 1969 survey

Figure 5.—Reconnaissance Bathymetric Map of Lahontan Reservoir

WATER RESOURCES-INFORMATION SERIES REPORT 9

STATE OF NEVADA

DEPARTMENT OF CONSERVATION AND NATURAL RESOURCES

DIVISION OF WATER RESOURCES

Prepared by the U.S. Geological Survey in cooperation with the U.S. Bureau of Reclamation

RECONNAISSANCE BATHYMETRIC MAP AND GENERAL HYDROLOGY OF LAHONTAN RESERVOIR, NEVADA

By

T. L. Katzer

1972

DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

Prepared in cooperation with the
NEVADA DEPARTMENT OF CONSERVATION AND NATURAL RESOURCES
DIVISION OF WATER RESOURCES

WATER RESOURCES-INFORMATION SERIES
REPORT 10

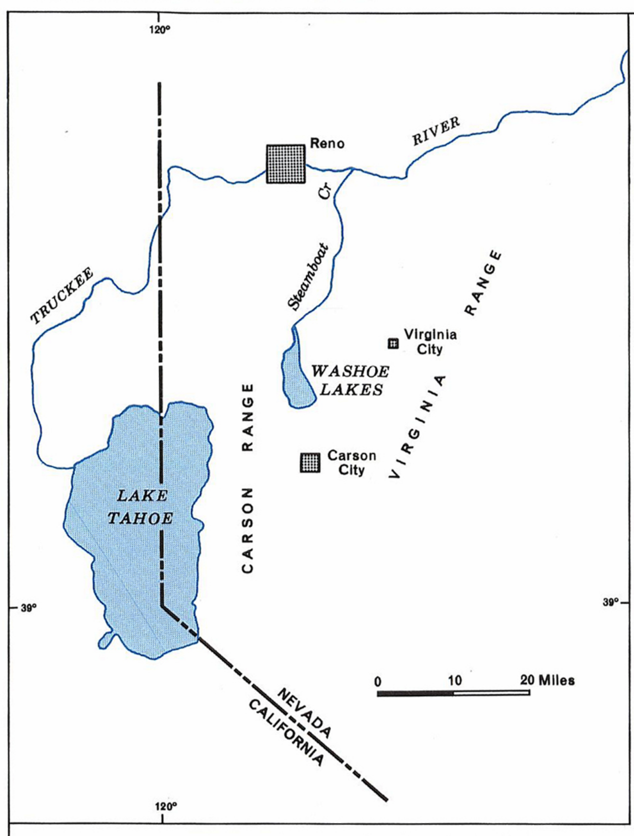


Figure 1.-Index map of northwestern Nevada showing the location of Washoe Lakes

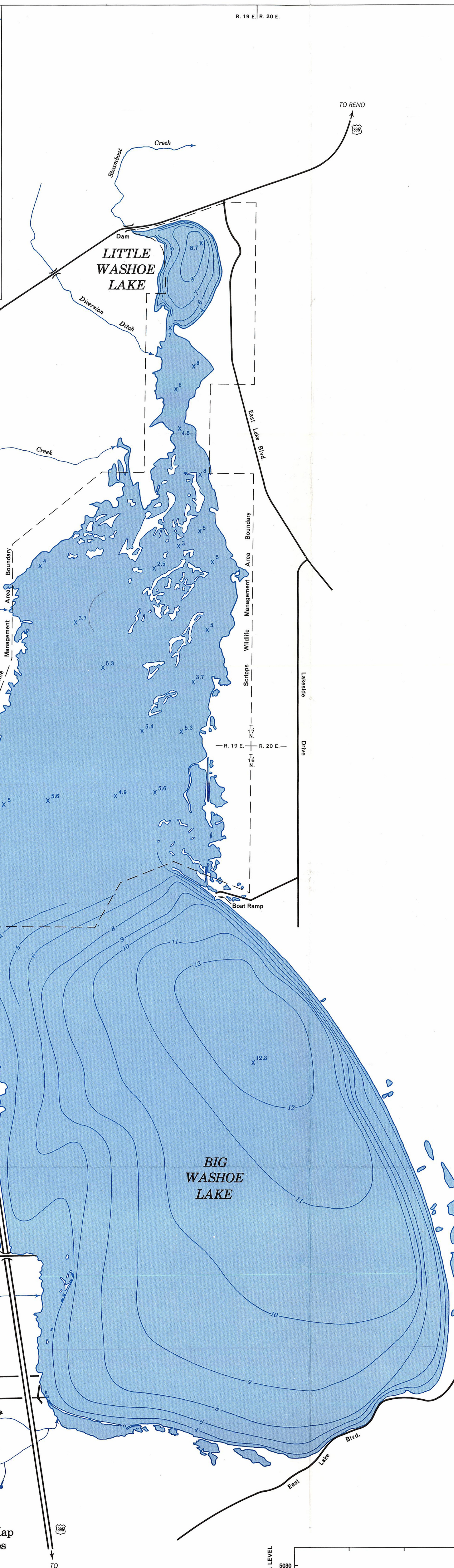


Figure 2.-Bathymetric Reconnaissance Map of Big and Little Washoe Lakes

EXPLANATION

8 — Lines of equal water depth, in feet ; interval variable. Datum is lake surface at a stage of 5029.8 feet above mean sea level

x 2.5 — Control point. Number is depth of water, in feet

1 ½ 0 1 mile

Base from aerial photographs, 1:19,000, 1971
Cartography by C. Bosch

INTRODUCTION

Big and Little Washoe Lakes are 15 miles south of Reno, Nev., and 5 miles north of Carson City on the floor of Washoe Valley (fig. 1). Mountains of the Carson Range of the Sierra Nevada and the Virginia Range surround the valley, except for a narrow canyon to the north through which Steamboat Creek drains the lakes to the Truckee River. Washoe Valley has an area of about 84 square miles.

The principal source of water for the lake is snow-melt in the Carson Range. Small quantities of water are imported to the Washoe Lakes from Browns, Galena, and Third Creeks west and north of the basin. Some water that would normally flow to Big Washoe Lake is exported from the basin to Carson City and Virginia City through the Marlette Water System. A small dam (about 30 feet wide and less than 10 feet high) at the north end of Little Washoe Lake (fig. 2), having a narrow spillway (about 8 feet wide) at an altitude of 5,028.9 feet, is used in part to control the stage of the lakes and the outflow to Steamboat Creek for downstream irrigation.

During most days of the winter, Big Washoe Lake is not frozen over with ice.

Washoe Lake is used mostly for fishing and boating; however, those uses are slight, probably because the lake water is highly turbid (Hutchinson, 1937, p. 85). However, the beaches and sand dunes along the east side of Big Washoe Lake are picturesque. The area is being considered as a site for a State park.

The Washoe Lakes were at a stage of 5,029.8 feet above sea level during June 1971, when the bathymetric survey was made. The lakes usually are a single body of water, because of the flooding of the intervening marshy area between Franktown Creek and the diversion ditch shown in figure 2. Following unusually dry periods of several years, the lakes have gone dry. The last time was in 1934 (Rush, 1967, p. 11). Figure 3 is a summary of stage variations for the period 1963-71.

BATHYMETRY

A continuously recording, electronic fathometer was used to measure the depths of the Washoe Lakes. The author was assisted by his son, Steven, in making the 19 traverses of the two lakes. The results of the survey are summarized in figures 2 and 4. The dimensions of the lakes at the time the survey was made, for the extremes in stage for the period 1963-71, and at spillway stage are summarized in table 1.

Table 1.—*Dimensions of the Washoe Lakes at various stages*

Dimension	Big Washoe Lake	Little Washoe Lake	Total
JUNE 1971			
Stage, in feet	5,029.8 ± 0.1	5,029.9 ± 0.1	--
Area, in acres	5,800		5,900
Volume, in acre-feet	33,000		34,000
AT SPILLWAY STAGE			
Stage, in feet	5,028.9	5,028.9	--
Area, in acres	5,700	110	5,800
Volume, in acre-feet	30,000	500	31,000
MAXIMUM RECORDED STAGE, 1963-71[1]			
Stage, in feet	5,030.6	5,030.6	--
Area, in acres	5,900	112	6,000
Volume, in acre-feet	36,000	850	37,000
MINIMUM RECORDED STAGE, 1963-71			
Stage, in feet	a5,023.5	b5,021.9	--
Area, in acres	3,160	16	--
Volume, in acre-feet	10,000	6	--

1. On February 12 and 24, 1970.
a. On November 24, 1964.
b. On October 28, 1964.

REFERENCES

Hutchinson, G. E., 1937, A contribution to the limnology of arid regions, primarily founded on observations made in the Lahontan Basin [Nev.]: Connecticut Acad. Arts Sci. Trans., v. 33, p. 47-132.

Rush, F. E., 1967, Water-resources appraisal of Washoe Valley, Nevada: Nevada Dept. Conserv. and Nat. Resources, Water Resources-Reconn. Ser. Rept. 41, 39 p.

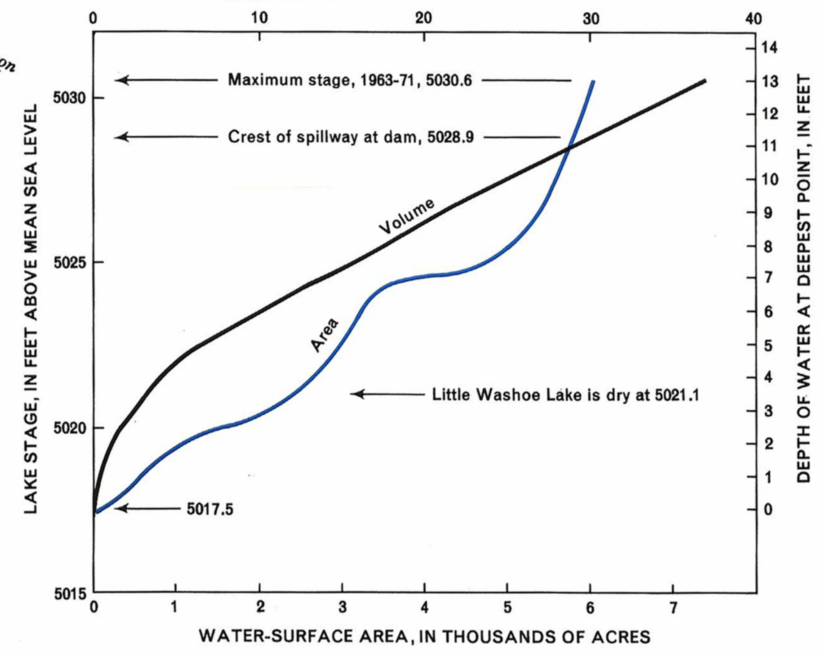


Figure 3.-Stage-area-volume relations for Big and Little Washoe Lakes

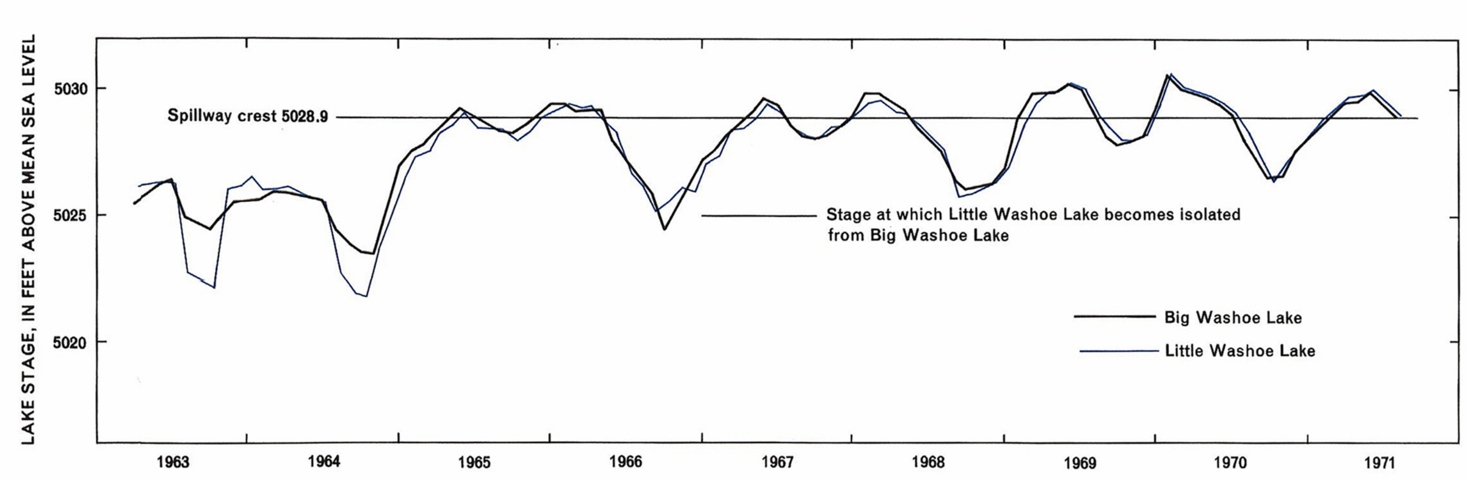


Figure 4.-Variations in lake stage, 1963-71

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BATHYMETRIC RECONNAISSANCE OF BIG AND LITTLE WASHOE LAKES, WASHOE COUNTY, NEVADA

By
F. Eugene Rush

1972

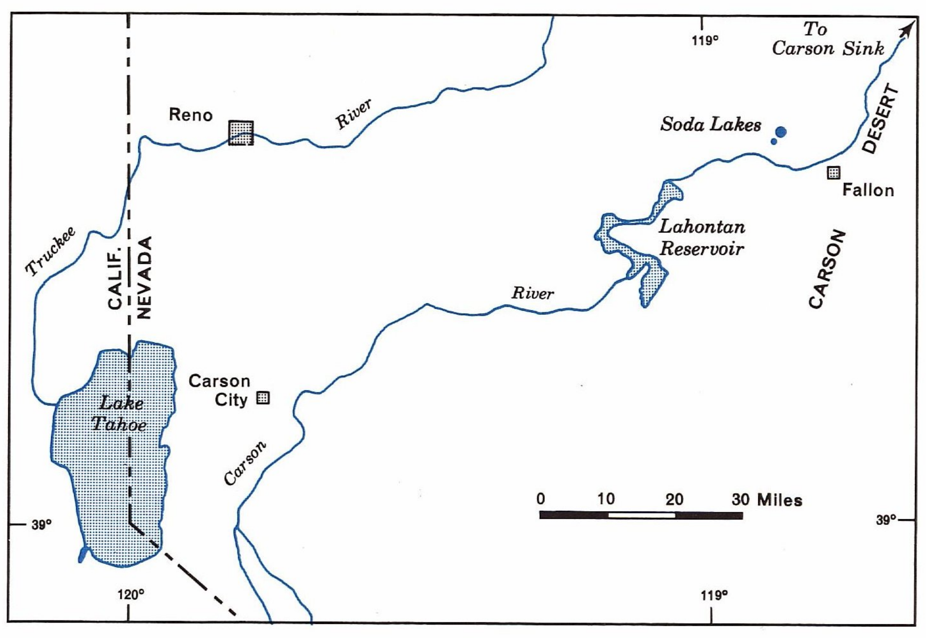


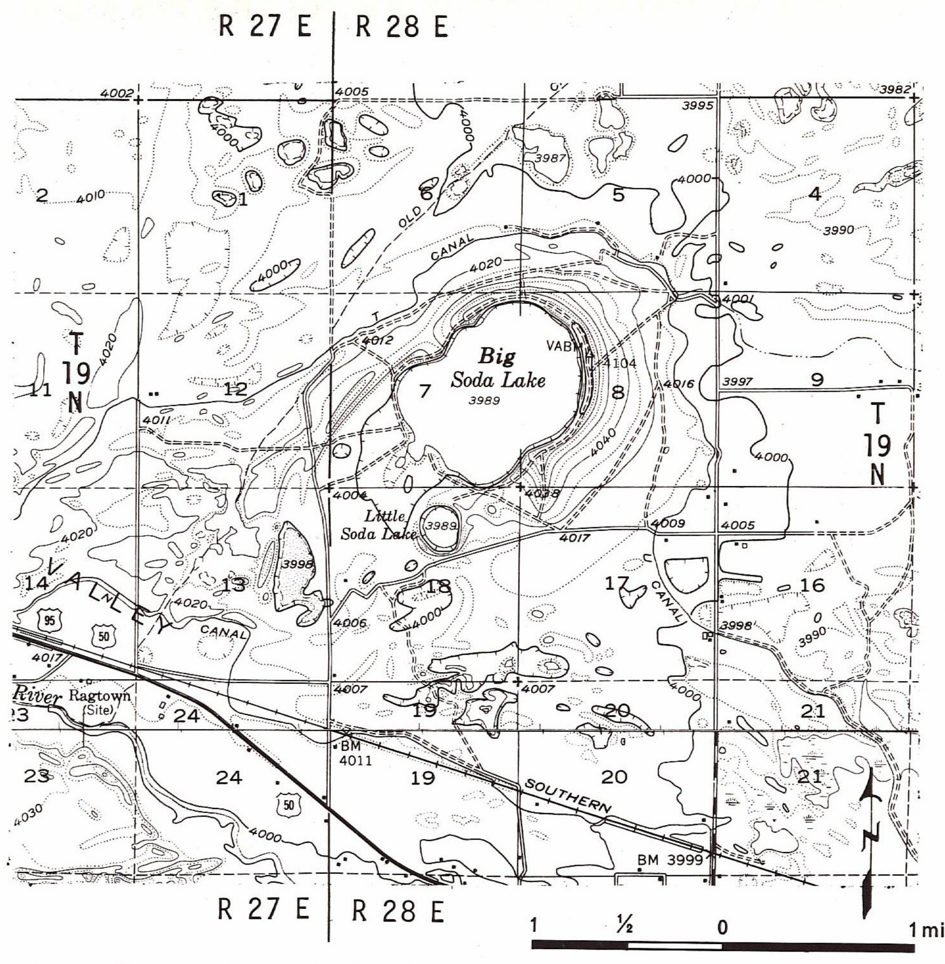
Figure 1.- *Index map of the Reno-Fallon area of northwestern Nevada showing the location of the Soda Lakes*

INTRODUCTION

Big and Little Soda Lakes are about 7 miles northwest of Fallon, Nev. (fig. 1), and about 50 miles east of Reno on the floor of Carson Desert. The two lakes occupy small craters composed of volcanic, basaltic sand (Morrison, 1964, p. 71 and Willden and Speed, 1968), surrounded by a broad expanse of alluvium. The form of the craters is shown in figure 2. On June 29, 1971, the stage of Big Soda Lake was at an altitude of 3,989.3 feet and Little Soda Lake, at 3,989.8 feet. The surrounding valley floor is generally at an altitude of about 4,000 feet. Regional ground-water flow is generally northeastward toward Carson Sink.

Prior to large-scale irrigation, fresh water entered the Soda Lakes mostly by subsurface percolation (Lee and Clark, 1916, p. 666) and numerous small springs (King, 1878, v. I, p. 512 and Russell, 1885, pl. 16) flowing from the adjacent saturated alluvium about the lakes. In addition, some thermal water (temperature, 86°F or 30°C) may be entering Big Soda Lake near its center (Breese, 1968, p. 25). Evaporation, the principal form of discharge from the lakes under native conditions, offset the inflow. The lakes functioned much like large wells or sumps below the general ground-water level of the area. Under native conditions prior to 1906, the lake stages were maintained at a fairly constant low level, as shown in figure 3. In 1906, when extensive irrigation began in the area, the lake levels began to rise, continuing until about 1930. The total rise in stage for the period was about 60 feet. The principal cause of the rise was attributed to seepage losses from the T, U, and N canals (fig. 2), which carried water from the Carson River to fields in the Fallon area as part of the Newlands Project of the U.S. Bureau of Reclamation (Lee and Clark, 1916, p. 672-675).

Big Soda Lake is highly saline, as shown in table 1, and reportedly has no fish population (Breese, 1968, p. 2). Extraction of soda (essentially equal parts of sodium carbonate and sodium sulfate, according to Russell, 1885, p. 78-79) from Big Soda Lake began in 1875 (Russell, 1885, p. 79, and Morrison, 1964, p. 116) and continued until the facilities were flooded by rising water. Little Soda Lake is much less saline, but was used for soda extraction beginning in 1867 (Russell, 1885, p. 80). Little Soda Lake was reported (King, 1878, v. I, p. 512) to have been nearly dry in 1867.



Base from U. S. Geological Survey - Soda Lake, Nevada (1951) 1:62,500

Contour interval 20 feet. Interval for dotted lines 10 feet. Datum is mean sea level.

Figure 2.- *Topography of the Soda Lakes area*

BATHYMETRY

A continuously recording electronic fathometer was used to measure depths in the Soda Lakes in June 1971. Data were gathered along 17 traverse lines, utilizing 10 control points along the shore of Big Soda Lake. The author was assisted by his daughter, Teresa, in collecting the field data. The bathymetry, stage-area-volume relations, and a cross section are shown in figures 4, 5, 6, and 7. The deepest point surveyed in Big Soda Lake was 207 feet below the lake surface. An island that is shown on Russell's bathymetric map of 1882 (1885, pl. 16) was located at a depth of 58 feet, as shown in figures 4 and 6. Big Soda Lake (fig. 6) is within a compound crater. Below a depth of about 80 feet, a small, steep-sided crater occupies the center of the larger crater of topographic prominence, as shown in figures 2 and 6.

Little Soda Lake had a maximum depth of about 56 feet when this survey was made (fig. 4).

Lake stage, area, and volume for (1) equilibrium under near native conditions (prior to 1907) and for (2) equilibrium under irrigation conditions (since 1930) are summarized as follows:

	Near native conditions (Prior to 1907)	Irrigation conditions (Since 1930)
Big Soda Lake:		
Stage (feet)	3,930 ± 2	3,988 ± 2
Area (acres)	270 ± 5	385 ± 5
Volume (acre-feet)	15,500 ± 500	35,000 ± 500
Little Soda Lake:		
Stage (feet)	3,937 ± 4	3,989 ± 2
Area (acres)	₹6	20 ± 1
Volume (acre-feet)	₹70	770 ± 50

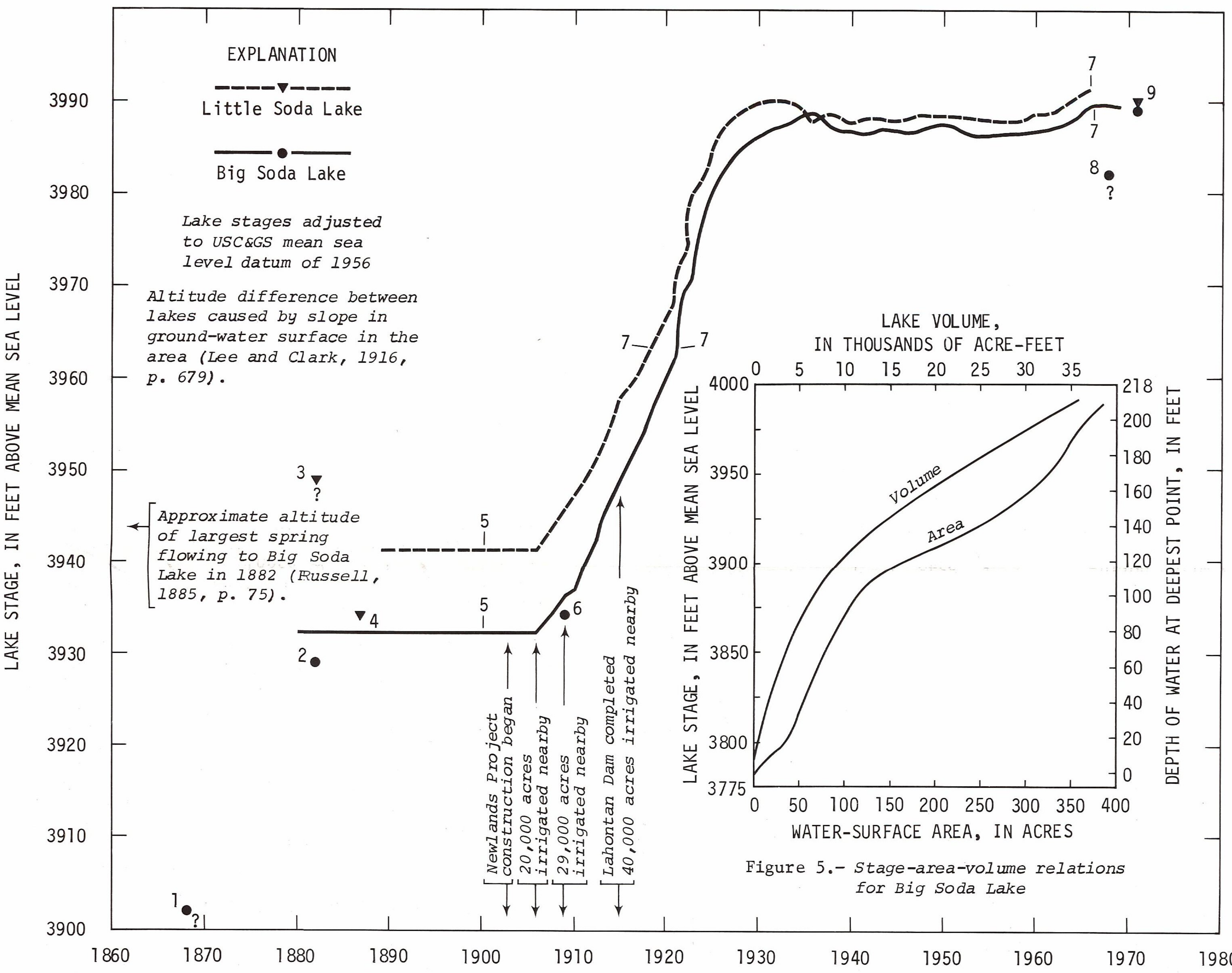


Figure 5.- *Stage-area-volume relations for Big Soda Lake*

Figure 3.- *Variations in the stages, areas and volumes of the Soda Lakes*

FOOTNOTES FOR FIGURE 3

1. *From King (1877, v. 4, p. 351); may be in error.*
2. *Based on lake area and water depth as reported by Russell (1885, p. 73).*
3. *Based on footnote by Russell (1885, p. 73). Probably not a natural stage.*
4. *As reported by Breese (1968, p. 8), Chatard (1890) observed Little Soda Lake to be dry. When first discovered, reported to have been dry (Russell, 1885, p. 79).*
5. *From Lee and Clark (1916, p. 705-706) for period 1880-1910. Data adjusted to U.S. Coast and Geodetic Survey mean sea level datum of 1956 by subtracting 3.7 feet from reported data.*
6. *From Strahorn and van Duyne (1911), as reported by Breese (1968, p. 13).*
7. *Data for period 1911-69 from U.S. Bureau of Reclamation.*
8. *From Breese (1968, p. 14). Probably in error.*
9. *Determined as part of present study in June 1971: Big Soda Lake, 3,989.3 feet; Little Soda Lake, 3,989.8 feet.*

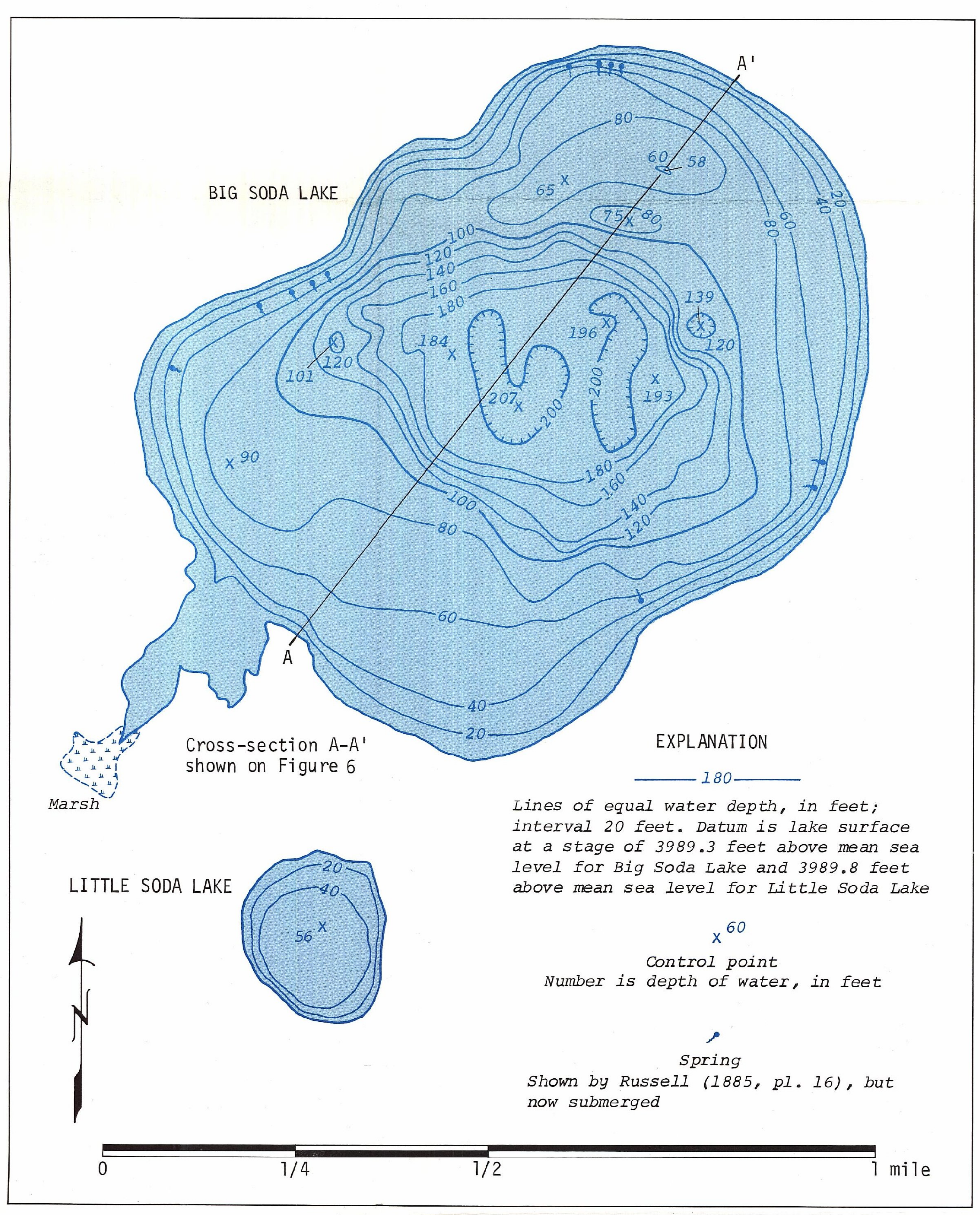


Figure 4.- *Reconnaissance bathymetry of the Soda Lakes*

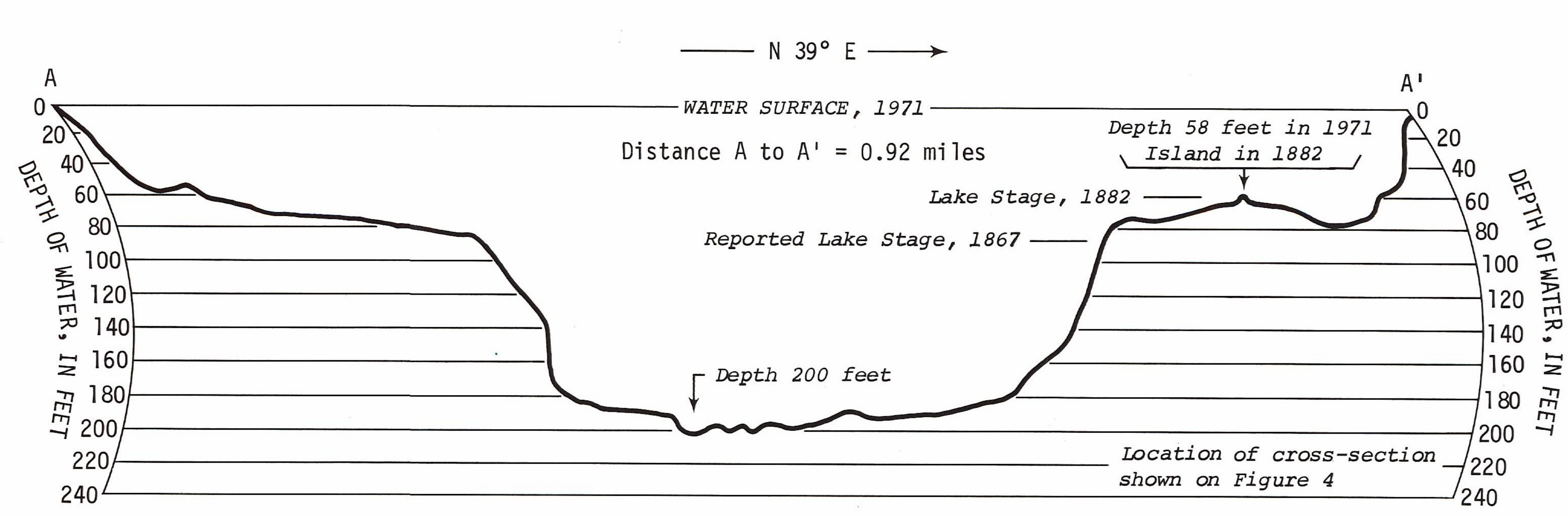


Figure 6.- *Cross-section of Big Soda Lake as recorded by the fathometer*

Base from aerial photographs, 1:19,000, 1971
Cartography by C. Bosch

HYDROLOGIC RECONNAISSANCE OF BIG AND LITTLE SODA LAKES, CHURCHILL COUNTY, NEVADA

By
F. Eugene Rush
1972

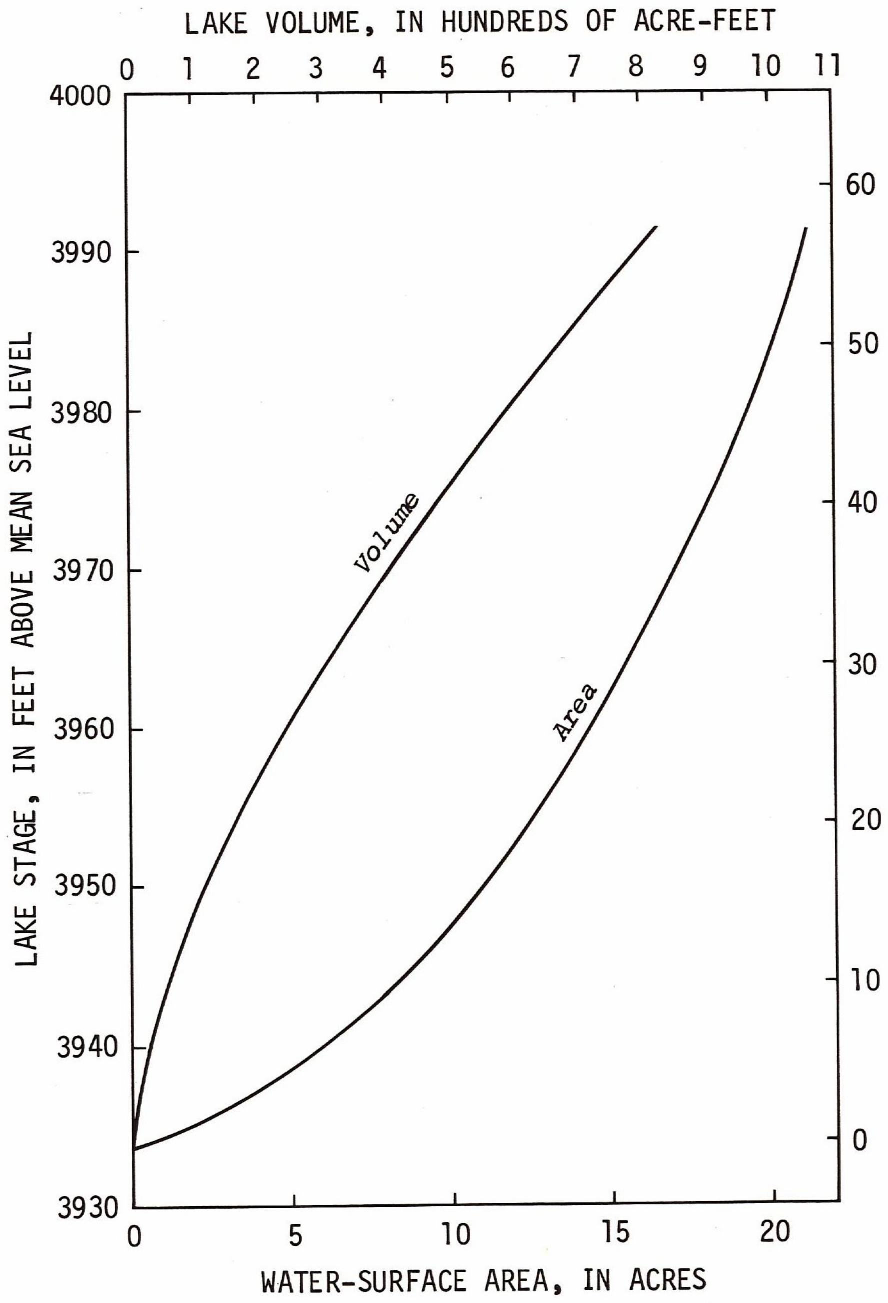


Figure 7.- *Stage-area-volume relations for Little Soda Lake*

SALT CONTENT

The principal dissolved constituents of Big Soda Lake, in descending order of abundance, are sodium, chloride, and sulfate. Little Soda Lake is different in that of these three dominant ions, sulfate has the highest concentration, followed by sodium. These ions make up approximately 90 percent of the total dissolved solids in both lakes. The naturally occurring ground water in the nearby alluvium, the principal source of water for the Soda Lakes prior to the Newlands Project, was described by Stabler (1904). He reports the following conditions near the Soda Lakes: (1) chloride and sulfate concentrations less than 100 mg/l, (2) springs of good quality in the lake craters, (3) dug well in the crater of Little Soda Lake had dissolved-solids content of 320 mg/l, (4) driven well in crater of Big Soda Lake had dissolved-solids content of 400 mg/l, and (5) depth to water in nearby alluvium generally less than 25 feet.

Changes in the salt content of the Soda Lakes are summarized in table 1. Both the concentrations of salt and the total tonnages of salt are shown to be decreasing with time. The dilution is due principally to increased volumes of water in the lakes. The decrease in total salt content probably is due principally to flushing of salt from the lakes to adjoining aquifers, as ground water moves through the lake.

The removal of soda from Big Soda Lake could not account for the large decrease in total salt tonnages shown in table 1. On the basis of data by Breese (1968, p. 26), it is calculated that a maximum of about 20,000 tons of soda was removed from the lake during 1868-93. Soda extraction continued until the lake began to rise in 1906. It is unlikely that the total tonnage of soda removed would account for any more than a very small part of the 900,000-ton loss of salt during 1869-1967, as determined from table 1.

Data reported by Chatard (1890, p. 48) indicate that Big Soda Lake probably was homogenous; that is, unstratified, under native conditions. More recent data collected by Hutchinson (1937, p. 75) and Breese (1968, table 7) indicate stratification of chemical constituents and water temperature into upper and lower zones, with an intervening transition zone. The upper zone of less salty water (table 1) extends to a depth of about 30 feet below the lake surface. The lower zone of more salty water is below a depth of about 120 feet. The transition zone between 30 to 120 feet is intermediate in composition. The temperature of the water below a depth of 120 feet was essentially constant at 62°F (17°C) in August 1967 (fig. 8). The chemical stratification probably is caused by a greater dilution of lake water near the surface than at depth as more ground water flows through the upper zone of the lake.

The rate of freshening has decreased in recent years. If we assume that the tonnage of chloride was nearly constant from 1867 to 1906 at about 970,000 tons (table 1) and decreased to 670,000 tons in 1933 and to 630,000 tons in 1967, then from 1906 to 1933 the average annual loss in chloride was about 11,000 tons. For 1933-67, the rate of loss was only about 1,200 tons per year. One implication is that if the present hydrologic conditions of Big Soda Lake persist, the chloride content, and possibly other chemical characteristics as well, may nearly stabilize in a few years.

EVAPORATION AND WATER BALANCE

The net evaporation rate (evaporation of 4.3 feet for fresh water, reduced to about 90 percent by the effects of salinity (Harbeck, 1955, fig. 5), minus precipitation of 0.3 foot) for Big Soda Lake under native conditions may have averaged about 1,000 acre-feet per year (that is, 3.6 feet x 270 acres). At the present stage, the evaporation may average about 1,500 acre-feet (that is, 4 feet x 385 acres). For native conditions, the net evaporation was offset by an equal amount of subsurface inflow; however, under recent equilibrium conditions and with a continuous loss of salt from the lake with high stage, a larger volume of ground water is moving into the lake; part of it leaving as subsurface outflow, carrying dissolved chemical constituents with it. The amount of thermal water entering the lake (Breese, 1968) is not known.

During the period of stage adjustment (1906-30), the volume of Big Soda Lake increased about 20,000 acre-feet, or at an average annual rate of about 800 acre-feet. During the adjustment, the average annual net inflow would have been on the order of 2,000 acre-feet, plus the additional ground-water outflow from the lake.

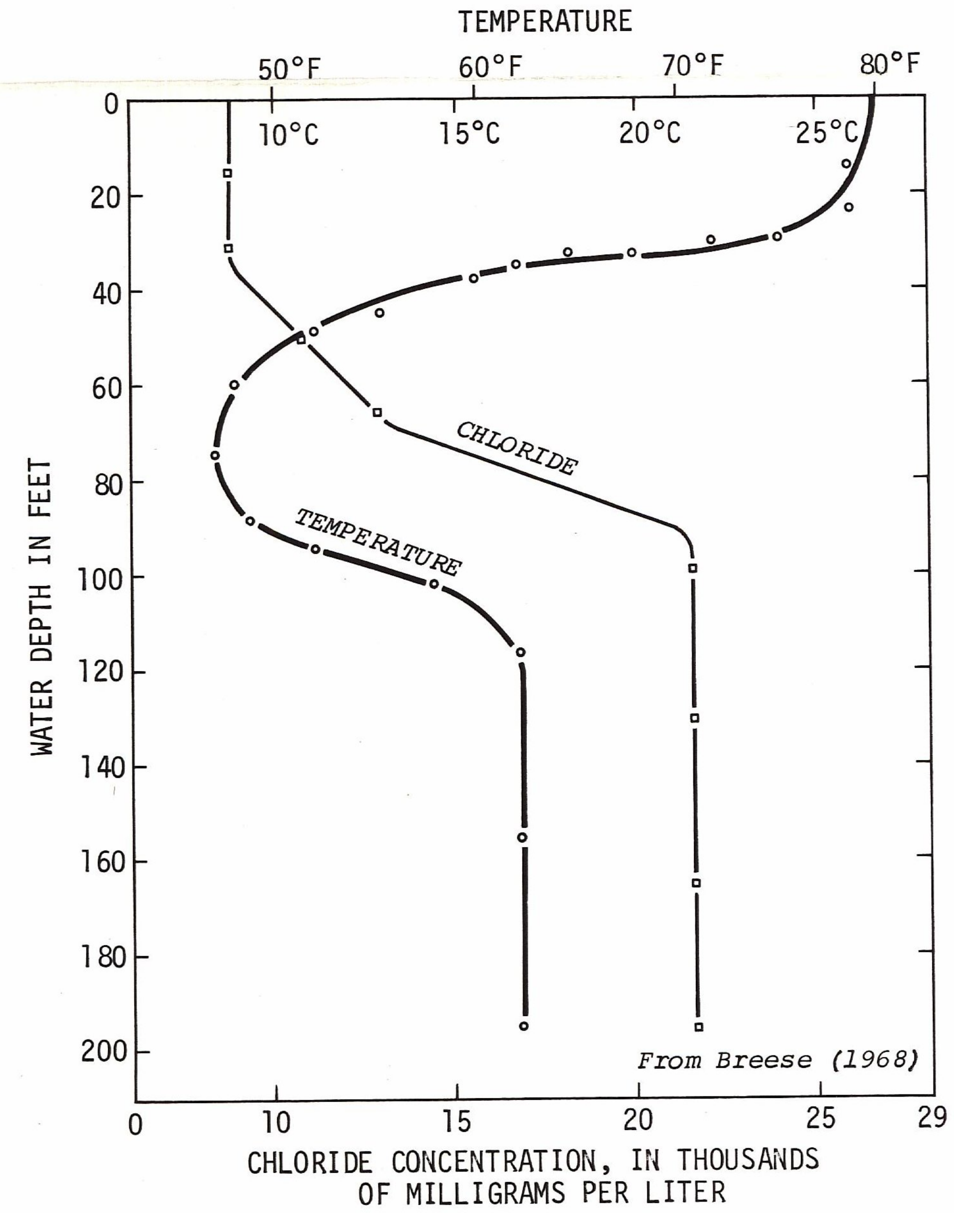


Figure 8.- *Variations in water temperature and chloride concentration with depth of Big Soda Lake, August 1967*

Table 1.--Summary of water-quality changes for the Soda Lakes

	Surface sample			Deep sample				Total lake content (thousands of tons)	
Date	Density[1] (g/ml)	Chloride (g/l)	Dissolved -solids content (g/l)	Depth (feet)	Density (g/ml)	Chloride (g/l)	Dissolved -solids content (g/l)	Chloride	Dissolved -solids content
				BIG SODA LAKE					
Aug. 1867[2]	1.0975	39.4	125	--	--	--	--	960	2,800
Sept. 1882[3]	1.0995	45.7	129	100	1.098	44.3	126	970	2,800
-- 1927[4]	a1.02	8.77	27.4	--	--	--	--	--	--
July 1933[5]	1.022	8.20	b26	192	1.066	27.3	b87	670	--
Aug. 1958[6]	1.017	7.70	24.7	--	--	--	--	--	--
Oct. 1963[7]	a1.02	7.39	25.7	--	--	--	--	--	--
-- 1967[7]	1.021	7.60	25.3	197	1.050	21.5	61.8	630	1,900
				LITTLE SODA LAKE					
Oct. 1963[7]	--	.880	6.33	--	--	--	--	.93	6.7
Jan. 1967[7]	--	.699	5.51	--	--	--	--	.78	6.2

a. Estimated from dissolved-solids and chloride data.
b. Estimated from density and chloride data.
1. Density in July 1915: Big Soda Lake, 1.0563 at 27°C; Little Soda Lake, 1.0051 at 27°C (Lee and Clark, 1916, p. 666).
2. Based on data from King (1877, v. 2, p. 747).
3. Based on data from Chatard (1890, p. 48).
4. Based on data from Miller, Hardman, and Mason (1953, p. 34).
5. Based on data from Hutchinson (1937, p. 75).
6. Based on data from Whitehead and Feth (1961, table 1).
7. Based on data from U.S. Bureau of Reclamation.

REFERENCES

Breese, C. R., Jr., 1968, A general limnological study of Big Soda Lake: Reno, Nevada, Nevada Univ., unpub. thesis (PhD), 83 p.

Chatard, T. M., 1890, Natural soda--its occurrence and utilization: U.S. Geol. Survey Bull. 60, p. 27-101.

