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The Wasatch Front in 1869: A Geographical Description

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THE WASATCH FRONT IN 1869: A GEOGRAPHICAL DESCRIPTION

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INTRODUCTION

The Problem

In 1847, the Mormon pioneers came to the Wasatch Front seeking isolation from persecution and a degree of economic independence, and in succeeding years they used the Wasatch bases as a springboard for further colonization of the Great Basin. By 1865, the irrigation system--so important in this semi-arid climate--was highly developed, almost all of the arable land in the oasis area was under cultivation and the economic and social patterns were set. A majority of the present-day communities along the Wasatch Front were already in existence by 1865. By the late 1860's these pioneers and their successors had firmly rooted their settlements in the soil of the Wasatch. The driving of the golden spike in May, 1869 at Promontory, Utah planted the seed of change in the Wasatch soil. The isolation for which the Latter-day Saints had come to Utah had been slowly slipping away from them; now it was to disappear rapidly. It was no longer difficult to come to the Intermountain West. The typical Mormon society, which had existed in the Great Basin relatively undisturbed for twenty-two years, began to be influenced by its more complete integration into the cultural and economic life of the nation.

A geographical description of the Wasatch Front in 1869 points up

some of the ways in which the Mormon culture was unique and provides a foundation for studying the changes that occurred following the completion of the transcontinental railroad.

In the first chapter I shall examine the question of how this area was chosen by the Mormons for colonization. This examination will include a brief physical description of the Wasatch Front designed to show the resources available in the area for the settling of a large group of people. Opinions of some of the early visitors to the Great Basin who may have influenced the Mormons' choice will be examined.

Succeeding chapters will be devoted to a geographical description of the Wasatch settlements around 1869. Emphasis will be placed upon describing methods and pattern of semi-subsistence irrigated agriculture developed along the Wasatch Front. The accompanying population, urban, business, and mining conditions in the Wasatch oasis at that period also will be examined.

CHAPTER I

WHY THE WASATCH FRONT

The Mormons settled at the western foot of the Wasatch, rather than go on to California or Oregon, because they had become convinced that conditions at the Great Basin's eastern edge would satisfy their desire for isolation and economic growth. The Latter-day Saints did not stop their westward trek in the Salt Lake Valley by accident, they felt they knew where they were going. They were reasonably certain that the area they had chosen could support a large body of people. In addition, they were confident that their new home would remain in comparative isolation for at least a few years; time enough for them to strengthen themselves as a people.[1]

Early Knowledge of the Wasatch Front

When the first permanent Mormon settlers entered the Salt Lake Valley it was not a virgin area, unknown to the white men. Explorers and trappers had wandered back and forth through the Wasatch Front

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[1] The Mormons' confidence about their future in the Rocky Mountains was not only prompted by what they learned from Fremont, Preuss, Bonneville, and others; but also by the prophecy of President Joseph Smith in 1842 that the Saints would go to the Rocky Mountains, build cities and become a mighty people unmolested by their oppressors. (B. F. Roberts, History of the Church, V. 85.)

valleys between 1824 and 1847. Many of the mountain men and government explorers wrote about their experiences and described in detail the characteristics of the Wasatch. These reports were published extensively in the East, and the Mormon leaders probably had access to a considerable literature describing their future home.[2] Men like Jedediah Smith, William Ashley, Peter Skene Ogden, Etienne Provost, and Captain James Bonneville were familiar with the Wasatch. Miles Goodyear had a permanent ranch near the present site of Ogden in 1845.[3]

Contemporary Descriptions

Reverend Joseph Williams, a missionary to Oregon who was on his way home, wrote of the Wasatch Front area in 1842:

> I am of the opinion, that on the east side of Big Salt Lake, that [sic] Bear River empties into, would be a great place to establish a mission, and well calculated for raising all kinds of grain. It is a good, rich land, a well watered and healthy country. Fish and fowls are very plenty. [sic] A beautiful prairie, about one hundred miles long, lies between the lake and the mountain. The plains are covered with green grass all winter, and well calculated for raising stock. Some pines on the mountains, and cottonwood along the creeks and rivers that empty into the lake. There is

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[2]The following is an example of the Mormon leaders' efforts along this line: "Thursday, December 31, 1845 - Elder Heber C. Kimball and I . . . examined maps with reference to selecting a location for the Saints west of the Rocky Mountains, reading various works written by travellers." Church of Jesus Christ of Latter-day Saints, Church Historian's Office. History of Brigham Young -- 1847-1867, Ms. Berkeley: Mass. Cal Associates, 1964.