Harbeck, G. E., 1955, The effects of salinity on evaporation: U.S. Geol. Survey Prof. Paper 272-A, p. 1-6.

Hutchinson, G. E., 1937, A contribution to the limnology of arid regions, primarily founded on observations made in the Lahontan Basin [Nev.]: Connecticut Acad. Arts Sci. Trans., v. 33, p. 47-132.

King, Clarence, 1870-80, Report of the geological exploration of the fortieth parallel: U.S. Army Corps of Engr. Prof. Paper 18, 7 vols.

Lee, C. H., and Clark, W. O., 1916, Report on Soda Lakes investigation, Truckee-Carson Project near Fallon, Nevada: Washington, Report of an Investigation by the U.S. Geol. Survey, p. 657-706.

Miller, M. R., Hardman, George, and Mason, H. G., 1953, Irrigation waters of Nevada: Nevada Univ. Agr. Expt. Sta. Bull. no. 187, 63 p.

Morrison, R. B., 1964, Lake Lahontan: Geology of southern Carson Desert, Nevada: U.S. Geol. Survey Prof. Paper 401, 156 p.

Russell, I. C., 1885, Geological history of Lake Lahontan, a Quaternary lake of northwestern Nevada: U.S. Geol. Survey Mon. 11, 288 p.

Stabler, Herman, 1904, Report on ground waters of Carson Sink: U.S. Geol. Survey, Reclamation Service typewritten report, 49 p.

Strahorn, A. T., and Van Duyne, Cornelius, 1911, Soil survey of the Fallon area, Nevada: U.S. Bur. Soils map.

Whitehead, H. C., and Feth, J. H., 1961, Recent chemical analyses of waters from several closed-basin lakes and their tributaries in Western United States: Geol. Soc. America Bull., v. 72, p. 1421-1426.

Willden, Ronald, and Speed, R. C., 1968, Geologic map of Churchill County, Nevada: U.S. Geol. Survey open-file map.

DEPARTMENT OF THE INTERIOR
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HYDROLOGIC INVESTIGATIONS
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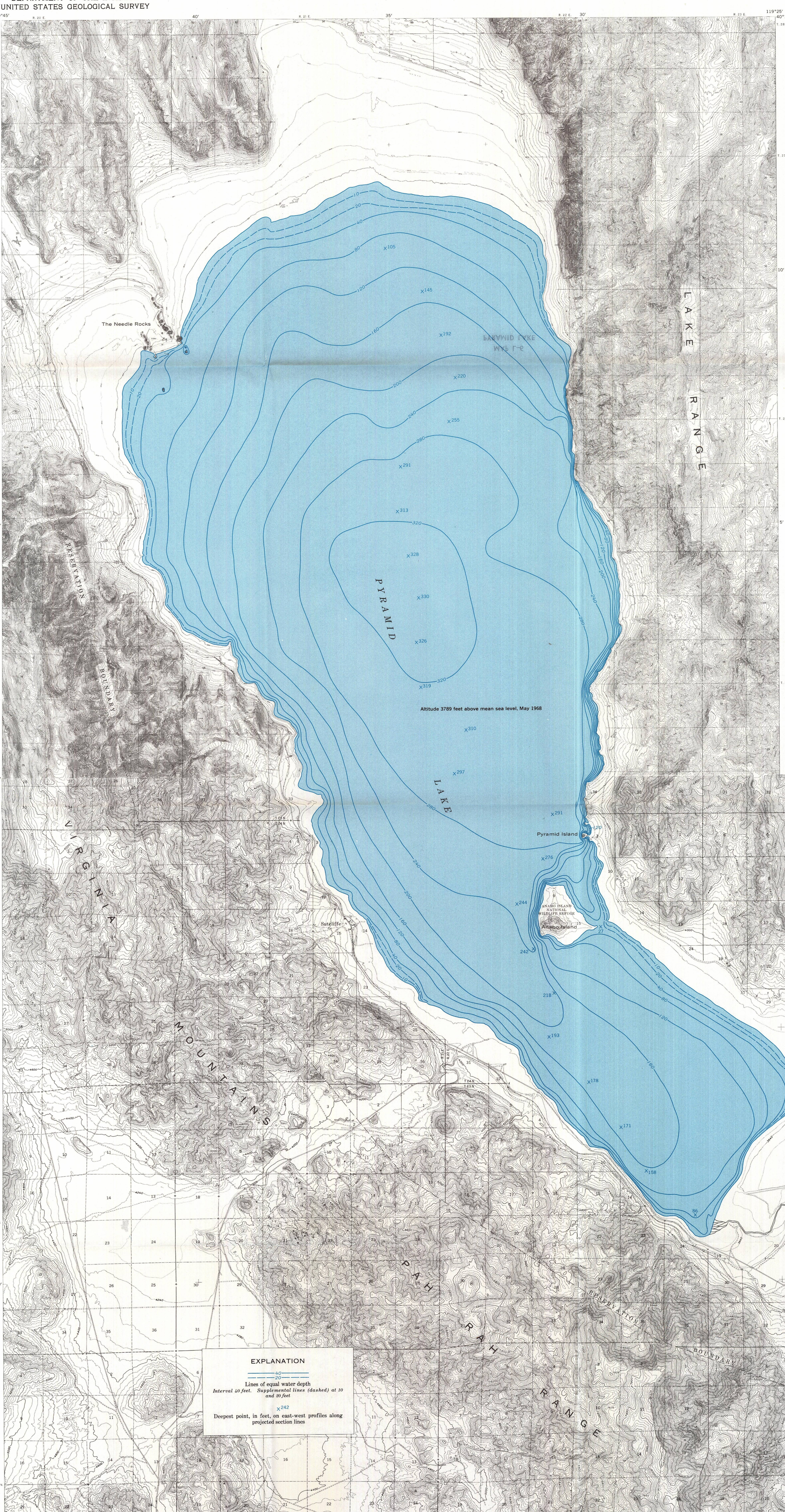

INTRODUCTION

Pyramid Lake, about 30 miles northeast of Reno, Nev., is the terminal water body of the Truckee River system. The principal inflow to the lake is from the Truckee River; local drainage around the lake contributes little. There is no outlet stream; therefore the only outflow is by evaporation. Considerable interest in the lake has developed in recent years because it is an important feature in the management of water in the Truckee and Carson River systems, and because of its potential as a recreation area. An important tool in the evaluation of Pyramid Lake from a management and recreation standpoint is an adequate physiographic and hydrologic survey.

This report was prepared under the general direction of G. F. Worts, Jr., district chief of the Geological Survey's Water Resources Division in Nevada.

HISTORY

The earliest written record of Pyramid Lake is the diary of John C. Fremont, who encountered the lake in January 1844. The next record is that by King (1878), who visited the lake in 1867 and 1871. Russell (1885) surveyed the lake in August-September 1882. From records of these early visits and other evidence, the lake at that time, under natural conditions, covered about 140,000 acres (220 square miles), and its stage fluctuated perhaps as much as 20 feet between wet and dry periods (A. M. Piper, U.S. Geol. Survey, oral commun., 1968).

Diversions from the Truckee River for irrigation began about 1860, and they were accelerated considerably following construction of the Truckee Canal in 1905 (fig. 1). The canal diverts water from the Truckee River to Lahontan Reservoir on the Carson River. Although some of this water is used for irrigation in the Fernley area, most is stored in Lahontan Reservoir for use in the Newlands project near Fallon. U.S. Bureau of Reclamation records show that an average of about 250,000 acre-feet per year was diverted into Truckee Canal during the period 1905-68.

Altitudes of the level of Pyramid Lake from 1867 to 1968, taken from the U.S. Geological Survey records, are shown in figure 2. From 1909 to 1968 the lake level declined from an altitude of 3,869 feet to 3,789 feet above sea level, or 80 feet in 59 years.

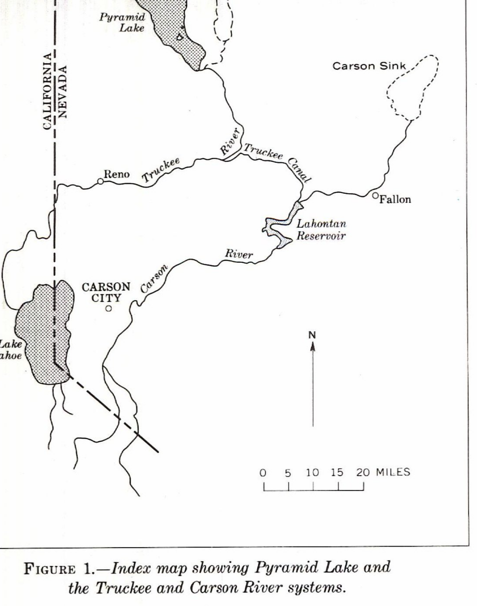

FIGURE 1.—*Index map showing Pyramid Lake and the Truckee and Carson River systems.*

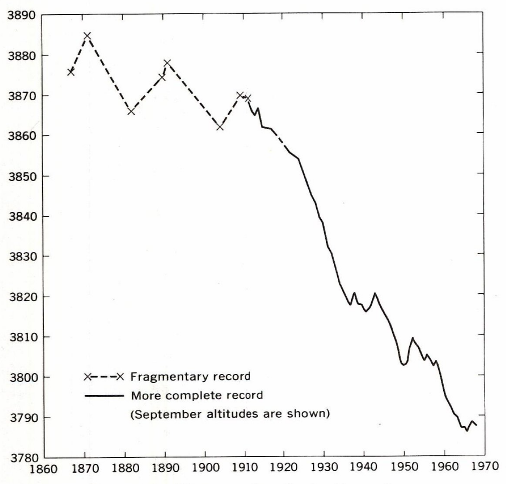

FIGURE 2.—*Water-surface fluctuations of Pyramid Lake, 1867-1968.*

BATHYMETRIC SURVEY

With the exception of a few fathometer surveys made by the Nevada Fish and Game Commission in the 1950's, the only previous systematic survey of Pyramid Lake was made by Russell in 1882 (1885, pl. 9).

For the present survey, section corners and east-west section lines were used to locate accurately the present shoreline and control points for the fathometer survey grid. A boat-mounted recording fathometer was used to obtain cross-sectional profiles of the lake bottom. Twenty-three cross-sectional profiles were run in an east-west direction at one-mile intervals. One long profile was run roughly north-south from The Needle Rocks to Anaho Island. Additional fathometer soundings were made around The Needle Rocks, Anaho Island, The Pyramid, the mouth of the Truckee River, and several beach areas along the west shore. The boat was operated at a constant speed on all profiles, and was kept on line by transit crews on both shores, which were in radio contact with the boat. Hand soundings were made as checks on fathometer readings at 6, 25, 68, 282, and 322 feet.

Aerial photography was obtained to provide details on the present shoreline configuration. Altitudes in this report are expressed in feet above mean sea level (datum of 1929, adjustment of 1956), referenced to U.S. Coast and Geodetic Survey benchmark N-21 at 3,940.29 feet altitude.

The fathometer profiles and aerial photographs were used to contour the lake bottom.

LAKE AREA AND VOLUME

Tables 1 and 2 and figure 3 may be used to obtain the area and volume of the lake at given altitudes. Below altitude 3,789 feet, lake area and volume are based on the bathymetric survey; above altitude 3,802 feet, they are based on planimetry of U.S. Geological Survey topographic maps at scales of 1:24,000 and 1:62,500 by A. M. Piper. Area and volume data have been extended to altitude 3,880 feet, which is approximately the highest recorded lake level.

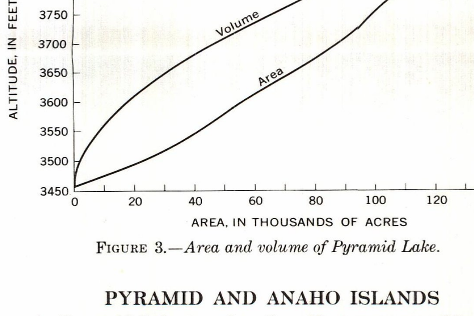

FIGURE 3.—*Area and volume of Pyramid Lake.*

PYRAMID AND ANAHO ISLANDS

As Pyramid Lake recedes, the effect on some of its prominent features is quite noticeable. Pyramid Island, for which the lake is named, is no longer an island but is now connected to the east shore by a narrow neck of land. Anaho Island, which is a National Wildlife Refuge, has been the nesting grounds for much of the bird life in the area. As the lake recedes, Anaho Island grows larger; and if the recession continues, it will soon be connected to the east shore much like Pyramid Island. In May, 1968, the width of the channel between Anaho Island and the east shore was 1,350 feet and its maximum depth was 27 feet.

TABLE 1.—*Area of Pyramid Lake.*

(thousands of acres)

Altitude (feet)	0	1	2	3	4	5	6	7	8	9
3,880	144.3									
3,870	142.4	142.6	142.8	143.0	143.2	143.4	143.6	143.8	144.0	144.2
3,860	139.0	139.4	139.8	140.2	140.5	140.9	141.2	141.5	141.8	142.1
3,850	134.3	134.8	135.3	135.8	136.3	136.8	137.2	137.7	138.1	138.6
3,840	129.1	129.6	130.1	130.7	131.2	131.7	132.2	132.8	133.3	133.8
3,830	123.8	124.3	124.9	125.4	125.9	126.4	127.0	127.5	128.0	128.6
3,820	118.6	119.1	119.6	120.1	120.7	121.2	121.7	122.2	122.8	123.3
3,810	114.7	115.1	115.4	115.8	116.2	116.6	117.0	117.4	117.8	118.2
3,800	111.3	111.6	112.0	112.3	112.6	113.0	113.3	113.6	114.0	114.4
3,790	108.2	108.5	108.8	109.1	109.4	109.7	110.0	110.3	110.7	111.0
3,780	105.9	106.1	106.3	106.6	106.8	107.0	107.2	107.4	107.7	108.0
3,770	103.7	103.9	104.1	104.4	104.6	104.8	105.0	105.2	105.5	105.7
3,760	101.5	101.7	101.9	102.2	102.4	102.6	102.8	103.0	103.3	103.5
3,750	99.3	99.5	99.7	100.0	100.2	100.4	100.6	100.8	101.1	101.3
3,740	97.1	97.3	97.5	97.8	98.0	98.2	98.4	98.6	98.9	99.1
3,730	94.9	95.1	95.3	95.6	95.8	96.0	96.2	96.4	96.7	96.9
3,720	92.6	92.8	93.1	93.3	93.5	93.8	94.0	94.2	94.4	94.7
3,710	90.3	90.5	90.8	91.0	91.2	91.4	91.7	91.9	92.1	92.4
3,700	87.8	88.0	88.3	88.6	88.8	89.0	89.3	89.6	89.8	90.0
3,690	85.2	85.5	85.7	86.0	86.2	86.5	86.8	87.0	87.3	87.5
3,680	82.6	82.9	83.1	83.4	83.6	83.9	84.2	84.4	84.7	84.9
3,670	79.9	80.2	80.4	80.7	81.0	81.2	81.5	81.8	82.1	82.3
3,660	76.6	76.9	77.3	77.6	77.9	78.2	78.6	78.9	79.2	79.6
3,650	73.1	73.4	73.8	74.2	74.5	74.8	75.2	75.6	75.9	76.2
3,640	69.4	69.8	70.1	70.5	70.9	71.2	71.6	72.0	72.4	72.7
3,630	65.7	66.1	66.4	66.8	67.2	67.6	67.9	68.3	68.7	69.0
3,620	62.1	62.5	62.8	63.2	63.5	63.9	64.3	64.6	65.0	65.3
3,610	58.9	59.2	59.5	59.9	60.2	60.5	60.8	61.1	61.5	61.8
3,600	55.7	56.0	56.3	56.7	57.0	57.3	57.6	57.9	58.3	58.6
3,590	52.5	52.8	53.1	53.5	53.8	54.1	54.4	54.7	55.1	55.4
3,580	49.7	50.0	50.3	50.5	50.8	51.1	51.4	51.7	51.9	52.2
3,570	47.0	47.3	47.5	47.8	48.1	48.4	48.6	48.9	49.2	49.4
3,560	44.2	44.5	44.8	45.0	45.3	45.6	45.9	46.2	46.4	46.7
3,550	41.4	41.7	42.0	42.2	42.5	42.8	43.1	43.4	43.6	43.9
3,540	38.4	38.7	39.0	39.3	39.6	39.9	40.2	40.5	40.8	41.1
3,530	35.1	35.4	35.8	36.1	36.4	36.8	37.1	37.4	37.7	38.1
3,520	31.5	31.9	32.2	32.6	32.9	33.3	33.7	34.0	34.4	34.7
3,510	27.6	28.0	28.4	28.8	29.2	29.6	29.9	30.3	30.7	31.1
3,500	23.0	23.5	23.9	24.4	24.8	25.3	25.8	26.2	26.7	27.1
3,490	17.5	18.0	18.6	19.2	19.7	20.2	20.8	21.4	21.9	22.4
3,480	11.8	12.4	12.9	13.5	14.1	14.6	15.2	15.8	16.4	16.9
3,470	5.9	6.5	7.1	7.7	8.2	8.8	9.4	10.0	10.6	11.3
3,460	.5	1.0	1.6	2.1	2.7	3.2	3.7	4.3	4.8	5.4
3,450										0

TABLE 2.—*Volume of Pyramid Lake.*

(thousands of acre-feet)

Altitude (feet)	0	1	2	3	4	5	6	7	8	9
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

REFERENCES CITED

King, Clarence, 1878, United States geological explorations of the fortieth parallel, v. 1, Systematic geology: Washington, D.C., Govt. Printing Office, 803 p.
Russell, I. C., 1885, Geological history of Lake Lahontan, a Quaternary lake of northwestern Nevada: U.S. Geol. Survey monograph 11, 288 p.

Base from U.S. Geological Survey, 1:24,000
The Needle Rocks, Pyramid NE, Pyramid SW,
Tohakum Peak NW, Tohakum Peak SE, Dove Creek,
1964 and 1:62,500, Nixon and Sutcliffe, 1957

APPROXIMATE MEAN DECLINATION, 1971

SCALE 1:62 500
1 ½ 0 1 2 3 4 MILES
1 .5 0 1 2 3 4 KILOMETERS
CONTOUR INTERVALS 20 AND 40 FEET
DATUM IS MEAN SEA LEVEL

INTERIOR—GEOLOGICAL SURVEY, WASHINGTON, D.C.—1970—W70026

Hydrography mapped in May 1968

RECONNAISSANCE BATHYMETRY OF PYRAMID LAKE, WASHOE COUNTY, NEVADA

By
E. E. Harris

1970

For sale by U.S. Geological Survey, price 50 cents

DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

PREPARED IN COOPERATION WITH THE
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HYDROLOGIC INVESTIGATIONS
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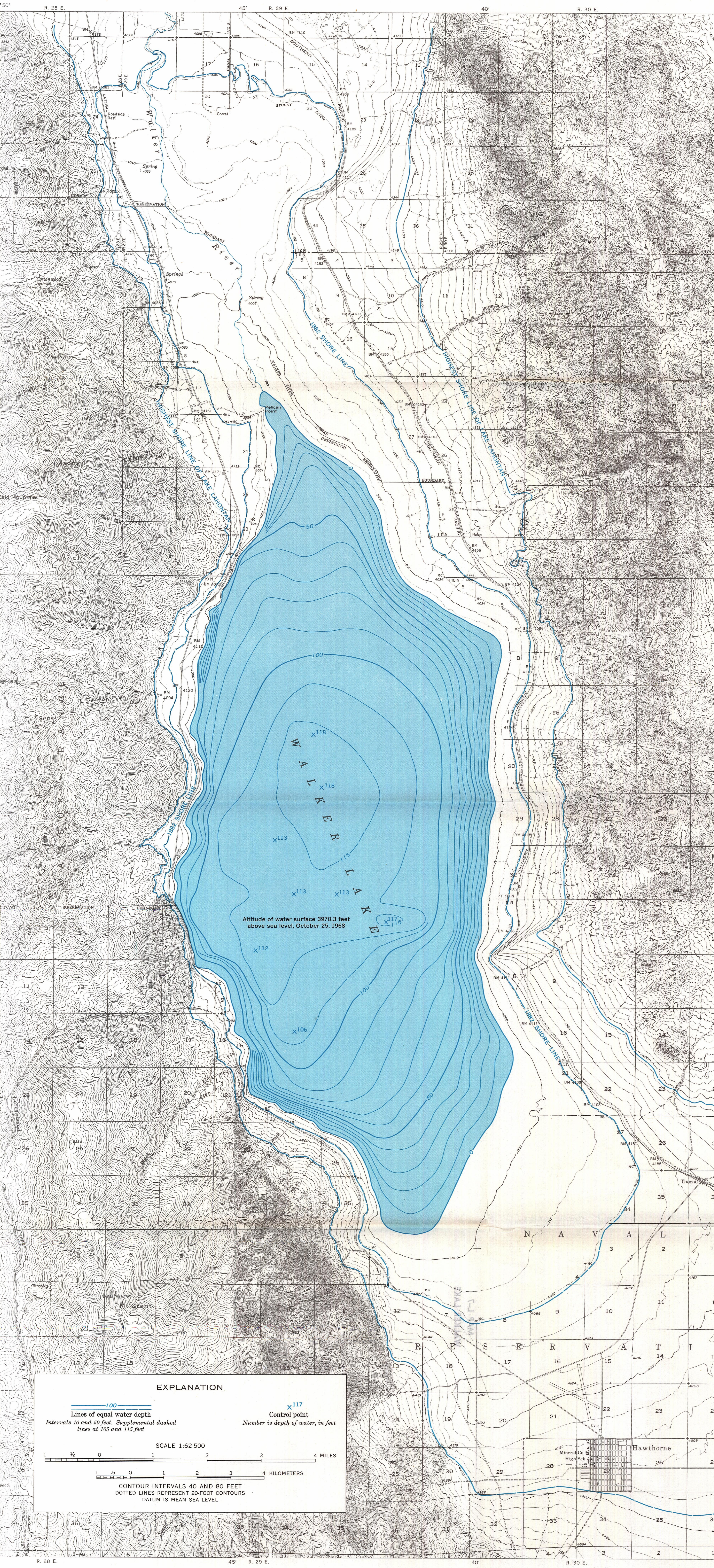

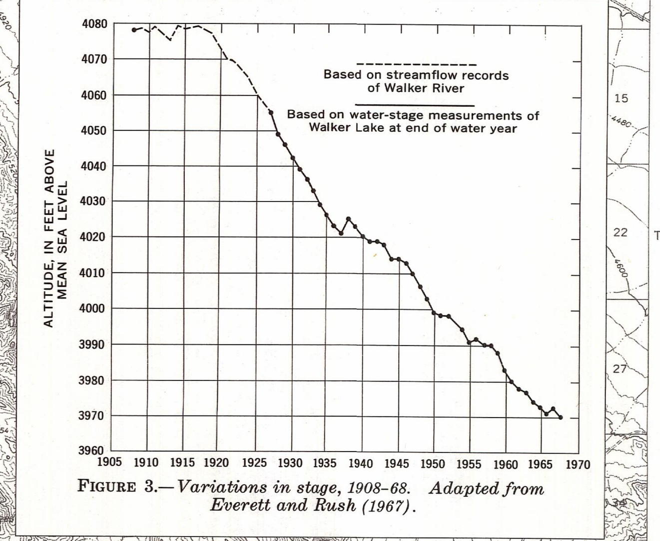

FIGURE 3.—*Variations in stage, 1908–68. Adapted from Everett and Rush (1967).*

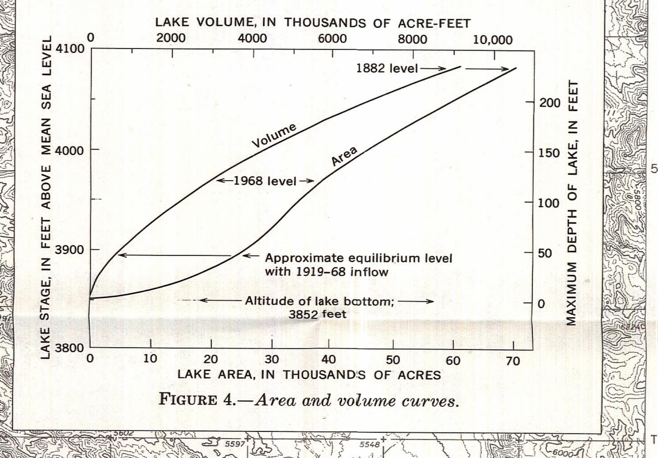

FIGURE 4.—*Area and volume curves.*

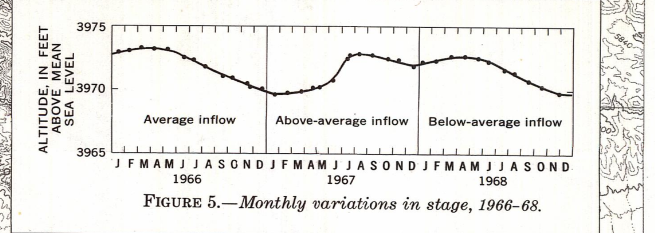

FIGURE 5.—*Monthly variations in stage, 1966–68.*

INTRODUCTION

Walker Lake is about 60 miles southeast of Carson City, Nev., as shown in figure 1. The town of Hawthorne, Nev., is near the south end of the lake. The lake is used principally for recreation—boating, water skiing, and fishing. However, there is considerable concern for the future of the lake because of its rapid stage recession. The altitude of the lake's surface has receded from about 4,083 feet in 1882 to 3,970 feet in 1968 and the surface area has decreased from nearly 69,000 acres to 38,000 acres. The maximum depth in 1968 was about 118 feet. At the present rate of recession, the lake may not reach new equilibrium until the lake level recedes another 70 feet, at which time the area might be approximately 25,000 acres and the depth 40 feet.

The purposes of this report is (1) to define the area and volume configurations of the lake and (2) to show the effects of recession processes on lake stage, area, volume, and dissolved-solids content.

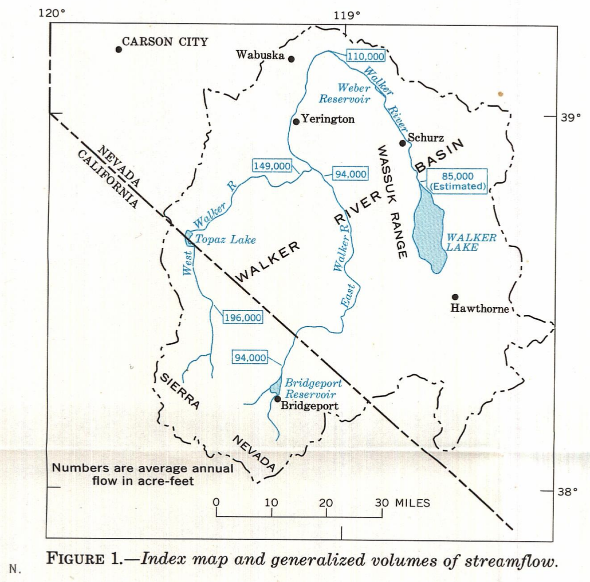

FIGURE 1.—*Index map and generalized volumes of streamflow.*

SETTING

Walker Lake is the lowest permanent body of water in the Walker River Basin (fig. 1), one of the 14 hydrographic regions of Nevada (Rush, 1968) and part of the Great Basin. The Walker River Basin, which includes about 4,000 square miles of Nevada and California, is drained mostly by Walker River and its two principal tributaries, East and West Walker Rivers. Most of the streamflow originates in the Sierra Nevada of California. Between the water-source areas and Walker Lake the flow is greatly reduced by diversions for irrigation and seepage losses to the ground-water system.

Within the basin, the Sierra Nevada rises to a maximum altitude of 12,440 feet, with crests commonly above 10,000 feet. Topaz Lake (fig. 1), on the West Walker River, has a surface altitude of 4,978 feet; Bridgeport Reservoir on the East Walker River, 6,427 feet. The confluence of East and West Walker Rivers is at an altitude of 4,490 feet; Weber Reservoir spillway, on the Walker River, is at 4,204 feet. The surface of Walker Lake on October 25, 1968, was at an altitude of 3,970.3 feet, the reference datum and stage for this report.

Almost all the streamflow in the basin is derived from precipitation. Precipitation in the basin is greatest in the Sierra Nevada, where the average annual quantity is as much as 50 inches. At Bridgeport, Calif., the average annual precipitation is about 13 inches. Yerington, Nev., and Hawthorne receive an average of about 5 inches per year. The estimated average annual precipitation on the lake is 4 inches (Everett and Rush, 1967, p. 7). Figure 1 shows the generalized distribution of streamflow at selected points.

BASIC DATA

Bathymetric soundings at 877 points were made in July 1957 by the Department of the Navy, Twelfth Naval District, San Bruno, Calif. The lake surface in July 1957 was 3,991.2 feet above sea level. To adjust the data to the 1968 level, 20.9 feet was subtracted from the 1957 data, and the water depths were rounded to the nearest foot.

Lake-stage data have been collected by the U.S. Geological Survey in cooperation with the Nevada Department of Conservation and Natural Resources, beginning in 1908 (no record for period 1909–26), and are published in the following Geological Survey publications.

Period	*Publication*
1908, 1927–50	Water-Supply Paper 1314, Part 10
1950–60	Water-Supply Paper 1734, Part 10
1960–64	Surface Water Records of Nevada, 1961, 1962, 1963, and 1964
1964–68	Water Resources Data for Nevada, 1965, 1966, 1967, and 1968

The summary of streamflow for the Walker River Basin is based on data also published in the above publications, and on interpretations by Everett and Rush (1967, p. 26), and Lamke and Moore (1965, table 1). Lake-stage data prior to 1908 are from Harding (1965, p. 143–150) and Russell (1885, p. 70).

LAKE AREA AND STAGE

Walker Lake, together with Pyramid and Honey Lakes, are remnants of Lake Lahontan, a larger Quaternary age lake. According to Snyder and others (1964), Lake Lahontan had a maximum area of 8,665 square miles, mostly in northwestern Nevada, and was sustained by a 42,322-square-mile drainage basin. The lake's maximum surface altitude was about 4,380 feet. Walker Lake now occupies part of what was the southernmost arm of Lake Lahontan.

The deepest part of Lake Lahontan was at the present site of Pyramid Lake (100 miles northwest of Walker Lake), where the maximum depth was about 920 feet (Harris, 1970). At the present location of Walker Lake, as well as on the Carson, Smoke Creek, and Black Rock Deserts (broad alluvial areas north of Walker Lake), the maximum depth of water was about 530 feet. With increased dryness, water levels receded, and Walker River Basin became hydrologically isolated from Lake Lahontan.

Figure 2 shows a generalized interpretation of long-term fluctuations in precipitation, starting with the year 800 A.D. Until 1810, the wet periods generally were longer and had greater departures from average conditions than dry periods. This suggests that Walker Lake may have remained at a rather high level prior to 1810. A drought period, 1810 to 1860, was followed by a wet period from about 1860 to 1920.

Figure 3 indicates the wet period probably ended about 1918. Morrison (1964, p. 106) described the climate of the area as being very dry in the 1840's, and abnormally wet from 1850 to 1923. The author, therefore, concludes that during the first part of the 19th century, the lake stage probably receded, and thereafter the stage probably rose to a maximum late in the century. Harding (1965, p. 145) indicated that the lake stage may have been as low as 4,035 feet above sea level in 1845, and that it then rose to about 4,082 feet in 1862 and 4,089 in 1868. The levels in 1862 and 1868 were based by Harding on information that the Indian Agent's home and agricultural lands at Schurz, Nev., (fig. 1) were flooded by a rising Walker Lake. James Long, Bureau of Indian Affairs, Stewart, Nev. (oral commun., 1969), after reviewing Bureau documents for that period concluded that (1) the Indian Agent's home was situated at an altitude of about 4,200 feet in the area now occupied by Weber Reservoir (fig. 1), which was the principal area of agricultural development prior to construction of the Weber Reservoir dam, and therefore at least 5 miles from Walker Lake and (2) the Indian Agent's home and garden probably were flooded by Walker River due to rapid spring and summer snowmelt in the Sierra Nevada, rather than by Walker Lake.

By 1882 the water level of Walker Lake was at an altitude of about 4,083 feet, as computed from data presented by Russell (1885, pl. 15) and using the Navy's bathymetric data as altitude control. Harding (1965, p. 143) computed a lake-surface altitude of 4,086 feet on the basis of Russell's data. Russell reported a maximum sounded depth of 225 feet, but unknown to him and Harding, this was not at the deepest part of the lake, as determined from the Navy's bathymetric data. In 1882, the lake probably had a maximum depth of 231 feet, an area of about 68,600 acres, and a volume of about 9,000,000 acre-feet (fig. 4).

In 1908, the U.S. Geological Survey made the first of a series of lake-stage observations, at which time the altitude of the lake surface was 4,078 feet, or 5 feet lower than the 1882 stage. The next known observation was not made until 1927, but by that time the lake level had receded 23 feet to an altitude of 4,055 feet. Because a wet period in the Sierra Nevada continued through most of the intervening 20 years (fig. 2). much of the recession probably was caused by large-scale river diversions for irrigation. From about 1918 to 1968, the trend in stage has been a marked recession, averaging about 2 feet per year. Figure 3 shows lake stage for the period 1908–68.

The general stage recession of Walker Lake during most years has been interrupted by small, short-term rises in stage. For example, figure 5 shows monthly stage data for 1966–68, a 3-year period that included above-average, near-average, and below-average inflow.

WATER BUDGET

A water budget for a lake relates the various components of water inflow, outflow, and change in storage:

$$\text{Inflow} = \text{Outflow} \pm \text{Change in storage.} \quad (1)$$

For Walker Lake, where the change in storage has been an overall marked depletion, equation (1) is modified as follows:

$$I_R + I_L + I_{GW} + P = E - \Delta S, \quad (2)$$

where the elements of inflow are: I_R, inflow from Walker River; I_L, local surface-water inflow; I_{GW}, ground-water inflow; and P, precipitation directly on the lake surface. Because no known subsurface flow occurs to adjacent valleys the only element of outflow is evaporation from the lake surface, E; and ΔS is the decrease in storage of the lake associated with lake-stage recession.

An approximate average annual water budget for the lake was compiled for the period 1919–68, the 50-year period during which most of the historical recession of stage had occurred.

I_R was estimated to average about 85,000 acre-feet per year, on the basis of streamflow records for stations at Wabuska, Nev., and Schurz (fig. 1), on streamflow seepage losses and diversions, and on ground-water recharge and underflow estimated by Everett and Rush (1967).

I_L was estimated by Everett and Rush (1967, p. 9) to be 3,000 acre-feet per year. I_{GW} was computed from published information (Everett and Rush, 1967) to be about 3,000 acre-feet per year. P was computed to be about 17,000 acre-feet per year. E was computed by using figures 3 and 4, data from Harding (1965, p. 147), and data from Kohler and others (1954, pl. 1) to be about 200,000 acre-feet per year. ΔS, as computed from figures 3 and 4, was about 110,000 acre-feet per year.

Equation (2) produces the following result:

$$\begin{aligned} I_R + I_L + I_{GW} + P &= 85{,}000 + 3{,}000 + 3{,}000 + 17{,}000 \\ &= 108{,}000 \text{ acre-feet per year} \\ E - \Delta S &= 200{,}000 - 110{,}000 \\ &= 90{,}000 \text{ acre-feet per year} \\ \text{Imbalance} &= 18{,}000 \text{ acre-feet per year} \end{aligned}$$

Because of errors in estimates or unresolved hydrologic problems, the equation does not balance. Neither side of the equation was considered more accurate than the other; so the average of the two values, or about 100,000 acre-feet, was selected to approximate both inflow and outflow plus decrease in storage.

During the period 1909–18, the lake stage was nearly constant (fig. 3) and in order to maintain this high stage, average annual inflow from all sources probably was more than 250,000 acre-feet. That part entering the lake from Walker River probably was at least 80 percent of the total inflow, or at least 200,000 acre-feet per year. Inflow from Walker River during the period 1860–1908 probably was even greater, because of the previously discussed rise in lake stage.

DISSOLVED-SOLIDS CONTENT OF THE LAKE

In 1882, Russell (1885, p. 69) collected and analyzed what probably was the first sample of Walker Lake water (table 1). Because of the high stage of the lake at that time, the lake water probably had about its lowest solute concentration since the dry period of early 19th century. Not until 1930 were additional samples collected (Miller and others, 1953, p. 38).

The main factor controlling the variation in concentration of dissolved solids in the lake is the volume of lake water that dilutes the dissolved solids. The concentration of dissolved solids from 1882 to 1918 was probably similar to that sampled in 1882, because of the almost constant lake stage and volume during this period. By 1966 the lake volume had diminished by a factor of 2.9 and the dissolved-solids concentration increased by a factor of 3.4.

The total dissolved-solids content of the lake, in tons, had not changed as dramatically as the concentration, as illustrated by figure 6.

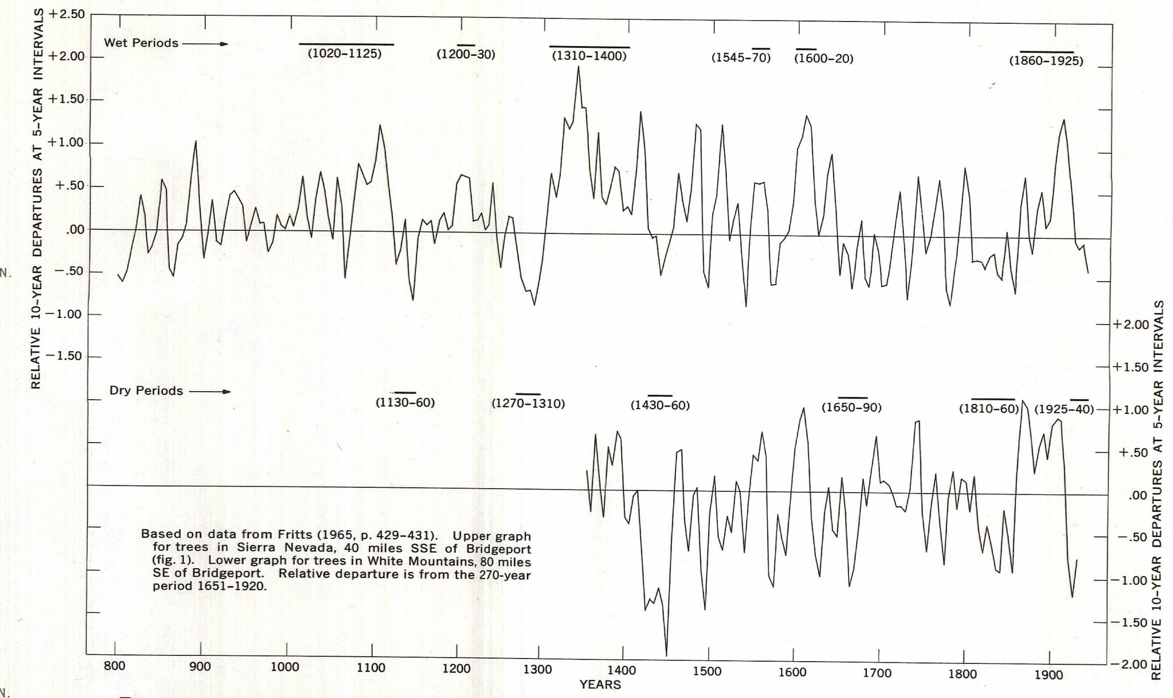

FIGURE 2.—*Generalized long-term fluctuations in precipitation as interpreted from data on dated tree-ring widths.*

A reconnaissance three-dimensional sampling survey of the lake was made by the Geological Survey on October 6, 1965, during which 28 samples were collected. On the basis of these data, the principal conclusions regarding the lake and its inflow at that time are as follows: (1) The lake was almost homogeneous chemically; for example, the chloride concentrations ranged from 2,020 mg/l (milligrams per liter), near the mouth of Walker River, to 2,240 mg/l. Only calcium varied appreciably; it ranged from about 2 to about 9 mg/l. (2) Water temperature decreased with water depth, as illustrated in figure 7.

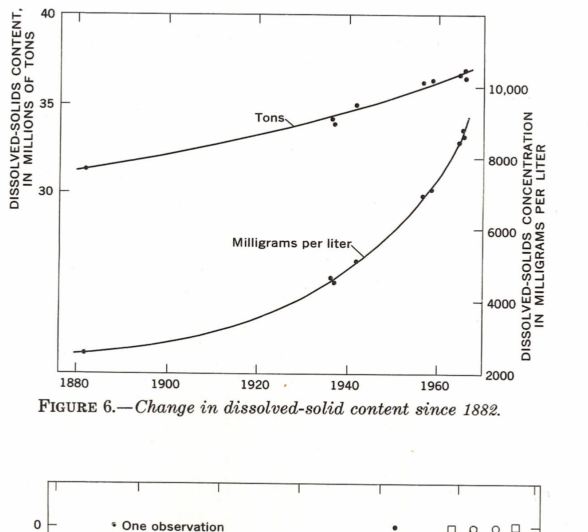

FIGURE 6.—*Change in dissolved-solid content since 1882.*

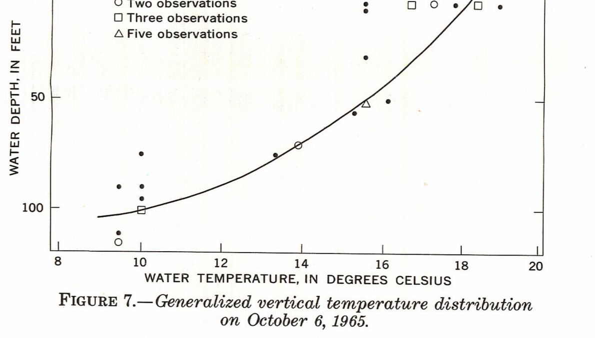

FIGURE 7.—*Generalized vertical temperature distribution on October 6, 1965.*

OUTLOOK FOR THE FUTURE

To maintain Walker Lake at its 1968 stage of 3,970 feet above sea level, an average annual inflow from Walker River of nearly 140,000 acre-feet would have to be sustained. This would provide a lake having a volume of about 3 million acre-feet and an area of about 38,000 acres, as shown in figure 4. Since 1918 the average annual inflow from the river has been about 85,000 acre-feet; obviously, present-day inflow will not be enough to maintain the present lake stage, area, and volume. The lake stage, therefore, will continue to recede until average annual evaporation is decreased enough to balance, rather than exceed, the average annual inflow from all sources. For example, if the inflow of Walker River to the lake is sustained at its present long-term average rate (about 85,000 acre-feet per year), equilibrium would be reached when the lake had an area of roughly 25,000 acres, a stage of about 3,896 feet above sea level, and a volume of about 600,000 acre-feet. This equilibrium stage would be some 70 feet below the 1968 stage and the maximum depth of the lake would be only about 40 feet, compared to a 1968 depth of 118 feet. When general equilibrium is reached, lake stage would continue to fluctuate in a narrow range related to annual variations in inflow.

Projecting the slope of the stage curve in figure 3, the estimated equilibrium stage (3,896 feet) would be reached between the years 2010 and 2060. Because upstream irrigation demands may increase, the average annual inflow from Walker River may decrease, thereby hastening the recession of the lake and consequently lowering its equilibrium level.

What will be the future dissolved-solids content of Walker Lake? The obvious answer is larger tonnages and high concentrations. Projecting trends shown in figure 6, the anticipated amount of dissolved solids at the estimated equilibrium stage (3,896 feet) may be about 40 million tons, and the dissolved-solids concentration would be nearly 50,000 mg/l.

REFERENCES

Everett, D.E., and Rush, F.E., 1967, A brief appraisal of the water resources of the Walker Lake area, Mineral, Lyon, and Churchill Counties, Nevada: Nevada Dept. Conserv. and Nat. Resources, Water Resources-Reconn. Ser. Rept. 40, 44 p.

Fritts, H. C., 1965, Tree-ring evidence for climatic changes in western North America: Monthly Weather Review, v. 93, no. 7, p. 421–443.

Harding, S.T., 1965, Recent variations in the water supply of the western Great Basin: Calif. Univ. Water Resources Center Archives, Archives Ser. Rept. no. 16, 225 p.

Harris, E. E., 1970, Reconnaissance bathymetric map of Pyramid Lake, Washoe County, Nevada: U.S. Geol. Survey, Hydrol. Inv. Atlas, HA-379.

Kohler, M.A., and others, 1959, Evaporation map of the United States: U.S. Weather Bureau Tech. Paper no. 37, 13 p.

Lamke, R.D., and Moore, D.O., 1965, Interim inventory of surface-water resources of Nevada: Nevada Dept. Conserv. and Nat. Resources, Water Resources Bull. 30, 39 p.

Miller, M.R., and others, 1953, Irrigation waters of Nevada: Nevada Univ. Agr. Expt. Sta. Bull. no. 187, 63 p.

Morrison, R.B., 1964, Lake Lahontan: Geology of southern Carson Desert, Nevada: U.S. Geol. Survey Prof. Paper 401, 156 p.

Rush, F.E., 1968, Index of hydrographic areas in Nevada: Nevada Dept. Conserv. and Nat. Resources, Div. Water Resources, Water Resources-Inf. Ser. Rept. 6, 38 p.

Russell, I.C., 1885, Geological history of Lake Lahontan, a Quaternary lake of northwestern Nevada: U.S. Geol. Survey Mon. 11, 288 p.

Snyder, C.T., Hardman, George, and Zdenek, F.F., 1964, Pleistocene lakes in the Great Basin: U.S. Geol. Survey Misc. Geol. Inv. Map I-416.

U.S. Geological Survey, 1960, Compilation of records of surface water of the United States through September 1950; part 10, the Great Basin: U.S. Geol. Survey Water-Supply Paper 1314, 485 p.

———1963, Compilation of records of surface water of the United States, Oct. 1950–Sept. 1960; part 10, the Great Basin: U.S. Geol. Survey Water-Supply Paper 1734, 318 p.

———1961–64, Surface water records for Nevada: U.S. Geol. Survey Ann. Reports.

———1965–68, Water resources data for Nevada: U.S. Geol. Survey Ann. Reports.

TABLE 1.—*Chemical analyses of Walker Lake water.*
[Constituents in milligrams per liter, except as indicated; analyses by U.S. Geological Survey.]

Date of collection	September 1882	February 18, 1966
Water temperature (°C)	----	5
Silica (SiO_2)	----	.5
Calcium (Ca)	27	4.2
Magnesium (Mg)	39	124
Sodium (Na)	858	3,040
Potassium (K)	----	160
Bicarbonate (HCO_3)	----	1,640
Carbonate (CO_3)	----	486
Sulfate (SO_4)	528	1,930
Chloride (Cl)	588	2,020
Fluoride (F)	----	20
Boron (B)	----	21
Dissolved solids (calculated)	[a]2,560	8,610
Hardness as $CaCO_3$	228	520
Specific conductance (micromhos per cm at 25°C)	----	12,100
pH	----	9.3

[a]Estimated.

HYDROLOGIC REGIMEN OF WALKER LAKE, MINERAL COUNTY, NEVADA

By
F. Eugene Rush

1970

Base from U.S. Geological Survey Hawthorne, 1955; Mt. Grant, 1956; and Gillis Canyon and Schurz, 1964

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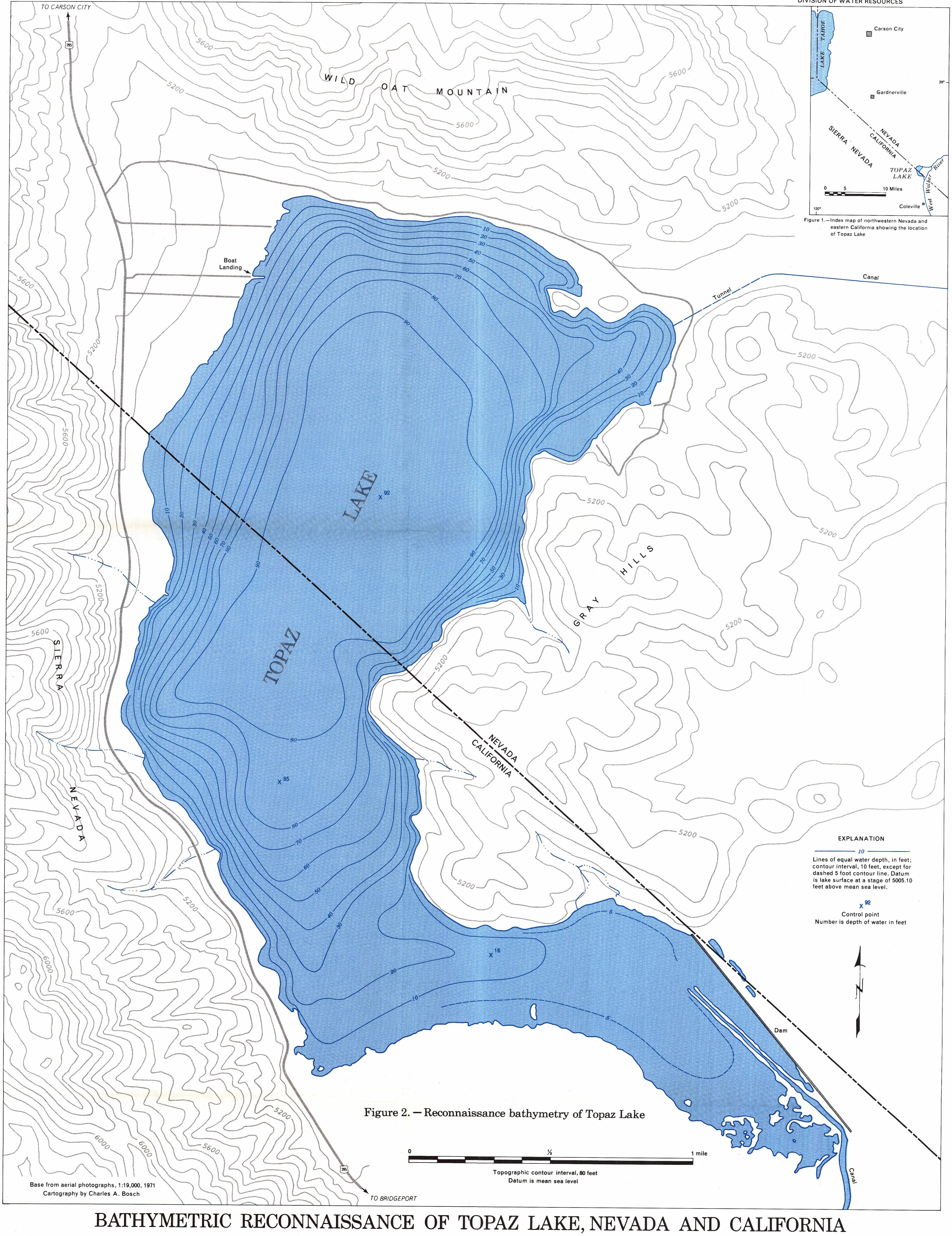


Figure 2. —Reconnaissance bathymetry of Topaz Lake

BATHYMETRIC RECONNAISSANCE OF TOPAZ LAKE, NEVADA AND CALIFORNIA

By
F. Eugene Rush
and
Victor R. Hill
1972

INTRODUCTION

Topaz Lake is 36 miles south-southwest of Carson City, Nevada, on the California-Nevada State line, as shown in figure 1. The valley in which the lake lies is a topographically closed basin, having an area of about 14 square miles. Mountains surround the valley floor on all but the southeast side, where the topographic divide is lowest. Here the divide is a narrow, but flat alluvial surface at an altitude of about 5,000 feet. The lowest point on the valley floor, the lake bottom, is at an altitude of 4,913 feet.

The mountains on the west are the timber-covered Sierra Nevada that locally reach an altitude of nearly 9,000 feet. The sagebrush- and piñon pine-covered mountain on the north and the sagebrush-covered mountains on the east have altitudes generally less than 6,000 feet.

Under native conditions, a small lake named Alkali Lake occupied the central part of the valley floor. This lake was sustained at a generally low stage by runoff from within the basin. It is physically possible that the West Walker River, south of the basin, could have changed course from time to time and flowed into Topaz Lake basin, across the alluvial part of the divide, described above. Inflow would have stopped when the lake began to spill southeastward out of the basin across the area now occupied by the low dam (fig. 2). Whether this actually happened is not known.

Beginning in 1921, water from the West Walker River was conveyed in a feeder canal across the low alluvial part of the divide to the basin, forming a storage reservoir. The enlarged body of water, which covered most of the valley floor, was renamed Topaz Lake. Stored water is released at the northeast end of the lake through a 1,200-foot long tunnel and a canal which conveys water back to the West Walker River. All water released from the lake passes through the tunnel, because there is no spillway. Downstream, the released water is used principally for irrigation by the Walker River Irrigation District, the developer of Topaz Lake.

The lowest practical lake stage at which water can be released through the tunnel is 4,972.3 feet, which leaves 59 feet of lake depth as dead storage. Releasable storage prior to 1937 was about 45,000 acre-feet. In that year, construction of a dam at the southeast end of the lake (fig. 2) increased this volume to a reported 59,440 acre-feet at a stage of 5,005.0 feet, the maximum operating stage of the lake.

In addition to being used for storage of irrigation water, Topaz Lake is used to an increasing extent for boating and fishing. However, the general absence of sandy beaches probably is discouraging to many potential recreational users.

Variations in lake stage are summarized in figure 3. At the time of the bathymetric survey, the stage of the lake was 5,005.10 feet, or about at its maximum operating stage.

BATHYMETRY

A continuously recording, electronic fathometer was used to measure the depth of Topaz Lake, during 19 traverses. The results of the survey are summarized in figures 2 and 4. The dimensions of the lake at the time of the survey, for the extremes and average in stage for the period 1922-71, and of the unreleasable pool, are summarized in table 1.

In 1940, the U.S. Geological Survey determined the stage-volume relation. The 1971 bathymetric survey produced virtually identical results.

Table 1.--*Dimensions of Topaz Lake at various stages*

Time or condition	Dimension: Depth (feet)	Stage (feet)	Area (acres)	Volume (acre-feet)	Releasable storage (acre-feet)
Time of survey in June 1971	92	5,005.10	2,400	125,000	60,000
Maximum stage	92	5,005.35	2,410	126,000	61,000
Minimum stage	59	4,972.25	1,500	65,000	0
Average stage	76	4,988.90	1,800	92,000	27,000
Maximum stage of unreleasable pool	59	4,972.30	1,500	65,000	0

Other bathymetric surveys have been completed or are planned, as follows:

Lake or Reservoir	*Publication*
Pyramid Lake - - - - - - - - -	USGS HA-379
Walker Lake - - - - - - - - -	USGS HA-415
Lahontan Reservoir - - - - - -	Nev. DWR Info. Ser. 9
Big and Little Washoe Lakes -	Nev. DWR Info. Ser. 10
Big and Little Soda Lakes - -	Nev. DWR Info. Ser. 11
Topaz Lake - - - - - - - - - -	Nev. DWR Info. Ser. 12
Rye Patch Reservoir and Upper and Lower Pitt-Taylor Reservoirs - - - - - - - - -	Nev. DWR Info. Ser. 13
Marlette and Spooner Lakes - -	Nev. DWR Info. Ser. 14
Weber Reservoir - - - - - - -	Nev. DWR Info. Ser. 15
Wild Horse Reservoir - - - - -	Nev. DWR Info. Ser. 16

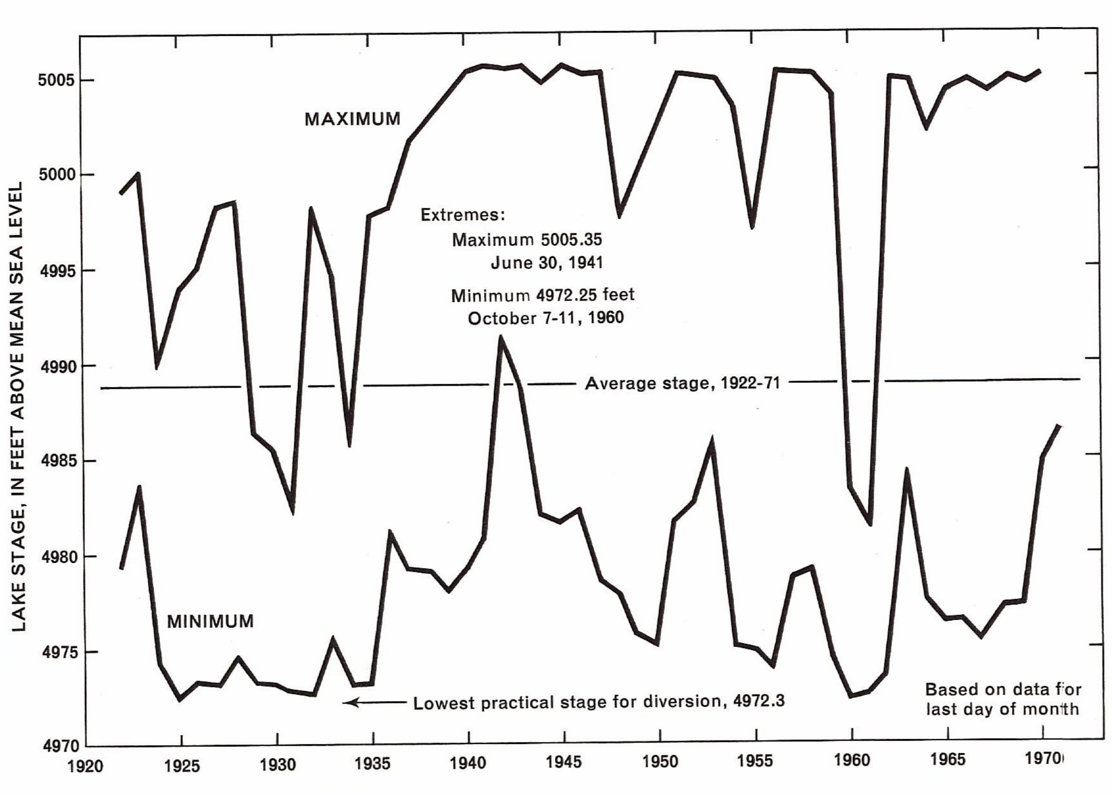


Figure 3.--Variations in stage of Topaz Lake

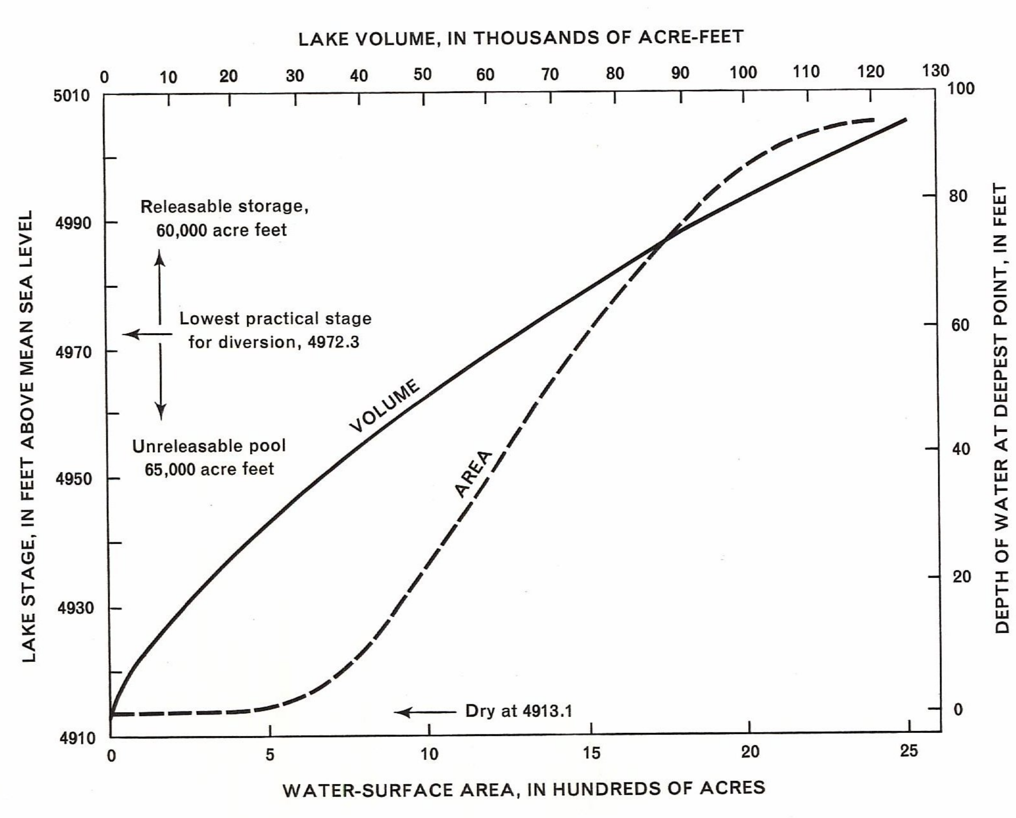


Figure 4.--Stage-area-volume relations for Topaz Lake

INTRODUCTION

Rye Patch, Upper Pitt-Taylor, and Lower Pitt-Taylor Reservoirs are 110 miles northeast of Reno, Nev., and about 35 miles north of Lovelock, Nev. (fig. 1). The reservoirs are on the narrow alluvial floor of a north-trending segment of the Humboldt River Basin at an altitude of about 4,100 feet.

The principal source of water for the reservoirs is snowmelt in the mountains of north-central and northeastern Nevada. The Humboldt River Basin has an area of about 17,000 square miles, of which 95 percent is tributary to the reservoirs. The Humboldt River flows westward and southwestward across northern Nevada to the reservoir sites. Rye Patch Reservoir is an on-channel reservoir, but Upper Pitt-Taylor Reservoir receives water through a canal extending from the Humboldt River; diversion is about 12 miles upstream. Lower Pitt-Taylor Reservoir is filled from Upper Pitt-Taylor Reservoir. To drain the Pitt-Taylor Reservoirs, water is released from the upper reservoir to the lower reservoir, and then to Rye Patch Reservoir. Releases of water from Rye Patch Reservoir are used for irrigation of land near Lovelock (fig. 1), as described by Everett and Rush (1965).

Flow of the Humboldt River a few miles above Rye Patch Reservoir is measured by the Geological Survey at the station, Humboldt River near Imlay, and is summarized in figure 2. The relatively small amount of water diverted to the Pitt-Taylor Reservoirs (fig.3) is not included in these amounts. Outflow from the reservoirs also is measured by the Geological Survey just below the dam at the station, Humboldt River near Rye Patch.

Irrigation near Lovelock began in 1862; however, full-season water supply was not available because of the erratic natural flow of the Humboldt River. In 1909, work was begun by the Humboldt-Lovelock Irrigation Light & Power Co. on construction of the Pitt-Taylor Reservoirs, named for two of the principals in the company. The design capacity of the reservoir system, to be used for power, irrigation, and domestic use, was 57,000 acre-feet. Water was first turned into the reservoirs in November 1912 when the completed capacity was 30,000 acre-feet. In 1915, levees and dams were raised to 19 feet for the upper reservoir and to 38 feet for the lower reservoir to increase storage capacity to 50,000 acre-feet. In 1935 the upper reservoir has a rated capacity of 29,000 acre-feet and the lower reservoir, 21,000 acre-feet. The reservoir system was sold to the Pershing County Water Conservation District in 1947. Figure 3 shows the diversions to the reservoirs.

Rye Patch Dam construction was begun by the U.S. Bureau of Reclamation in 1935 and was completed and water impoundment began in the following year. The dam is an earth-fill, rock-faced structure with a structural height of 75 feet, a hydraulic height of 63 feet, a crest length of 914 feet, and a volume of 356,000 cubic yards (U.S. Bur. Reclamation, 1961, p. 261-265). The design capacity is 190,000 acre-feet when 12-inch flashboards are in place on top of the spillway gates and the reservoir is full at a stage of 4,134.0 feet above mean sea level. The reservoir is used to some extent for fishing and boating, but its principal use is for storage of irrigation water.

Figure 4 shows the variation in the stage of Rye Patch Reservoir, since its construction. By comparing this graph to water-diversion data for the Pitt-Taylor Reservoirs (fig. 3), it can be seen that since about 1940, water is put into the Pitt-Taylor Reservoirs only during periods when supplemental storage for Rye Patch Reservoir is needed. There are three reasons for this: (1) Pitt-Taylor Reservoirs are less efficient than Rye Patch Reservoir for storage because of their generally lower ratio of stored-water volume to evaporation, as shown in figure 5; (2) water stored in the Pitt-Taylor Reservoirs leaches salts from the reservoir beds, reducing the quality of the stored water, whereas the quality of water stored in Rye Patch Reservoir remains better; and (3) in case of earthquake, Rye Patch Reservoir is considered by the Pershing County Water Conservation District to be a safer reservoir because of higher quality of its dam's design.

To convert staff gage readings to reservoir stage, in feet above mean sea level, the following factors should be added to the staff gage readings: Upper Pitt-Taylor Reservoir, 4,098.0 feet and Lower Pitt-Taylor Reservoir, 4,099.6 feet. These factors are based on the assumption that the stage values, in feet above mean sea level, for Rye Patch Reservoir are essentially correct. These relations were determined during this study by running levels between reservoir water surfaces. Prior to this survey, slightly different factors for the Pitt-Taylor Reservoirs were used by the reservoir operators.

The quality of water released from Rye Patch Reservoir is summarized in table 1.

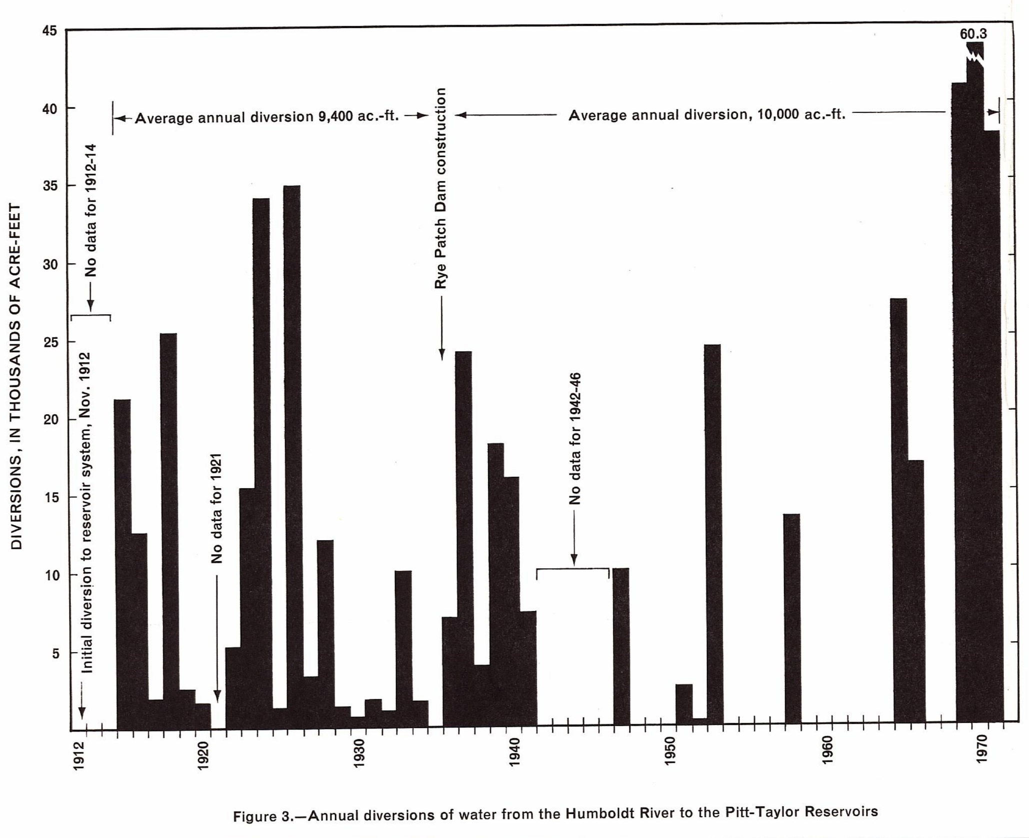


Figure 3.—Annual diversions of water from the Humboldt River to the Pitt-Taylor Reservoirs

MATCH TO NORTHERN PART OF RESERVOIR (See front)

Other bathymetric surveys have been completed or are planned, as follows:

Lake or Reservoir	*Publication*
Pyramid Lake - - - - - - - - - - - - -	USGS HA-379
Walker Lake - - - - - - - - - - - - -	USGS HA-415
	Nev. DWR
Lahontan Reservoir - - - - - - - - -	Info. Ser. 9
Big and Little Washoe Lakes - -	Info. Ser. 10
Big and Little Soda Lakes - - -	Info. Ser. 11
Topaz Lake - - - - - - - - - - - - -	Info. Ser. 12
Rye Patch Reservoir and Upper and Lower Pitt-Taylor Reservoirs - - - - - - - - - - -	Info. Ser. 13
Marlette and Spooner Lakes - - -	Info. Ser. 14
Weber Reservoir - - - - - - - - - -	Info. Ser. 15
Wildhorse Reservoir - - - - - - - -	Info. Ser. 16

Table 1.--*Summary of water-quality data for Rye Patch Reservoir*

[At gaging station 1,000 feet below Rye Patch Dam]

Constituent	Concentration range (in milligrams per liter unless otherwise specified)
Water year 1970 (9 samples)	
Discharge when sample collected	13-694 cfs
Temperature	36-71°F 2.2-21.5°C
Silica	33-36
Calcium	38-45
Magnesium	15-16
Sodium	125-135
Potassium	16-18
Bicarbonate	296-312
Carbonate	0-8
Sulfate	72-87
Chloride	86-106
Fluoride	0.8-1.1
Nitrate	0.0-0.2
Boron	260-580 μg/l
Dissolved solids	562-604
Hardness	161-174
Specific conductance	893-950 micromhos
pH	7.7-8.5
Total phosphorus (as PO_4)	0.27-0.65
Aldrin, DDD, DDT, dieldrin, endrin, heptachlor, heptachlor epoxide, lindane, 2,4-D, 2,4,5-T, chlordane	0.00 μg/l
Silvex	0.01-0.06 μg/l
Period of record	
Specific conductance, (1951-58, 1959-61, 1962-69):	
Maximum daily	4,010 micromhos on Sept. 2, 1954
Minimum daily	384 micromhos on June 24, 1956
Water temperature:	
Maximum (1951-54, 1956-58, 1959-61, 1962-68)	78°F(25.5°C) on Sept. 21, 1958
Minimum (1951-54, 1956-58, 1959-61, 1962-67, 1968-69)	33°F(0.5°C) on many winter days

BATHYMETRY

A continuously recording, electronic fathometer was used to measure water depth on each of the 43 traverses of Rye Patch Reservoir, 21 traverses of Upper Pitt-Taylor Reservoir, and 16 traverses of Lower Pitt-Taylor Reservoir, in June 1971. The results of the surveys are summarized in figures 5, 6, 7, 8, and 9. Dimensions of the reservoirs at reference stages used in figures 5, 6, 7, 8, and 9 are summarized in table 2.

Table 2.--*Dimensions of the reservoirs when full*[1]

Dimension	Rye Patch Reservoir	Pitt-Taylor Reservoirs Upper	Pitt-Taylor Reservoirs Lower
Stage, in feet above mean sea level	4,134	4,158	4,147
Staff gage, in feet	--	60.0	47.4
Maximum depth, in feet	61.5	17.5	26
Area, in acres	11,400	2,070	2,570
Volume, in acre-feet	171,000	24,200	22,200
Limit of drawdown when down-system reservoir is at maximum stage:			
Stage, in feet above mean sea level	- no limit -	4,147	4,134
Maximum depth, in feet		6.5	13
Area, in acres		1,360	360
Volume, in acre-feet		4,800	1,600

1. Pershing County Water Conservation District and the State Engineer may consider the Pitt-Taylor Reservoirs to be full at stages other than those listed in this table.

SEDIMENTATION

The extent of sedimentation within Rye Patch Reservoir has been estimated by two methods: (1) the computed reduction in reservoir storage since the reservoir was formed, and (2) by estimating the amount of sediment fill on the reservoir bottom.

In 1936, the Bureau of Reclamation (1961, p. 261) computed that the reservoir, at a stage of 4,134 feet, had a storage capacity of 190,000 acre-feet. The results of the bathymetric survey of 1971 indicated a capacity of 171,000 acre-feet, or 19,000 acre-feet less. The difference in estimates may be the result of sedimentation, small errors in storage estimates, or both.

Comparing the bathymetric data of 1971 to an unpublished Bureau of Reclamation topographic map of the reservoir site compiled in 1934, sedimentation of from 1 to 5 feet along the axis of the reservoir is indicated. Figure 6 shows supplemental (dashed) contours that represent the configuration of the reservoir bottom in 1934 as compared to 1971 findings (the solid-line contours). The sedimentation, based on this comparison, is estimated to be on the order of 16,000 acre-feet. Sources of sediment would be the inflow of the Humboldt River and the collapse of vertical banks of the reservoir at high stage, as observed during the bathymetric study. This collapse has apparently enlarged the water-surface area of the reservoir from about 11,100 acres, when the reservoir was formed, to its 1971 area of 11,400 acres at a 4,134-foot stage.

From the two methods of estimating sedimentation within Rye Patch Reservoir, it is concluded that between 15,000 and 20,000 acre-feet of sediment has been deposited during the period 1936-71, or between about 30 and 40 million tons, assuming the unit weight of the deposits to be about 90 pounds per cubic foot. According to P. A. Glancy, hydrologist, U.S. Geological Survey (oral commun.), the 36-year sediment yield of the upstream 16,000-square-mile basin, in order to supply this amount to the reservoir from the Humboldt River, assuming a trap efficiency of nearly 100 percent, would be only about 50 to 70 tons per square mile per year. No estimates of sedimentation in the Pitt-Taylor Reservoirs have been made.

REFERENCES

Everett, D. E., and Rush, F. E., 1965, Water-resources appraisal of Lovelock Valley, Pershing County, Nevada: Nevada Dept. Conserv. and Nat. Resources, Water-Resources Reconn. Ser. Rept. 32, 40 p.

U.S. Bureau of Reclamation, 1961, Reclamation project data: U.S. Bur. Reclamation pub., 890 p.

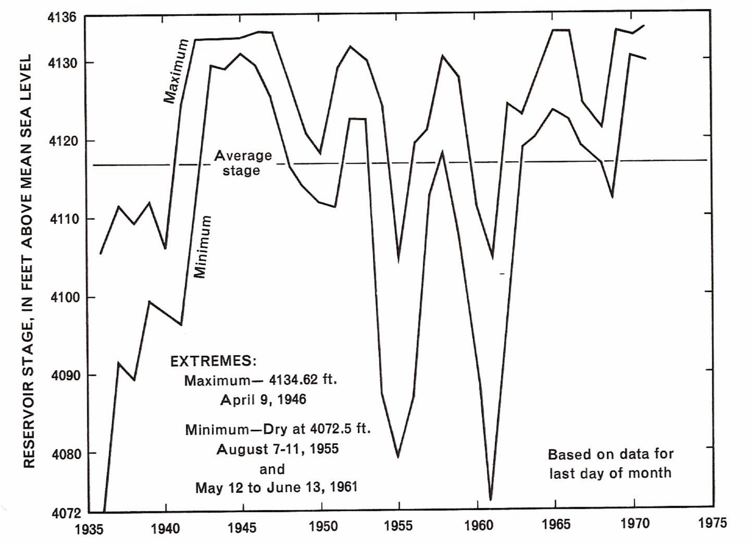


Figure 4.—Annual variation in stage of Rye Patch Reservoir

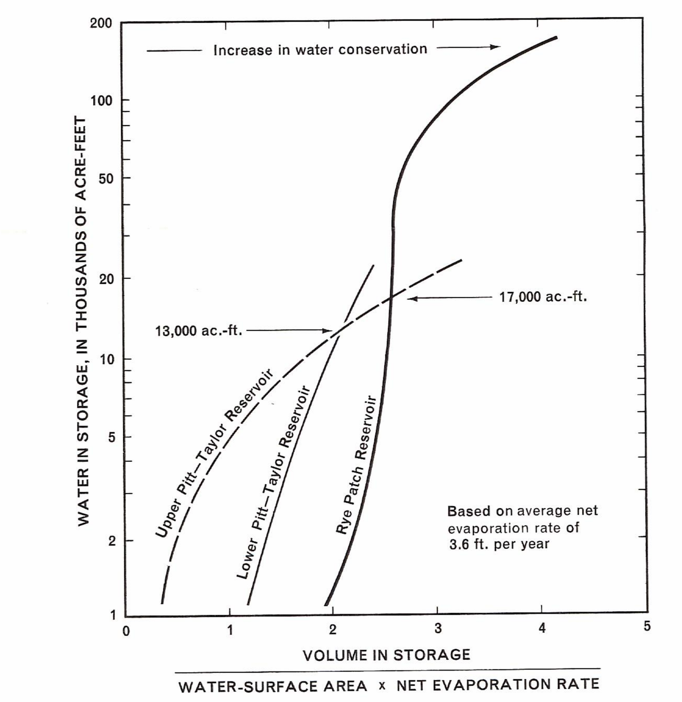


Figure 5.—Storage efficiency of the reservoirs

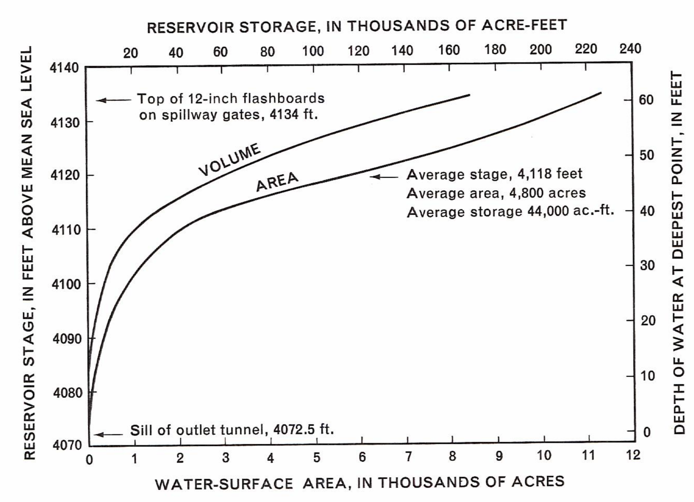


Figure 7.—Stage-area-volume relations for Rye Patch Reservoir, June 1971

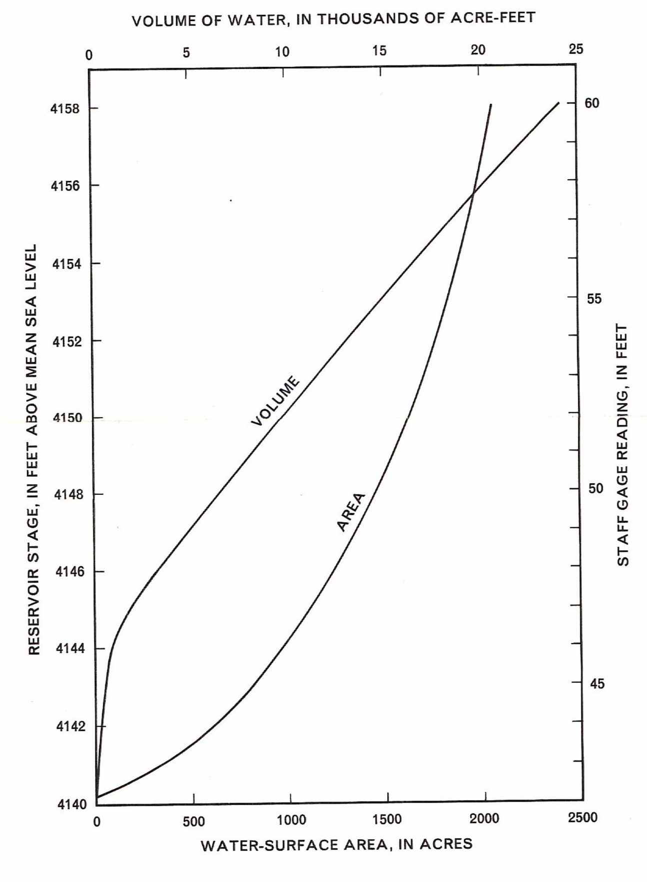


Figure 8.—Stage-area-volume relation for Upper Pitt-Taylor Reservoir

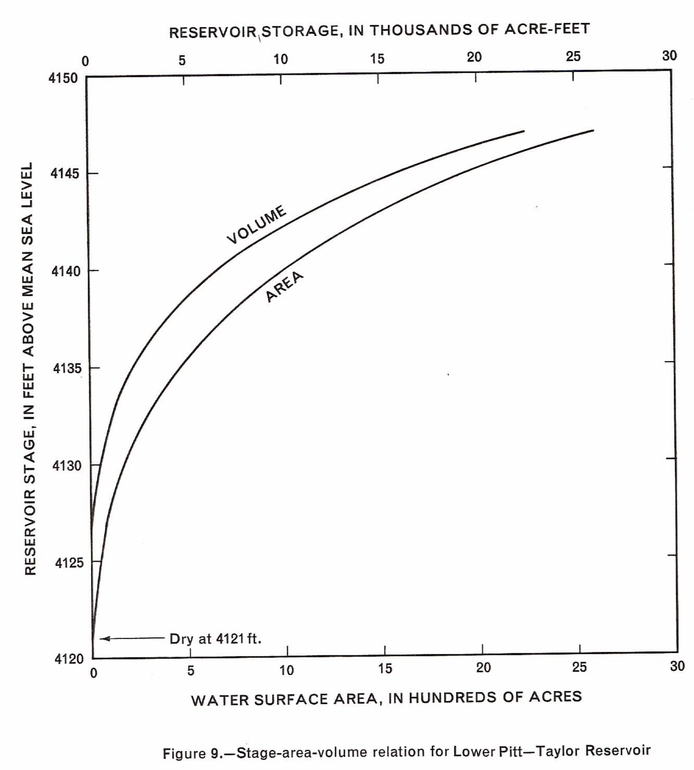


Figure 9.—Stage-area-volume relation for Lower Pitt-Taylor Reservoir

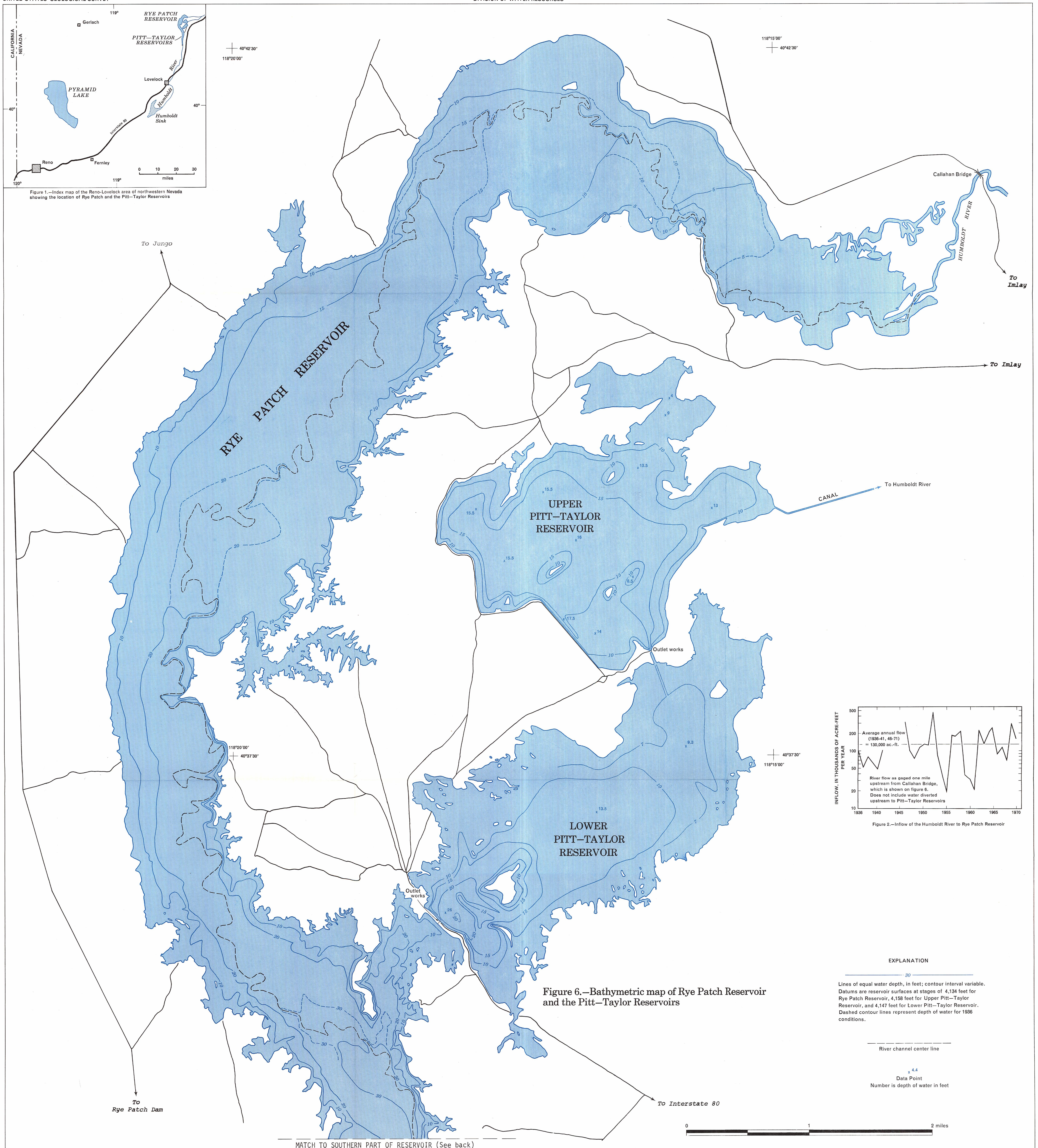


Figure 1.—Index map of the Reno-Lovelock area of northwestern Nevada showing the location of Rye Patch and the Pitt—Taylor Reservoirs

Figure 6.—Bathymetric map of Rye Patch Reservoir and the Pitt—Taylor Reservoirs

Figure 2.—Inflow of the Humboldt River to Rye Patch Reservoir

EXPLANATION

30

Lines of equal water depth, in feet; contour interval variable. Datums are reservoir surfaces at stages of 4,134 feet for Rye Patch Reservoir, 4,158 feet for Upper Pitt—Taylor Reservoir, and 4,147 feet for Lower Pitt—Taylor Reservoir. Dashed contour lines represent depth of water for 1936 conditions.

River channel center line

4.4

Data Point
Number is depth of water in feet

Base: U.S. Geological Survey 1:24,000 topographic series:
Imlay 3 NE (preliminary draft, 1971) and
Imlay 3 SE (preliminary draft, 1971); and
aerial photographs 1:19,000, 1971

Cartography by Charles Bosch

BATHYMETRIC RECONNAISSANCE OF RYE PATCH RESERVOIR AND THE PITT—TAYLOR RESERVOIRS, PERSHING COUNTY, NEVADA

By
F. Eugene Rush and Bruce L. Rice
1972

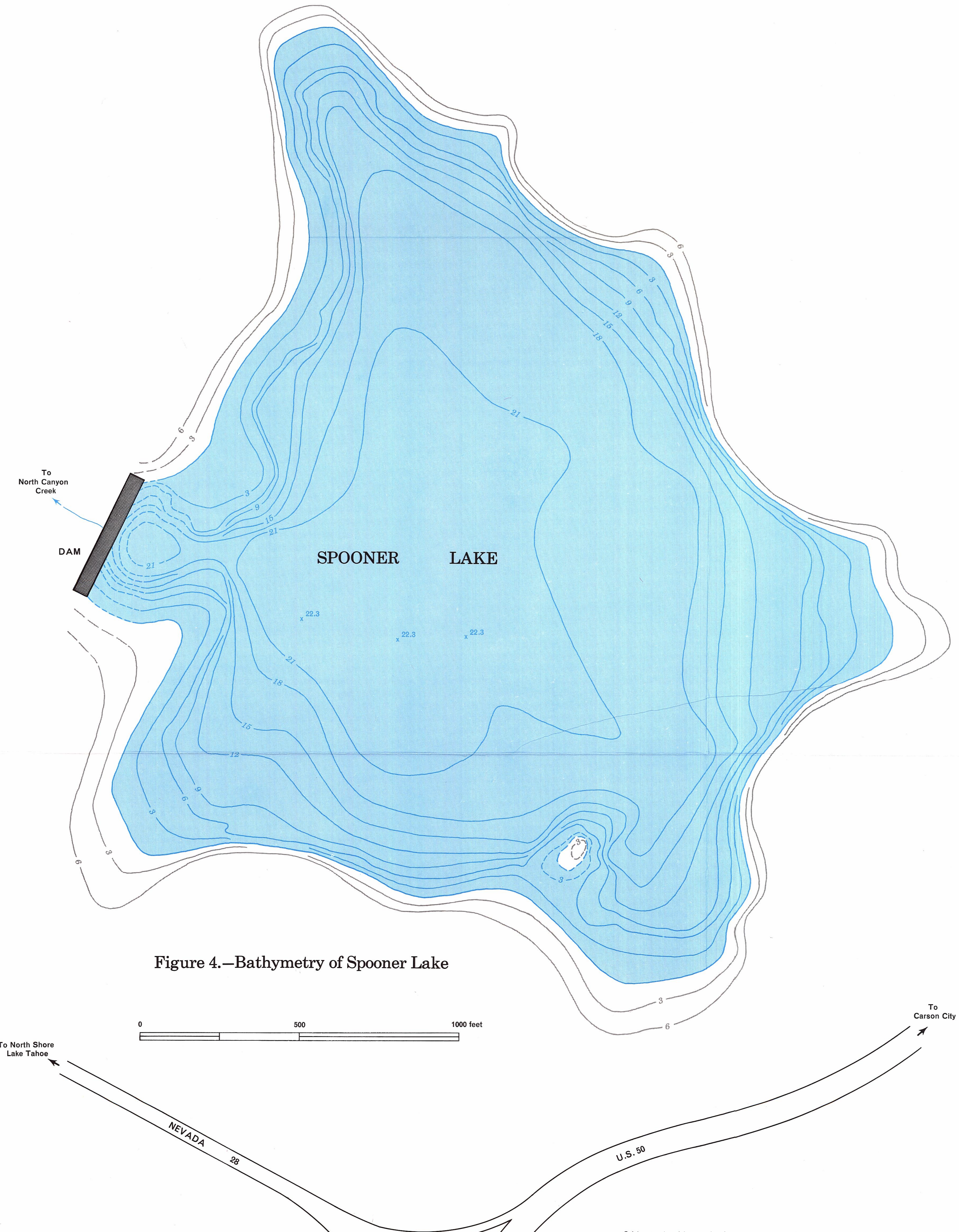


Figure 4.—Bathymetry of Spooner Lake

EXPLANATION

Lines of equal water depth, in feet; contour interval 3 feet, dashed where approximately located. Datum is lake surface at a stage of 6981.1 feet above mean sea level.

x 22.3 Data point
Number is depth of water in feet

Topographic contour, in feet; contour interval 3 feet, dashed where approximately located. Datum is lake surface at a stage of 6981.1 feet above mean sea level.

Dimensions of Spooner Lake at various stages are given in the following tabulation:

Time or condition	Stage (feet above mean sea level)	Area (acres)	Volume (acre-feet)
During bathymetric survey, July 1, 1971	6,976.8	84	1,030
December 2, 1971	6,975.4	80	910
At stage shown in figure 4	6,981.1	95	1,410
Overflow stage of dam	6,982.9	100	1,580

With reference to the above tabulation, it can be seen that the bathymetric map of Spooner Lake (fig. 4) was drawn at a stage about 4 feet higher than actual conditions during the time of the survey. This was done for two reasons: (1) to make the bathymetric map more meaningful by "filling" the lake, and (2) to provide the Nevada Department of Fish and Game with information on the character of the lake if more water were to be stored or if the dam were to be raised or replaced with a higher structure. The data needed to determine this increase in stage above existing field conditions in the summer of 1971 were obtained by instrument surveying peripheral to the lake.

At the time of the survey, water was leaking through or beneath the dam of Spooner Lake at an estimated rate of between 100 and 200 gallons per minute. This leakage is probably about of the same general magnitude as the evaporation from the lake, if both are evaluated on the basis of average annual quantities. Therefore, a somewhat higher stage probably could be maintained, if this leak were eliminated, as the leakage and evaporation probably are the two principal means of discharge from the lake.

REFERENCES

Galloway, J. D., 1947, *Early engineering works contributary to the Comstock: Nevada Univ. Bull.*, v. 41, no. 5, 102 p.

Nevada Legislative Commission, 1969, *The Marlette Lake water system; a report on the feasibility and desirability of its retention: Nevada Legislative Council Bureau Bull.* no. 79, 103 p.

Scott, E. B., 1957, *The saga of Lake Tahoe, Crystal Bay, Nevada: Sierra-Tahoe Publishing Co.*, 519 p.