[3]Goodyear was subsequently bought out by the Mormons in 1847.

> plenty of salt on the edges of the lake. It is about two hundred and fifty miles in circumference, and lies in 40° North Latitude.[4]

This description, which appeared in a book published at Cincinnati in 1843, was available three years before the Mormons left Nauvoo.

The Fremont explorations of 1842, 1843, and 1844 were of particular interest to the Mormon leaders. From the journal of Charles Preuss, Fremont's right hand man, we find the following description of Utah Lake Valley, dated May 26, 1844:

> The lake is surrounded by high, rocky mountains, whose peaks are still covered with snow. Between the water and the mountains there is a magnificent growth of grass for a mile around. Six smaller and larger mountain brooks, lined by poplar, etc., empty into the lake . . . the Indians are very friendly, and, under the circumstances, it would be nice to live here if one had something to live on.[5]

Fremont himself, describing the northern part of the Wasatch oasis in 1842 relates:

> The bottoms are extensive; water excellent; timber sufficient; the soil good and well adapted to the grains and grasses suited to such elevated regions.[6]

Fremont's description of the southern part of the Wasatch Front and the area as a whole follows:

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[4]LeRoy and Ann W. Hafen, (eds.), To the Rockies and Oregon, 1839-1842, (Glendale, 1955), p. 269.

[5]Charles Preuss, Exploring with Fremont, (Univ. of Okla. Press, Norman, Oklahoma, 1958) p. 92.

[6]John Charles Fremont, Report to the Exploring Expedition to the Rocky Mountains in the Year 1842 and to Oregon and Northern California 1843-1844, (Washington, 1845), p. 93.

> We had now entered a region of great pastoral promise, abounding with fine streams, the rich bunch grass, soil that would produce wheat, and indigenous flax growing as if it had been sown . . . this fertility of soil and vegetation does not extend far into the Great Basin.
>
> . . . . . .
>
> This would be an excellent locality for stock farms; it is generally covered with good bunch grass, and would abundantly produce the ordinary grains.
>
> . . . . . .
>
> In this eastern part of the Basin containing Sevier, Utah, and the Great Salt Lakes, and the rivers and creeks falling into them, we know there is good soil and good grass, adapted to civilized settlements.[7]

In August, 1845 Brigham Young acquired a report of Fremont's two expeditions to the Rocky Mountains. The Mormon leaders studied the report for one month, then on September 24th, published a full-page account of Fremont's experiences around the Great Salt Lake for all the Saints to read.[8] It seems evident that the study of such written material concentrated the attention of the Mormons on the Wasatch Front prior to the actual migration.

It is significant that other groups did not see the same possibilities and settle in this area first. One reason for this may be found in the differing economic and social goals of Mormon and non-Mormon occupations in the West.[9] Another reason for this may be found in examining the

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[7]Ibid., pp. 297, 300, 303.

[8]William J. Snow, The Great Basin Before the Coming of the Mormons, (unpublished Ph.D. dissertation, Dept. of History, Univ of Calif., Berkeley, California., 1923) p. 190.

[9]See D. M. Meinig, "The Mormon Culture Region," Annals of the AAG, Vol. 55, June, 1965.

contemporary attitude of the people to the Great Basin in the 1840's. Not all of the reports coming from this area were favorable. The name "Great American Desert" was commonly accepted as suited to all of the region from the 100th Meridian to the west slope of the Sierra Nevada. The following statement has been attributed to Daniel Webster:

> What do we want of this vast worthless area, this region of savages and wild beasts, of deserts and shifting sands and whirlwinds of dust, of cactus and prairie dogs? To what use could we put these great deserts or endless mountain ranges, impenetrable and covered to their base with eternal snow?[10]

Senator William L. Dayton stated in 1844: "The whole country is as barren as the desert of the Sahara."[11] Domenench, a German traveler of our Far West in 1845 wrote:

> The country in general is dry and sterile; scarcely any pasture or wood is to be seen there. The heart saddens as one penetrates into this strange and melencholy region . . . a dismal silence, painful and awful, continually reigns in those regions; one would say that death hovers in that atmosphere without life or echo, and that it prepares a grave for the traveler who may venture into them.[12]

The Mormon leaders displayed a great deal of strength and inspiration, as well as courage, in seeing and exploiting the possibilities of the Great Basin.

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[10]Orson F. Whitney, History of Utah, pp. 288-289.

[11]W. F. Sanders, Historical Soc. of Montana, Vol. IV, 1903, pp. 123-126.

[12]E. H. D. Domenench, Seven Years Residence in the Great Deserts of North America, (2 vols; London, 1860), I, 242.

Information gleaned on the trail probably reinforced Mormon determination to move to the Wasatch Front. Along the way they met veteran trappers Moses Harris, Thomas (Pegleg) Smith, and Jim Bridger, each of whom was earnestly questioned for information about the Mormons' projected new home. Jim Bridger gave them the most comprehensive account of the whole region:

> In the Bear River Valley there is [sic] oak timber, sugar trees, cottonwood, pine and maple . . . There is no timber in Utah Lake only on the streams that empty into it. In the outlet of Utah Lake which runs into the Salt Lake there is an abundance of blue grass and red and white clover . . . There was a man opened up a farm in the Bear River Valley. The soil is good and likely to produce corn were it not for the excessive cold nights which he thinks would prevent the growth of corn. There is a good country south of Utah Lake or southeast of the Great Basin. There are three large rivers which enter into the Sevier Lake unknown to travelers . . . The three rivers mentioned are southwest of the desert. There is a tribe of Indians in that country unknown to either travelers or geographers. They make farms and raise abundance of grain of various kinds. One can buy any quantity of the best of wheat there. There is one mountain in the region and the country adjoining, in which he considers if there was a promised land, that must be it . . . He thinks the Utah Lake is the best country in the vicinity of Salt Lake and the country is still better the farther south we go until we meet the desert which is upwards of 200 miles south from Utah Lake. There is abundance of timber on all the streams and mountains and abundance of fish in the streams.[13]

The migrating Saints apparently met another traveler, Father De Smet, a Catholic missionary who had visited the Salt Lake Valley

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[13]Snow, pp. 195-196.

on the way east from Oregon. He described the Wasatch oasis as "capable, in time, of supporting over one million."[14] De Smet wrote of his confrontation with the Mormons:

> In 1846, near the frontiers of Missouri, I found the advance guard of the Mormons, numbering in about ten thousand, camped in the territory of the Omahas, not far from the old Council Bluffs. They did not know at that time the goal of their long wanderings. They asked me a thousand questions about the country I had explored, and the spot I have just described to you. Bear River and Cache Valleys pleased them greatly from the account I gave them of it. Was that what determined them? I would not dare assert it. They are there and the country has changed from a desert to a flourishing territory.[15]

In July, 1847, the advance group of Mormon pioneers stood at the foot of the Wasatch and gazed upon the Salt Lake Valley. William Clayton historian for the pioneer group made this statement:

> There is an extensive and beautiful and level looking valley from here to the lake which I should judge from the numerous deep green patches must be fertile and rich . . . I am happily disappointed in the appearance of the valley of Salt Lake. . . . the soil looks indeed rich, black, and a little sandy . . .[16]

Mormon preferences for the eastern margin of the Great Basin were found to be justified.

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[14]Ibid., p. 194.

[15]Ibid.

[16]William Clayton, William Clayton's Journal, (Salt Lake City, 1921). p. 319.

Success in the Great Basin

In the Wasatch Front oasis the Mormons had found what they seemed to be seeking: A place that would support the "gathering of Zion" and a location that was isolated from their persecutors, real or potential. In addition, the commonly accepted ideas about the Great Basin, held in the East, promised them at least a few more years of relative isolation in which to consolidate and strengthen themselves as a people. The Saints were confident of their success, not only because of Joseph Smith's prophecy,[17] but also because of those things they had learned about the physical geography of the Wasatch Front. An examination of this physical geography helps us understand the success that vindicated their confidence.

Physical Geography of the Wasatch Front

The Wasatch Range stretches for 130 miles from Bear River on the north to Mount Nebo on the south. It is the principal front range on the western edge of the Rocky Mountains and forms part of the eastern margin of the Great Basin. Physiographically it is a great fault block thrust above the valleys of the Great Basin in an abrupt and impressive rise averaging about 6500 feet from valley floor to mountain crest. The eastern face of the range is regionally much gentler than that of the west and slopes gradually to several upland valleys or parks, the dissected floors of which lie more than 1000 feet above the Great Basin to the west