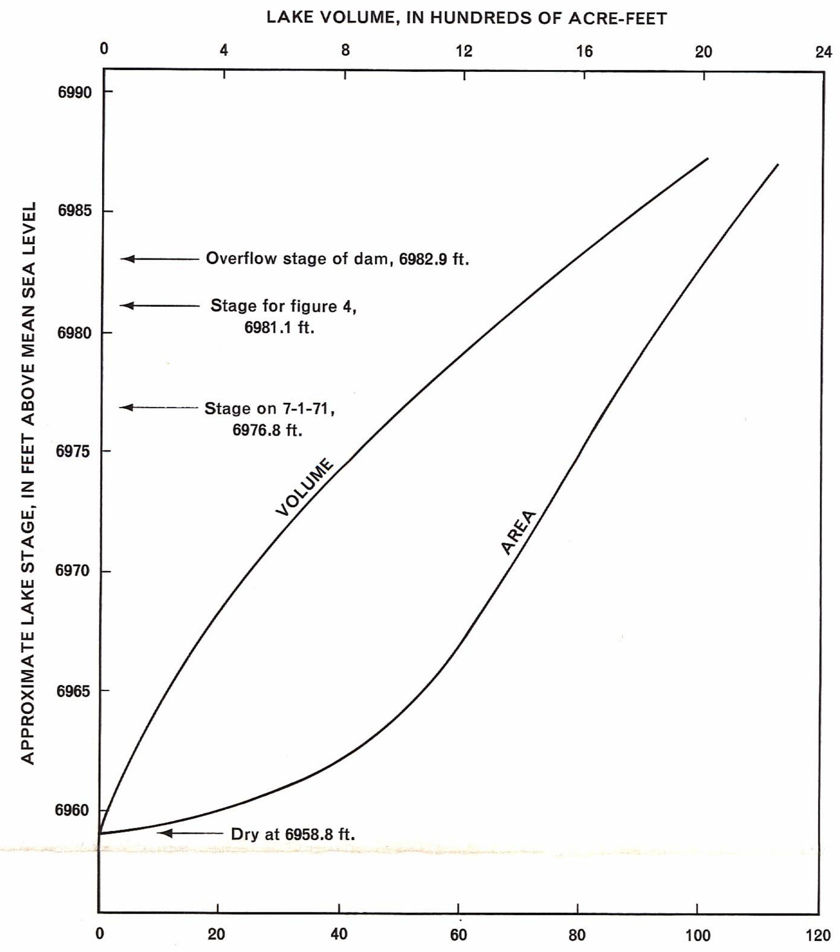


Figure 5.—Stage-area-volume relation for Spooner Lake

Other bathymetric surveys have been completed or are planned, as follows:

Lake or Reservoir	*Publication*
Pyramid Lake	USGS HA-379
Walker Lake	USGS HA-415
Lahontan Reservoir	Nev. DWR Info. Ser. 9
Big and Little Washoe Lakes	Nev. DWR Info. Ser. 10
Big and Little Soda Lakes	Nev. DWR Info. Ser. 11
Topaz Lake	Nev. DWR Info. Ser. 12
Rye Patch Reservoir and Upper and Lower Pitt-Taylor Reservoirs	Nev. DWR Info. Ser. 13
Marlette and Spooner Lakes	Nev. DWR Info. Ser. 14
Weber Reservoir	Nev. DWR Info. Ser. 15
Wild Horse Reservoir	Nev. DWR Info. Ser. 16

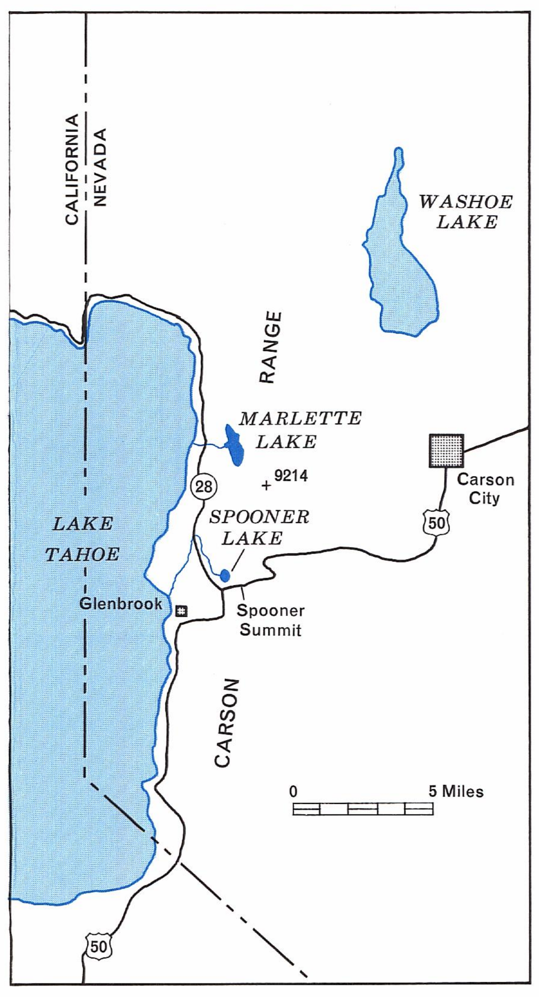


Figure 1.—Index map of the Carson City area showing the locations of Marlette and Spooner Lakes

INTRODUCTION

Marlette and Spooner Lakes are between Carson City and Lake Tahoe (fig. 1) in the Carson Range of the Sierra Nevada. Marlette Lake is at an altitude of 7,838 feet and Spooner Lake, at about 6,980 feet. Marlette Lake is about 1,600 feet higher than Lake Tahoe and about 3,200 feet higher than Carson City. Both lakes drain to Lake Tahoe; Marlette Lake by way of Marlette Creek and Spooner Lake by way of North Canyon and Slaughterhouse Creeks. Marlette Lake is in a consolidated-rock depression (graben), probably containing little sediment. Spooner Lake is in an alpine meadow area, probably underlain by a veneer of alluvium. Both lakes are surrounded by pine-covered mountain ridges and peaks extending as high as 9,000 feet at Marlette Lake and 7,800 feet at Spooner Lake.

The principal source of water for the lakes is snowmelt in their small basins; the Marlette Lake basin has an area of 3.0 square miles and Spooner Lake basin, about 1.2 square miles. Precipitation at Marlette and Spooner Lakes averages about 27 inches per year, or an average annual total of each basin of about 4,500 acre-feet and 1,700 acre-feet, respectively. Of these amounts, an estimated 60 percent runs off to the lakes. The principal use of Marlette Lake in 1971 was as a source of cutthroat trout spawn for the Nevada Department of Fish and Game and is administered by that department. Most of the land adjoining Marlette and Spooner Lakes is within the Lake Tahoe Nevada State Park.

In 1873, according to Galloway (1947) and the Nevada Legislative Commission (1969), Duane L. Bliss and H. M. Yerington (Carson and Tahoe Lumber and Fluming Company) placed a 26-foot high dirt-fill and rock dam (Scott, 1957, p. 301) across the natural outlet from a small lake, then called Goodwin Lake but later named Marlette Lake. Water from the reservoir was conveyed southward to Spooner Summit (fig. 1), by a 6-mile-long V-flume, where it was used to flume lumber 12 miles to a lumber yard a mile south of Carson City. Most of the lumber was transported to the summit by a short railroad (Lake Tahoe Railroad) extending past what is now Spooner Lake to sawmills at Glenbrook on the nearby shore of Lake Tahoe.

In 1876, the Virginia and Gold Hill Water Co. received consent from Bliss and Yerington to draw water from Marlette Lake to be conveyed to the Virginia City area, 17 miles to the northeast. The dam was raised to a reported height of 37 feet, with a length of 213 feet. The top of this dam was at an altitude of 7,828 feet, according to Walter G. Reid, Virginia City (written commun., 1971). With a maximum lake stage of 7,823 feet above sea level, the estimated storage volume was 6,100 acre-feet, according to Galloway (1947) and 5,000 acre-feet according to Reid. The Virginia and Gold Hill Water Co. built a 14-inch by 30-inch flume northward along the west side of the crest of the Carson Range, a distance of 4.38 miles, to the west portal of a tunnel extending eastward through the crest of the Carson Range. The tunnel, 3,994 feet long, connected to another flume which conveyed the water eastward to an inverted siphon and again by flume to Virginia City.

In 1959, the dam at Marlette Lake was raised 15 feet to an altitude of 7,843 feet, bringing the high-water line to 7,838 feet and the storage volume to an estimated 10,400 acre-feet (Reid, written commun., 1971). The tunnel that conveyed water for Virginia City collapsed prior to 1963, preventing the usual movement of water from Marlette Lake to Virginia City and Carson City. In 1966, a diesel-operated pump was installed to pump water from Marlette Lake through a pipeline over the crest of the Carson Range to Red House diversion dam, near Hobart Reservoir, 2 miles northeast of Marlette Lake. Pumping has been infrequent.

Spooner Lake was created prior to 1927 by the construction of a small earthen dam across a narrow part of Spooner Meadow, situated near and due north of the intersection of U.S. Highway 50 and State Route 28, as shown in figure 4. The lake was built by Charles L. Fulstone to store irrigation water. In the past, the lake was called Fulstone Reservoir and Spooner Meadow Reservoir.

Altitudes of the dam and lake are based on the approximate altitude of a nearby feature, a large rock at the north end of the dam. The top of this rock has an altitude of about 6,990.7 ± 1.0 feet.

BATHYMETRY

A continuously recording, electronic fathometer was used to measure the depths of Marlette and Spooner Lakes, making a total of 19 traverses on Marlette Lake and 17 on Spooner Lake. The results of the survey are summarized in figures 2, 3, 4, and 5. The dimensions of Marlette Lake at high-water lines with 1873, 1876, and the 1959 dams are summarized in the following tabulation:

Spillway level, 1873 dam	
Stage, approximate (feet)	7,813 ± 1
Area (acres)	270 ± 13
Volume (acre-feet)	3,400 ± 300
Maximum depth (feet)	19.4 ± 1
Spillway level, 1876 dam	
Stage (feet)	7,823
Area (acres)	325
Volume (acre-feet)	6,400
Maximum depth (feet)	29.4
Spillway level, 1959 dam	
Stage (feet)	7,838
Area (acres)	381
Volume (acre-feet)	11,800
Maximum depth (feet)	44.4

It can be seen from the data presented in this report that previous estimates of lake volume for the old and present dams were low with reference to the data resulting from this bathymetric survey.

The bottom of Marlette Lake, or that area below a depth of 35 feet, generally can be characterized as a very gently sloping plane. The plane, dipping to the northwest, may have been formed as a horizontal playa-like surface that has been tilted by faulting along the western margin of the lake. The short time since faulting has limited the modification of the surface by sedimentation or erosion.

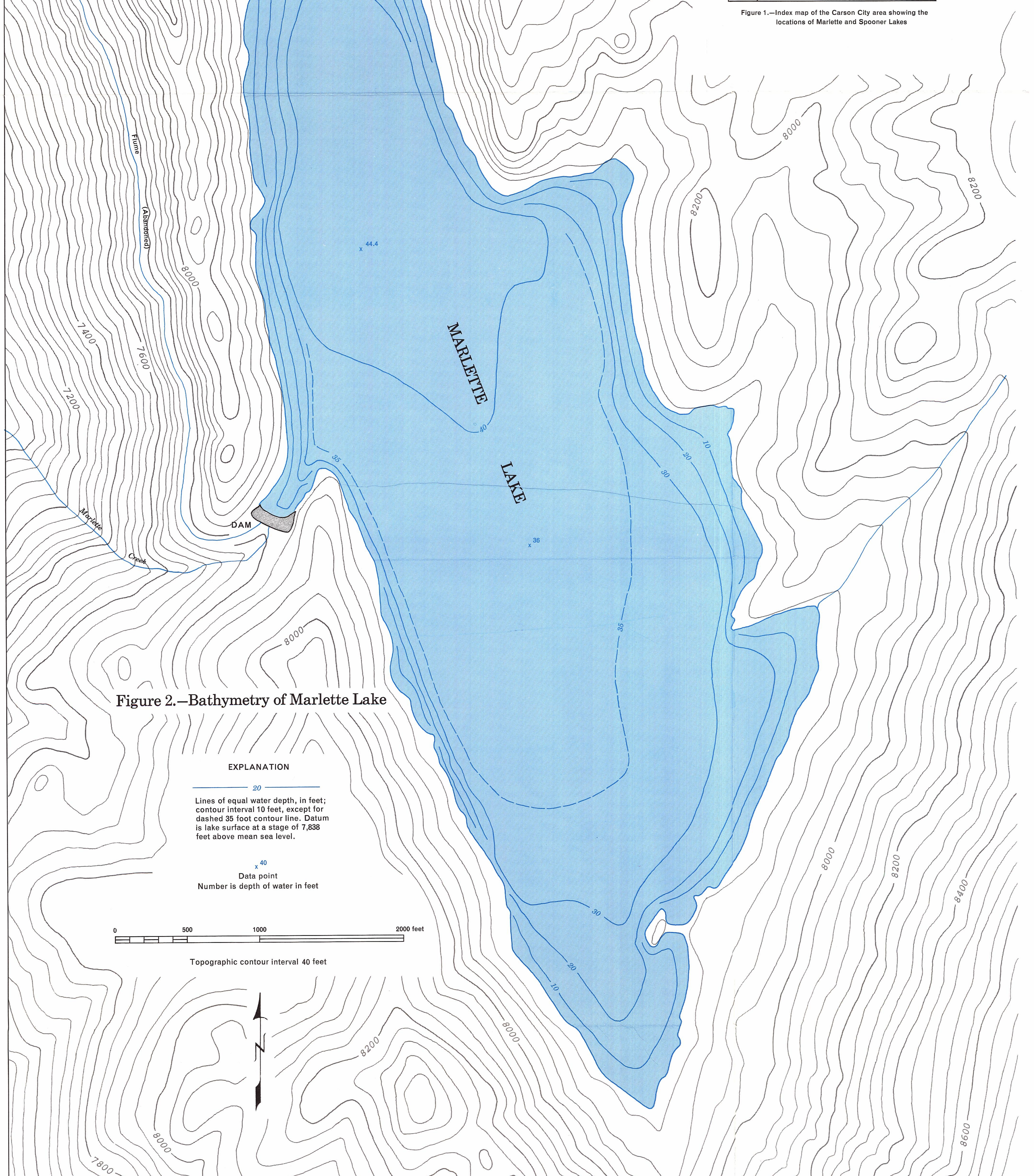


Figure 2.—Bathymetry of Marlette Lake

Base: Aerial photographs, 1:19,000 for Marlette Lake and 1:2,700 for Spooner Lake, 1971

Cartography by Charles Bosch

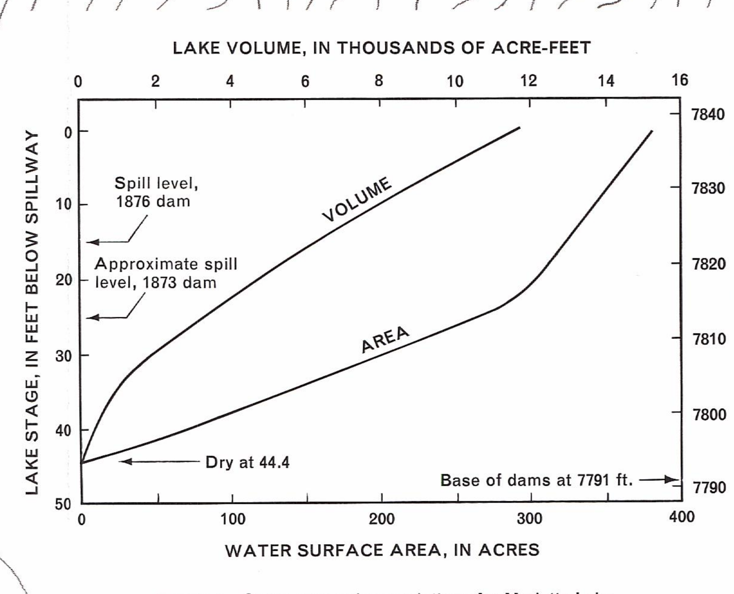


Figure 3.—Stage-area-volume relations for Marlette Lake

BATHYMETRIC RECONNAISSANCE OF MARLETTE AND SPOONER LAKES, WASHOE COUNTY AND CARSON CITY, NEVADA

By
F. Eugene Rush, Bruce R. Scott,
Patrick A. Glancy, Terrance L. Katzer
and Edwin P. Ament
1972

MAP L-11
LAKE TAHOE

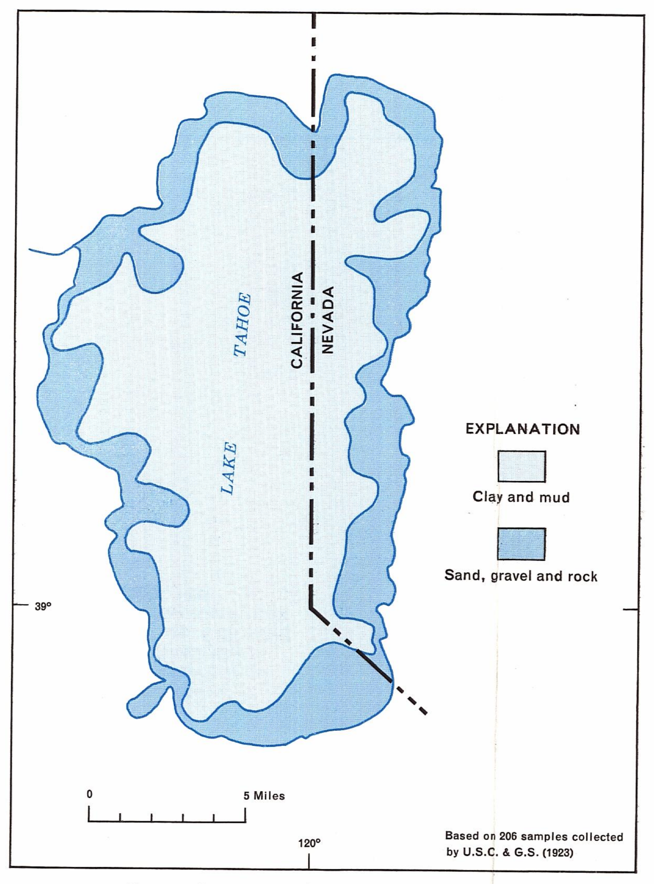


Figure 2.-General distribution of lake-bottom sediments

Table 2.--Summary for Lake Tahoe

Feature	Description
Reference stage (U.S. Bureau of Reclamation datum)	6,229 feet above mean sea level
Water-surface area	194 square miles (124,000 acres)
Nevada part	61 square miles
California part	133 square miles
Maximum depth	1,646 feet (Hyne and others, 1972, p. 1435, report 1,627 feet as deepest encountered)
Rank:	
In North America	3d deepest
In world	10th deepest
Volume	125 million acre-feet
Stage:	
Natural outlet	6,223 feet
Recorded variations (1901-71):	
Maximum	6,231.26 feet in July 1907
Minimum	6,211.74 feet in December 1934
Mean	6,226.5 feet
Maximum prehistoric (approximate)	7,000 feet (Hyne and others, 1972, p. 1435)
Length	22 miles
Width	12 miles
Shoreline (approximate)	75 miles
Nevada	30 miles
California	45 miles
Shoreline ownership (U.S. Forest Service, 1972):	
Private	55 miles
Federal	12 miles
States	8 miles
Water temperature (mostly from Crippen and Pavelka, 1970; and Lake Tahoe Area Council, 1963):	
At surface:	
Minimum (winter)	40-45°F
Maximum (summer)	65-75°F
At depth below 500 feet	Nearly constant 39°F
Freezing	Only to a minor extent in shallow, protected inlets, except Emerald Bay, which occasionally freezes over.
Water quality (Crippen and Pavelka, 1970; and Lake Tahoe Area Council, 1963):	
Dissolved solids	60-70 mg/l
Clarity	Secchi disc[1] visible to about 120 feet; 90 percent light penetration to 120-130 feet.
Emerald Bay:	
Area	460 acres
Maximum depth	213 feet
Fannette Island:	
Area	2.5 acres
Height (approximate)	100 feet
Age (Hyne and others, 1972)	10,000 years
Origin (Hyne and others, 1972)	Scoured by Tioga glaciation

[1] White, 8-inch diameter disc.

Table 3.--Summary for dam at lake outlet

Feature	Description
Site	At Tahoe City, outlet of lake to Truckee River
Initial dam:	
Date	1870[1]
Builder	A. W. Von Schmidt[1]
Materials	Wood crib and rock
Present dam (mostly from U.S. Bureau of Reclamation, 1961, p. 534-542):	
Construction period	1909-13[1]
Probable builders	Floriston Pulp and Paper Company and Truckee River General Electric Company[1]
Structural height	16 feet
Hydraulic height	11 feet
Top width	11 feet
Maximum base width	19 feet
Crest length	109 feet
Outlet works	Seventeen 5-foot by 4-foot gates
Design:	
Outflow capacity	2,630 cfs
Active stage	6,223-6,229.1 feet (legal limits by Federal Court decree)
Active capacity	744,600 acre-feet (USGS)

[1] Published information on dam-construction dates and builders is inconsistent. Information presented hopefully is correct.

The basin was formed about 2 million years ago by faulting and volcanism. The basin is a graben, or down-dropped block. The lake level has been lowered by erosion of a natural dam created by tilting and faulting (Hyne and others, 1972, p. 1435).

Precipitation, the source of water in Lake Tahoe, is summarized in figure 3. The greatest precipitation is on the western and southwestern mountains. Most of the precipitation falls in the winter and spring as snow. Snow-melting and subsequent runoff to the lake occur principally in the period April-July, as shown by a graph of the runoff distribution of the Upper Truckee River (fig. 4), a major tributary to the lake at Tahoe Keys. Outflow to Truckee River occurs each year, as summarized in figure 5. Precipitation, runoff, and evaporation from the lake surface are the principal factors controlling the interrelation between the outflow to the Truckee River and the fluctuations in lake stage (fig. 6).

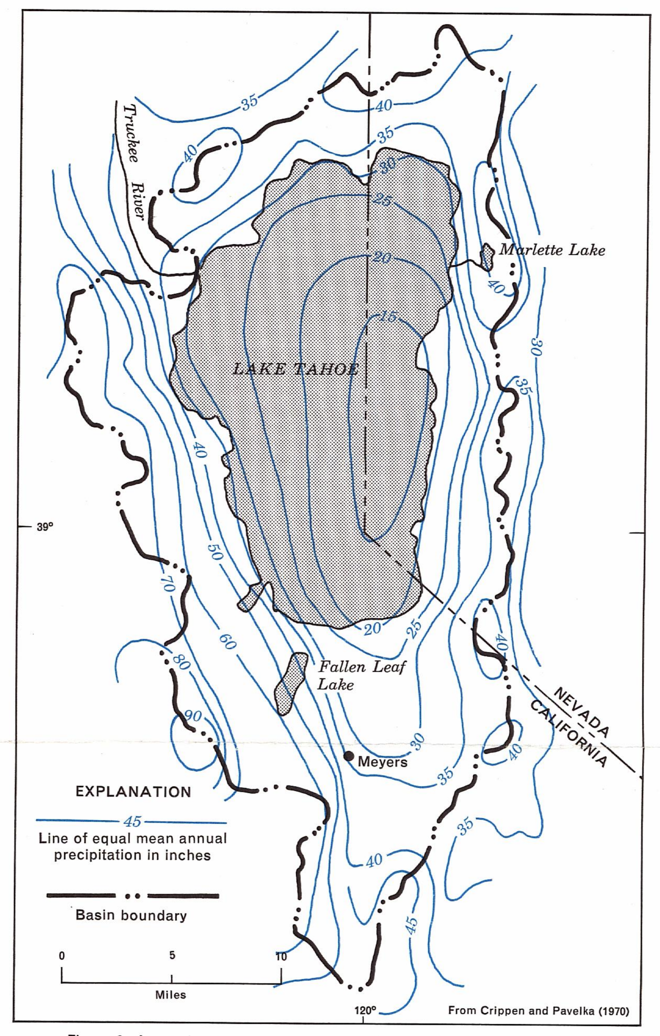


Figure 3.-Approximate mean annual precipitation in the Lake Tahoe Basin

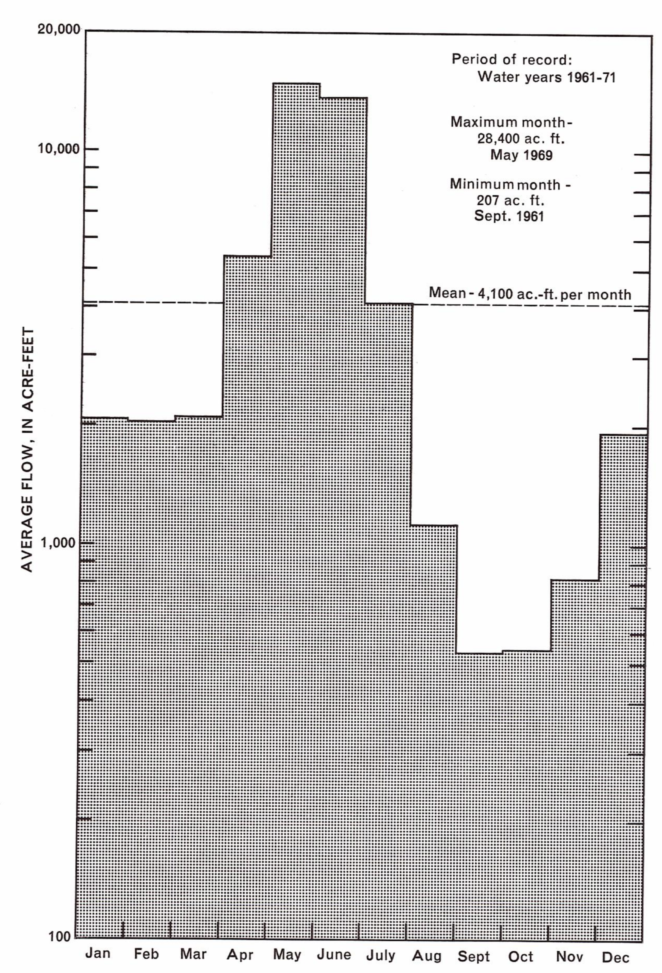


Figure 4.-Mean monthly flow of Upper Truckee River near Meyers, California

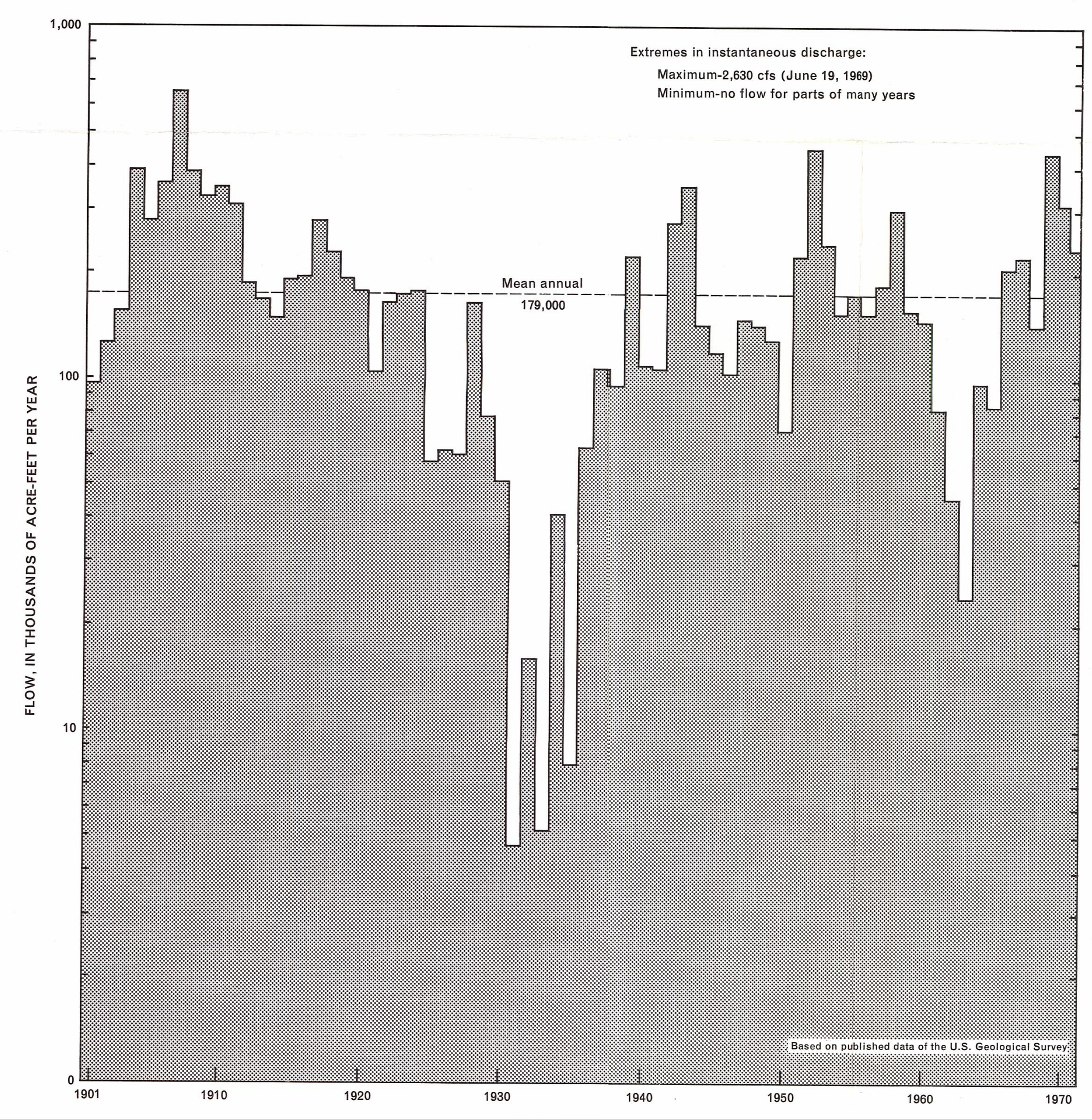


Figure 5.- Flow from Lake Tahoe to the Truckee River

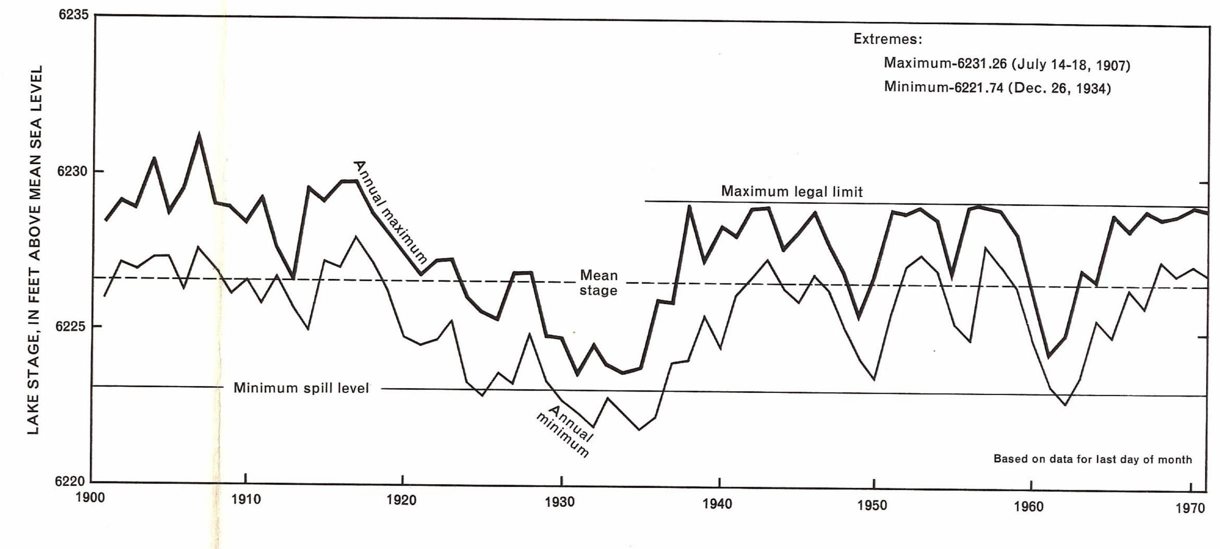


Figure 6.-Annual variations in stage of Lake Tahoe

BATHYMETRY

The bathymetric map of Lake Tahoe is based on a soundings map of the U.S. Coast and Geodetic Survey (1923). The U.S. Coast and Geodetic Survey map shows water depths for about 1,800 points. The deepest sounding in the lake, 1,646 feet and the only sounding greater than 1,600 feet, was about 6 miles due east of the Truckee River outlet and along the axis of the lake.

Several submerged mounds, as shown, range in height up to about 400 feet. Hyne and others (1972, p. 1441) describe the mounds as composed of slumped sediments, whereas Goldman and Court (1968) suggested a possible volcanic origin.

Most of the steep slopes shown by the close spacing of the bathymetric contours on the east and west sides of the lake are of fault origin. In addition, a fault scarp extends southwestward from Stateline Point, at the north end of the lake, toward the deepest point in the lake. About 2 miles north of Emerald Bay at Rubicon Point, the lake depth increases 1,300 feet in about the same horizontal distance, producing a bottom slope of about 45° from horizontal.

Stage-area-volume relations are shown in figure 7.

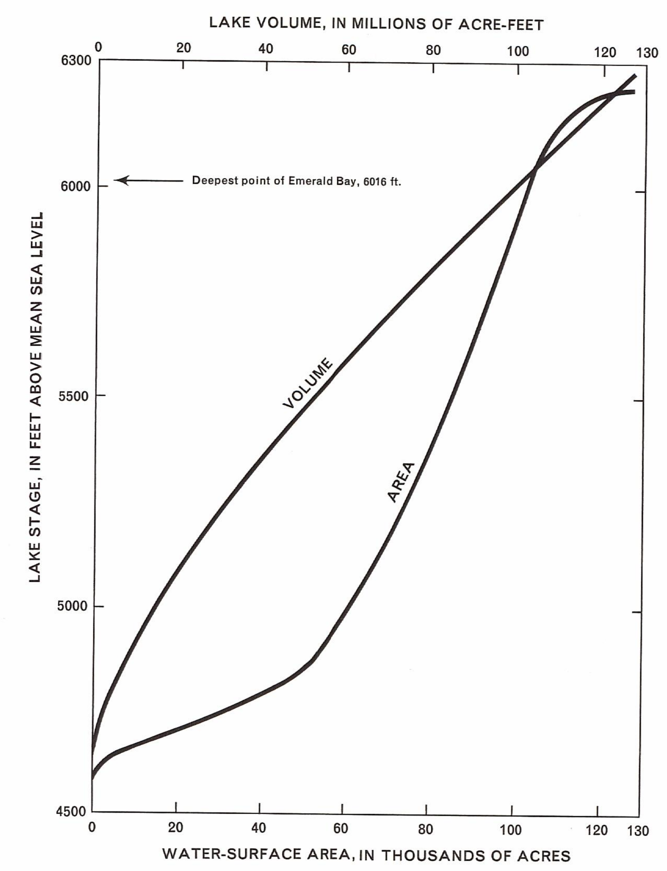


Figure 7.-Stage-area-volume relation for Lake Tahoe

WATER BUDGET

A water budget for a lake relates the various components of water inflow, outflow, and change in storage:

$$\textit{Inflow} = \textit{Outflow} \pm \textit{Change in storage}. \qquad (1)$$

For Lake Tahoe, equation (1) is modified as follows:

$$I_{sw} + I_{gw} + P = O_{sw} + E + D \pm \Delta S, \qquad (2)$$

where the elements of inflow are: I_{sw}, inflow of all surface water; I_{gw}, inflow of ground water; and P, precipitation directly on the lake surface. The elements of outflow are: O_{sw}, surface-water outflow from the lake to the Truckee River; E, evaporation from the lake surface; and D, diversions from the lake. ΔS is change in lake storage associated with net stage change for the budget period. Ground-water seepage from the lake is believed to be negligible to nonexistent.

For the purposes of this reconnaissance, an approximate mean annual water budget for the lake can be computed by omitting ground-water inflow (I_{gw}), diversions from the lake (D), and storage change (ΔS), because these elements, though pertinent, are small in relation to the other budget elements and the total water in storage. Equation (2) therefore is modified as follows:

$$I_{sw} + P = O_{sw} + E. \qquad (3)$$

A 71-year period, 1901-71 was used as a base for computation. Based largely on estimates of Crippen and Pavelka (1970, p. 36), equation (3) becomes (rounded):

$$310{,}000 + 220{,}000 = 180{,}000 + 350{,}000,$$

or approximately 530,000 acre-feet of total mean annual inflow and outflow. However, because the 71-year period of record is believed to be somewhat wetter than normal, this total, when adjusted to the base periods 1919-69 and 1931-60 of average wetness, probably is more nearly 500,000 acre-feet per year.

The lakes and reservoirs of this series are listed as follows:

Lake or Reservoir	*Publication*
Pyramid Lake	USGS HA-379[1]
Walker Lake	USGS HA-415
Lahontan Reservoir	Nev. DWR Info. Ser. 9[2]
Big and Little Washoe Lakes	Nev. DWR Info. Ser. 10
Big and Little Soda Lakes	Nev. DWR Info. Ser. 11
Topaz Lake	Nev. DWR Info. Ser. 12
Rye Patch Reservoir and Upper and Lower Pitt-Taylor Reservoirs	Nev. DWR Info. Ser. 13
Marlette and Spooner Lakes	Nev. DWR Info. Ser. 14
Weber Reservoir	Nev. DWR Info. Ser. 15
Wild Horse Reservoir	Nev. DWR Info. Ser. 16
Lake Tahoe	Nev. DWR Info. Ser. 17

[1] U.S. Geological Survey Hydrologic Atlas.
[2] Nevada Division of Water Resources Information Series Report.

REFERENCES

Crippen, J. R., and Pavelka, B. R., 1970, The Lake Tahoe Basin, California-Nevada: U.S. Geol. Survey, Water-Supply Paper 1972, 56 p.

Goldman, C. R., and Court, J. E., 1968, Limnological studies of Lake Tahoe, in Evans, J. R., and Matthews, R. A., Geological studies in the Lake Tahoe area, California and Nevada: Geol. Soc. Sacramento, Annual Field Trip Guidebook, p. 60-66.

Hyne, N. J., and others, 1972, Quaternary history of Lake Tahoe, California-Nevada: Geol. Soc. America Bull., v. 83, p. 1435-1448.

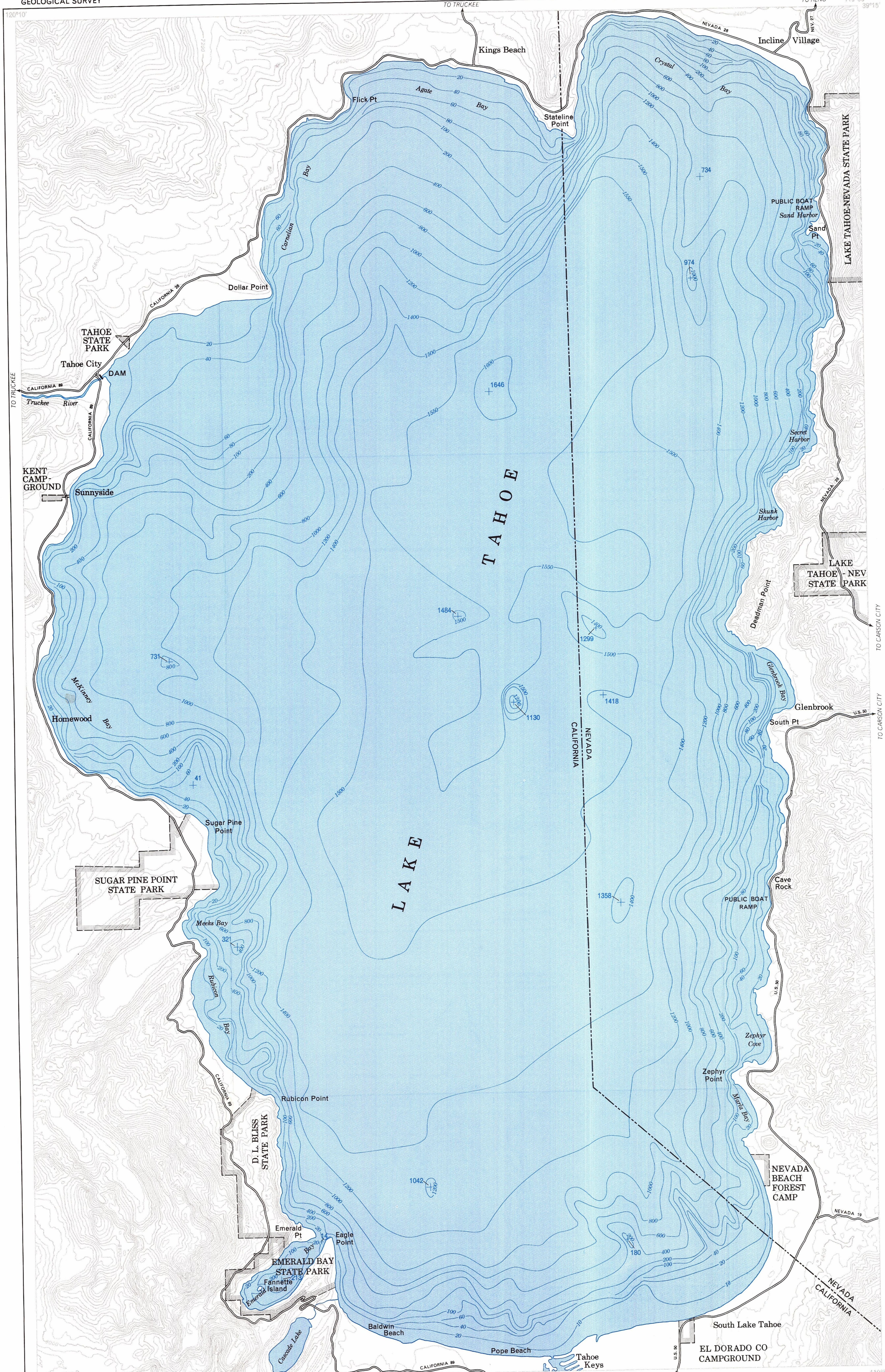
Lake Tahoe Area Council, 1963, Comprehensive study on protection of water resources of Lake Tahoe Basin through controlled waste disposal: South Lake Tahoe, Calif., Lake Tahoe Area Council, 157 p.

Matthews, R. A., and Schwarz, Charles, 1969, Lake Tahoe Basin-a preliminary bibliography, 1969: California Div. Mines and Geol., Spec. Pub. 36, 102 p.

U.S. Bureau of Reclamation, 1961, Reclamation project data: U.S. Bur. Reclamation Pub., 890 p.

U.S. Coast and Geodetic Survey, 1923, Lake Tahoe: U.S. Coast and Geodetic Survey Map 5001, 3d edition, March 1965.

U.S. Forest Service, 1972, Lake Tahoe Basin, planning for environmental quality: U.S. Forest Service Published Report, 8 p.



Base: U.S. Geological Survey
1:62,500 topographic series:
Carson City, Nev., 1956
Fallen Leaf Lake, Calif., 1955
Freel Peak, Nev.-Calif., 1956
Tahoe, Calif., 1955

Compiled from soundings made by the U.S. Coast and Geodetic Survey (1923)
Cartography by Charles A. Bosch

EXPLANATION

——1550——
Lines of equal water depth, in feet; contour interval variable. Datum is lake surface at a stage of 6229 feet above mean sea level (U.S. Bureau of Reclamation datum of 1929, supplementary adjustment of 1959)

+321
Data point
Number is depth of water in feet

1 0 1 2 3 4 miles

Topographic contour interval, 80 feet
Datum is mean sea level

INTRODUCTION

Lake Tahoe is on the Nevada-California State line, 10 miles west of Carson City, Nevada, as shown in figure 1. The natural outflow from Lake Tahoe, high in the Sierra Nevada, is to the Truckee River, which flows through Reno to Pyramid Lake. Since the beginning of the 20th century, a part of the Truckee River flow has been diverted through a canal of the Newlands Project (U.S. Bureau of Reclamation) for use in the Carson River Basin near Fallon, Nevada (60 miles east of Carson City).

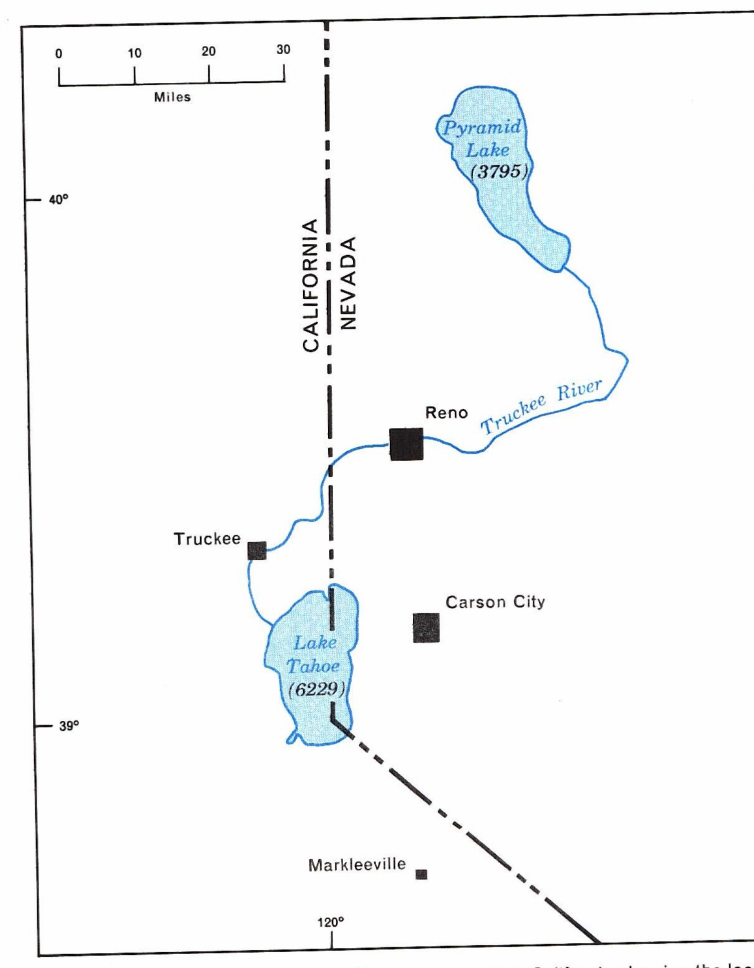


Figure 1.-Index map of northwestern Nevada and eastern California showing the location of Lake Tahoe (Numbers in parenthesis are water-surface altitudes)

Table 1 is an informational summary for the Lake Tahoe Basin. In addition, the U.S. Forest Service (1972) has published data on land-use capability. This report shows that approximately three-fourths of the land has either a high relative erosion potential or disturbance hazard. The 1970 U.S. Census indicates a total population in the basin of about 26,000. Table 2 summarizes facts about Lake Tahoe. The facts presented describe the lake at a stage of 6,229 feet above mean sea level, U.S. Bureau of Reclamation Lake Tahoe datum, which is the maximum stage regulated by use of a small dam (table 3). The Lake Tahoe datum is 1.14 feet higher than the sea level datum of 1929 used elsewhere in the area, as determined by the U.S. Geological Survey in November 1960. Reference stages of 6,223 feet and 6,225 feet have been used in other studies (Matthews and Schwarz, 1969), but for a series of bathymetric reconnaissances, of which this study is a part, the decision was made to evaluate each lake and reservoir when "full".

Table 1.--Summary for the Lake Tahoe Basin

Feature	Description	
Basin area (mostly from Crippen and Pavelka, 1970)	506 square miles (324,000 acres)	
Land area (approximate)	306 square miles (196,000 acres)	
Water area (approximate)	200 square miles (128,000 acres)	
Lakes in basin:		
Tahoe (stage 6,229 feet)	194 square miles (124,000 acres)	
Fallen Leaf	1,400 acres	
Marlette	381 acres	
Upper and Lower Echo	330 acres	
Cascade	210 acres	
Spooner	97 acres	
Numerous small lakes and ponds	600 acres	
Length (north-south)	40 miles	
Width	18 miles	
Highest altitude (Freel Peak)	10,881 feet	
Lowest altitude (deepest point of lake)	4,583 feet	
Generalized rock distribution in order of outcropping abundance (adapted from Crippen and Pavelka, 1970)		
Granitic rocks (Sierra Nevada batholith)	East, south, and southwest ranges.	
Glacial deposits	Mostly south and west of Lake Tahoe.	
Volcanic rocks	Scattered, but mostly in northwest range.	
Metamorphic rocks	Southwest range.	
Lake beds	Along west, south, and north shores up to an altitude of about 7,000 feet. Underlying the floor of Lake Tahoe with a thickness of at least 400 feet (Hyne and others, 1972, p. 1435). Bottom sediments are summarized in figure 2.	
Land ownership January 1972 (U.S. Forest Service, 1972)	Square miles	Percent
Federal Government:		
In Nevada	28	9
In California	153	50
State Government:		
Nevada	9.5	3
California	5.6	2
Private	110	36
Total (rounded)	306	100
Weather at Tahoe City (Crippen and Pavelka, 1970):		
Temperature (°F):		
Maximum	94	
Minimum	-15	
Mean annual	42	
Average frost-free period		86 days
Mean annual precipitation		31 inches
Mean annual snowfall		18 feet

BATHYMETRIC RECONNAISSANCE OF LAKE TAHOE, NEVADA AND CALIFORNIA

By F. Eugene Rush

1973

DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

STATE OF NEVADA
DEPARTMENT OF FISH AND GAME AND
DIVISION OF WATER RESOURCES

WATER RESOURCES INFORMATION SERIES
REPORT-15

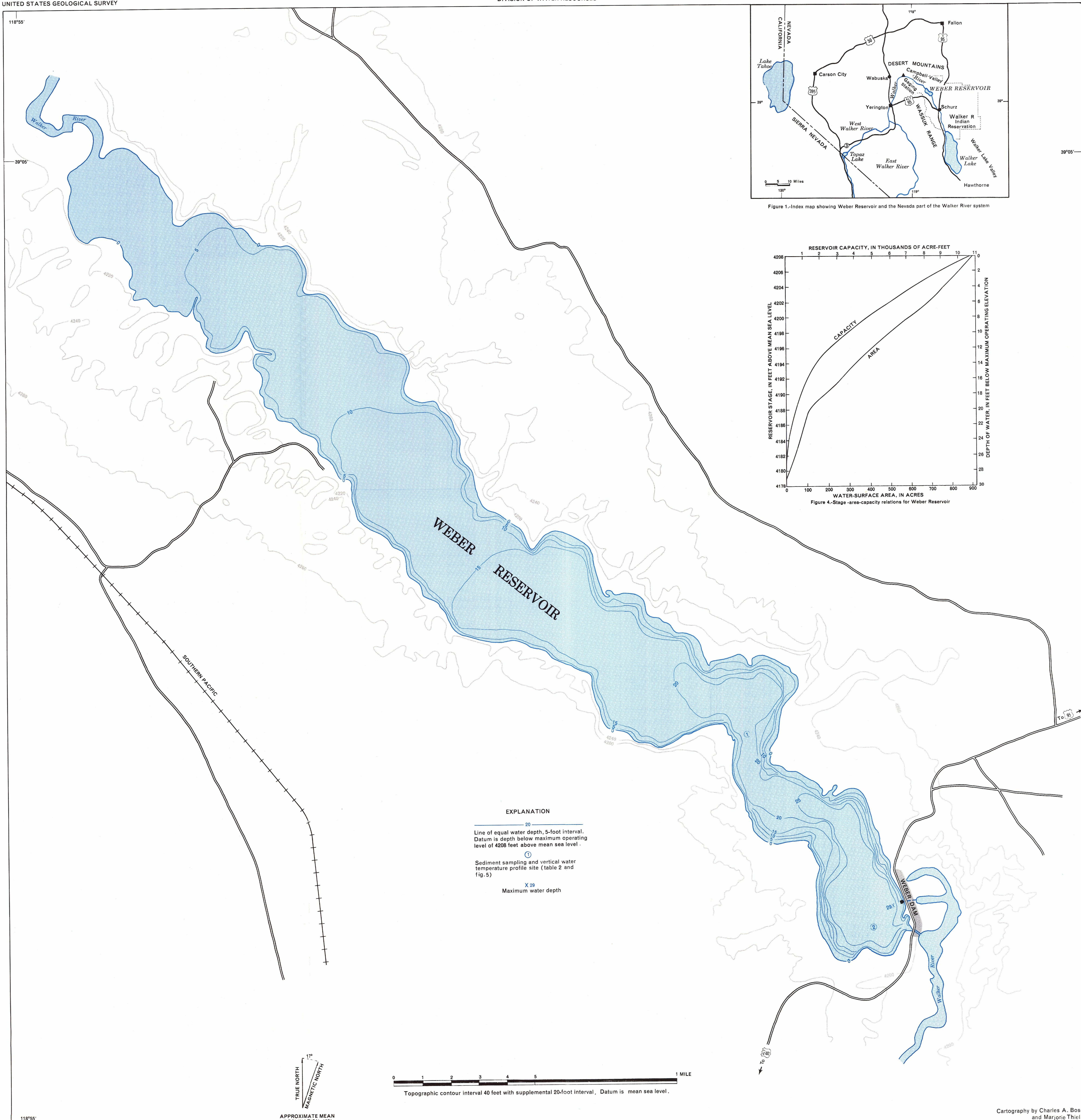


Figure 1.-Index map showing Weber Reservoir and the Nevada part of the Walker River system

Figure 4.-Stage -area-capacity relations for Weber Reservoir

BATHYMETRIC RECONNAISSANCE OF WEBER RESERVOIR, MINERAL COUNTY, NEVADA

By

T. L. Katzer and Lynn Harmsen

1973

BATHYMETRIC RECONNAISSANCE OF WEBER RESERVOIR, MINERAL COUNTY, NEVADA

INTRODUCTION

Weber Reservoir is in Campbell Valley (northern end of Walker Lake Valley) on the Walker River about 7 road miles northwest of Schurz and about 16 miles east of Yerington in Mineral County, Nevada (fig. 1). Weber Reservoir is totally within the Walker River Indian Reservation and is at an elevation of about 4,200 feet. The Desert Mountains that form the northern boundary of Campbell Valley have a maximum elevation of 6,404 feet. The northern end of the Wassuk Range, that forms the southern boundary of Campbell Valley, has a maximum elevation of 8,159 feet (fig. 1).

Shortages of Walker River irrigation water on the Walker River Indian Reservation created an interest in upstream storage, and in 1915, Frank Weber, an engineer, made the first reservoir site investigation. The National Industrial Recovery Act of 1933 allocated funds to the U.S. Indian Service (now the Bureau of Indian Affairs) for the building of the reservoir. On Sept. 21, 1933, construction started, and 10 months later on July 27, 1934, storage began, although it was more than a year later before the dam was completely finished. The reservoir is operated by the Bureau of Indian Affairs to provide summer irrigation water to the Walker River Indian Reservation.

The primary source of water for Weber Reservoir is the Walker River, which heads in the high Sierra Nevada (fig. 1). Flow of the Walker River is somewhat depleted by extensive irrigation upstream from Weber Reservoir. A continuous-record streamflow gaging station is at the head of Campbell Valley on the Walker River near Wabuska (fig. 1), about 16 miles upstream from Weber Dam. This station is the furthest downstream gage on the Walker River. Table 1 lists the annual flows at this site for water years 1924-71 (a water year is the 12-month period, October 1 to September 30). There are streamflow records prior to 1924; however, the years 1924-71 represent the period of manmade modifications of the hydrologic system that exist today. Streamflow at this site for the 48-year period 1924-71 has averaged about 118,000 acre-feet per year, and this value agrees closely with the runoff of 120,000 acre-feet per year of average wetness for the base period 1919-69. Streamflow measurements made about 2 miles upstream from Weber Reservoir suggest that the flows into the reservoir may be on the order of 5 to 15 percent less than the flows measured at the Wabuska gaging station. The loss is due largely to evapotranspiration in excess of local runoff along the river.

Table 1.--*Streamflow of the Walker River at the Wabuska gaging station for water years 1924-71*

Water year	Streamflow (acre-feet)	Water year	Streamflow (acre-feet)
1924	52,600	1948	31,070
1925	*a* 20,000	1949	36,520
1926	29,200	1950	30,330
1927	100,000	1951	158,600
1928	46,900	1952	379,000
1929	18,300	1953	121,800
1930	14,500	1954	43,340
1931	9,340	1955	34,620
1932	59,800	1956	277,000
1933	35,900	1957	88,350
1934	21,000	1958	227,300
1935	46,410	1959	70,590
1936	*a* 110,000	1960	26,260
1937	*a* 114,000	1961	23,780
1938	*a* 470,000	1962	37,260
1939	*a* 80,000	1963	169,200
1940	62,960	1964	51,460
1941	179,900	1965	123,200
1942	*a* 280,000	1966	107,600
1943	240,100	1967	237,100
1944	*a* 70,000	1968	90,710
1945	331,900	1969	403,200
1946	170,900	1970	134,900
1947	84,410	1971	93,720
Average annual streamflow (rounded)			118,000 acre-feet

a. Estimated streamflow based on streamflow records on the East Walker River near Mason and the West Walker River near Hudson.

Figure 2 shows the monthly flow distribution at the streamflow gaging station near Wabuska for the water years 1940-71. In general, this flow distribution is also applicable to the monthly inflow to Weber Reservoir.

Weather Bureau records at Schurz and Yerington suggest that the average precipitation on the reservoir is about 5 inches per year. The full reservoir has a surface area of 900 acres (1972 survey); thus, the estimated inflow from precipitation is nearly 380 acre-feet per year (rounded). Using an average evaporation rate of 4 feet per year (Kohler and others, 1959, p. 13), annual evaporation loss is estimated to be about 3,600 acre-feet per year for a full reservoir, which is nine times the average annual precipitation inflow. Everett and Rush (1967) used a precipitation inflow rate of 400 acre-feet per year and an evaporation loss rate of 4,000 acre-feet per year. These figures were based on an average reservoir surface area of 1,000 acres.

Lack of storage prevents the reservoir from being fully effective in the control of downstream flooding, although minor flooding can be reduced. Figure 3 shows the annual variation in contents of Weber Reservoir for the period of continuous record, water years 1956-72.

BATHYMETRY

A continuously recording, electronic fathometer was used to measure the depth of the reservoir on 38 traverses. The reservoir was at maximum operating stage, 4,208.0 feet (considered full with 2 feet of freeboard left on radial spillway gates) during the survey on May 22-23, 1972. Figure 4 shows the stage-area-capacity relations. The new stage-area-capacity figures indicate a water-surface area of 900 acres and a storage capacity of 10,700 acre-feet at stage 4,208 feet, or about 2,400 acre-feet less storage than the original area-capacity figures. This represents an 18 percent loss of computed storage capacity. The maximum reservoir depth found was 29 feet.

SEDIMENTATION

The difference between the two capacities is probably the result of sedimentation and errors in the estimates of storage. The original figures (from the files of the Bureau of Indian Affairs, Stewart, Nev.) show that the minimum elevation on the reservoir floor was at elevation 4,176 feet, which was 3 feet lower than that found by this study. The thickness of fill probably is not uniform but may average somewhere between 2 to 3 feet, or on the order of 2,000 to 2,500 acre-feet. This computes to be an average sedimentation rate in the reservoir for the 38 years of operation of about 60 acre-feet per year. Because of upstream storage reservoirs and natural sediment traps, and because much of the area contributes little sediment, no meaningful erosion rate for the entire watershed could be computed.

Sedimentation data for the reservoir are virtually nonexistent, except for a few samples taken for this study, the results of which are listed in table 2. The data for May 23, 1972 show (1) an increase of sediment concentration with depth of water, and (2) that more sediment was moving into the reservoir (236 mg/l) than was moving out (82 mg/l).

Table 2.--*Suspended sediment quantities at selected sites*

Location	Date	Concentration (milligrams per liter)	Streamflow at time of sample (cubic feet per second)	Tons of sediment per day during time of sampling
Walker River 2 miles upstream from Weber Reservoir	April 27, 1972	65	80	14
	May 23, 1972	80	90	67
Walker River at outlet of Weber Reservoir	do.	82	85	19
Weber Reservoir point sampling:				
Site 1 (bathymetric map)				
12 feet below water surface	do.	47	--	--
20 feet below water surface	do.	57	--	--
Site 2 (bathymetric map)				
3 feet below water surface	do.	29	--	--
13 feet below water surface	do.	54	--	--
26 feet below water surface	do.	164	--	--

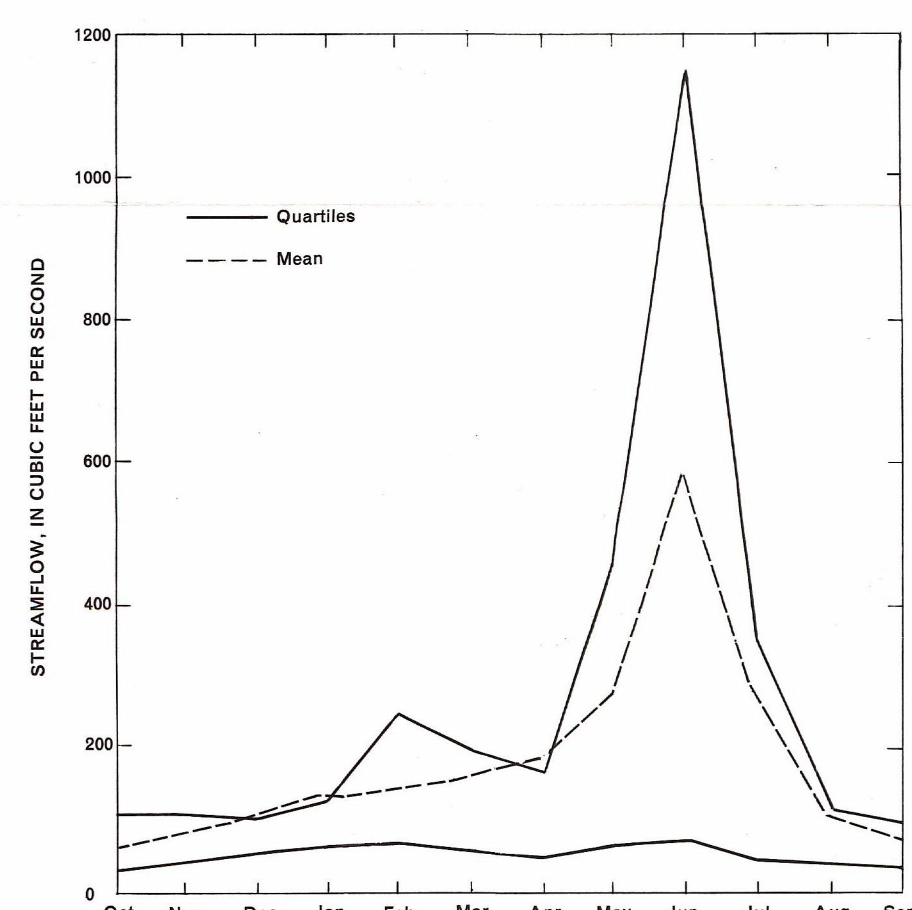


Figure 2.-Mean monthly flow distribution, Walker River near Wabuska, water years 1940-71 (Quartiles show 25 percent of the monthly flows were higher and lower than indicated)

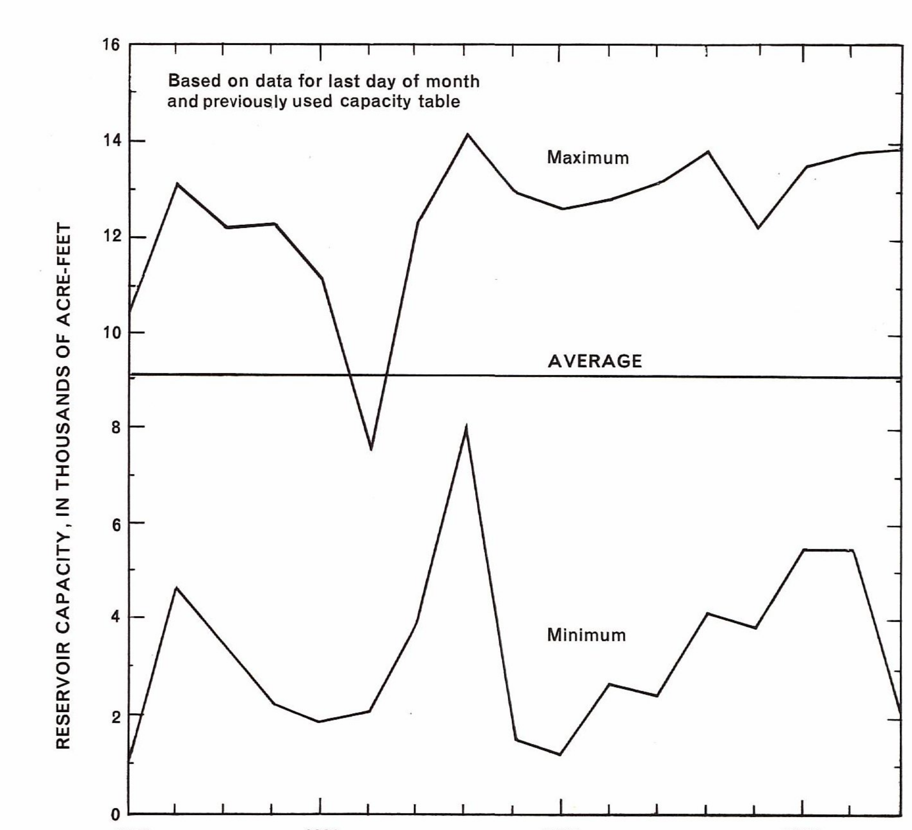


Figure 3.-Annual variation in contents of Weber Reservoir, Water years 1956-1972, (furnished by Bureau of Indian Affairs, Stewart, Nev.)

WATER QUALITY

Table 3 lists the results of U.S. Geological Survey chemical analyses of water samples collected during the 1971 water year at the Walker River gaging station near Wabuska. Although this sampling site is several miles above the reservoir, it should be generally representative of the water quality entering the reservoir. Figure 5 shows vertical temperature profiles at two sites in the reservoir taken on May 23, 1972. The water-inflow temperature at the head of the reservoir at that time was 21°C; the outflow temperature, taken as water was being released from the bottom of the reservoir, was 14.5°C.

Table 3.--*Summary of water-quality data for river*

(Data for Walker River gaging station near Wabuska, 16 miles upstream from reservoir, fig. 1)

Constituent	Concentration range[1] (in milligrams per liter unless otherwise specified)
Water year 1971 (11 samples)	
Temperature	0.5 - 21.5°C
Calcium	19 - 49
Magnesium	4.6 - 13
Sodium	19 - 80
Bicarbonate	101 - 267
Chloride	6.1 - 32
Nitrate (as N)	0.0 - 1.1
Orthophosphate (as P)	0.09 - 0.40
Dissolved solids	194 - 437
Hardness (as $CaCO_3$)	66 - 176
Specific conductance	222 - 677 micromhos

[1] *Range in flow at time of sampling, 29 to 1,010 cubic feet per second.*

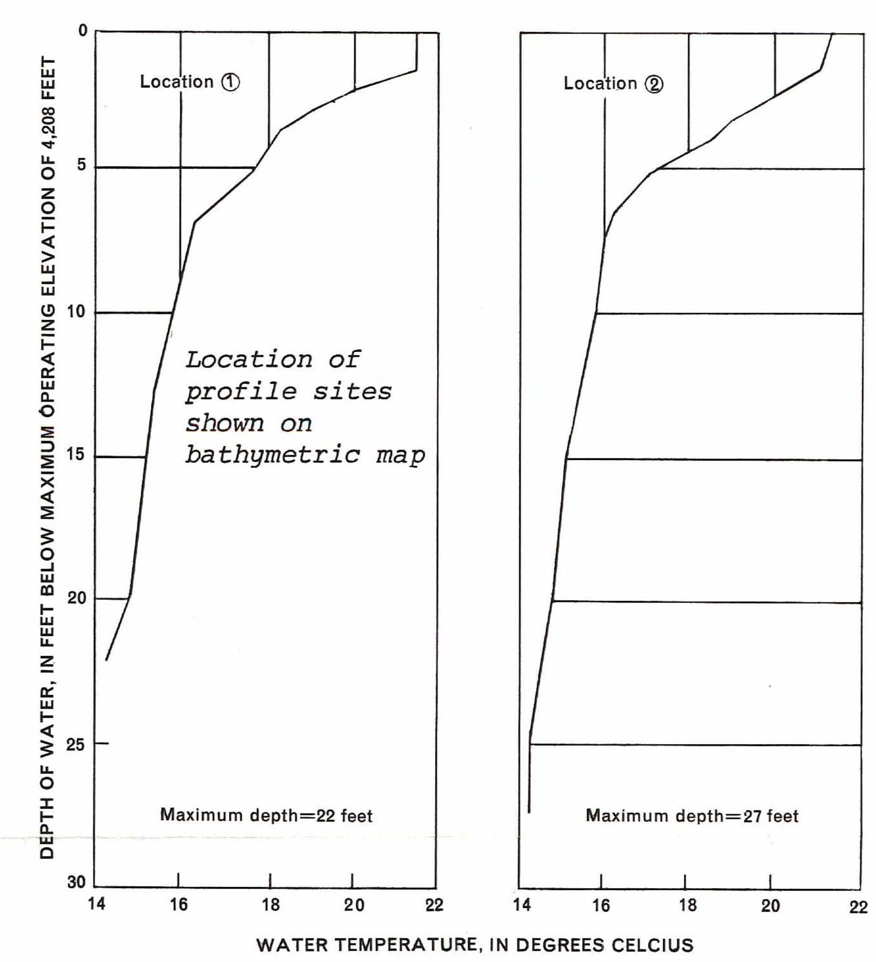


Figure 5.-Vertical water-temperature profiles at two sites in Weber Reservoir, May 23, 1972

OTHER BATHYMETRIC SURVEYS

Other bathymetric surveys have been completed or planned, as follows:

Lake or Reservoir	*Publication*
Pyramid Lake	USGS HA-379[1]
Walker Lake	USGS HA-415
Lahontan Reservoir	Nev. DWR Info. Ser. 9[2]
Big and Little Washoe Lakes .	Nev. DWR Info. Ser. 10
Big and Little Soda Lakes . .	Nev. DWR Info. Ser. 11
Topaz Lake	Nev. DWR Info. Ser. 12
Rye Patch Reservoir and Upper and Lower Pitt-Taylor Reservoirs	Nev. DWR Info. Ser. 13
Marlette and Spooner Lakes . .	Nev. DWR Info. Ser. 14
Weber Reservoir	Nev. DWR Info. Ser. 15
Wild Horse Reservoir	Nev. DWR Info. Ser. 16
Lake Tahoe	Nev. DWR Info. Ser. 17

[1] *U.S. Geological Survey Hydrologic Atlas.*
[2] *Nevada Division of Water Resources Information Series Report.*

REFERENCES CITED

Everett, D. E., and Rush, F. E., 1967, A brief appraisal of the water resources of the Walker Lake area, Mineral, Lyon, and Churchill Counties, Nevada: Nevada Dept. Conserv. and Nat. Resources, Water Resources - Reconn. Ser. Rept. 40.

Kohler, M. A., and others, 1959, Evaporation maps of the United States: U.S. Weather Bureau Tech. Paper no. 37, p. 13.

DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

STATE OF NEVADA
DEPARTMENT OF FISH AND GAME AND
DIVISION OF WATER RESOURCES

WATER RESOURCES - INFORMATION SERIES
REPORT-16

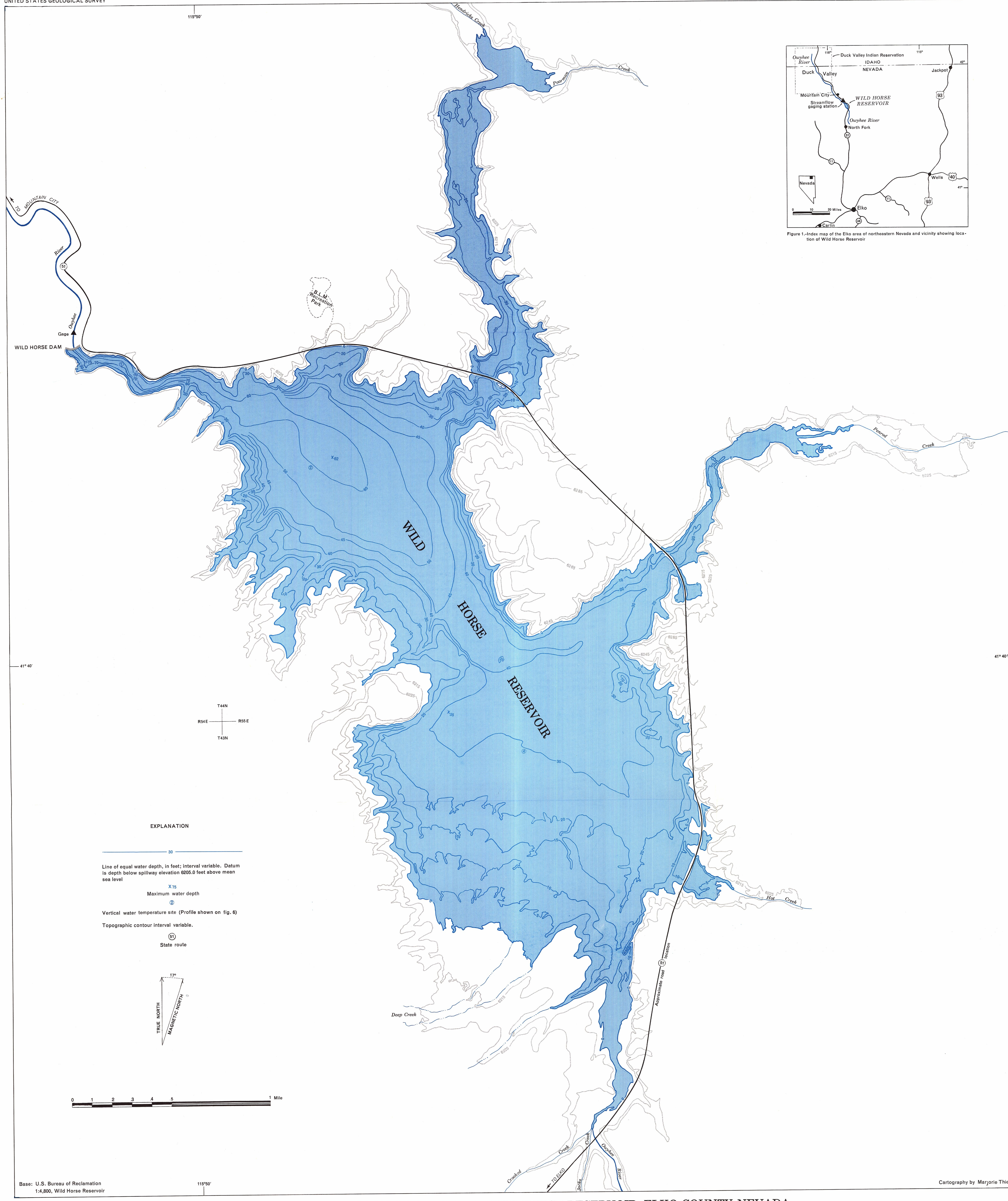


Figure 1.-Index map of the Elko area of northeastern Nevada and vicinity showing location of Wild Horse Reservoir

Base: U.S. Bureau of Reclamation 1:4,800, Wild Horse Reservoir

Cartography by Marjorie Thielke

BATHYMETRIC RECONNAISSANCE OF WILD HORSE RESERVOIR, ELKO COUNTY, NEVADA

By

T. L. Katzer and Lynn Harmsen

1973

BATHYMETRIC RECONNAISSANCE OF WILD HORSE RESERVOIR, ELKO COUNTY, NEVADA

By T. L. Katzer and Lynn Harmsen

INTRODUCTION

Wild Horse Reservoir is in Elko County, on the northeastern flank of the Independence Mountains, about 62 miles north of Elko and 12 miles southeast of Mountain City, on State Route 51 (fig. 1). The drainage area of the Owyhee River, the main tributary to Wild Horse Reservoir, at the gaging station immediately below the reservoir is about 209 square miles. The Owyhee River is one of Nevada's few north-flowing streams and is a tributary to the Snake River (not shown in fig. 1). Wild Horse Reservoir, when full, is at an elevation of 6,205 feet above mean sea level and the surrounding mountains commonly have peaks above an elevation of 7,000 feet.

The need for supplemental irrigation water for Duck Valley on the Western Shoshone Indian Reservation led to the first reservoir site investigation by Halbert T. Johnson in 1916. The National Industrial Recovery Act of 1933 allocated funds to the U.S. Indian Service (now the Bureau of Indian Affairs) for the building of a dam. Construction started in June 1936, ended in June 1937, and storage began March 18, 1938. According to the Bureau of Indian Affairs, at spillway elevation 6,189.2 feet, the reservoir had a water-surface area of 1,860 acres and a capacity of 33,500 acre-feet.

According to the U.S. Bureau of Reclamation, the aggregate used in the contruction of the first dam proved to be of poor quality. The Bureau of Indian Affairs, therefore, decided to build a new dam to remove a possible safety hazard and allow the reservoir to be enlarged to about double its former capacity. Construction by the U.S. Bureau of Reclamation on the second dam started in September 1967 and was completed in June 1969. This present dam is a double-curvature, thin-arch, concrete structure. The crest is 435 feet long, the spillway is 75 feet wide at elevation 6,205.0 feet. The 1972 survey determined that at spillway elevation 6,205.0 feet, the surface area is 2,830 acres, and the capacity is 73,500 acre-feet.

The reservoir is operated to provide irrigation water for about 21,000 acres of Indian land (W. H. Hoy, Bureau of Indian Affairs, Stewart, Nev., oral commun., 1973). Figure 2 shows the reservoir's annual variation in contents for the water years 1938-71 (a water year is from October 1 to September 30). The original capacity table was used prior to 1969. Table 1 presents the annual releases and spills from the reservoir, as recorded by a downstream gaging station on the Owyhee River (fig. 1). Figure 3 shows the mean monthly flow distribution for the Owyhee River below the reservoir, before and after dam construction.

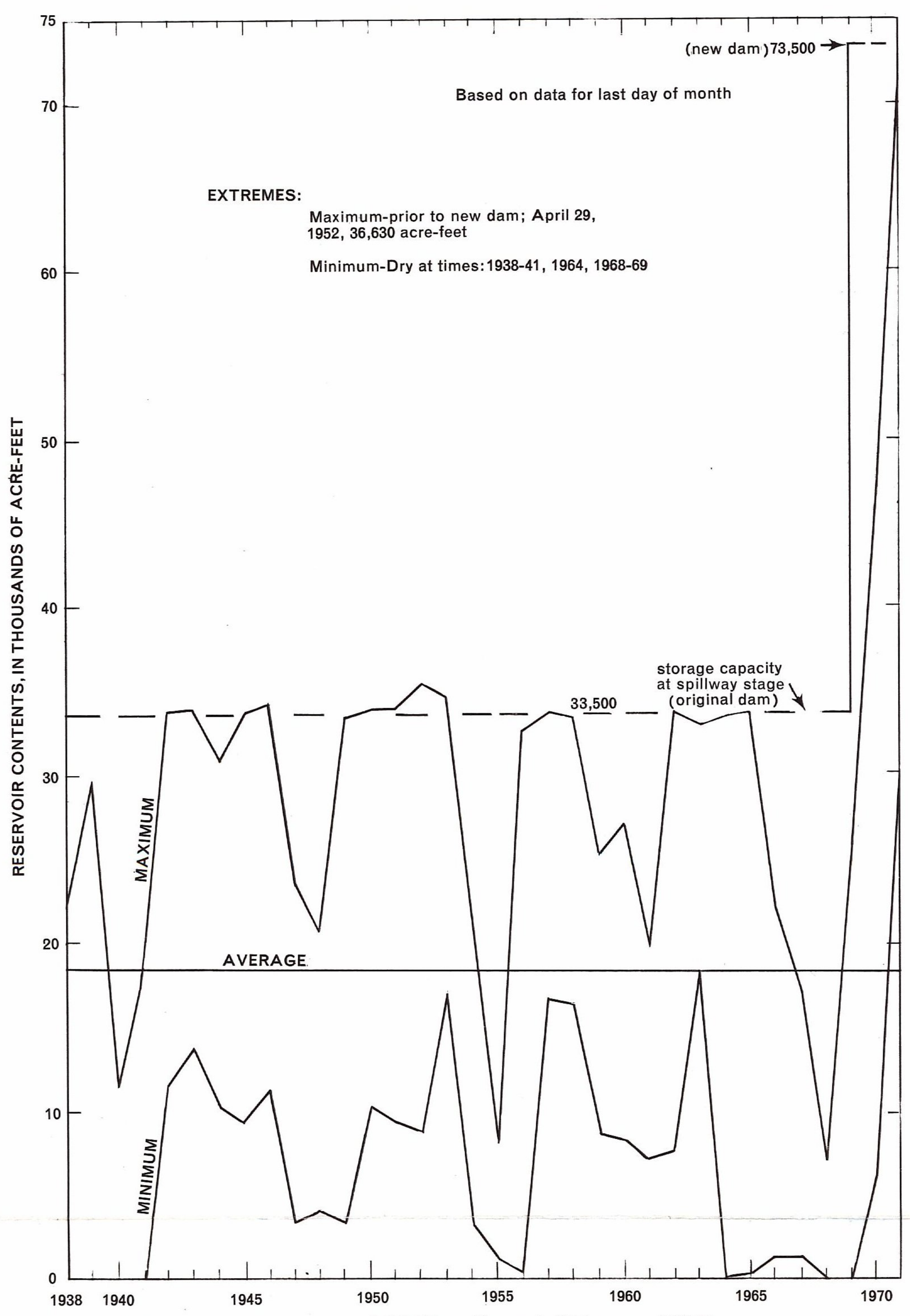


Figure 2.-Annual variation in contents of Wild Horse Reservoir, Water years 1938-71.

Table 1.--*Outflow from Wild Horse Reservoir in the Owyhee River, 1939-72*

(Measured at the gaging station near Gold Creek)

Water year	Streamflow in acre-feet (rounded)	Water year	Streamflow in acre-feet (rounded)
1939	39,700	1957	39,300
1940	15,100	1958	37,200
1941	a 9,000	1959	19,600
1942	33,200	1960	12,600
1943	b 63,700	1961	38,200
1944	27,200	1962	32,900
1945	37,200	1963	14,500
1946	45,800	1964	52,900
1947	22,900	1965	23,000
1948	17,900	1966	25,900
1949	26,800	1967	13,500
1950	33,800	1968	11,000
1951	46,000	1969	40,000
1952	62,100	1970	13,800
1953	30,300	1971	37,600
1954	21,800	1972	54,600
1955	9,800		
1956	15,300	Average	30,100

a. Minimum.
b. Maximum.

Weather Bureau records at North Fork (fig. 1) suggest that the average annual precipitation on the reservoir is about 10 inches. According to Kohler and others (1959, pl. 2), the average annual evaporation from the reservoir is about 3.5 feet (net evaporation, about 2.7 feet). Based on these figures, the construction of the new dam has increased the average inflow from direct precipitation on the reservoir from about 1,500 acre-feet to about 2,300 acre-feet per year at spillway stage, and the water lost by evaporation has also increased from about 6,500 acre-feet to about 10,000 acre-feet at spillway stage.

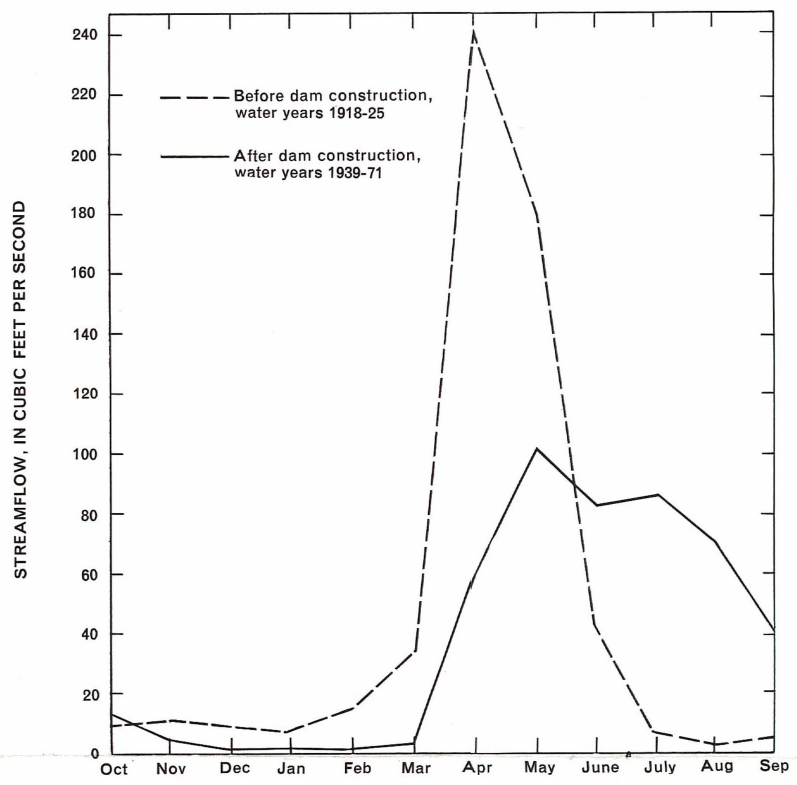


Figure 3.- Mean monthly flow distribution, Owyhee River near Gold Creek, water years 1918-25 and 1939-71.

BATHYMETRY

A continuous recording, electronic fathometer was used to measure the depth of the reservoir on 48 traverses. The Nevada Fish and Game Department provided a boat which was operated by Enforcement Officer Robert Poling. The bathymetric survey was made on May 25-26, 1972, when the reservoir was spilling at stage 6,205.6 feet.

Figure 4 is a graph of the stage-area-volume relations. The results of this survey indicate that at spillway elevation 6,205 feet, the water-surface area is 2,830 acres and the storage capacity is 73,500 acre-feet. A comparison of these results and data furnished by the Bureau of Indian Affairs, Stewart, Nev., shows that at spillway stage the water-surface area computed in this survey to be 7 percent less and the capacity to be 3 percent greater than those previously used. The differences are within the accuracy limits of this reconnaissance. The stage-area-volume tables of the Bureau of Indian Affairs show that the original reservoir, at spillway stage 6,189.2 feet, had a water-surface area of 1,860 acres and a capacity of 33,500 acre-feet. The 1972 survey shows that at the original reservoir spillway stage the surface area was 1,870 acres and the capacity was 36,700 acre-feet. The differences in capacity are again considered to be within the accuracy limits of the two surveys. Bathymetric data were used to develop the stage-area-volume relations below elevation 6,185 feet, and existing topographic maps were used above elevation 6,185 feet.

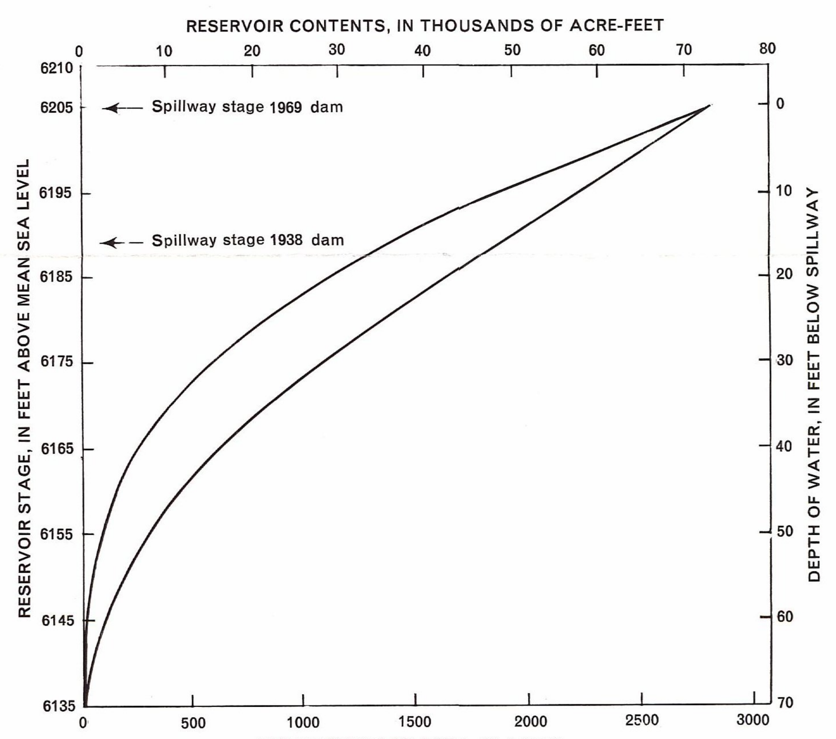


Figure 4.-Stage-area-capacity relations of Wild Horse Reservoir (1972 Survey)

SEDIMENTATION AND WATER QUALITY

Sediment movement and deposition data are lacking for Wild Horse Reservoir. The results of this survey, however, indicate that there has been no identifiable loss of storage due to sedimentation, and therefore sediment transport into Wild Horse Reservoir is assumed to have been minor. The lack of identifiable sedimentation in the reservoir is mainly due to the relatively stabilized soils, small size of the drainage area above the reservoir, and small runoff.

Table 2 presents the results of the Nevada State Health Department water sampling and analyses of the Owyhee River during 1971. The sampling site was about 10 miles downstream from the reservoir.

Table 2.--*Water-quality data for sampling site downstream from Wild Horse Reservoir*

[Data for Owyhee River immediately upstream from Mountain City (fig. 1), furnished by the Nevada State Health Department]

	Concentration in milligrams per liter unless otherwise specified 1971 May 24	August 30
Approximate flow, cubic feet per second	250	80
Temperature	12.5°C (54.5°F)	18.5°C (65.3°F)
pH (units)	7.9	8.3
Dissolved oxygen	8.9	8.3
Chloride (Cl)	1	4
Orthophosphate (PO_4)	.16	.40
Nitrate (NO_3)	.2	0
Dissolved solids	121	137
Alkalinity	74	94
Bicarbonate	90	115
Carbonate	0	0

Figure 5 shows vertical temperature profiles at four sites in the reservoir.

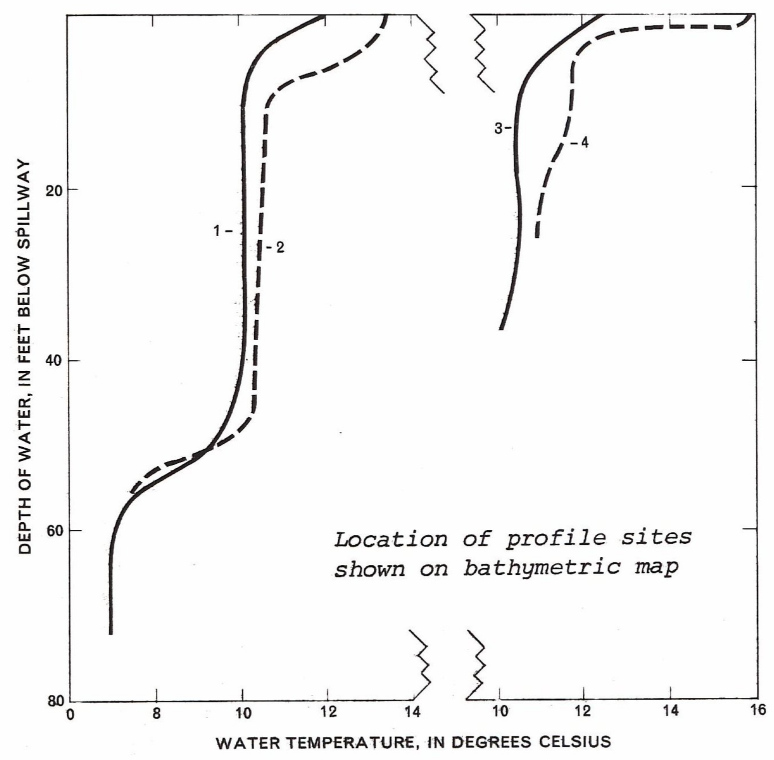


Figure 5.-Vertical water-temperature profiles for Wild Horse Reservoir, May 26, 1972

OTHER BATHYMETRIC SURVEYS

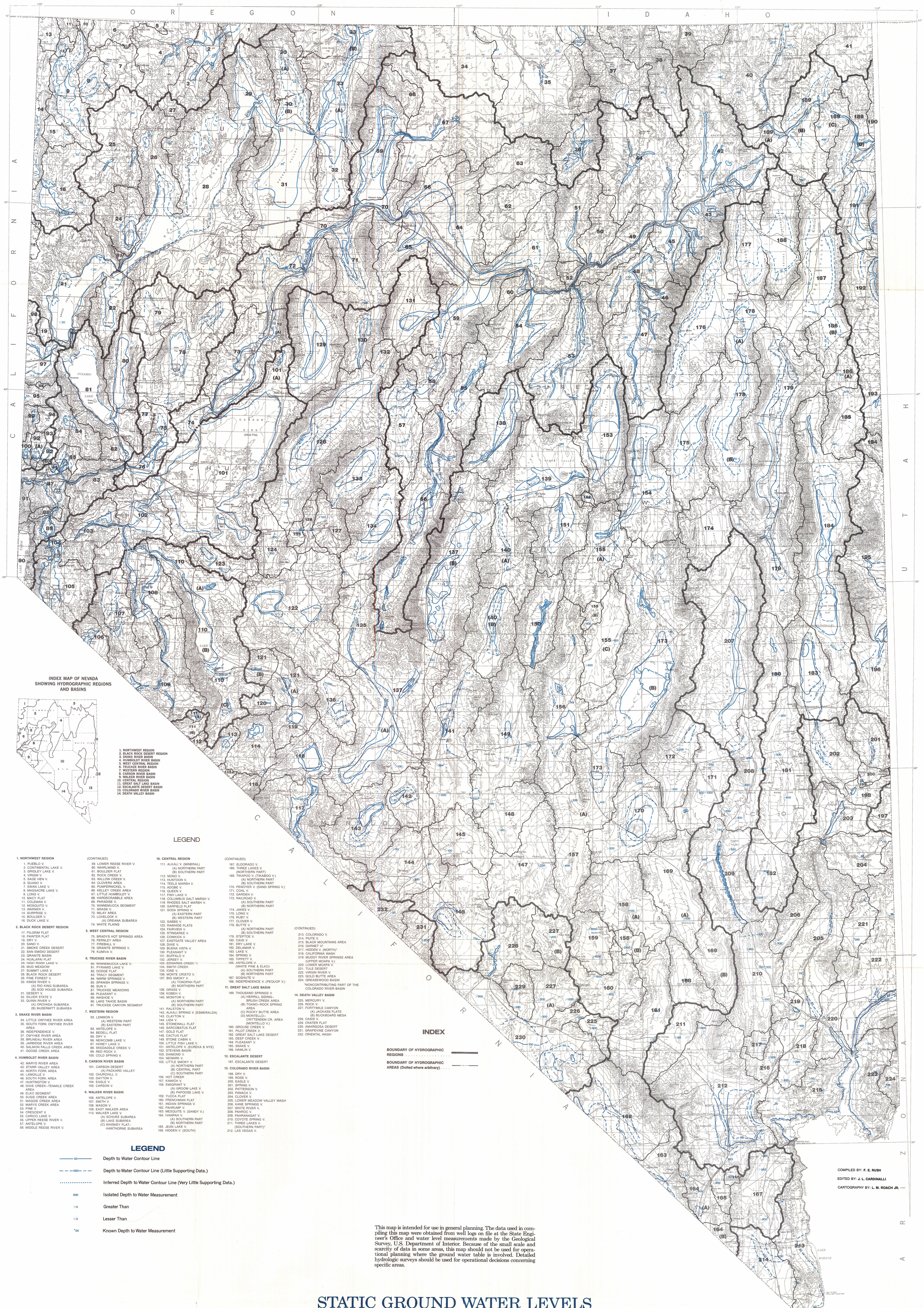
Reconnaissance bathymetric surveys of this series are listed below:

Lake or Reservoir	*Publication*
Pyramid Lake	USGS HA-379[1]
Walker Lake	USGS HA-415[2]
Lahontan Reservoir	Nev. DWR Info. Ser. 9[2]
Big and Little Washoe Lakes	Nev. DWR Info. Ser. 10
Big and Little Soda Lakes .	Nev. DWR Info. Ser. 11
Topaz Lake	Nev. DWR Info. Ser. 12
Rye Patch Reservoir and Upper and Lower Pitt-Taylor Reservoirs	Nev. DWR Info. Ser. 13
Marlette and Spooner Lakes .	Nev. DWR Info. Ser. 14
Weber Reservoir	Nev. DWR Info. Ser. 15
Wild Horse Reservoir	Nev. DWR Info. Ser. 16
Lake Tahoe	Nev. DWR Info. Ser. 17

1 U.S. Geological Survey, Hydrologic Atlas.
2 Nevada Division of Water Resources, Information Series Report.

REFERENCE CITED

Kohler, M. A., and others, 1959, *Evaporation maps of the United States: U.S. Weather Bureau Tech. Paper No. 37, p. 13.*



This map is intended for use in general planning. The data used in compiling this map were obtained from well logs on file at the State Engineer's Office and water level measurements made by the Geological Survey, U.S. Department of Interior. Because of the small scale and scarcity of data in some areas, this map should not be used for operational planning where the ground water table is involved. Detailed hydrologic surveys should be used for operational decisions concerning specific areas.