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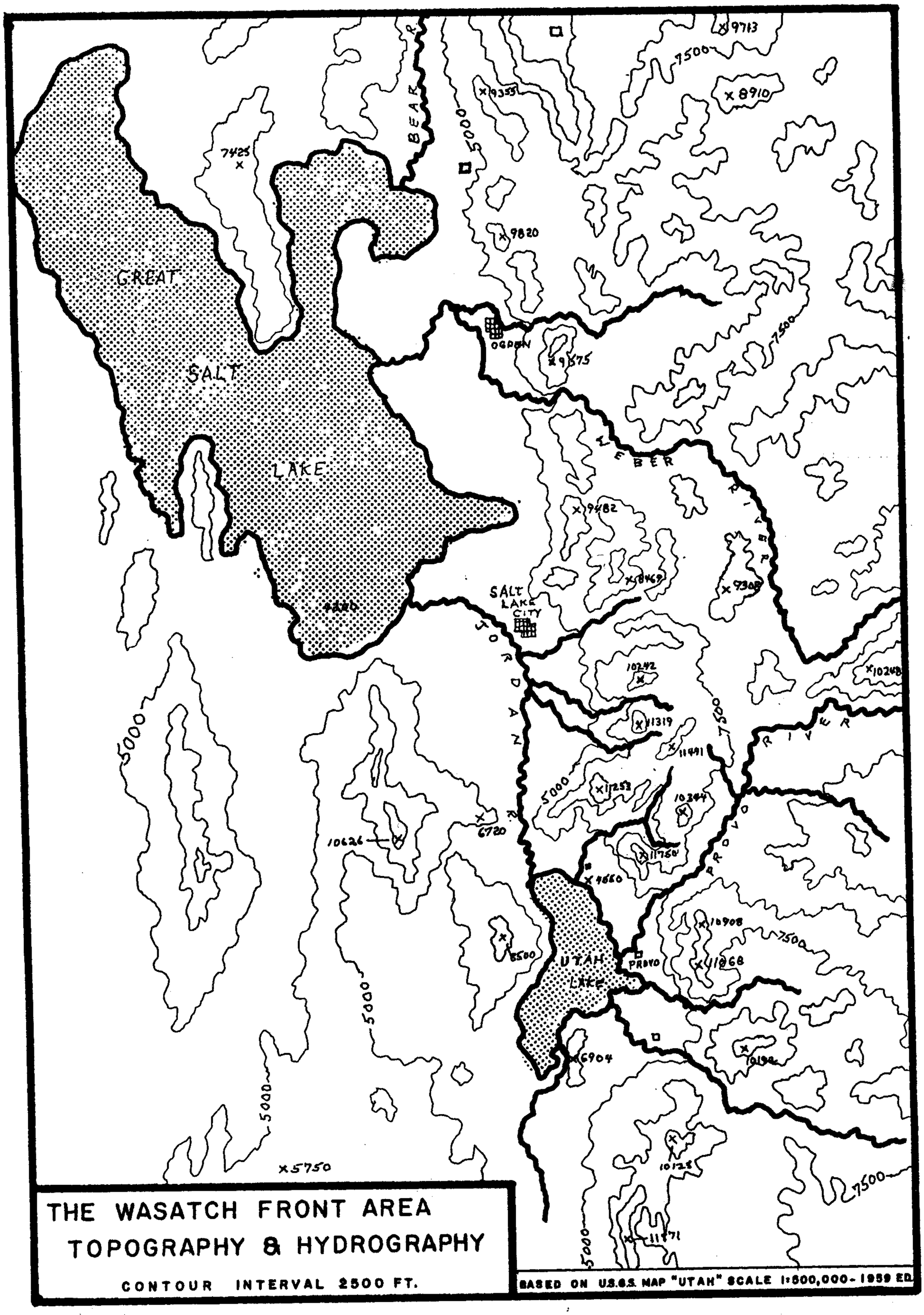
[17] See page 3, footnote 1.


BEAR R.
9713
7500
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9355
5000
7425
9820
GREAT
SALT
LAKE
OGDEN
9575
7500
LEHER RIVER
9482
8469
9308
SALT LAKE CITY
10242
10248
11319
11491
7500
RIVER
5000
11253
10344
JORDAN R.
6720
10626
11760
5000
8500
UTAH LAKE
PROVO
11068
10908
7500
6904
10192
5000
5000
5750
10125
7500
11171
THE WASATCH FRONT AREA
TOPOGRAPHY & HYDROGRAPHY
CONTOUR INTERVAL 2500 FT.
BASED ON U.S.G.S. MAP "UTAH" SCALE 1:500,000 - 1959 ED.

MAP 1

(see figs. 1-3).