STATIC GROUND WATER LEVELS OF NEVADA

PREPARED AS PART OF THE NEVADA STATE WATER PLAN

DIVISION OF WATER RESOURCES
STATE ENGINEERS OFFICE

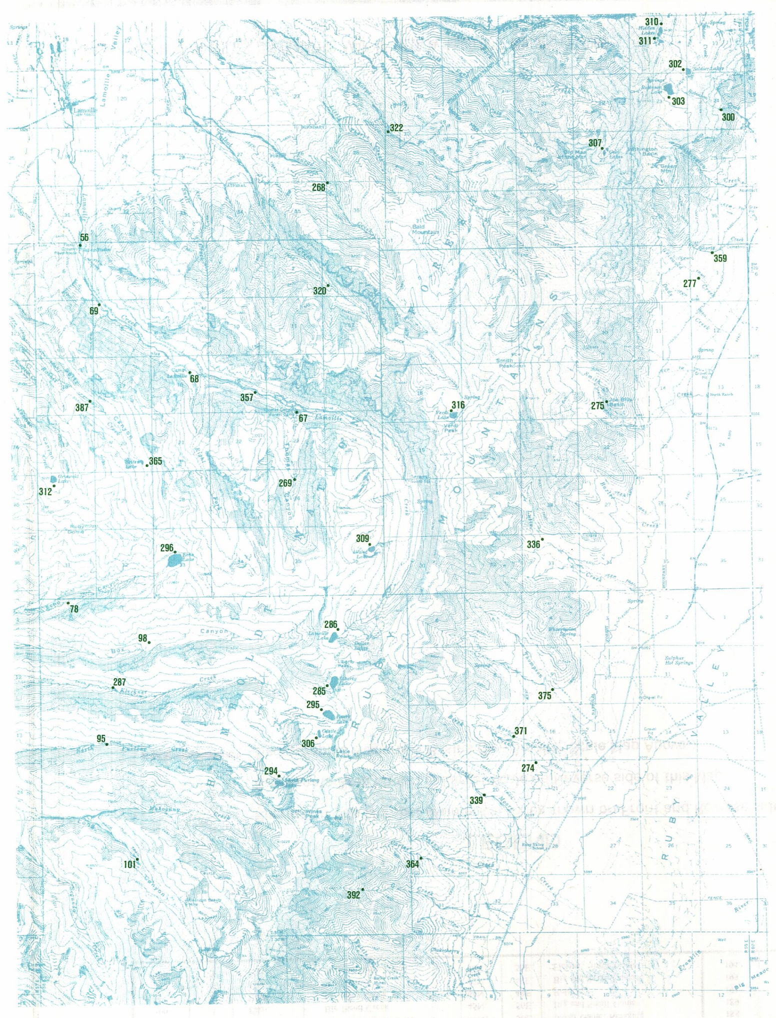
1974

SCALE 1:750,000
1 inch equals approximately 12 miles

BASE: REDUCTION OF U.S.G.S. TOPOGRAPHIC MAP OF NEVADA, 1:500,000, EDITION OF 1965

PREPARED WITH THE COOPERATION OF THE GEOLOGICAL SURVEY, U.S. DEPARTMENT OF INTERIOR.

MAP 17
WATER RELATED OUTDOOR RECREATION AREAS OF NEVADA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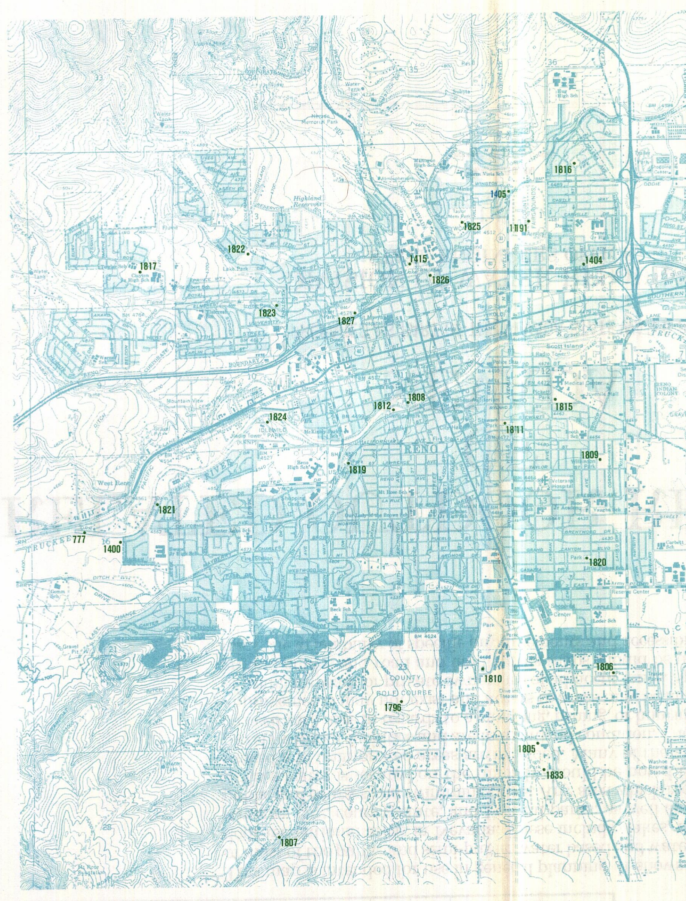
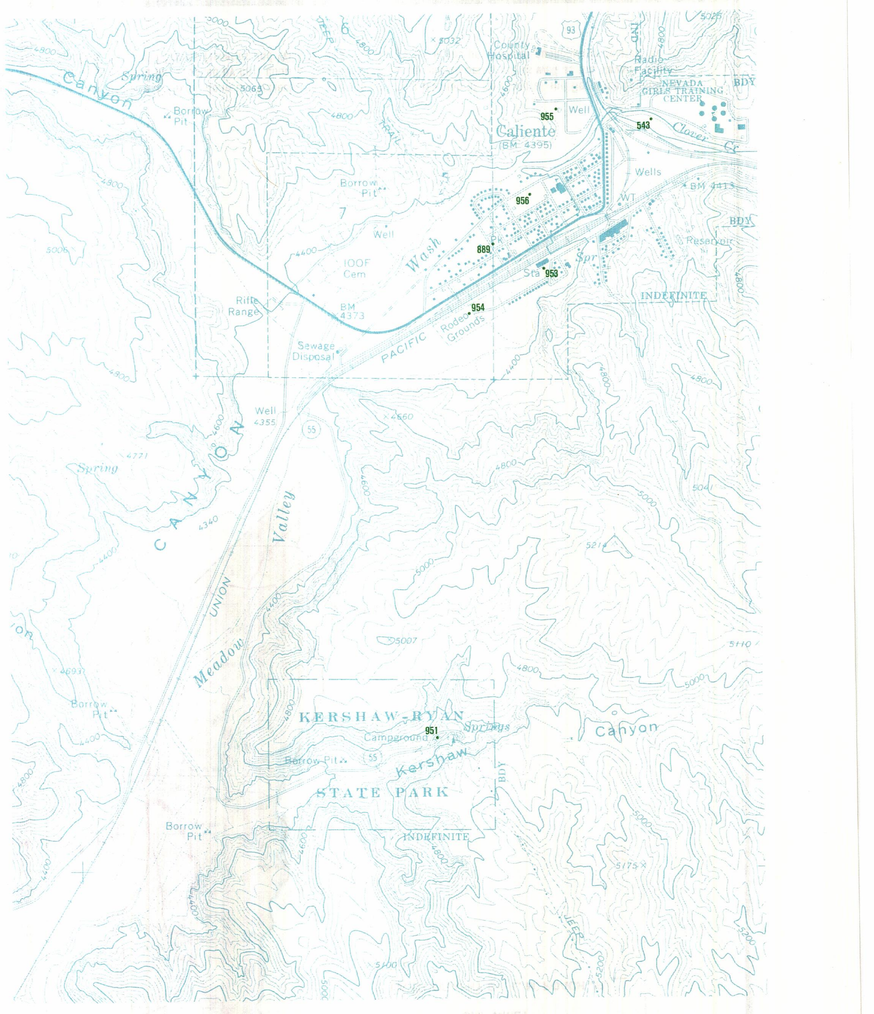
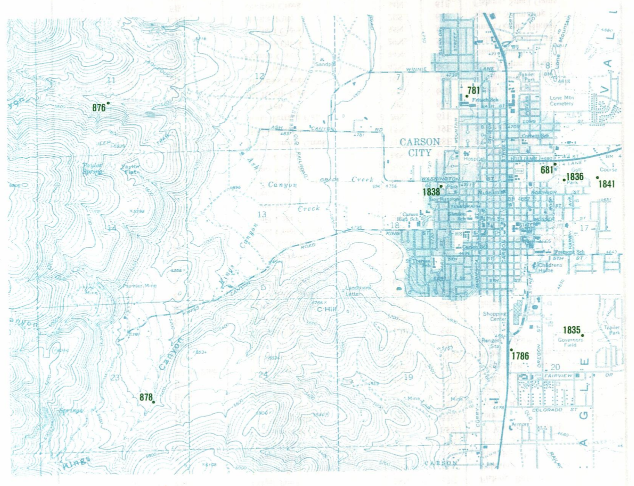
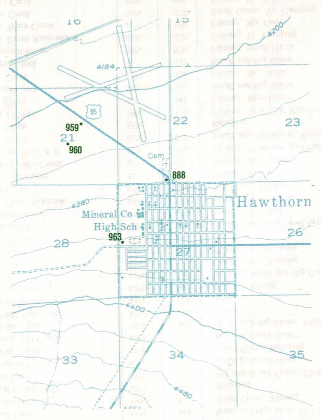

Reno - Sparks


Caliente - Kershaw Ryan State Park


Carson City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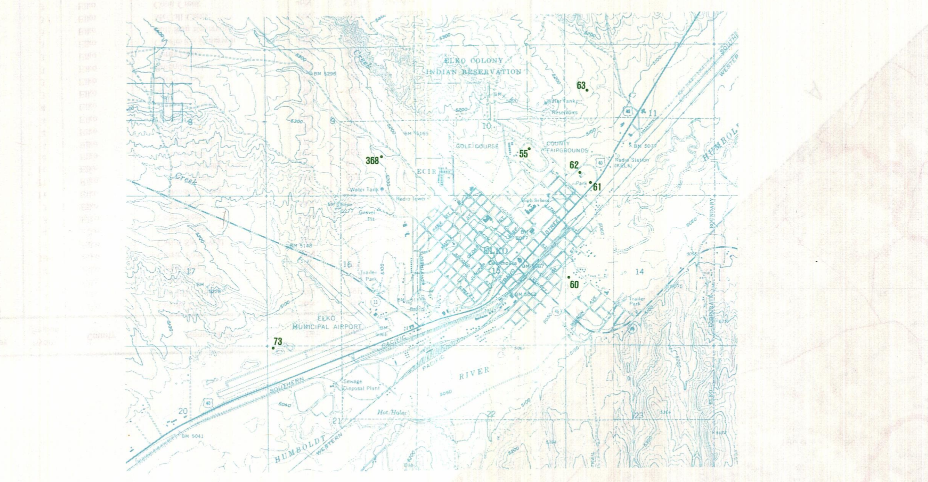
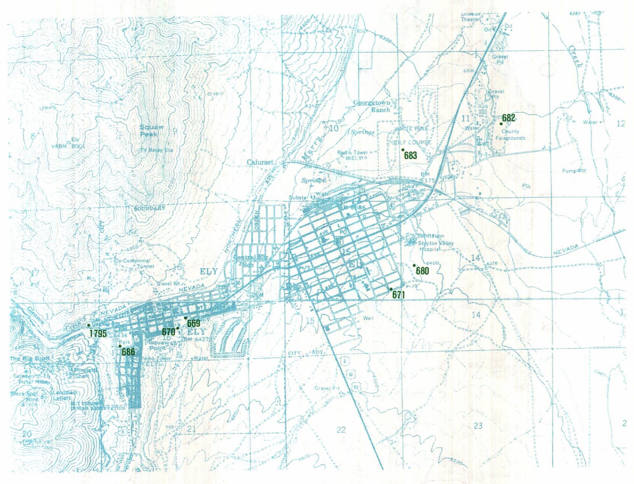

Elko


Winnemucca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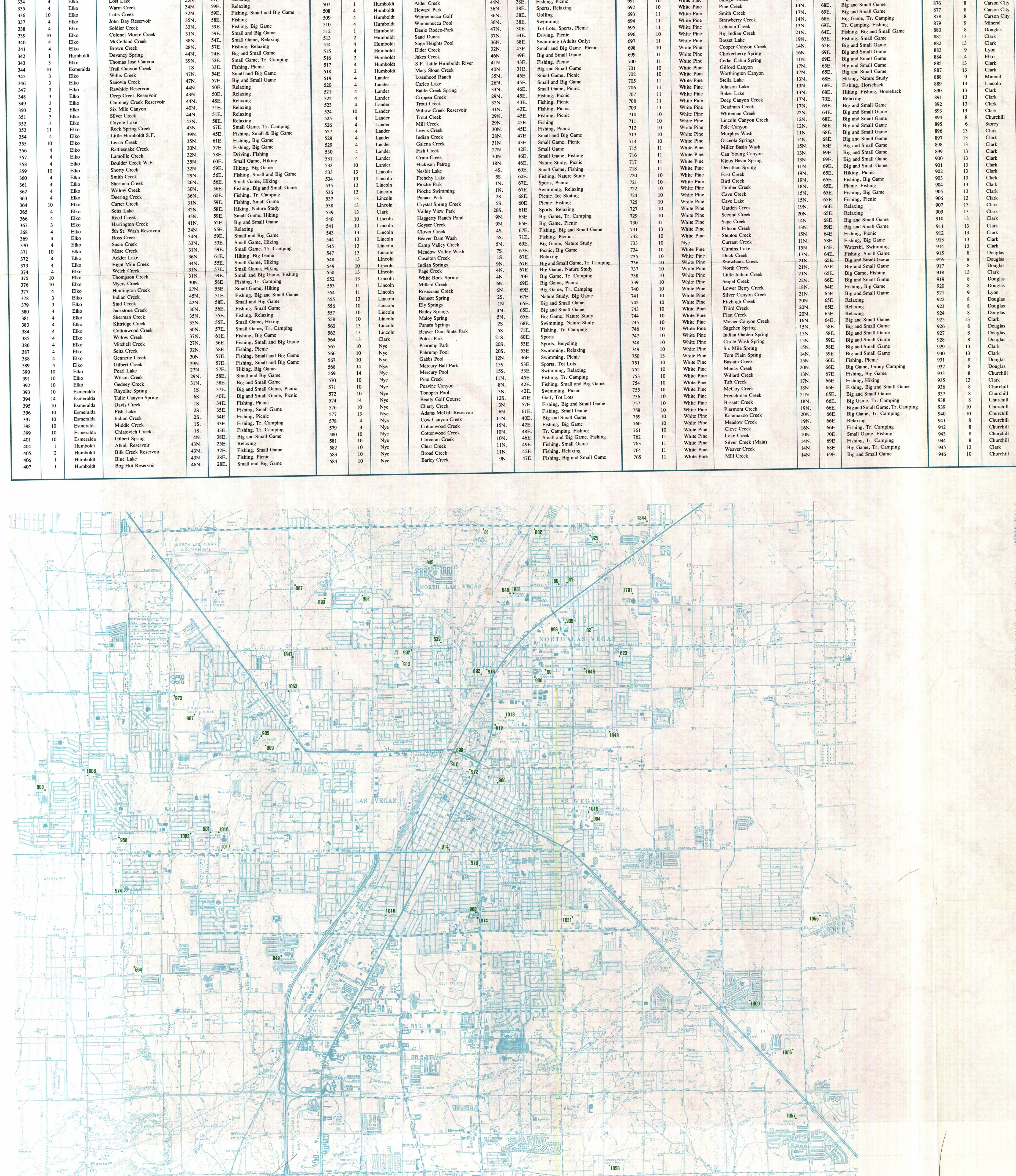
Survey No.	Hydro. Region	County	Name of Area	Twp.	Rng.	Recreational Activity[1]
241	3	Elko	Riffe Creek	43N.	54E.	Big and Small Game, Fishing
242	3	Elko	Poorman Creek	44N.	55E.	Big and Small Game
243	3	Elko	Lamb Reservoir	46N.	51E.	Tr. Camping, Relaxing
244	3	Elko	Hendrick Creek	44N.	55E.	Fishing, Small Game
245	3	Elko	Gold Creek	44N.	56E.	Tr. Camping, Small and Big Game
246	3	Elko	Coyote Hole Reservoir	47N.	51E.	Relaxing
247	3	Elko	Skull Creek	47N.	53E.	Fishing, Picnic
248	3	Elko	Fawn Creek	46N.	53E.	Small and Big Game, Fishing
249	3	Elko	Owyhee River S. Fork	41N.	47E.	Small and Big Game
250	3	Elko	Jerritt Canyon Creek	40N.	52E.	Small and Big Game, Fishing
251	10	Elko	Pole Canyon Creek	34N.	60E.	Big and Small Game
252	3	Elko	Beaver Creek	44N.	54E.	Small and Big Game
253	3	Elko	Jack Creek	42N.	52E.	Fishing, Small Game
254	3	Elko	Columbia Creek	44N.	52E.	Fishing, Small and Big Game
255	3	Elko	Marsh Creek	43N.	52E.	Small Game, Fishing
256	3	Elko	Thompson Creek	44N.	56E.	Small and Big Game, Fishing
257	3	Elko	Owyhee River E.F.	45N.	53E.	Fishing, Small Game
258	3	Elko	Sweet Creek	44N.	56E.	Big and Small Game
259	3	Elko	Deep Creek	42N.	51E.	Tr. Camping, Small Game
260	3	Elko	Deep Creek	43N.	54E.	Small Game, Relaxing
261	3	Elko	Clear Creek	43N.	54E.	Fishing, Small and Big Game
262	3	Elko	Blue Jacket Creek	44N.	52E.	Fishing, Big Game
263	3	Elko	Schoonover Creek	42N.	53E.	Fishing, Big Game
264	3	Elko	Allegheny Creek	45N.	54E.	Sports, Snowmobiles
265	3	Elko	Canyon Creek	45N.	60E.	Fishing, Big Game
266	3	Elko	Bull Run Creek	44N.	50E.	Fishing, Small Game
267	3	Elko	Copper Creek	44N.	57E.	Fishing, Big Game
268	4	Elko	Conrad Creek	33N.	58E.	Fishing, Mtn. Climbing
269	3	Elko	Thomas Creek	32N.	58E.	Fishing, Big Game
271	10	Elko	Renshaw Creek	36N.	61E.	Relaxing
272	10	Elko	Hankin's Creek	29N.	58E.	Small and Big Game, Tr. Camping
273	10	Elko	Dawley Creek	29N.	58E.	Fishing, Tr. Camping
274	10	Elko	Birch Creek	31N.	59E.	Small and Big Game
275	10	Elko	Smith Creek	32N.	59E.	Fishing, Picnic
276	10	Elko	Mayhew Creek	29N.	58E.	Fishing, Small Game
277	10	Elko	Griswold Creek	32N.	59E.	Relaxing
279	3	Elko	Mill Creek	45N.	53E.	Small Game, Fishing
280	4	Elko	Marys River	43N.	58E.	Small Game, Fishing
281	3	Elko	McCann Creek	39N.	51E.	Fishing, Tr. Camping
282	3	Elko	Daves Creek	47N.	58E.	Small Game, Fishing
283	3	Elko	Hot Creek	43N.	55E.	Relaxing
284	10	Elko	Overland Lake	30N.	58E.	Fishing, Hiking
285	4	Elko	Liberty Lake	31N.	58E.	Fishing, Hiking
286	4	Elko	Lamoille Lake	31N.	58E.	Fishing, Relaxing
287	4	Elko	Kleckner Creek	31N.	58E.	Fishing, Horsebacking
288	4	Elko	Humboldt River S.F.	31N.	54E.	Fishing, Small Game
289	4	Elko	Ackler Creek	36N.	60E.	Fishing, Big Game
291	4	Elko	Boyds Reservoir	34N.	57E.	Small Game, Relaxing
292	4	Elko	Boulder Lake	35N.	61E.	Fishing, Hiking, Big Game
293	4	Elko	Grays Lake	36N.	61E.	Fishing, Big Game
294	4	Elko	N. Furlong Lake	31N.	58E.	Relaxing
295	4	Elko	Favre Lake	31N.	58E.	Fishing, Hiking
296	4	Elko	Echo Lake	32N.	58E.	Hiking, Nature Study
297	10	Elko	Angel Creek S.F.	36N.	61E.	Fishing, Big and Small Game
298	4	Elko	Corral Creek	28N.	56E.	Fishing, Small and Big Game
299	10	Elko	Overland Creek	30N.	58E.	Fishing, Tr. Camping
300	10	Elko	Robinson Creek	33N.	59E.	Relaxing
301	4	Elko	Cold Creek	34N.	58E.	Fishing, Small and Big Game
302	4	Elko	Soldier Lake	33N.	59E.	Big Game, Hiking
303	4	Elko	Robinson Lake	33N.	59E.	Fishing, Big Game
304	10	Elko	Schoer Creek	36N.	61E.	Fishing, Hiking
305	4	Elko	Sleeman Ponds	31N.	56E.	Fishing, Relaxing
306	4	Elko	Castle Lake	31N.	58E.	Relaxing
307	4	Elko	Cold Lakes	33N.	59E.	Fishing, Hiking
308	10	Lander	Birch Pond	18N.	44E.	Fishing, Big and Small Game
309	4	Elko	Island Lake	32N.	58E.	Fishing, Big Game
310	4	Elko	Hidden Lake Upper	33N.	59E.	Relaxing
311	4	Elko	Hidden Lake Lower	33N.	59E.	Fishing, Hiking
312	4	Elko	Griswold Lake	32N.	58E.	Fishing, Big Game
313	4	Elko	Bishop Creek	38N.	61E.	Small Game, Hiking
314	4	Elko	Trout Creek	37N.	61E.	Relaxing
315	4	Elko	Dorsey Creek Reservoir	37N.	55E.	Fishing, Small and Big Game
316	10	Elko	Verdi Lake	32N.	59E.	Fishing, Small Game
317	4	Elko	Herder Creek	36N.	60E.	Fishing, Tr. Camping
318	4	Elko	Secret Creek	34N.	59E.	Fishing, Picnic
319	4	Elko	Kelly Creek	39N.	44E.	Fishing, Hiking
320	4	Elko	Talbot Creek	32N.	58E.	Fishing, Big Game
321	4	Elko	Ten Mile Creek	32N.	55E.	Small Game, Relaxing
322	4	Elko	Thorpe Creek	33N.	59E.	Fishing, Big and Small Game
323	4	Elko	Toyn Creek	28N.	57E.	Small Game, Fishing
324	10	Elko	Weeks Creek	35N.	61E.	Big and Small Game
325	4	Elko	McCutcheon Creek	30N.	56E.	Fishing, Small and Big Game
326	10	Elko	Steele Lake	35N.	61E.	Fishing, Small and Big Game
328	4	Elko	Pearl Creek	28N.	56E.	Fishing, Tr. Camping
330	10	Elko	Winchell Lake	36N.	61E.	Relaxing
331	10	Elko	Steels Creek	35N.	61E.	Fishing, Hiking
332	4	Elko	Mitchell Creek	32N.	56E.	Relaxing
333	10	Elko	Battle Creek	30N.	59E.	Small and Big Game, Fishing
334	4	Elko	Lost Lake	35N.	61E.	Relaxing
335	4	Elko	Warm Creek	34N.	59E.	Relaxing
336	10	Elko	Lutts Creek	32N.	59E.	Fishing, Small and Big Game
337	4	Elko	John Day Reservoir	35N.	58E.	Fishing
338	4	Elko	Soldier Creek	33N.	59E.	Fishing, Big Game
339	10	Elko	Colonel Moore Creek	31N.	59E.	Small and Big Game
340	4	Elko	McClelland Creek	38N.	54E.	Small Game, Relaxing
341	4	Elko	Brown Creek	28N.	57E.	Fishing, Relaxing
342	1	Humboldt	Devaney Spring	44N.	24E.	Big and Small Game
343	3	Elko	Thomas Jose Canyon	39N.	52E.	Small Game, Tr. Camping
344	10	Esmeralda	Trail Canyon Creek	1S.	33E.	Fishing, Picnic
345	3	Elko	Willis Creek	47N.	54E.	Small and Big Game
346	3	Elko	Sanovia Creek	47N.	57E.	Big and Small Game
347	3	Elko	Rawhide Reservoir	44N.	50E.	Relaxing
348	3	Elko	Deep Creek Reservoir	43N.	50E.	Relaxing
349	3	Elko	Chimney Creek Reservoir	44N.	48E.	Relaxing
350	3	Elko	Six Mile Canyon	40N.	51E.	Relaxing
351	3	Elko	Silver Creek	44N.	51E.	Relaxing
352	3	Elko	Coyote Lake	43N.	58E.	Relaxing
353	11	Elko	Rock Spring Creek	43N.	67E.	Small Game, Tr. Camping
354	4	Elko	Little Humboldt S.F.	39N.	45E.	Fishing, Small & Big Game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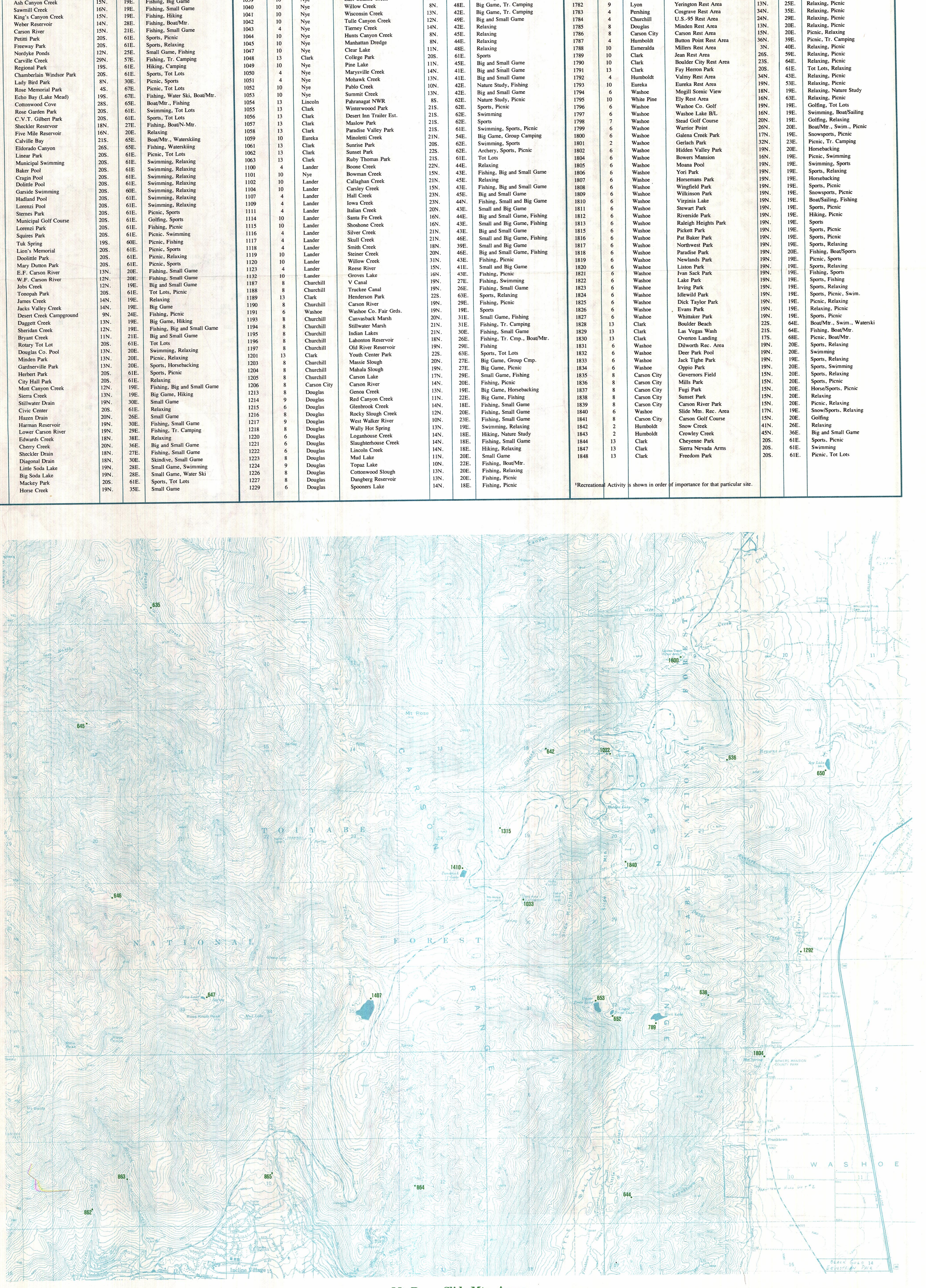
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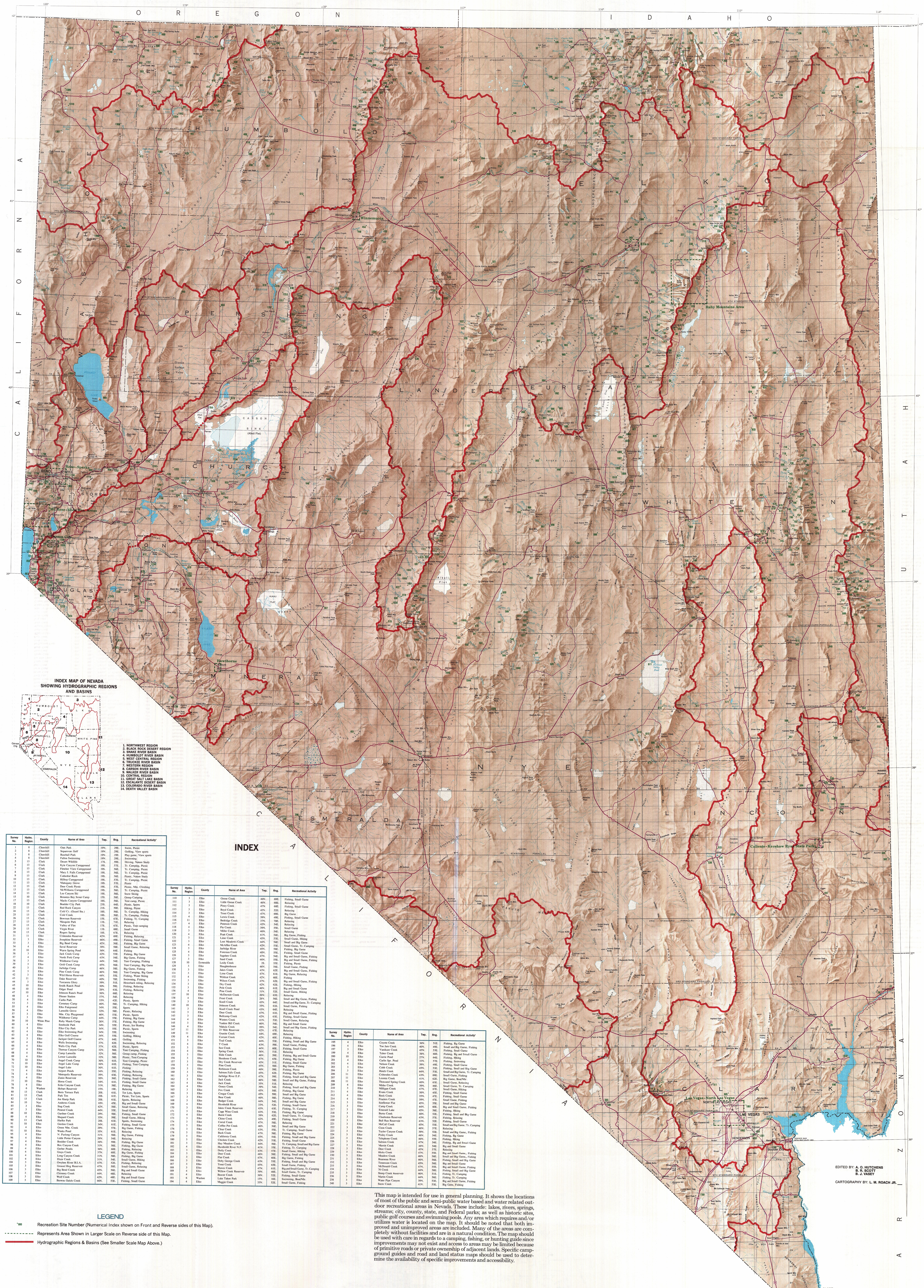

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Survey No.	Hydro. Region	County	Name of Area	Twp.	Rng.	Recreational Activity[1]
38	3	Elko	Wildhorse Camp	44N.	54E.	Tent Camping, Fishing
39	3	Elko	Gold Creek Camp	45N.	56E.	Tent Camping, Big Game
40	3	Elko	Jarbidge Camp	46N.	58E.	Big Game, Fishing
41	3	Elko	Pine Creek Camp	46N.	58E.	Tent Camping, Big Game
42	3	Elko	Wild Horse Reservoir	44N.	55E.	Fishing, Water Skiing
43	11	Elko	Dake Reservoir	40N.	70E.	Swimming, Fishing
44	3	Elko	Tuscarora Glory	39N.	51E.	Horseback riding, Relaxing
45	10	Elko	Smith Ranch Pond	30N.	59E.	Fishing, Relaxing
46	10	Elko	Odger Pond	28N.	63E.	Fishing, Relaxing
47	10	Elko	Johnson Ranch Pond	36N.	66E.	Relaxing
48	4	Elko	Dinner Station	37N.	54E.	Relaxing
50	4	Elko	Carlin Park	33N.	42E.	Picnic, Sports
53	3	Elko	Cemetary Camp	46N.	58E.	Tr. Camping, Hiking
55	4	Elko	Elko Fairground	34N.	55E.	Sports
56	4	Elko	Lamoille Grove	32N.	58E.	Picnic, Relaxing
57	3	Elko	Mtn. City Playground	46N.	53E.	Picnic, Sports
58	3	Elko	Wildhorse Camp	44N.	55E.	Fishing, Big Game
59	10	White Pine	Ruby Marsh Camp	26N.	57E.	Fishing, Big Game
60	4	Elko	Southside Park	34N.	55E.	Picnic, Ice Skating
61	4	Elko	Elko City Park	34N.	55E.	Picnic, Sports
62	4	Elko	Elko Swimming Pool	34N.	55E.	Swimming
63	4	Elko	Elko Golf Course	34N.	55E.	Golfing, Hiking
64	3	Elko	Jackpot Golf Course	47N.	64E.	Golfing
65	4	Elko	Wells Swimming	37N.	62E.	Swimming, Relaxing
66	4	Elko	Wells City Park	37N.	62E.	Picnic, Sports
67	4	Elko	Thomas Canyon Camp	32N.	58E.	Tent Camping, Fishing
68	4	Elko	Camp Lamoille	32N.	58E.	Group camp, Fishing
69	4	Elko	Lower Lamoille	32N.	58E.	Picnic, Tent Camping
70	10	Elko	Angel Creek Camp	36N.	61E.	Tent Camping, Picnic
71	10	Elko	Angel Lake Camp	36N.	61E.	Fishing, Tent Camping
72	10	Elko	Angel Lake	36N.	61E.	Fishing
73	4	Elko	Airport Ponds	34N.	55E.	Fishing, Relaxing
74	4	Elko	Metropolis Reservoir	39N.	63E.	Fishing, Relaxing
75	4	Elko	Zunio Reservoir	30N.	56E.	Fishing, Small Game
77	10	Elko	Horse Creek	34N.	61E.	Fishing, Small Game
78	4	Elko	Echo Canyon Creek	31N.	58E.	Fishing, Big Game
79	6	Washoe	Hobart Reservoir	15N.	19E.	Relaxing
80	13	Clark	Boris Terrace Park	20S.	61E.	Tot Lots, Sports
81	13	Clark	Park Ten	20S.	61E.	Picnic, Tot Lots, Sports
82	13	Clark	Joe Kneip Park	20S.	61E.	Sports, Relaxing
84	10	Nye	Andrews Creek	10N.	45E.	Big and Small Game
85	3	Elko	Stag Creek	42N.	58E.	Small Game, Relaxing
87	3	Elko	Penrod Creek	44N.	55E.	Small Game
88	10	Elko	Gardner Creek	29N.	58E.	Fishing, Small Game
89	4	Elko	Shepard Creek	35N.	59E.	Small Game, Hiking
90	13	Clark	Harlke Park	20S.	61E.	Sports, Swimming
91	10	Elko	Gordon Creek	34N.	61E.	Fishing, Small Game

Survey No.	Hydro. Region	County	Name of Area	Twp.	Rng.	Recreational Activity
110	3	Elko	Goose Creek	46N.	69E.	Fishing, Small Game
111	3	Elko	Little Goose Creek	46N.	68E.	Relaxing
112	3	Elko	Piney Creek	47N.	68E.	Fishing, Small Game
113	3	Elko	Boyd Creek	42N.	52E.	Relaxing
114	3	Elko	Trout Creek	47N.	69E.	Big Game
115	4	Elko	Lewis Creek	39N.	49E.	Fishing, Small Game
116	11	Elko	Bedridge Creek	37N.	70E.	Relaxing
117	4	Elko	Peterson Creek	42N.	54E.	Relaxing
118	4	Elko	Pie Creek	39N.	55E.	Small Game
119	3	Elko	Miller Creek	46N.	54E.	Relaxing
120	4	Elko	Pratt Creek	41N.	54E.	Big Game, Fishing
121	3	Elko	Lime Creek	45N.	53E.	Small Game, Hiking
122	3	Elko	Lost Meadows Creek	44N.	54E.	Small and Big Game
123	4	Elko	McAffee Creek	42N.	53E.	Small Game, Tr. Camping
124	3	Elko	Jarbidge River	45N.	58E.	Fishing, Big Game
125	4	Elko	Foreman Creek	40N.	55E.	Fishing, Small Game
126	3	Elko	Sagehen Creek	47N.	54E.	Big and Small Game, Fishing
127	3	Elko	Sand Creek	46N.	55E.	Big and Small Game, Fishing
128	10	Esmeralda	Leidy Creek	2S.	35E.	Fishing, Picnic
129	3	Elko	Slaughterhouse	46N.	54E.	Small Game, Fishing
130	3	Elko	Jakes Creek	43N.	62E.	Big and Small Game, Fishing
131	3	Elko	Lime Creek	47N.	61E.	Big Game, Relaxing
132	4	Elko	Wildcat Creek	42N.	60E.	Fishing
133	3	Elko	Wilson Creek	47N.	62E.	Big and Small Game, Fishing
134	3	Elko	Dry Creek	42N.	62E.	Fishing, Hiking
135	3	Elko	Pole Creek	46N.	61E.	Big and Small Game
136	4	Elko	Pine Creek	31N.	52E.	Small Game, Hiking
137	10	Elko	McDermitt Creek	26N.	63E.	Relaxing
138	4	Elko	Frost Creek	28N.	56E.	Small and Big Game, Fishing
139	3	Elko	Knoll Creek	43N.	64E.	Small and Big Game, Tr. Camping
140	10	Elko	Johnson Creek	35N.	61E.	Small Game, Fishing
141	3	Elko	Knoll Creek Pond	43N.	64E.	Relaxing
142	3	Elko	Deer Creek	47N.	61E.	Big and Small Game, Fishing
143	3	Elko	Bullcamp Creek	42N.	63E.	Fishing, Small Game

EDITED BY: A. O. HUTCHENS
R. R. SCOTT
R. J. VASEY

CARTOGRAPHY BY: L. M. ROACH JR.

LEGEND

- Recreation Site Number (Numerical Index shown on Front and Reverse sides of this Map).
- Represents Area Shown in Larger Scale on Reverse side of this Map.
- Hydrographic Regions & Basins (See Smaller Scale Map Above.)

This map is intended for use in general planning. It shows the locations of most of the public and semi-public water based and water related outdoor recreational areas in Nevada. These include: lakes, rivers, springs, streams; city, county, state, and Federal parks; as well as historic sites, public golf courses and swimming pools. Any area which requires and/or utilizes water is located on the map. It should be noted that both improved and unimproved areas are included. Many of the areas are completely without facilities and are in a natural condition. The map should be used with care in regards to a camping, fishing, or hunting guide since improvements may not exist and access to areas may be limited because of primitive roads or private ownership of adjacent lands. Specific campground guides and road and land status maps should be consulted to determine the availability of specific improvements and accessibility.

WATER RELATED OUTDOOR RECREATION AREAS OF NEVADA

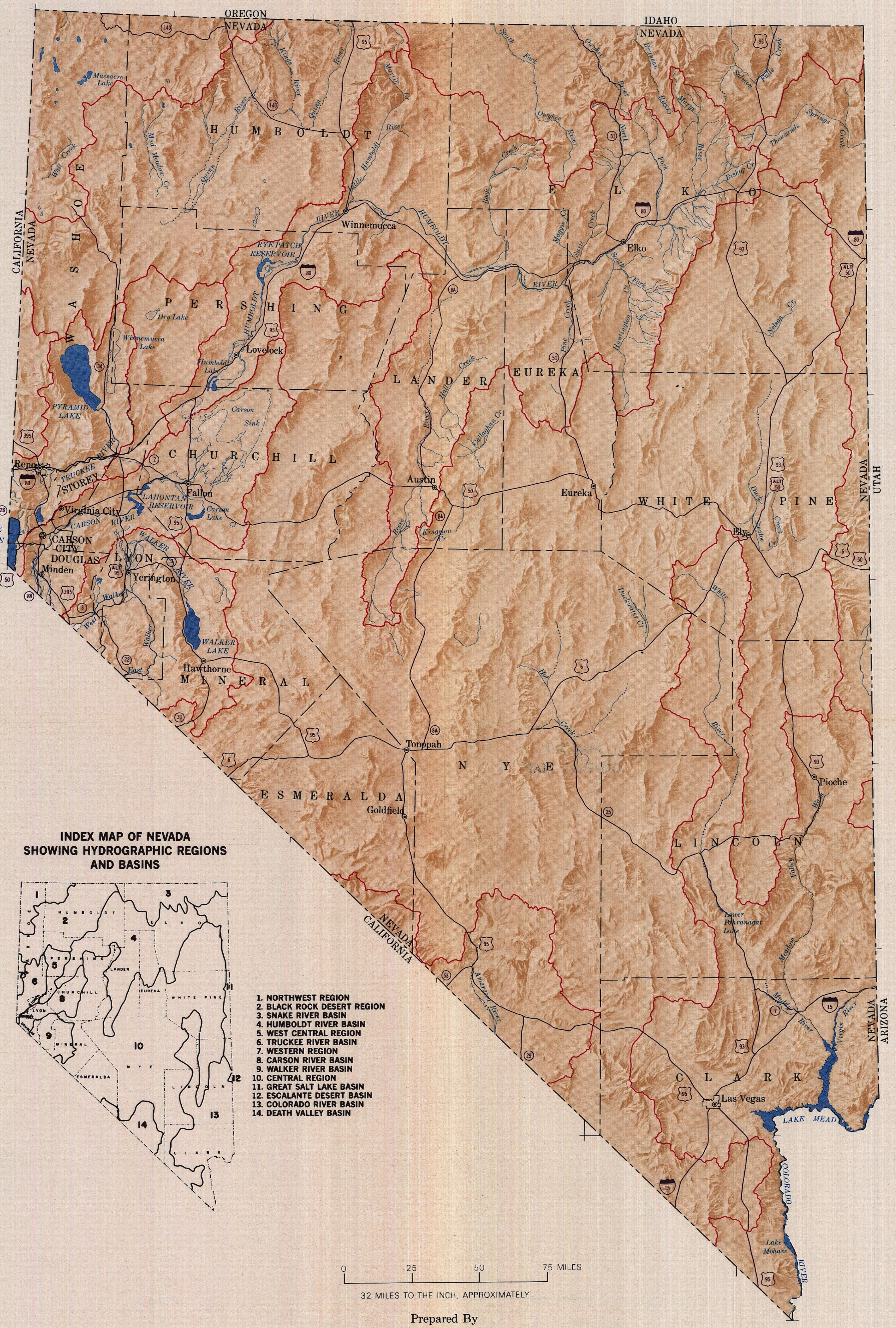
PREPARED AS PART OF THE NEVADA STATE WATER PLAN

DIVISION OF WATER RESOURCES
STATE ENGINEERS OFFICE

1974

BASE: REDUCTION OF U.S.G.S. TOPOGRAPHIC MAP OF NEVADA, 1:500,000, EDITION OF 1965

Prepared from data compiled by Theodore J. Dixon, John G. McNeely, Jr., and others of the Division of Agricultural and Resource Economics, University of Nevada, Reno, from information supplied by city, county, State and Federal recreation personnel as well as the Nevada Department of Fish and Game, the U.S. Bureau of Sports Fisheries and Wildlife, and others involved in the provision of public water related recreational facilities in Nevada.



0 25 50 75 MILES

32 MILES TO THE INCH, APPROXIMATELY

INDEX MAP OF NEVADA SHOWING HYDROGRAPHIC REGIONS AND BASINS

1. NORTHWEST REGION
2. BLACK ROCK DESERT REGION
3. SNAKE RIVER BASIN
4. HUMBOLDT RIVER BASIN
5. WEST CENTRAL REGION
6. TRUCKEE RIVER BASIN
7. WESTERN REGION
8. CARSON RIVER BASIN
9. WALKER RIVER BASIN
10. CENTRAL REGION
11. GREAT SALT LAKE BASIN
12. ESCALANTE DESERT BASIN
13. COLORADO RIVER BASIN
14. DEATH VALLEY BASIN

Prepared By
STATE OF NEVADA
DIVISION OF WATER RESOURCES
STATE ENGINEER'S OFFICE
1971

GENERAL MAP OF NEVADA

Edited by B. R. Scott

Cartography by L. M. Roach, Jr.
with cooperation of
Branch of Technical Illustrations
U.S.G.S., Menlo Park, California.

BASED ON STATE-FEDERAL COMPREHENSIVE FRAMEWORK STUDIES

NORTHWEST REGION

15. Boulder V.
11. Coleman V.
2. Continental Lake V.
16. Duck Lake V.
3. Gridley Lake V.
6. Guano V.
9. Long V.
10. Macy Flat
8. Massacre Lake V.
12. Mosquito V.
1. Pueblo V.
5. Sage Hen V.
14. Surprise V.
7. Swan Lake V.
4. Virgin V.
13. Warner V.

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31. Desert V.
19. Dry V.
23. Granite Basin
25. High Rock Lake V.
24. Hualapai Flat
30. Kings River V.
    (A) Rio King Subarea
    (B) Sod House Subarea
26. Mud Meadow
18. Painters Flat
17. Pilgrim Flat
29. Pine Forest V.
22. San Emidio Desert
20. Sano V.
•32. Silver State V.
21. Smoke Creek Desert
27. Summit Lake V.
33. Quinn River V.
    (A) Orovada Subarea
    (B) McDermitt Subarea

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41. Goose Creek Area
36. Independence V.
39. Jarbidge River Area
34. Little Owyhee River Area
37. Owyhee River Area
40. Salmon Falls Creek Area
35. South Fork Owyhee River Area

HUMBOLDT RIVER BASIN

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61. Boulder Flat
55. Carico Lake V.
64. Clovers Area
54. Crescent V.
48. Dixie Creek — Tenmile Creek Area
49. Elko Segment
71. Grass V.
68. Hardscrabble Area
47. Huntington V.
72. Imlay Area
66. Kelly Creek Area
45. Lamoille V.
67. Little Humboldt V.
73. Lovelock V.
    (A) Oreana Subarea
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51. Maggie Creek Area
52. Marys Creek Area
42. Marys River Area
58. Middle Reese River V.
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53. Pine V.
65. Pumpernickel V.
62. Rock Creek V.
46. South Fork Area
43. Starr V. Area
50. Susie Creek Area
56. Upper Reese River V.
60. Whirlwind V.
74. White Plains
63. Willow Creek V.
70. Winnemucca Segment

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76. Fernley Area
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78. Granite Springs V.
79. Kumiva V.

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88. Pleasant V.
81. Pyramid Lake V.
85. Spanish Springs V.
86. Sun V.
83. Tracy Segment
91. Truckee Canyon Segment
87. Truckee Meadows
84. Warm Springs V.
89. Washoe V.
80. Winnemucca Lake V.

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94. Bedell Flat
100. Cold Spring V.
95. Dry V.
97. Honey Lake V.
92. Lemmon V.
    (A) Western Part
    (B) Eastern Part
96. Newcomb Lake V.
99. Red Rock V.
98. Skedaddle Creek V.

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105. Carson V.
102. Churchill V.
103. Dayton V.
104. Eagle V.

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107. Smith V.
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    (B) Lake Subarea
    (C) Whiskey Flat — Hawthorne Subarea

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    (B) Southern Part
142. Alkali Spring V. (Esmeralda)
151. Antelope V. (Eureka & Nye)
186. Antelope V. (White Pine & Elko)
    (A) Southern Part
    (B) Northern Part
137. Big Smoky V.
    (A) Tonopah Flat
    (B) Northern Part
129. Buena Vista V.
131. Buffalo V.
178. Butte V.
    (A) Northern Part (Round V.)
    (B) Southern Part
148. Cactus Flat
180. Cave V.
143. Clayton V.
177. Clover V.
171. Coal V.
118. Columbus Salt Marsh V.
126. Cowkick V.
182. Delamar V.
153. Diamond V.
128. Dixie V.
181. Dry Lake V.
127. Eastgate Valley Area
133. Edwards Creek V.
167. Eldorado V.
158. Emigrant V.
    (A) Groom Lake V.
    (B) Papoose Lake V.
124. Fairview V.
117. Fish Lake V.
160. Frenchman Flat
122. Gabbs V.
120. Garfield Flat

CENTRAL REGION *(cont.)*

172. Garden V.
147. Gold Flat
187. Goshute V.
138. Grass V.
166. Hidden V. (South)
156. Hot Creek V.
113. Huntoon .V
188. Independence V. (Pequop V.)
161. Indian Springs V.
135. Ione V.
164. Ivanpah V.
    (A) Northern Part
    (B) Southern Part
174. Jakes V.
165. Jean Lake V.
132. Jersey V.
157. Kawich V.
139. Kobeh V.
183. Lake V.
144. Lida V.
150. Litle Fish Lake V.
155. Little Smoky V.
    (A) Northern Part
    (B) Central Part
    (C) Southern Part
175. Long V.
163. Mesquite V. (Sandy V.)
140. Monitor V.
    (A) Northern Part
    (B) Southern Part
136. Monte Cristo V.
112. Mono V.
154. Newark V.
162. Pahrump V.
170. Penoyer V. (Sand Spring V.)
130. Pleasant V.
116. Queen V.
173. Railroad V.
    (A) Southern Part
    (B) Northern Part
141. Ralston V.
123. Rawhide Flats
119. Rhodes Salt Marsh V.
176. Ruby V.
146. Sarcobatus Flat
134. Smith Creek V.
121. Soda Spring V.
    (A) Eastern Part
    (B) Western Part
184. Spring V.
179. Steptoe V.
152. Stevens Basin
125. Stingaree V.
149. Stone Cabin V.
145. Stonewall Flat
114. Teels Marsh V.
168. Three Lakes V. (Northern Part)
169. Tikapoo V. (Tickaboo V.)
185. Tippett V.
159. Yucca Flat

GREAT SALT LAKE BASIN

193. Deep Creek V.
192. Great Salt Lake Desert
190. Grouse Creek V.
196. Hamlin V.
191. Pilot Creek V.
194. Pleasant V.
195. Snake V.
189. Thousand Springs V.
    (A) Herrell Siding — Brush Creek Area
    (B) Toano — Rock Spring Area
    (C) Rocky Butte Area
    (D) Montello — Crittenden Creek Area (Montello V.)

ESCALANTE DESERT

197. Escalante Desert

COLORADO RIVER BASIN

215. Black Mountains Area
218. California Wash
204. Clover V.
213. Colorado River V.
210. Coyote Spring V.
198. Dry V.
200. Eagle V.
216. Garnet V. (Dry Lake V.)*
223. Gold Butte Area
224. Greasewood Basin
217. Hidden V. (North)*
206. Kane Springs V.
212. Las Vegas V.
205. Lower Meadow Valley Wash
220. Lower Moapa V.
219. Muddy River Springs Area (Upper Moapa V.)
209. Pahranagat V.
208. Pahroc V.
203. Panaca V.
202. Patterson V.
214. Piute V.
199. Rose V.
201. Spring V.
211. Three Lakes V. (Southern Part)*
221. Tule Desert
222. Virgin River V.
207. White River V.

* NONCONTRIBUTING PART OF THE COLORADO RIVER BASIN

DEATH VALLEY BASIN

230. Amargosa Desert
229. Crater Flat
227. Fortymile Canyon
    (A) Jackass Flats
    (B) Buckboard Mesa
231. Grapevine Canyon
225. Mercury V.
228. Oasis V.
232. Oriental Wash
226. Rock V.

STATE OF NEVADA
HYDROGRAPHIC AREAS

PREPARED BY
DIVISION OF WATER RESOURCES
STATE ENGINEERS OFFICE

10 0 10 20 30 40
scale in miles

Revised September 1968

EXPLANATION

—— 16 ——

Lines of equal precipitation are shown in inches per year-contour interval 4 inches. Contours for quantities greater than 20 inches per year are not shown. Data modified from Hardman, "Nevada Precipitation Map" (rev, 1965).

———

Boundary of hydrologic regions

0 25 50 75 MILES

32 MILES TO THE INCH, APPROXIMATELY

Prepared By
STATE OF NEVADA
DIVISION OF WATER RESOURCES
STATE ENGINEER'S OFFICE
1971

AVERAGE ANNUAL PRECIPITATION

Edited by B. R. Scott

Cartography by L. M. Roach, Jr.
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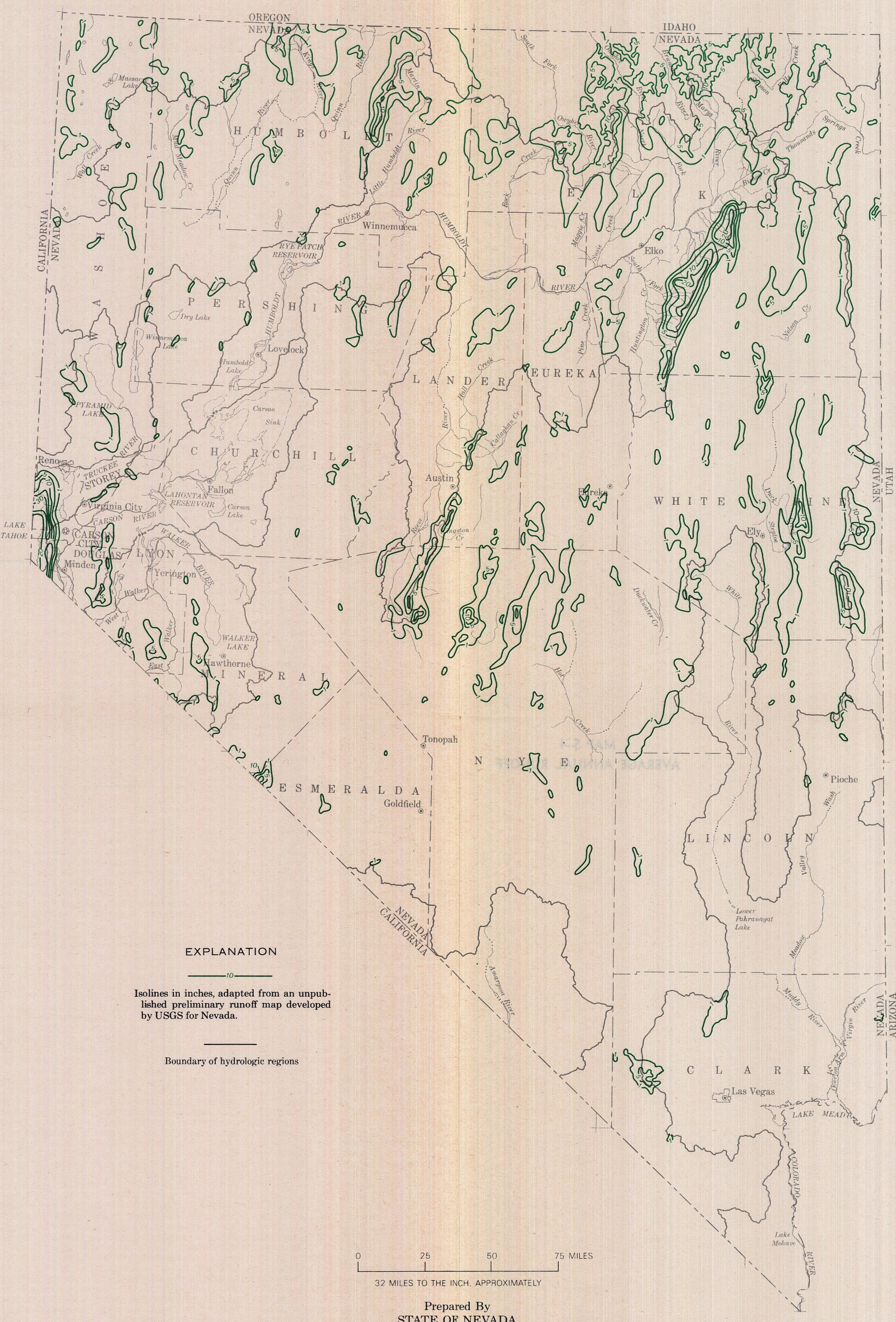
BASED ON STATE-FEDERAL COMPREHENSIVE FRAMEWORK STUDIES



EXPLANATION

Isolines in inches, adapted from an unpublished preliminary runoff map developed by USGS for Nevada.

Boundary of hydrologic regions

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AVERAGE ANNUAL RUNOFF

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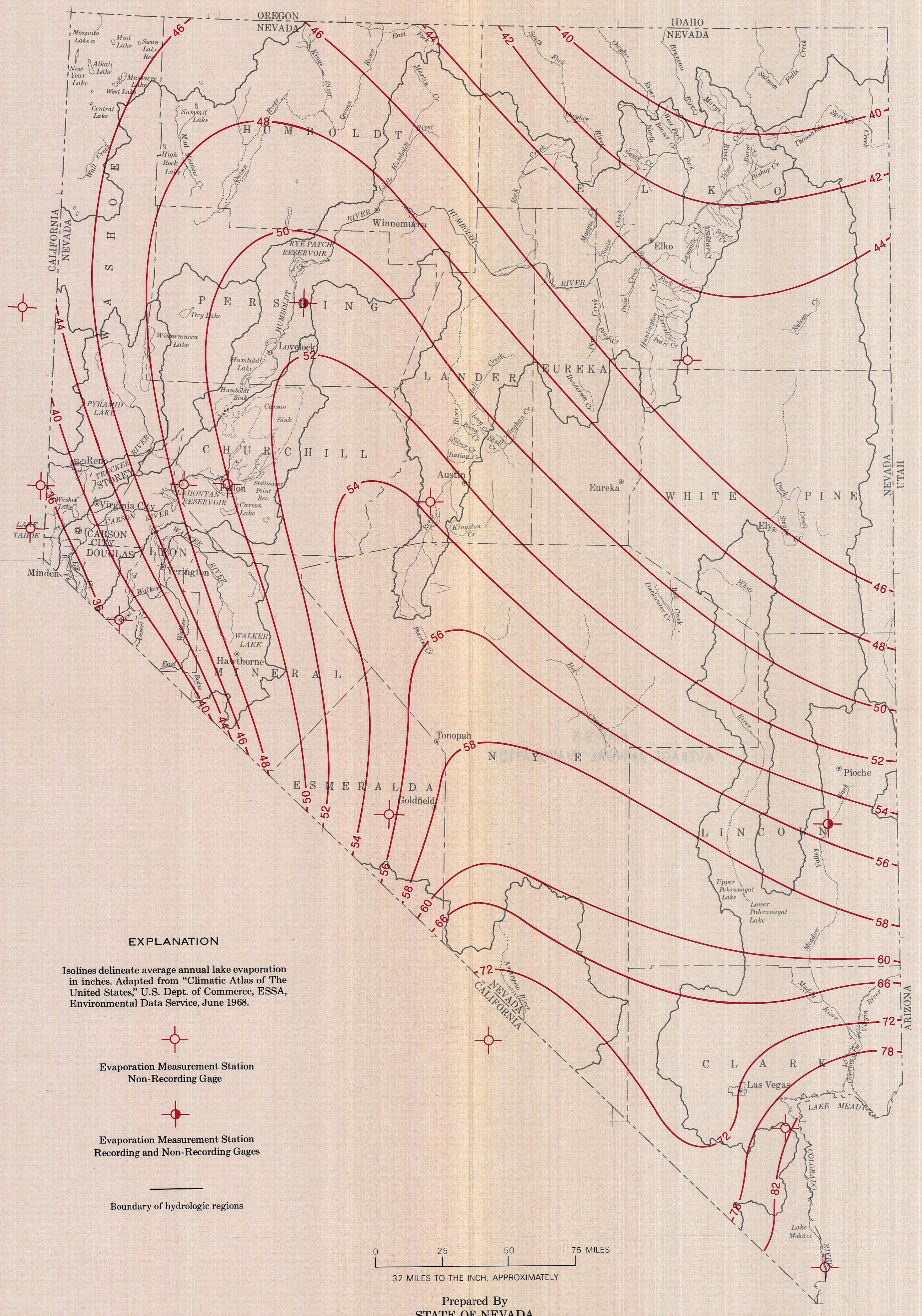

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AVERAGE ANNUAL EVAPORATION

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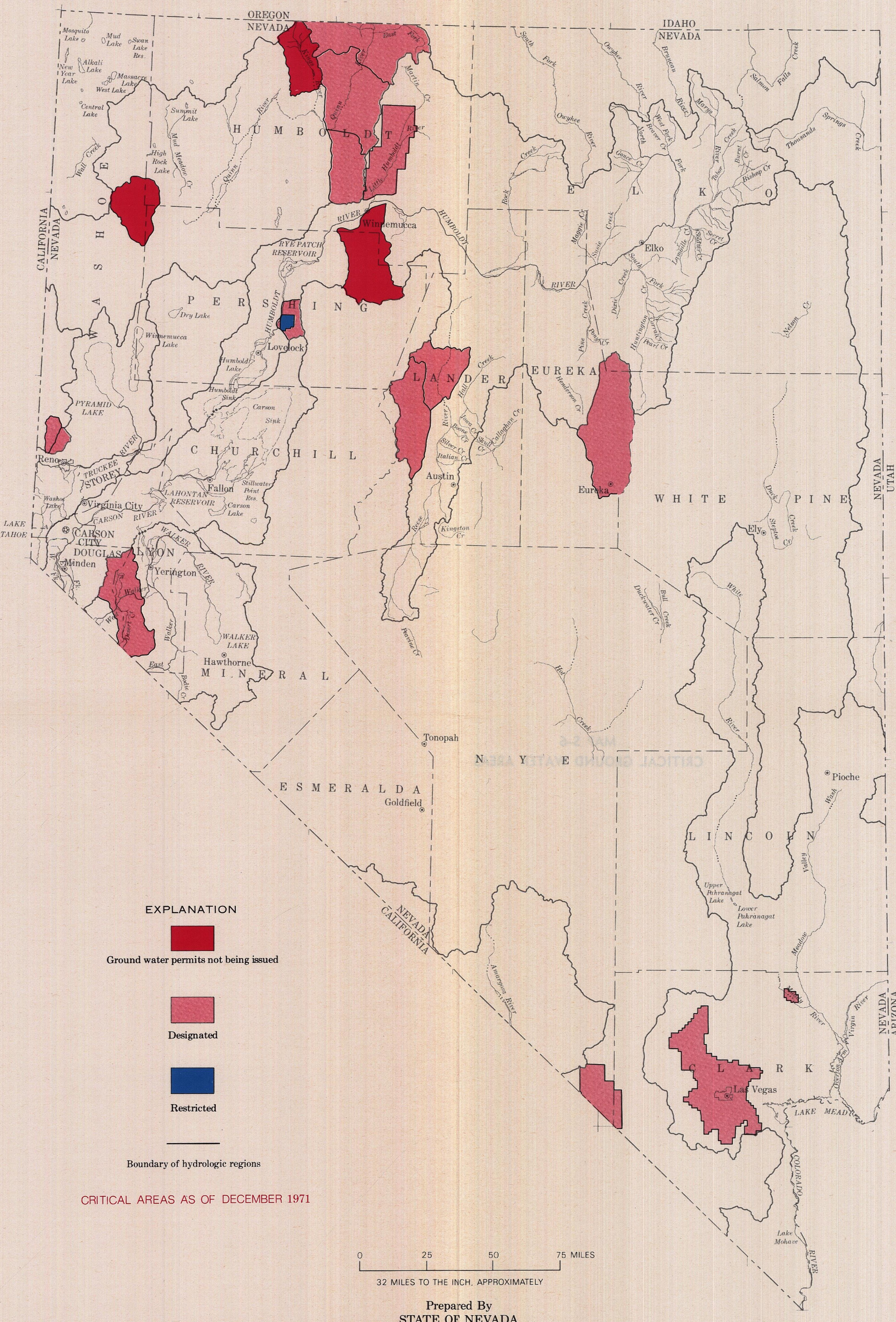

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1971

CRITICAL GROUND WATER AREAS

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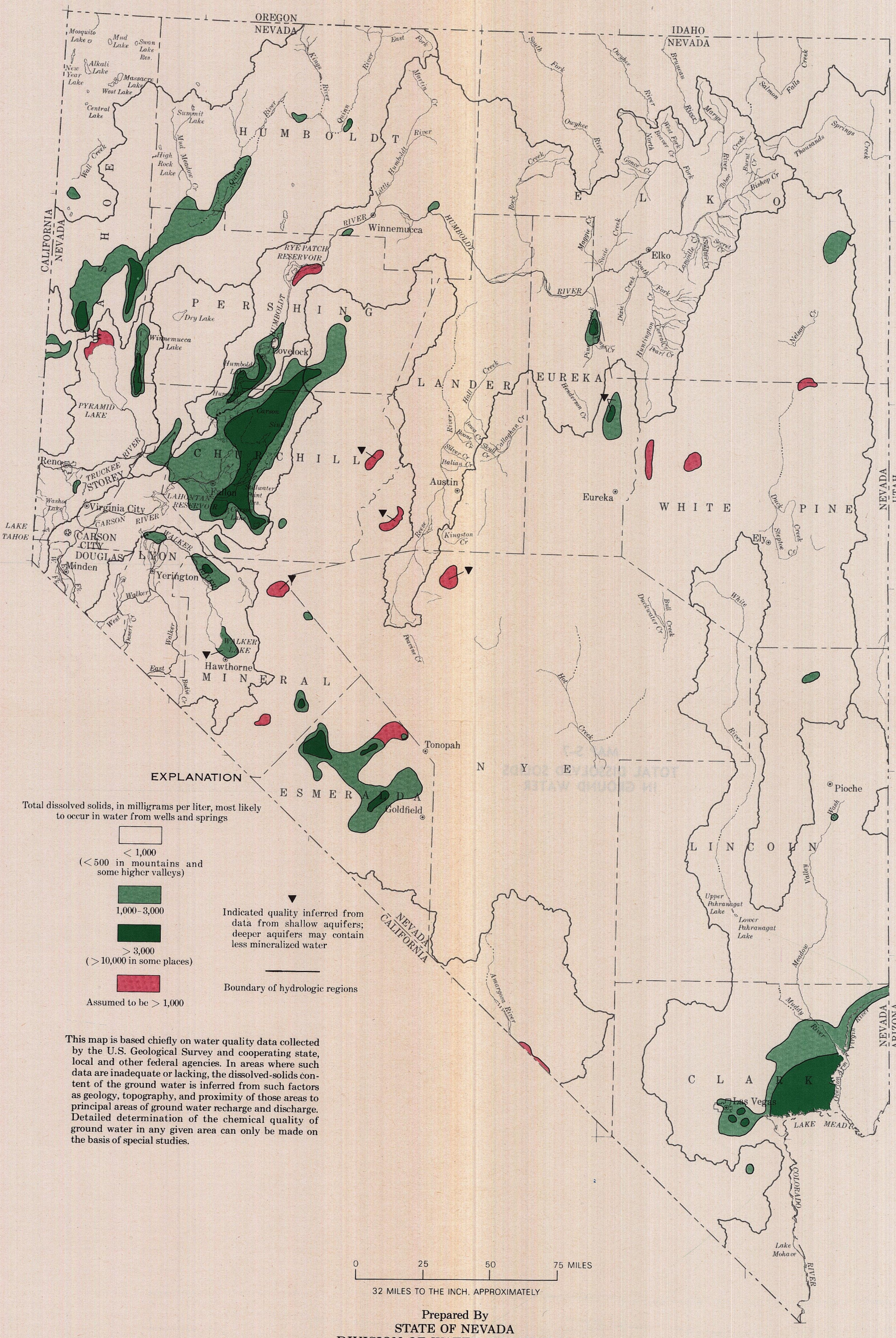
BASED ON STATE-FEDERAL COMPREHENSIVE FRAMEWORK STUDIES



EXPLANATION

Total dissolved solids, in milligrams per liter, most likely to occur in water from wells and springs

< 1,000
(<500 in mountains and some higher valleys)

1,000–3,000

> 3,000
(>10,000 in some places)

Assumed to be > 1,000

▼ Indicated quality inferred from data from shallow aquifers; deeper aquifers may contain less mineralized water

Boundary of hydrologic regions

This map is based chiefly on water quality data collected by the U.S. Geological Survey and cooperating state, local and other federal agencies. In areas where such data are inadequate or lacking, the dissolved-solids content of the ground water is inferred from such factors as geology, topography, and proximity of those areas to principal areas of ground water recharge and discharge. Detailed determination of the chemical quality of ground water in any given area can only be made on the basis of special studies.

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TOTAL DISSOLVED SOLIDS IN GROUND WATER

Edited by B. R. Scott

**Cartography by L. M. Roach, Jr.
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BASED ON STATE-FEDERAL COMPREHENSIVE FRAMEWORK STUDIES

EXPLANATION

AREA OF GROUND WATER DISCHARGE

Includes area of phreatophytes and area of bare soil (playas) where ground water is discharged by direct evaporation. Depth to water is generally less than 50 feet.

Boundary of hydrologic regions

0 25 50 75 MILES

32 MILES TO THE INCH, APPROXIMATELY

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DIVISION OF WATER RESOURCES
STATE ENGINEER'S OFFICE
1971

PRINCIPAL AREAS OF NATURAL GROUND WATER DISCHARGE

Edited by B. R. Scott

Cartography by L. M. Roach, Jr. with cooperation of Branch of Technical Illustrations U.S.G.S., Menlo Park, California.

BASED ON STATE-FEDERAL COMPREHENSIVE FRAMEWORK STUDIES

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1971

GENERAL DISTRIBUTION OF VALLEY GROUND WATER RESERVOIRS

Edited by B. R. Scott

Cartography by L. M. Roach, Jr.
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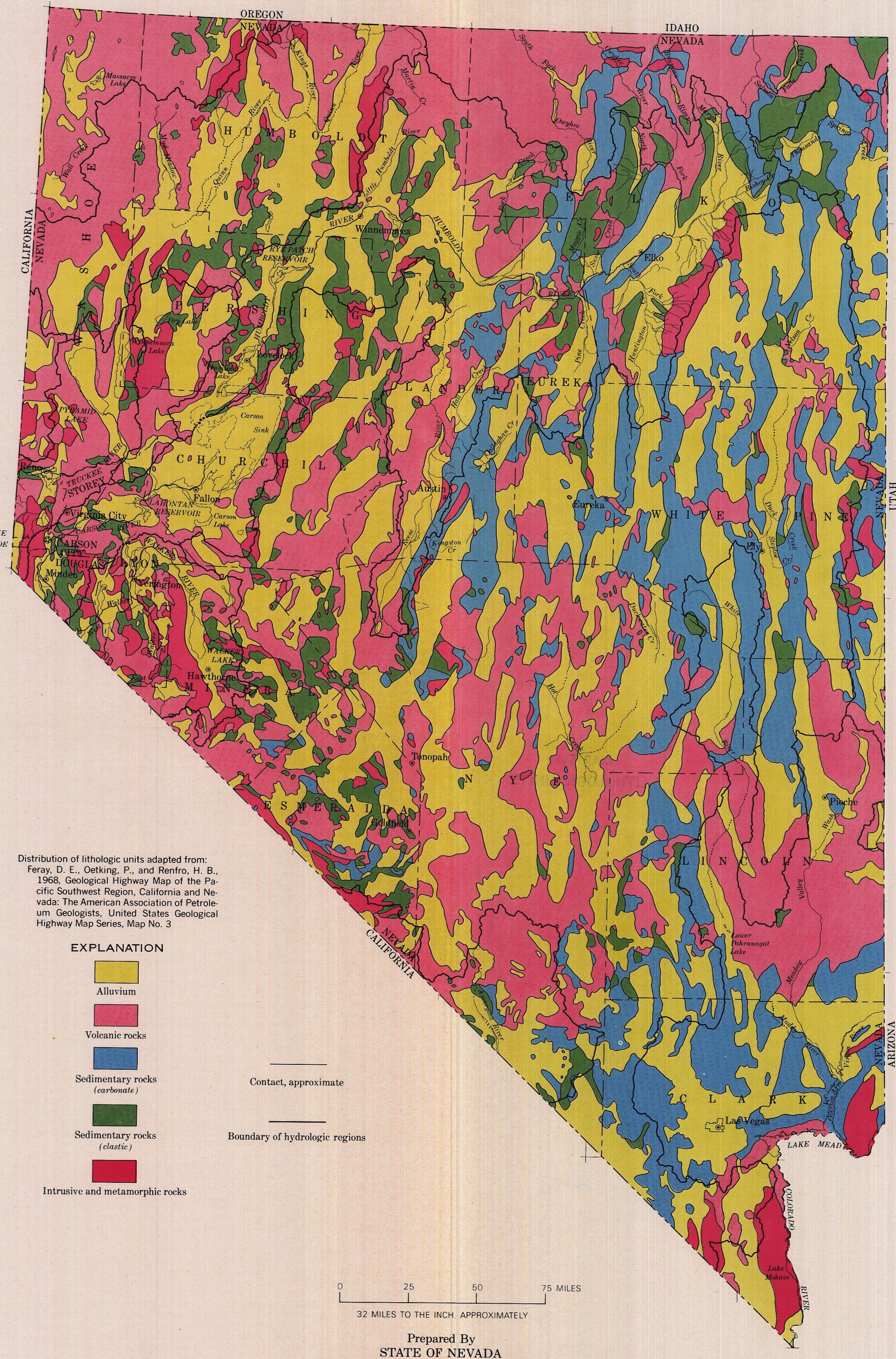
BASED ON STATE-FEDERAL COMPREHENSIVE FRAMEWORK STUDIES



Distribution of lithologic units adapted from: Feray, D. E., Oetking, P., and Renfro, H. B., 1968, Geological Highway Map of the Pacific Southwest Region, California and Nevada: The American Association of Petroleum Geologists, United States Geological Highway Map Series, Map No. 3

EXPLANATION

- Alluvium
- Volcanic rocks
- Sedimentary rocks (*carbonate*)
- Sedimentary rocks (*clastic*)
- Intrusive and metamorphic rocks
- Contact, approximate
- Boundary of hydrologic regions

Prepared By
STATE OF NEVADA
DIVISION OF WATER RESOURCES
STATE ENGINEER'S OFFICE
1971

GENERAL DISTRIBUTION OF THE PRINCIPAL LITHOLOGIC UNITS IN NEVADA

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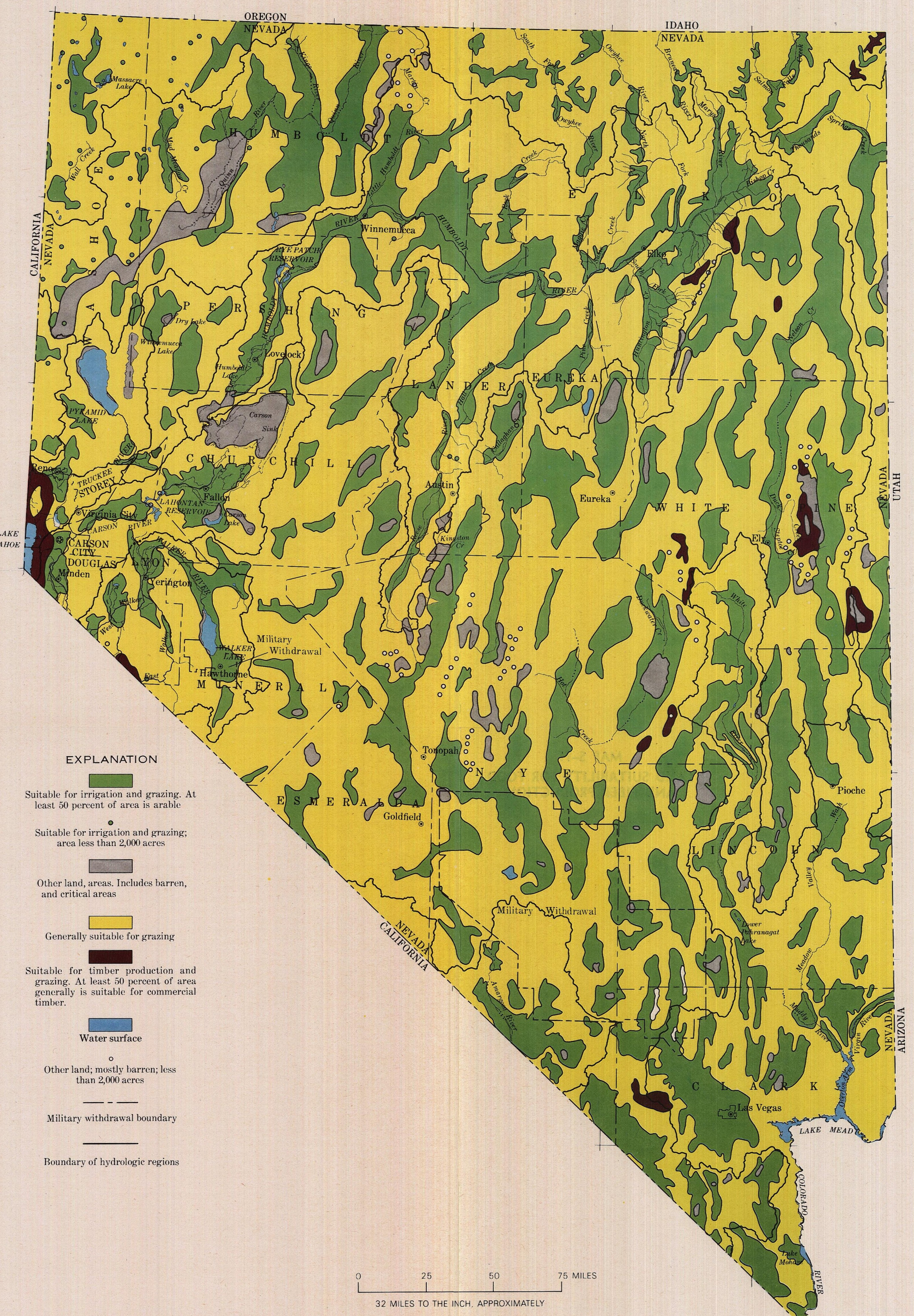

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1971

LAND SUITABILITY FOR FOOD AND FIBER PRODUCTION

Edited by B. R. Scott

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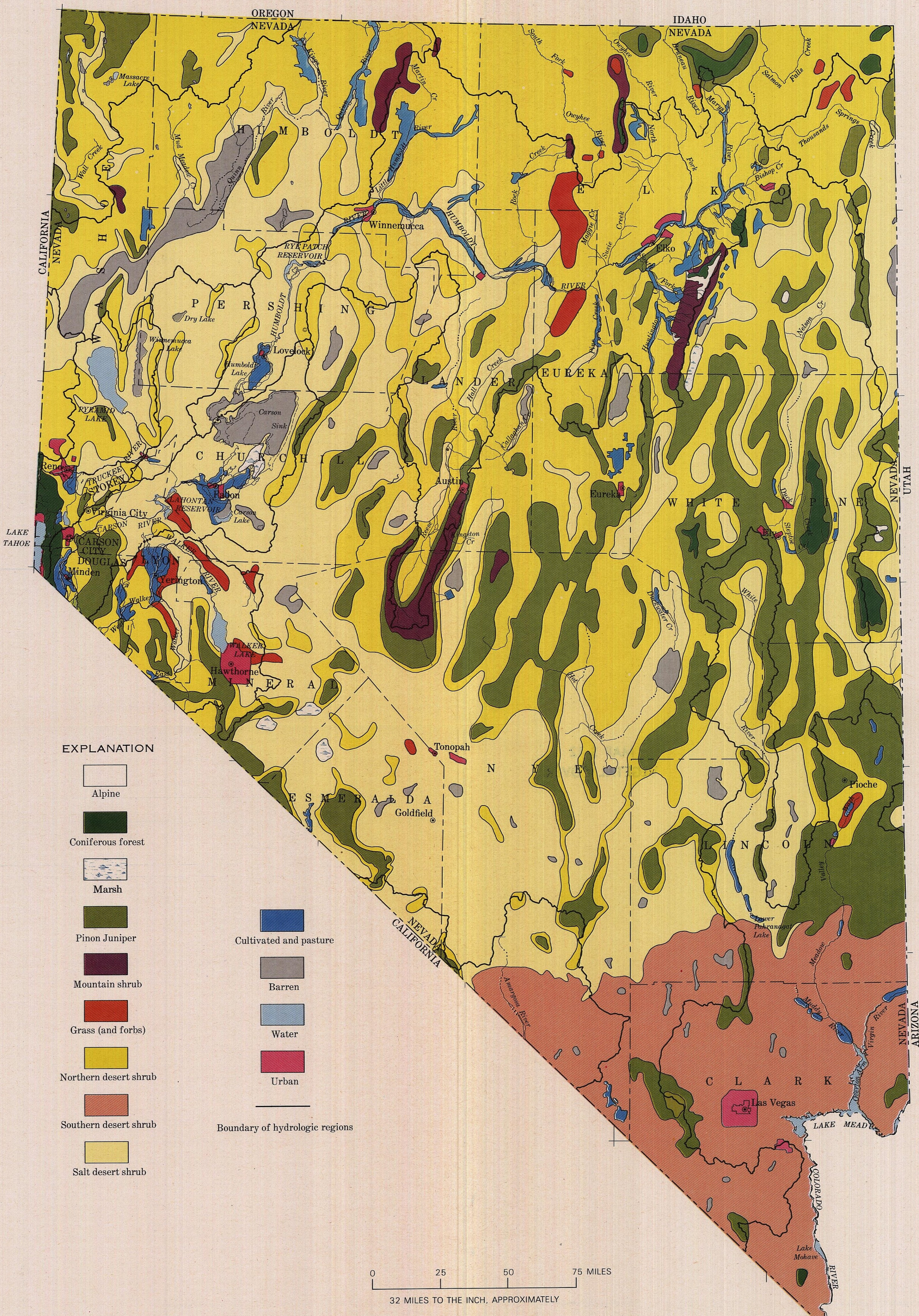

Prepared By
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1971

VEGETAL COVER MAP

Edited by B. R. Scott

Cartography by L. M. Roach, Jr.
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U.S.G.S., Menlo Park, California.

BASED ON STATE-FEDERAL COMPREHENSIVE FRAMEWORK STUDIES


STATE OF NEVADA
WATER RESOURCES AND INTER-BASIN FLOWS
PREPARED BY
DIVISION OF WATER RESOURCES
STATE ENGINEERS OFFICE
EXPLANATION
This map shows estimated annual surface and groundwater flows between hydrologic areas and across state lines. Also shown for each area where data are available are estimates of annual runoff, perennial yield and water stored in the upper 100 feet of the groundwater reservoir. The term runoff refers to the estimated annual amount of surface water which flows from the mountains to the alluvial fan measured where the two meet. Perennial yield is the amount of groundwater which can be removed from a hydrographic area each year without depleting the groundwater reservoir. Where perennial yield was not available system yield is shown followed by the letter Y. System yield is the maximum amount of surface and groundwater which can be removed from a hydrographic area each year for an indefinite period of time.
SCALE 1:750,000
CONTOUR INTERVAL 500 FEET
DATUM IS MEAN SEA LEVEL
NOTE
Surface water flows are based on varying periods of record. Man made diversions are estimated 1970 figures except those on the Truckee Canal which are estimates based on historic diversion. Southern Nevada Project is shown at projected first stage level. Inflow from Arizona computed from gaged flow at Hoover Dam (Period of record 1934 to 1969). Outflow from Nevada based on Davis Dam gage (Period of record 1949-1969). Incline Village diversion estimated for 1971.
LEGEND
BOUNDARY OF HYDROGRAPHIC REGIONS
BOUNDARY OF HYDROGRAPHIC AREAS (DOTTED WHERE ARBITRARY)
Compiled by:
F.E. RUSH
B.R. SCOTT
A.S. VAN DENBURGH
B.J. VASEY
Drawn by:
L.M. ROACH JR.
SEPTEMBER 1971
LEGEND
(All figures are in thousands of acre feet)
Estimated annual surface water flow.
Estimated annual groundwater flow.
Man made diversion. Surface water source - estimated annual amount.
Man made diversion. Groundwater source - estimated annual amount.
Man made diversion. Spring source - estimated annual amount.
Minor quantity. An amount which is either less than 500 acre feet per year, or small in comparison to other quantities in the particular hydrologic area.
Significant size. However, sufficient information is not currently available to make an estimate.
Quantity uncertain. Figure shown represents annual discharge of springs which this flow is known to supply, at least in part.
12 Estimated annual runoff.
12 Estimated perennial yield.
1,200 Estimated storage.
INDEX MAP OF NEVADA SHOWING HYDROGRAPHIC REGIONS AND BASINS
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232. ORIENTAL WASH
226. ROCK VALLEY
BASE: U.S.G.S. TOPOGRAPHIC MAP OF NEVADA, EDITION OF 1965.
PREPARED WITH THE COOPERATION OF THE GEOLOGICAL SURVEY, U.S. DEPARTMENT OF INTERIOR.

FREEZE-FREE (32°F) SEASONS OF THE MAJOR BASINS AND PLATEAUS OF NEVADA

by C. M. Sakamoto, F. F. Peterson, E. A. Naphan, H. P. Cords, H. R. Guenthner and R. O. Gifford[1]

SUMMARY

This map shows the freeze-free (32°F) seasons of the level to rolling basins and plateaus of Nevada. These are the areas of greatest potential for agricultural or urban development. The major crops adapted to Nevada's different freeze-free zones are listed to indicate the agricultural potential of lands in the zones. Hydrographic areas used for state-wide water management are shown as part of the base maps.

FREEZE-FREE SEASONS (32°F)

The freeze-free season, as used here, is the period between the last occurrence of a 32°F temperature in the spring and its first occurrence in the fall. During this period, minimum temperatures are continuously above 32°F. Few, if any, plants grown in Nevada suffer cold weather damage during the freeze-free season. Also, many plants survive temperatures even colder than 32°F. The freeze-free season is thus a guide to suitable commercial crops or horticultural plants for various parts of Nevada.

Data from the National Weather Service Cooperative Substation Nevada Network were used to estimate freeze-free seasons and plot the zones shown on this map. These weather stations are distributed throughout Nevada, but some stations have too short a record for prediction and a few are located where cold air drainage results in records uncharacteristic for the local area. Limitations like these are minimized by the statistical procedure used for predicting freeze-free seasons.[2] Where local cropping experience is at marked variance with the statistically predicted freeze-free season, zone identification of the local area was changed to fit cropping experience. All such revisions are listed in Table 1.

The statistical model used to predict freeze-free seasons has two independent variables accessible for the entire state: latitude and elevation above sea level. The equation is:

$$S = 920 - 0.017E - 18\ L$$

where S is the freeze-free season, in days, E is the elevation in feet, and L is latitude in degrees. Boundaries of freeze-free season zones were plotted on 1:250,000 scale, 200-foot contour-interval U.S. Geological Survey topographic maps using intervals of 500 feet elevation and one-quarter degree of latitude as guides to the equation. The statistical model accounts for 80 percent of the variability of weather station data; the standard deviation of the freeze-free seasons for the State is about 3 weeks, or 18 to 24 days in various areas. Therefore, one can expect that the freeze-free season for a given location will be 3 weeks shorter than the mean in 1 year out of 6 (*i.e.*, 17 percent of the time) or 3 weeks longer in 1 out of 6 years.

Strictly local, topographically controlled variations in length of freeze-free season also can be expected for particular basins or plateau areas. During calm, clear nights cold air drainage from surrounding slopes can reduce temperatures on valley floors, whereas cold air drainage from higher elevations keeps the slopes relatively warmer. The cold air pools which collect in Nevada basins on such nights are about 400 to 600 feet deep. Near the tops of these pools, or "inversions," temperatures are warmer than on the valley floors.

The elevation of the top of the cold air pool is an exceedingly important boundary on the landscape since the freeze-free season of land lying at about this elevation can be significantly longer than on the valley floor. Such local season variations are not indicated on this map. Bodies of water, such as the lakes of northwestern Nevada, also can ameliorate freezes several hundred yards to several miles around them. This depends on winds and the lake's size. The freeze-free season lengths shown are generalized averages for whole basins and plateaus. Random year-to-year variations can be expected, as discussed earlier, but topographically determined variations within basins must be locally determined. Fortunately, many of these local variations are included within the variability implicit in the statistical model.

The map delineations show discrete geographic areas within which the average freeze-free season varies with the limits of the zones defined later. Most of these delineations are separated by natural boundaries formed by mountain ranges (the mountains have shorter seasons than the basins and plateaus); but in several locations, boundaries had to be drawn within basins or across plateaus. These latter boundaries follow contour lines at about equal elevation, since elevation and latitude are the only objective data available for the whole State. Clear-cut season length differences do not occur across these elevationally-determined boundaries on sloping land. Local cold air drainage indeed can result in longer seasons for the higher slopes, even though they are shown on the shorter-season side of a boundary. Similarly, where boundaries cut across gently sloping basins, such as the boundary northwest of Lovelock, there are no abrupt changes in adapted crops. The freeze-free season is shorter in the northern part of each zone. Long-season crops well adapted to the southern portions of the zone might be only marginal at its northern extreme. One final caution: this map is drawn at a scale of 1:250,000 (or one-twelfth-inch per mile); each one-quarter- by- one-quarter-inch area on the map equals 5,600 acres on the ground. At such a small scale, only a general characterization of freeze-free season is appropriate, and only general planning should be based on this map.

FREEZE-FREE SEASON ZONES AND ADAPTED CROPS

Five classes of freeze-free season length, or zones, are given. Zone 1 includes areas of more than 200 days' freeze-free season; zone 2 includes areas of 130 to 200 days' season; zone 3 includes areas of 100 to 130 days' season; zone 4 includes areas of 70 to 100 days' season and zone 5 includes those areas of less than 70 days' freeze-free season. These season lengths give useful predictions of crop adaptability based on our current knowledge of Nevada's climate and crops.