Drainage

Most drainage flows eastward down the more extensive eastern slope of the range and collects in the parks. Here the waters are joined by larger rivers from the Uinta Mountains and turn westward and cross the range through spectacular canyons to the Great Basin and the Great Salt Lake. The Provo and Weber Rivers, both rising in the Uintas, are the recipients of most of the Wasatch waters and they cut deeply through the range to reach the Great Basin.[18] The Bear River, largest in volume in the Great Basin, also arises in the Uinta Mountains;[19] but the Bear skirts around the northern end of the Wasatch Range rather than cutting through its heart (Map 1). Streams running down the steep western slope of the Wasatch have also cut deeply into the range creating steep-walled canyons which, though they do not cut completely across the range, do extend the catchment basin of the westward-flowing drainage far back into the mountains. Nearly all drainage from the Wasatch Range and most all from the western Uintas thus flows to the western piedmont of the Wasatch Front. The oasis receives very little stream flow from the

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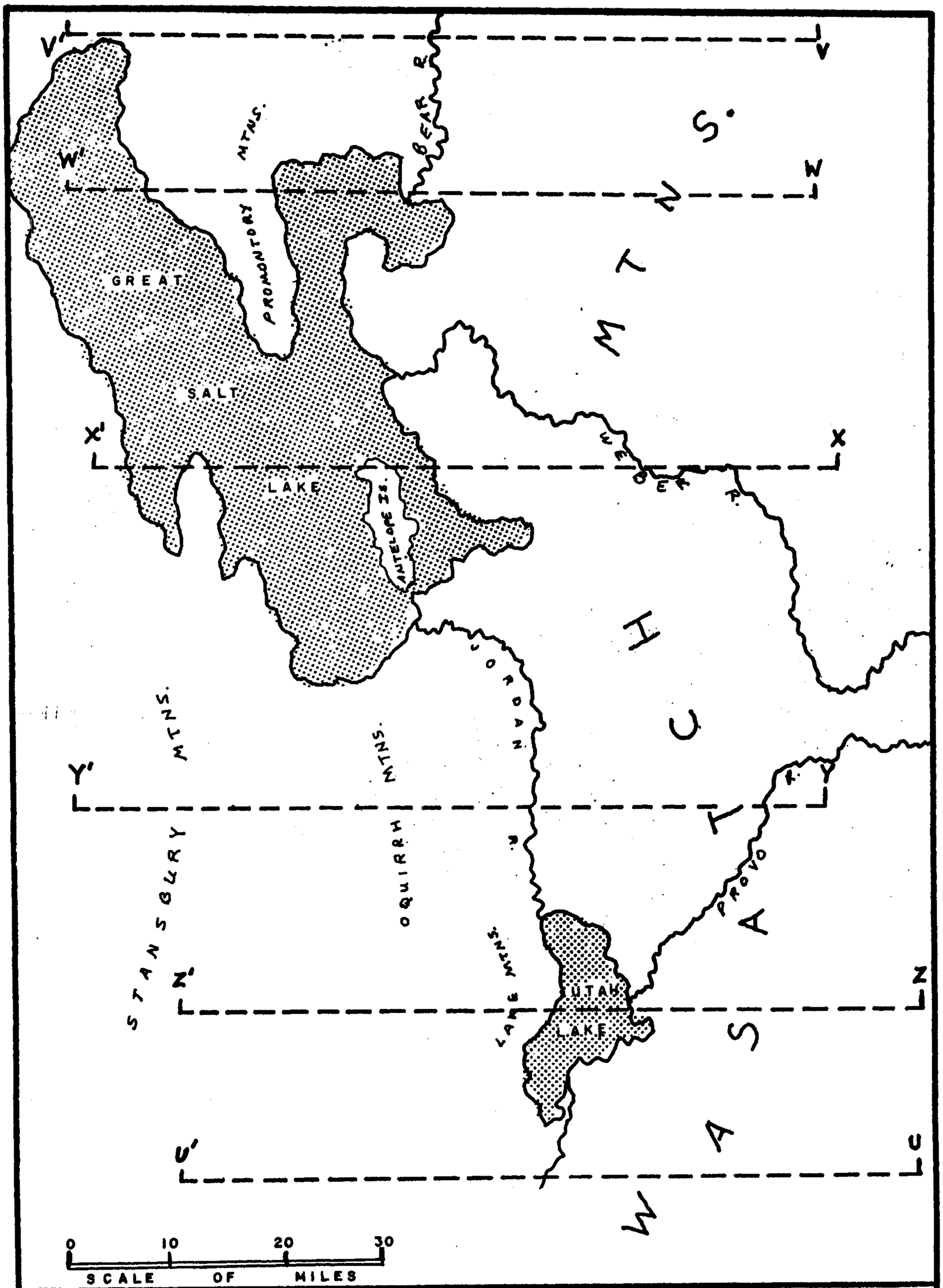
[18]These canyons were probably responsible for the name "Wasatch" which in Ute Indian languages means, "a low pass through a high mountain range." Utah Historical Quarterly, Vol. 16, 1948, p. 18.