The freeze-free season requirements of common crops grown in Nevada are given in Table 2. The bar to the right of each crop listing indicates the range of season length within which the crop is grown. The pointed end of the bar to the left indicates the approximate minimum season length for continual commercial production. Most short-season crops, or crops requiring cool temperatures, can be grown even in the warmest, longest-season areas of southern Nevada, but they are grown early or late in the year as temperature requirements or marketing dates demand. Several crops given additional cuttings under longer freeze-free seasons. A few crops are intolerant of heat, or not grown in southern Nevada. Each of the zones has general crop potentialities and limitations. Specific crop recommendations can be furnished by the Nevada Cooperative Extension Service; summary recommendations follow:

ZONE 1
(Greater than 200 days)

In the warmer portions of zone 1, such as the Moapa Valley, winters are mild enough for dependable winter production of hardy vegetables such as beets, broccoli, Brussels sprouts, cabbage, chives, Chinese cabbage, carrots, cauliflower, chard, collards, endive, garlic, kale, kohlrabi, lettuce, mustard greens, green onions, parsley, parsnips, peas, radishes, rutabaga, spinach and turnips. In slightly cooler areas, such as the Las Vegas Valley, these vegetables can be grown in home gardens during the winter, but the cold hazard is too great for commercial production. Tender or perennial vegetables, and all of the hardy vegetables mentioned above can be matured from early spring, summer, or early fall seedlings. Additionally, asparagus, snap beans, lima beans, dry beans, horse beans, soybeans, celery, cucumbers, eggplant, horse-radish, leeks, cantaloupes, okra, peppers, pumpkins, rhubarb, squash, sweet corn, sweet potatoes, tomatoes, watermelons, and white potatoes can be grown during the summer.

The only limitation for field crops is that certain cool-season forages must be grown during the cooler months of the year. Some of these, such as tall fescue, will survive hot summer weather in a dormant state. Others like ryegrass and white clover are killed by hot weather, and must be grown from fall seedings as winter annuals. Non-dormant alfalfas are used in the warmer portions of zone 1, whereas both dormant and non-dormant alfalfas are adapted to the cooler portions. Warm-season perennial grasses, such as bermudagrass and blue panic grass, are adapted throughout this zone. Frost-susceptible annuals, such as sudangrass and the sorghum-sudangrass hybrids, are useful for pasture, green-chop and silage. The millets are adapted, but generally are not as productive as sudangrass or the sorghum-sudangrass hybrids.

Cotton is adapted to this entire zone, but is commercially grown only in the Pahrump Valley and occasionally in the Moapa Valley. Other adapted crops include castorbeans, sugarbeets, corn, cowpeas, dill, grain sorghums, peanuts, safflower, sesame and soybeans. Spring varieties of wheat, oats, barley and rye can be fall seeded, but occasional cold winters result in injury. Winter small grain varieties are adapted to this entire zone.

Bermudagrass is the most used lawn grass. The cool-season lawn grasses, such as Kentucky bluegrass, perennial ryegrass and the bentgrasses, survive the summers in a semidormant state, but must be constantly protected from fungus diseases during the hot summer months. Annual ryegrass may be used to over-seed bermudagrass lawns in the fall to provide a green lawn during the winter.

ZONE 2
(130 to 200 days)

All the vegetables listed for zone 1 are adapted in zone 2, but winter production is not possible except during the mildest winters in the warmest portions of this zone. Some melons are only marginal in the coldest parts of this zone; and if they mature, they will have poor flavor because of cool nights.

Bermudagrass and the other warm-season perennial grasses listed for zone 1 are adapted to the warmer parts of zone 2 as well. The cool-season grasses such as tall fescue, orchardgrass, tall, intermediate, pubescent and slender wheatgrasses, smooth brome, timothy, tall oatgrass, perennial ryegrass, meadow foxtail and reed canarygrass produce well throughout zone 2.

Winter-dormant alfalfas are preferred in zone 2, but warmer portions of this zone, such as the Pahranagat Valley, are mild enough for non-dormant varieties. Cool-season legumes, such as white clover, red clover, strawberry clover and alsike clover, will grow in all portions of this zone.

Winter wheats and barleys are adapted to this entire zone, but winter temperatures in its coldest parts are frequently hazardous to winter oats. Spring cereals can be used without limitation. Other adapted field crops include safflower, castorbean, sugarbeets, dill, grain and forage sorghums, and soybeans. Corn is adapted to this entire zone, but only early maturing varieties produce dependably in its coldest portions.

Bermudagrass is adapted for lawn use only in the warmest portions of zone 2. Bluegrass is adapted throughout this zone, but must be given regular protection against summer fungus diseases in its warmest portions. Cool-season lawn grasses, such as the bentgrasses and perennial ryegrass, can be used throughout this zone when their special attributes are desired.

ZONE 3
(100 to 130 days)

Asparagus, snap beans, early varieties of lima beans, beets, broccoli, cabbage, chinese cabbage, carrots, cauliflower, chard, chives, collards, sweet-corn, cucumbers, endive, garlic, kale, kohlrabi, leeks, lettuce, mustard greens, okra, onions, parsley, parsnips, peas, very early pepper varieties, white potatoes, radishes, rhubarb, rutabaga, spinach, squash, only earliest tomato varieties, and turnips are all suitable for production in zone 3.

Winter-dormant alfalfas must be used throughout zone 3, but only moderate winter-hardiness is required for their survival. The cool-season legumes listed for zone 2 are also adapted to zone 3.

All the cool-season perennial grasses listed for zone 2 are adapted to zone 3 as well. The forage sorghums are marginal in zone 3, and are generally used only as a catch crop (*i.e.*, where failure of a seeding forces use of an annual crop as an interim measure).

Winter wheats, barleys and ryes are adapted to zone 3, as well as the spring wheats, barleys, ryes and oats. Other field crops grown in this zone include sugarbeets, field beans, silage corn, and dill. Kentucky bluegrass is the preferred lawngrass, but the bentgrasses are also adapted.

ZONE 4
(70 to 100 days)

Asparagus, beets, broccoli, Brussels sprouts, cabbage, carrots, cauliflower, chard, chives, collards, endive, kale, kohlrabi, lettuce, mustard greens, onions (from sets), parsnips, peas, radishes, rutabaga, spinach, squash and turnips can be grown in zone 4. Early varieties of cucumbers and sweet corn can be grown in the warmest parts of this zone.

All the cool-season grasses listed for zones 2 and 3 can be grown in zone 4, but tall fescue and orchardgrass are not adapted to its coldest portions. Seed production from all these grasses is possible.

Only the most winter-hardy alfalfa varieties are recommended for zone 4. Some other winter-hardy legumes, such as red clover and sainfoin, can be grown.

Winter barleys are only marginal in the colder parts of zone 4, whereas winter wheats and ryes can be grown there. The spring cereals are all adapted to zone 4, but late spring frosts are a hazard.

ZONE 5
(Less than 70 days)

The most common agriculture in this zone is livestock grazing on rangelands, with occasional hay production on high, wet meadows and in a few cultivated fields. Intermediate wheatgrass, crested wheatgrass, mountain brome, smooth brome, timothy, the hardiest alfalfas and sainfoin are hardy enough to survive in this zone and can be used for meadow improvement.

The likelihood of frosts at any time of the year eliminates all but a few short-season, hardy vegetables such as peas, leaf lettuce and radishes from zone 5. None of the cash crops can be produced.

GEOGRAPHIC PATTERNS OF THE FREEZE-FREE ZONES

Freeze-free seasons are shorter in northern than southern Nevada, and also are shorter for basins at higher elevations at the same latitude. The map shows that the longest seasons are in the low basins of southern Nevada, whereas the shortest seasons are in the high basins of east-central Nevada and across its northern basins and plateaus. The extent of each zone, and other geographic attributes, are given in Table 3.

BASINS, PLATEAUS, AND MOUNTAINS

Besides aridity and short growing seasons, Nevada's prominent basin and mountain range topography is the major environmental factor limiting and guiding land use. The numerous, rugged mountain ranges comprise 34 percent of the State and are barriers to transportation, on one hand, and sources of scarce water, grazing, and recreation on the other. The gently sloping lands of the basins comprise 61 percent of the State and provide easy transportation routes, good agricultural fields, and Urban development sites. The gently sloping to rolling plateaus are cut by erosional valleys and afford variable topography and valuable grazing lands. Plateaus comprise only 5 percent of Nevada. This map shows the pattern of these governing landforms: basin and plateau areas are colored to indicate their freeze-free seasons, and white hatchures distinguish the plateaus from the basins. Mountainous areas are shown in white with no indication of freeze-free seasons since rapid changes in season length take place with elevation and aspect and few climatic data are available.

Slopes of the mountainous terrains are commonly steeper than 15 percent, whereas the basins and a large portion of the plateaus are gently sloping or nearly level. For this map, boundaries of the major mountain ranges were drawn at about the 15 percent slope break, that is, at that abrupt juncture of the steep mountain fronts and gently sloping alluvial fan piedmonts which is such a prominent landscape feature in Nevada. Outlying small mountains of less than about 8 square miles area are not shown; similarly, small, gently sloping floors of intramontane valleys, and basins, and gently sloping mountain summit areas are also not shown.

Steep slopes dominate the mountainous terrain. Soils are commonly shallow to bedrock and frequently are stoney, but deep soils do occur along many colluvial footslopes. Contrary to some expectations that soils of Nevada mountains are necessarily eroding and coarse textured, the majority are stable and fine textured, particularly on the volcanic bedrock which is the most extensive bedrock in Nevada. Air and soil temperatures decrease with elevation in the mountains, and precipitation increases markedly at higher elevations. Native vegetation displays similar geographic zoning and aspect patterns.

The basins are sites of deep accumulations of alluvium and are commonly comprised of broad, gently sloping alluvial fan piedmonts, nearly level basin-fill plains between the fan piedmonts of opposing mountain ranges, and playa sinks, or dry lakes at their lowest elevations. Most basins are without drainage outlets; only the Snake River tributaries and the Humboldt and White River valleys have through-drainage systems of any distance. The vast proportion of available ground water is stored in the deep alluvial fill of the basins.

The soils of the alluvial fan piedmonts are commonly medium or fine textured; coarse-textured soils commonly occur on the youngest alluvial fans or below granitic mountains. Many of the higher and older alluvial fan surfaces have soils with hardpans, and some old alluvial fans are dissected by gullies which are difficult to traverse. The alluvial fan toeslopes and basin-fill plains are most commonly smooth and have coarse to fine textured soils which afford numerous, extensive areas with good agricultural potential. The soils of the basins are well drained, except at their lowest elevations. Wet, saline soils bound the playa sinks. Except for the playas, the wet soils, and some fine textured soils, there generally are few or only moderate limitations to road building or urban development in the basins.

Nevada's plateaus are located mostly along its northern border. These are gently sloping to rolling, ancient landforms once leveled by erosion, later dissected by steep-sided erosional valleys. Since the plateaus are at moderately high elevations and receive moderate amounts of precipitation, they support some of Nevada's better rangelands. Extensive portions of the plateaus drain to lower lying basins, but shallow, closed basins and small dry lakes are common on some. Small, low mountains and hills are scattered across the plateaus. The soils are most commonly fine textured, some are stoney, some are shallow to bedrock. The incised valleys and some clayey or shallow soils present problems for construction of transportation lines or urban development which are intermediate with those of the basins and mountains. Short, cool summers effectively limit most crop production.

HYDROGRAPHIC AREAS

Water is a most limiting resource in Nevada and its distribution and management guide economic development. The State has been divided in hydrographic areas within and between which supplies of ground and surface water can be most effectively managed (Nev. State Engineer's Office, 1971). This map is overprinted with the boundaries and numerical identifications of the hydrographic areas to key the environmental factors of freeze-free seasons and major landforms to water supplies for general planning.

Names and locations of the different hydrographic areas are listed in Table 4, along with the freeze-free zones which occur in basins and on the plateaus of each area.

[1]Climatologist for Nevada, USDC, NOAA; Assoc. Soil Scientist, Nev. Agr. Exp. Sta.; State Soil Scientist, USDA SCS; Agronomist, Nev. Agr. Exp. Sta.; Ext. Agronomist, Nev. Coop. Ext. Ser.; and Soil Physicist, Nev. Agr. Exp. Sta., respectively.

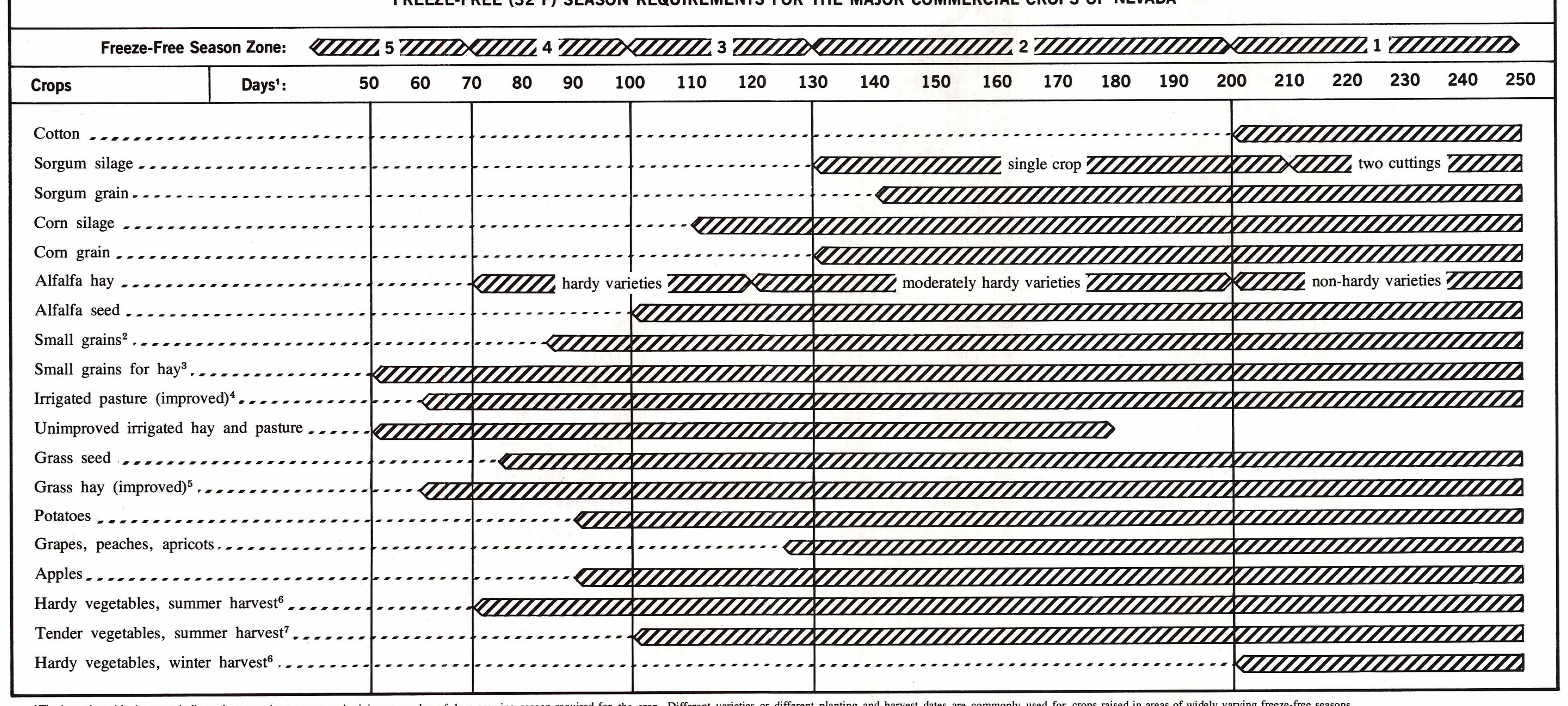
[2]Since this statistical procedure and the plotting of freeze-free seasons by zones for geographic areas does generalize, some seasons shown on the map do not exactly correspond to published data for specific locations (Sakamoto and Gifford, 1970).

REFERENCES

(1) Nevada State Engineer's Office, 1971. Water Resources and Interbasin Flows. (Fig. 5) in Water for Nevada, Report 3; Nevada's Water Resources. Nevada Dept. of Conservation and Natural Resources, Div. of Water Resources. Carson City, Nevada.

(2) Sakamoto, C. M. and R. O. Gifford. 1970 Spring and Fall Low Temperatures and Growing Season Probabilities in Nevada. Nev. Agr. Expt. Sta. Bul. B26.

TABLE 2
FREEZE-FREE (32°F) SEASON REQUIREMENTS FOR THE MAJOR COMMERCIAL CROPS OF NEVADA



[1]The bars alongside the crops indicate the approximate range and minimum number of days growing season required for the crop. Different varieties or different planting and harvest dates are commonly used for crops raised in areas of widely varying freeze-free seasons.
[2]Wheat, oats, and barley are common small grains grown in Nevada.
[3]Oats are the most commonly grown for hay in Nevada.
[4]Tall fescue, alfalfa, and bermuda grass (for detailed recommendations see Nev. Agr. Expt. Sta. Circulars 105, 106, 107).
[5]Smooth brome and orchard grass are commonly sown with alfalfa for grass hay in Nevada (for detailed recommendations see Nev. Agr. Sta. Circulars 105, 107, 107).
[6]Broccoli, cabbage, carrots, chard, green onions, peas, radishes, and turnips are illustrative of the hardy vegetables.
[7]Asparagus, snap beans, celery, cucumbers, eggplant, peppers, squash, tomatoes, and watermelons are illustrative of the tender vegetables.

TABLE 1
AREAS FOR WHICH FREEZE-FREE SEASONS WERE DETERMINED BY CROPPING EXPERIENCE

Hydrographic area[1]	Name	Zone by Prediction	Zone by Cropping Experience
56	Upper Reese River Valley	3	4
107	Smith Valley	2	3
108	Mason Valley	2	3
109	East Walker Area	3	4
110A	Walker Lake Valley, Schurz Subarea	2	3
117	Fish Lake Valley	2	3
189D	Thousand Springs Valley, Montello	4	3
191	Pilot Creek Valley	4	3

[1]The freeze-free zone designations were changed for only portions of these areas.

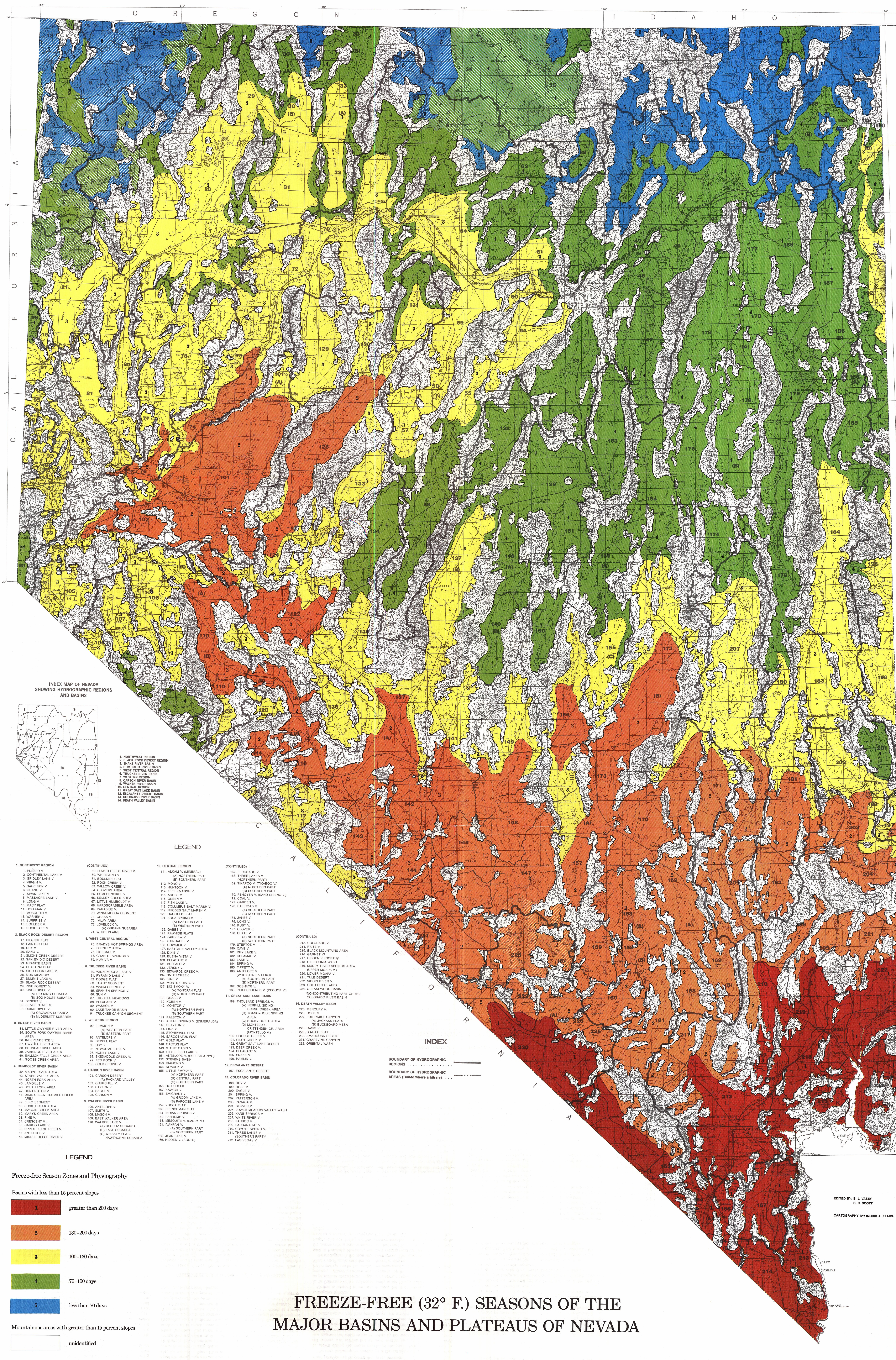
TABLE 3
GEOGRAPHIC ATTRIBUTES OF THE FREEZE-FREE SEASON ZONES

Freeze-free Season Zone	Fraction of Nevada[1] %	Latitudinal Reach: Southern °N Lat.	Latitudinal Reach: Northern °N Lat.	Modal Elevation of Valley Floors ft.	Range in Elevation of Valley Floors ft.
1	6	35°00′	37°10′	2,600	800 – 3,500
2	14	36°20′	40°00′	4,700	3,200 – 5,800
3	21	37°30′	41°40′	4,700	3,800 – 6,800
4	19	39°50′	41°00′	5,700	4,200 – 7,000
5	6	40°50′	41°00′	5,500	5,000 – 5,900

[1]The total land area of Nevada is 110,540 square miles. About 61 percent of the State is comprised of basins which include 651 square miles of lakes. About 5 percent of the State consists of plateaus. The mountainous 34 percent of the State is not included in any of the freeze-free zones.

TABLE 4
HYDROGRAPHIC AREAS

Area Number on Map	Name	Location: Townships N	Location: Ranges E	Freeze-free Season Zone
	NORTHWEST REGION			
1	Pueblo Valley	46 – 47	28–32	4
2	Continental Lake Valley	43–47	27–30	4
3	Gridley Lake Valley	42–45	26–28	4 & 5
4	Virgin Valley	42–47	23–27	5 & 4
5	Sage Hen Valley	46–47	24–25	5
6	Guano Valley	45–47	21–24	5
7	Swan Lake Valley	42–46	21–24	5
8	Massacre Lake Valley	42–45	20–22	5
9	Long Valley	39–47	18–22	4 & 5
10	Macy Flat	46–47	20–21	5
11	Coleman Valley	46–47	19–20	4
12	Mosquito Valley	45–46	19–20	5
13	Warner Valley	45–47	18–19	5
14	Surprise Valley	37–46	18–19	4 & 5
15	Boulder Valley	39–41	18–20	5
16	Duck Lake Valley	34–39	18–21	4 & 5
	BLACK ROCK DESERT REGION			
17	Pilgrim Flat	34–35	18	4
18	Painters Flat	33–35	18	4
19	Dry Valley	28–29	18–19	3
20	Sano Valley	28	20–21	3
21	Smoke Creek Desert	27–36	18–23	3
22	San Emidio Desert	27–32	22–24	3
23	Granite Basin	33	23	3
24	Hualapai Flat	33–37	22–24	3
25	High Rock Lake Valley	37–43	20–24	5 & 4
26	Mud Meadow	36–42	24–26	3 & 4 & 5
27	Summit Lake Valley	41–42	25–27	5
28	Black Rock Desert	31–43	23–32	3 & 4
29	Pine Forest	40–46	29–33	3 & 4
30	Kings River Valley	41–47	32–35	——
	(A) Rio King Subarea	43–47	32–35	3 & 4
	(B) Sod House Subarea	41–43	33–35	3 & 4
31	Desert Valley	34–42	31–35	3 & 4
32	Silver State Valley	36–41	35–37	3 & 4
33	Quinn River Valley	40–47	35–41	——
	(A) Orovada Subarea	40–46	35–39	3 & 4 & 5
	(B) McDermitt Subarea	44 – 47	34–41	4 & 5
	SNAKE RIVER BASIN			
34	Little Owyhee River Area	43–47	41–47	4 & 5
35	South Fork Owyhee River Area	40–47	46–53	4 & 5
36	Independence Valley	38–42	50–53	4 & 5
37	Owyhee River Area	42–47	51–56	4 & 5
38	Bruneau River Area	41–47	53–58	5
39	Jarbidge River Area	45–47	57–61	5
40	Salmon Falls Creek Area	41–47	59–67	4 & 5
41	Goose Creek Area	44–47	66–70	5
	HUMBOLDT RIVER BASIN			
42	Marys River Area	36–45	58–64	4 & 5
43	Starr Valley Area	33–38	58–62	4
44	North Fork Area	35–43	53–58	5 & 4
45	Lamoille Valley	31–35	56–59	4
46	South Fork Area	30–32	56–58	4
47	Huntington Valley	24–32	53–58	4
48	Dixie Creek—Tenmile Creek	29–34	53–57	4
49	Elko Segment	31 – 36	52–56	4
50	Susie Creek Area	33–37	52–54	4 & 5
51	Maggie Creek Area	33 – 39	50 – 53	4
52	Marys Creek Area	32–33	50 – 52	4
53	Pine Valley	23–32	48 – 53	4
54	Crescent Valley	25 – 31	45–51	3 & 4
55	Carico Lake Valley	22–28	43–46	3 & 4
56	Upper Reese River Valley	10 – 24	39–45	4
57	Antelope Valley	19–27	40–42	3 & 4
58	Middle Reese River Valley	24–28	41–44	3
59	Lower Reese River Valley	27 – 33	42–48	3
60	Whirlwind Valley	30–32	47–48	3
61	Boulder Flat	31 – 37	45 – 51	3 & 4
62	Rock Creek Valley	33–38	45–50	4
63	Willow Creek Valley	37–41	45–50	4 & 5
64	Clovers Area	32–39	42–46	3 & 4
65	Pumpernickel Valley	31–36	39–43	3 & 4
66	Kelly Creek Area	36–40	40–44	3 & 4
67	Little Humboldt Valley	38–46	39–47	4 & 5
68	Hardscrabble Area	42–45	39–42	4 & 5
69	Paradise Valley	36 – 44	37–41	3 & 4
70	Winnemucca Segment	34–38	34–41	3 & 4
71	Grass Valley	30–36	36–40	3
72	Imlay Area	30–34	30–37	3 & 4
73	Lovelock Valley	24–30	29 – 33	2 & 3
	(A) Oreana Subarea	28–30	32–34	3
74	White Plains	22–25	27–29	2 & 3
	WEST CENTRAL REGION			
75	Bradys Hot Springs Area	21–24	25 – 27	2 & 3
76	Fernley Area	19–21	23–26	2 & 3
77	Fireball Valley	22–24	25–26	3
78	Granite Springs Valley	24–31	24–31	3 & 4
79	Kumiva Valley	27–32	24–27	3 & 4
	TRUCKEE RIVER BASIN			
80	Winnemucca Lake Valley	24–30	23–25	3
81	Pyramid Lake Valley	21–29	20–25	3
82	Dodge Flat	21–22	23–24	3
83	Tracy Segment	17–21	20–24	3
84	Warm Springs Valley	21–24	19–22	3
85	Spanish Springs Valley	20–21	20–21	3
86	Sun Valley	20	19–20	3
87	Truckee Meadows	17–20	18–21	3
88	Pleasant Valley	17	18–20	3
89	Washoe Valley	15–17	18–20	3
90	Lake Tahoe Basin	13–17	18–19	4
91	Truckee Canyon Segment	17–20	18	3
	WESTERN REGION			
92	Lemmon Valley	20–22	18–20	——
	(A) Western Part	20–22	18–19	3
	(B) Eastern Part	20–21	19–20	3
93	Antelope Valley	22	19–20	3
94	Bedell Flat	22 – 24	18–20	3
95	Dry Valley	24–25	18–20	3
96	Newcomb Lake Valley	25	18–19	3
97	Honey Lake Valley	25–28	18–20	3 & 4
98	Skedaddle Creek Valley	28–30	18	4
99	Red Rock Valley	22–24	18–19	3
100	Cold Spring Valley	20–22	18	3
	CARSON RIVER BASIN			
101	Carson Desert	15–28	25–35	2 & 3
	(A) Packard Valley	25 – 28	31 – 34	2 & 3
102	Churchill Valley	14–19	22–27	2
103	Dayton Valley	14–18	20–24	2 & 3
104	Eagle Valley	14–16	19–20	3
105	Carson Valley	10–14	19–22	3
	WALKER RIVER BASIN			
106	Antelope Valley	8–11	21–23	3
107	Smith Valley	7–14	22–26	3 & 4
108	Mason Valley	9–16	24–28	3
109	East Walker Area	5–11	24–29	4
110	Walker Lake Valley	3–16	26–33	——
	(A) Schurz Subarea	11–16	27 – 32	2 & 3
	(B) Lake Subarea	8–11	28–32	2
	(C) Whiskey Flat—Hawthorne Subarea	3–9	28 – 33	2 & 3
	CENTRAL REGION			
111	Alkali Valley	4–5	28–30	——
	(A) Northern Part	5	29	4
	(B) Southern Part	4–5	28–30	4
112	Mono Valley	3–4	29–30	4
113	Huntoon Valley	2–4	30–32	3
114	Teels Marsh Valley	1–5	31–34	2 & 3
115	Adobe Valley	1–2	30–31	3
116	Queen Valley	1 S.–1 N.	31–33	3
117	Fish Lake Valley	6 S.–1 N.	33–40	3
118	Columbus Salt Marsh Valley	1–5	33–38	2 & 3
119	Rhodes Salt Marsh Valley	3–6	34–36	2
120	Garfield Flat	5–7	32–34	3
121	Soda Spring Valley	6–9	32–36	——
	(A) Eastern Part	6–9	33 – 36	2
	(B) Western Part	7–9	32–34	2
122	Gabbs Valley	7–15	31–37	2 & 3
123	Rawhide Flats	14–16	28–32	2 & 3
124	Fairview Valley	14–18	32–35	2 & 3
125	Stingaree Valley	16–17	34–35	3
126	Cowkick Valley	15–19	34–36	3
127	Eastgate Valley Area	15–19	36–38	3
128	Dixie Valley	16–27	33–40	2 & 3
129	Buena Vista Valley	24–31	34–37	3
130	Pleasant Valley	26–30	37–40	3
131	Buffalo Valley	27–33	40–43	3 & 4
132	Jersey Valley	25–28	39–41	2 & 3
133	Edwards Creek Valley	18–22	36–40	3
134	Smith Creek Valley	13–20	37–41	4
135	Ione Valley	8–14	37–40	3 & 4
136	Monte Cristo Valley	4–8	36–38	3
137	Big Smoky	1 S.–20 N.	37–46	——
	(A) Tonopah Flat	1 S.–10 N.	37–44	2 & 3
	(B) Northern Part	9–20	41–46	3 & 4
138	Grass Valley	20–26	45–49	4
139	Kobeh Valley	17–23½	46–52	4
140	Monitor Valley	8–18	45–49	——
	(A) Northern Part	12–18	46 – 49	4
	(B) Southern Part	8–13	45–48	4
141	Ralston Valley	2 S. – 9 N.	42–47	2 & 3
142	Alkali Spring Valley	3 S.–2 N.	40–43	2
143	Clayton Valley	5 S.–2 N.	37–41	2
144	Lida Valley	3 S. – 7 S.	40–44	2
145	Stonewall Flat	1 S. – 5 S.	43–47	2
146	Sarcobatus Flat	5 S. – 12 S.	42–47	2
147	Gold Flat	1 S. – 8 S.	46–51	2
148	Cactus Flat	4 S.–1 N.	46–50	2
149	Stone Cabin Valley	2 S.–9 N.	45 – 50	2 & 3
150	Little Fish Lake Valley	8–14	48–51	4
151	Antelope Valley	14–19	49–52	4
152	Stevens Basin	18–19	52–53	5
153	Diamond Valley	18–27	51–55	4
154	Newark Valley	16–24	54–58	4
155	Little Smoky Valley	6–18	51–55	——
	(A) Northern Part	12–18	51–55	4
	(B) Central Part	11–12	52 – 53	4
	(C) Southern Part	6–14	52–55	3 & 4
156	Hot Creek Valley	1 – 13	48 – 52	2 & 3
157	Kawich Valley	3 S. – 8 S.	51–52	2 & 3
158	Emigrant Valley	5 S. – 11 S.	52–57	——
	(A) Groom Lake Valley	5 S. – 10 S.	52–57	2
	(B) Papoose Lake Valley	9 S. – 11 S.	54–56	2
159	Yucca Flat	8 S. – 12 S.	51–53	2
160	Frenchman Flat	10 S. – 15 S.	51–56	2
161	Indian Springs Valley	10 S. – 18 S.	53 – 57	2
162	Pahrump Valley	17 S. – 23 S.	51–57	1 & 2
163	Mesquite Valley (Sandy Valley)	21 S. – 26 S.	55–58	1
164	Ivanpah Valley	23 S. – 29 S.	58–61	——
	(A) Northern Part	23 S. – 27 S.	58–61	1
	(B) Southern Part	26 S. – 29 S.	58 – 61	1
165	Jean Lake Valley	23 S. – 26 S.	59–61	1
166	Hidden Valley (South)	24 S. – 25 S.	61	1
167	Eldorado Valley	23 S. – 28 S.	61–65	1
168	Three Lakes Valley, Northern Part	9 S. – 14 S.	57–60	2
169	Tikapoo (Tickaboo) Valley	3 S. – 14 S.	55–61	2
	(A) Northern Part	3 S. – 10 S.	55 – 59	2
	(B) Southern Part	8 S. – 14 S.	58 – 61	2
170	Penoyer Valley (Sand Spring Valley)	2 N.–5 S.	52–58	2
171	Coal Valley	3 S.–4 N.	57 – 61	2 & 3
172	Garden Valley	2 S.–5 N.	55–59	2 & 3
173	Railroad Valley	3 S.–16 N.	50–59	——
	(A) Southern Part	3 S.–3 N.	50–54	2 & 3
	(B) Northern Part	2–16	51½–59	2 & 3
174	Jakes Valley	14–19	58–61	4
175	Long Valley	18–27	56–60	4
176	Ruby Valley	24–35	57–61	4
177	Clover Valley	31–37	61–63	4
178	Butte Valley	18–31	59–63	——
	(A) Northern Part	27–31	61–63	4
	(B) Southern Part	18–27	59–63	4
179	Steptoe Valley	10–29	61–67	4
180	Cave Valley	5–11	62–64	3 & 4
181	Dry Lake Valley	5 S.–7 N.	63–66	2 & 3
182	Delamar Valley	3 S. – 8 S.	62–65	2
183	Lake Valley	5–11	64–68	3
184	Spring Valley	6–25	65–69	3 & 4
185	Tippett Valley	21–25	66–69	4
186	Antelope Valley	25–30	66–69	——
	(A) Southern Part	25–28	67–69	4
	(B) Northern Part	26–30	66–68	4
187	Goshute Valley	27–38	63–68	4 & 5
188	Independence Valley (Pequop Valley)	31–39	63–65	4 & 5
	GREAT SALT LAKE BASIN			
189	Thousand Springs Valley	36–46	61–70	——
	(A) Merrell Siding—Brush Creek Area	39–42	61–65	4 & 5
	(B) Toano—Rock Spring Area	38–46	64–68	4 & 5
	(C) Rocky Butte Area	40–43	66–68	4 & 5
	(D) Montello—Crittenden Creek Area (Montello Valley)	36–44	67–70	3 & 4
190	Grouse Creek Valley	40 – 45	69–70	4
191	Pilot Creek Valley	33–38	68–70	3 & 4
192	Great Salt Lake Desert	27–37	68–70	3 & 4
193	Deep Creek Valley	22–27	69–70	4
194	Pleasant Valley	20–22	69–70	4
195	Snake Valley	10–21	68–70	3 & 4
196	Hamlin Valley	1 – 12	68–71	3
	ESCALANTE DESERT			
197	Escalante Desert	3 S.–1 N.	69–71	2 & 3
	COLORADO RIVER BASIN			
198	Dry Valley	2 S.–1 N.	68–71	2 & 3
199	Rose Valley	1	69–70	3
200	Eagle Valley	1–2	69–71	3 & 4
201	Spring Valley	2–6	68–71	4
202	Patterson Valley	1 S.–5 N.	65–69	2 & 3
203	Panaca Valley	4 S.–1 N.	65–70	2 & 3
204	Clover Valley	3 S. – 7 S.	67–71	2 & 3
205	Lower Meadow Valley Wash	4 S.– 14 S.	64–69	1 & 2
206	Kane Springs Valley	6 S. – 11 S.	63–66	2
207	White River Valley	3–16	58–63	3 & 4
208	Pahroc Valley	3 S.–5 N.	60 – 63	2 & 3
209	Pahranagat Valley	2 S. – 9 S.	58–63	2
210	Coyote Spring Valley	8 S. – 15 S.	61–64	1 & 2
211	Three Lakes Valley, Southern Part	14 S. – 18 S.	56 – 60	1 & 2
212	Las Vegas Valley	15 S. – 24 S.	56–64	1 & 2
213	Colorado River Valley	22 S. – 33 S.	63–66	1
214	Piute Valley	27 S. – 32 S.	61–65	1
215	Black Mountains Area	16 S. – 23 S.	63–68	1
216	Garnet Valley	15 S. – 19 S.	61–64	1
217	Hidden Valley (North)	15 S. – 17 S.	62–63	1
218	California Wash Area	14 S. – 19 S.	63–66	1
219	Muddy River Springs Area (Upper Moapa Valley)	12 S. – 15 S.	63–65	1
220	Lower Moapa Valley	12 S. – 17 S.	66–68	1
221	Tule Desert	7 S. – 11 S.	68–70	2
222	Virgin River Valley	4 S. – 17 S.	67–71	1 & 2
223	Gold Butte Area	15 S. – 22 S.	68–71	1
224	Greasewood Basin	15 S. – 20 S.	70–71	1
	DEATH VALLEY BASIN			
225	Mercury Valley	14 S. – 17 S.	52–54	2
226	Rock Valley	14 S. – 15 S.	50–52	1 & 2
227	Fortymile Canyon	8 S. – 15 S.	49–52	——
	(A) Jackass Flats	11 S. – 15 S.	49–52	1 & 2
	(B) Buckboard Mesa	8 S. – 11 S.	49–51	2
228	Oasis Valley	7 S. – 12 S.	46–50	2
229	Crater Flat	11 S. – 15 S.	47–49	1 & 2
230	Amargosa Desert	11 S. – 19 S.	44 – 53	1 & 2
231	Grapevine Canyon	8 S. – 12 S.	41 – 44	2
232	Oriental Wash	6 S. – 10 S.	38–42	2



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5. SAGE HEN V.
6. GUANO V.
7. SWAN LAKE V.
8. MASSACRE LAKE V.
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    (B) McDERMITT SUBAREA

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39. JARBIDGE RIVER AREA
40. SALMON FALLS CREEK AREA
41. GOOSE CREEK AREA

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55. CARICO LAKE V.
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57. ANTELOPE V.
58. MIDDLE REESE RIVER V.

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66. KELLEY CREEK AREA
67. LITTLE HUMBOLDT V.
68. HARDSCRABBLE AREA
69. PARADISE V.
70. WINNEMUCCA SEGMENT
71. GRASS V.
72. IMLAY AREA
73. LOVELOCK V.
    (A) OREANA SUBAREA
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8. CARSON RIVER BASIN

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137. BIG SMOKY V.
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BOUNDARY OF HYDROGRAPHIC AREAS (Dotted where arbitrary)

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Freeze-free Season Zones and Physiography

Basins with less than 15 percent slopes

1 — greater than 200 days

2 — 130–200 days

3 — 100–130 days

4 — 70–100 days

5 — less than 70 days

Mountainous areas with greater than 15 percent slopes

unidentified

Plateaus with less than 15 percent slopes

2 4 5 — Freeze-free season zones 2, 4, and 5

CAUTION: Within all freeze-free season zones smaller areas occur which have shorter or longer seasons. This must be identified locally.

BASE: REDUCTION OF U.S.G.S. TOPOGRAPHIC MAP OF NEVADA, 1:500,000, EDITION OF 1965

EDITED BY: B. J. VASEY
B. R. SCOTT

CARTOGRAPHY BY: INGRID A. KLAICH

FREEZE-FREE (32° F.) SEASONS OF THE MAJOR BASINS AND PLATEAUS OF NEVADA

PREPARED AS PART OF THE NEVADA STATE WATER PLAN

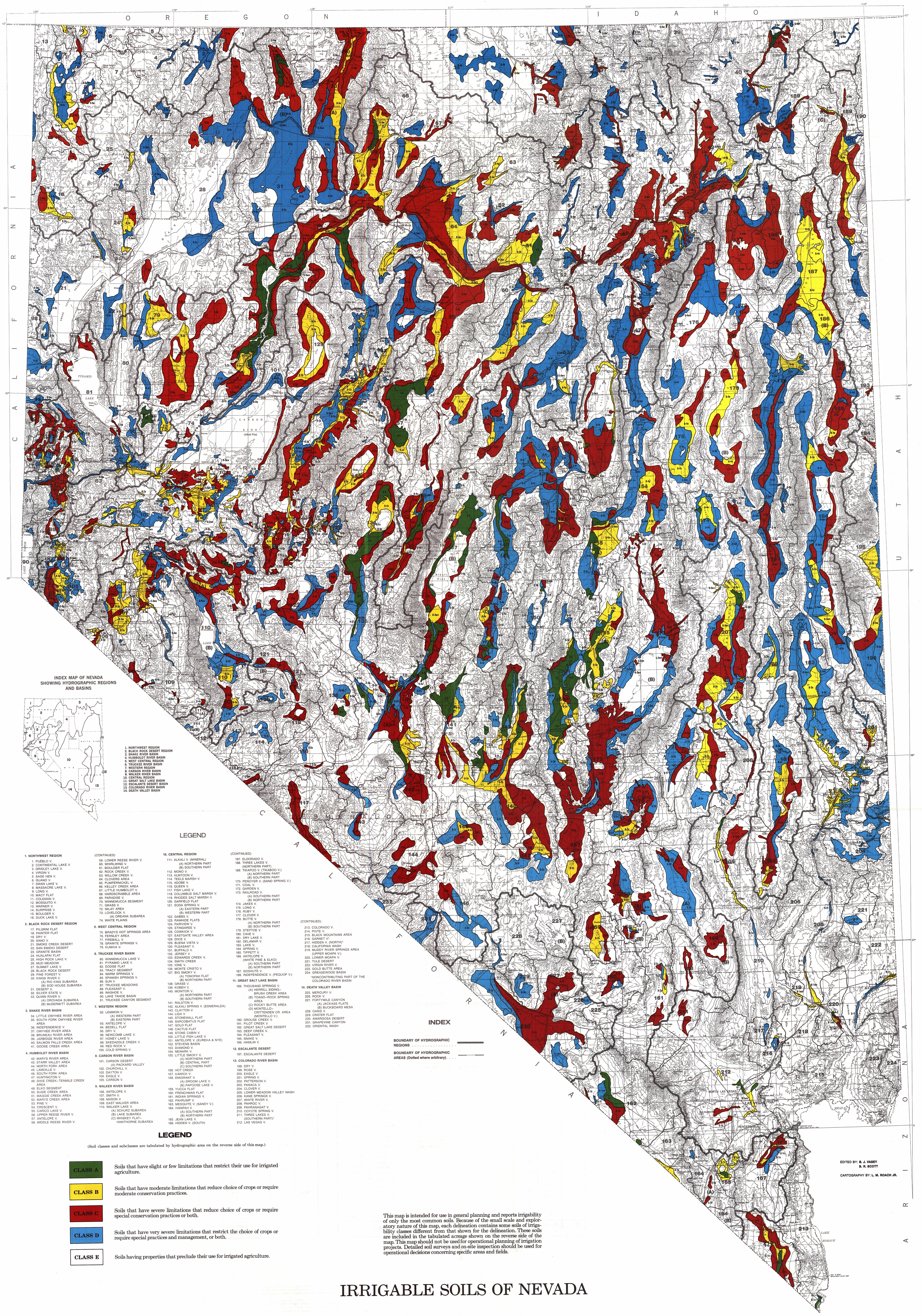
DIVISION OF WATER RESOURCES
STATE ENGINEERS OFFICE
1973

SCALE 1:750,000

PREPARED BY
The Agricultural Experiment Station
University of Nevada Reno
Dale W. Bohmont, Dean and Director

State of Nevada
Division of Water Resources

U.S. Department of Agriculture
Soil Conservation Service



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197. ESCALANTE DESERT

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(Soil classes and subclasses are tabulated by hydrographic area on the reverse side of this map.)

CLASS A	Soils that have slight or few limitations that restrict their use for irrigated agriculture.
CLASS B	Soils that have moderate limitations that reduce choice of crops or require moderate conservation practices.
CLASS C	Soils that have severe limitations that reduce choice of crops or require special conservation practices or both.
CLASS D	Soils that have very severe limitations that restrict the choice of crops or require special practices and management, or both.
CLASS E	Soils having properties that preclude their use for irrigated agriculture.

This map is intended for use in general planning and reports irrigability of only the most common soils. Because of the small scale and exploratory nature of this map, each delineation contains some soils of irrigability classes different from that shown for the delineation. These soils are included in the tabulated acreage shown on the reverse side of the map. This map should not be used for operational planning of irrigation projects. Detailed soil surveys and on-site inspection should be used for operational decisions concerning specific areas and fields.

EDITED BY: B. J. VASEY
B. R. SCOTT

CARTOGRAPHY BY: L. M. ROACH JR.

IRRIGABLE SOILS OF NEVADA

PREPARED AS PART OF THE NEVADA STATE WATER PLAN

DIVISION OF WATER RESOURCES
STATE ENGINEERS OFFICE

1973

BASE: REDUCTION OF U.S.G.S. TOPOGRAPHIC MAP OF NEVADA, 1:500,000, EDITION OF 1965

Prepared by generalization of data from detailed and reconnaissance soil surveys which have been completed by the Soil Conservation Service, U.S. Department of Agriculture, Bureau of Reclamation, U.S. Department of Interior, and the University of Nevada Agricultural Experiment Station, Reno, Nevada. Data for the extensive areas not covered by soil surveys has been developed by exploratory field methods and surveys.

State of Nevada

WATER PLANNING REPORT