[19]The head waters of the Weber, Provo, and Bear Rivers are located within 25 miles of each other in an area known as the High Uintas near Mirror Lake, Utah.



LOCATION OF PROFILE LINES FOR FIGURES 1-3 R.D.G.

MAP 2

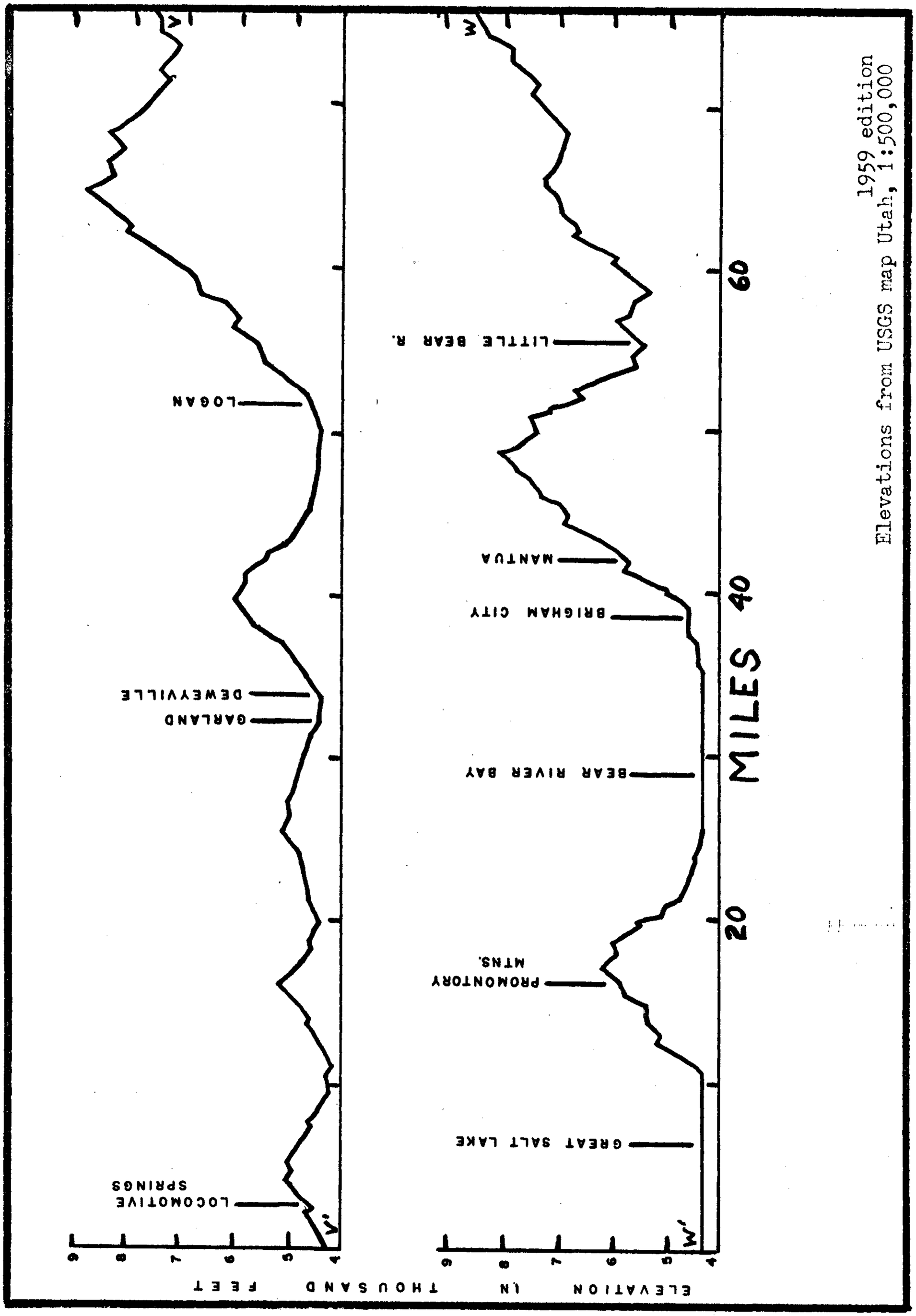


Fig. 1.--Profile lines across the northern Wasatch Mountains, Utah

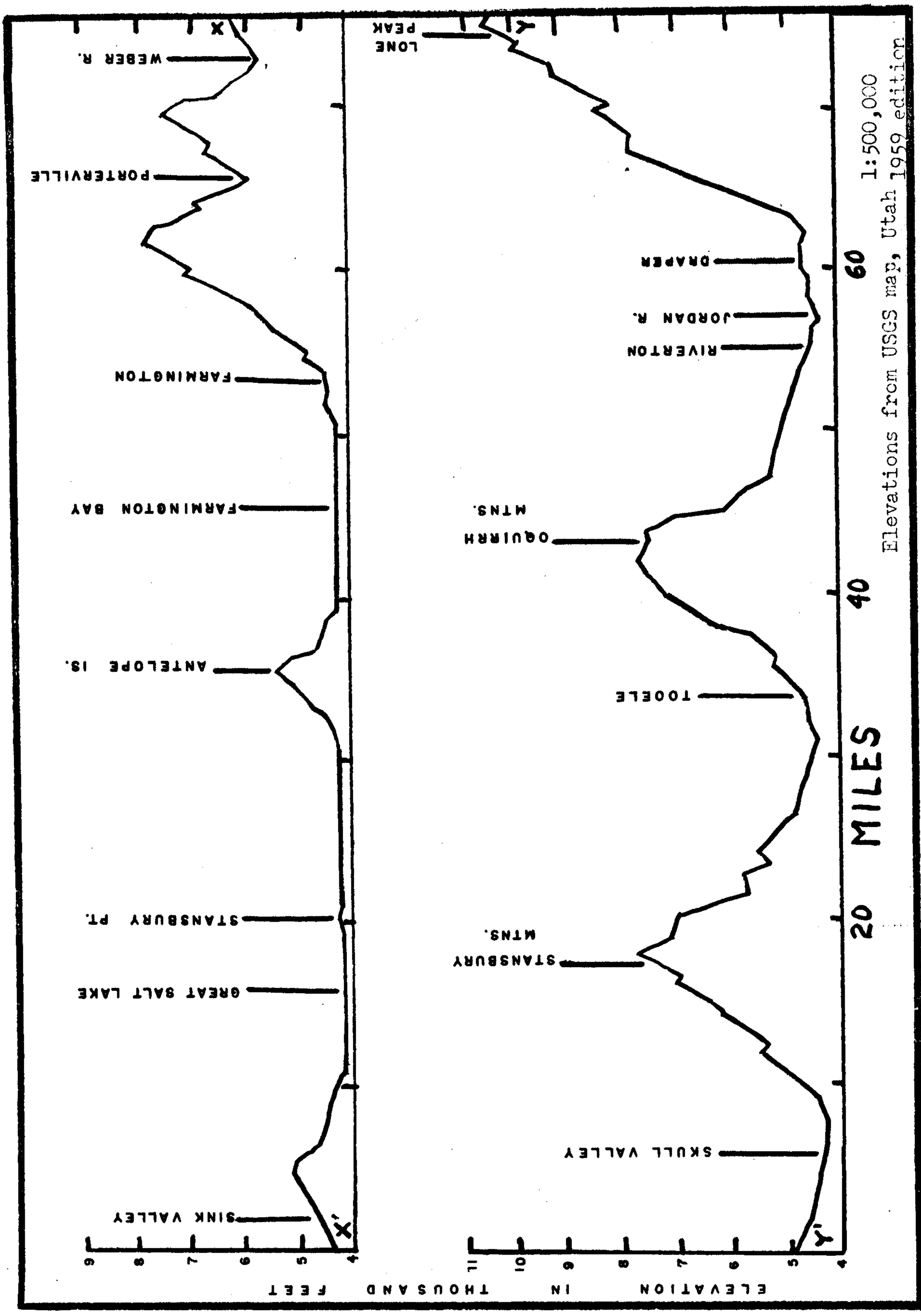


Fig. 2.--Profile lines across the central Wasatch Mountains, Utah

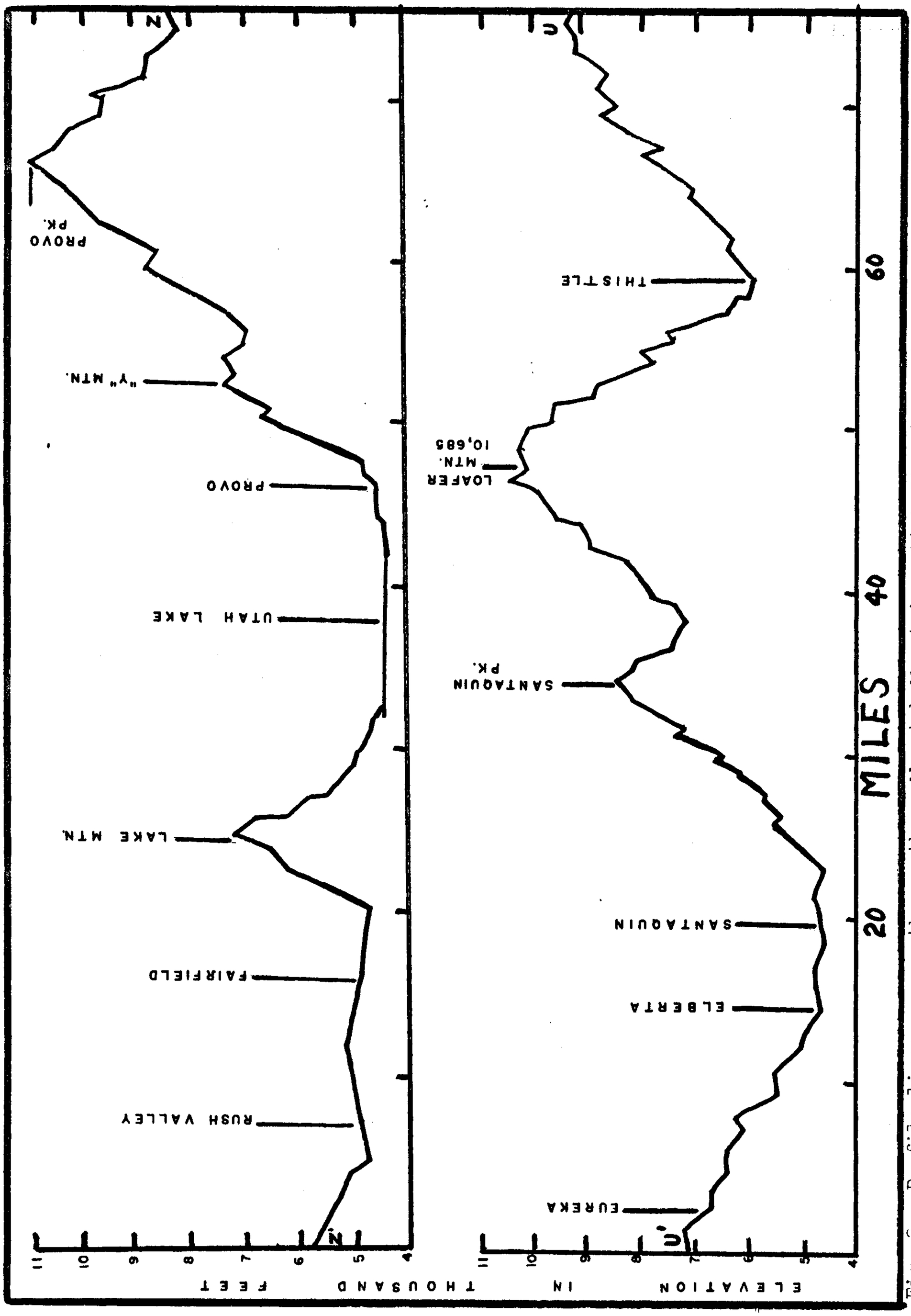


Fig. 3.--Profile lines across the southern Wasatch Mountains, Utah-Elevations from USCS map Utah 1:500,000 1959 edition

drier ranges to the west.

Eight hundred miles to the west of the Wasatch Front valleys is the Sierra Nevada. Between the Wasatch and the Sierra is the basin and range topography of the Great Basin. The only remnant of the fabled "Great American Desert" of the last century, this basin and range area is principally a region of dry sterile valleys and playas interrupted by north-south trending block mountains.

Water Supply of the Oasis

Meteorologically the Wasatch Front has two principal effects that benefit the valleys on the eastern edge of the Great Basin. The first effect is the great intensification of precipitation in the mountain region proper through adiabatic cooling of eastward drifting air forced to rise over the Wasatch. Coming mostly in the form of winter snows, this orographically-increased precipitation is stored and is dispensed slowly to the western valleys below for spring and summer irrigation (table 1). This life-giving water, supplemented by the flow of the three streams heading in the Uinta Mountains to the east, is further augmented by increased precipitation in the valley areas closest to the Wasatch Front. Pacific maritime air moving across the deserts from the North Pacific Ocean is caused to rise as it approaches the Wasatch Front. This rise may begin as much as ten miles west of the Wasatch Mountains. The twin factors of ascending air and turbulance to windward of the mountains bring additional quantities of precipitation to the land immediately west of the

TABLE 1

REPRESENTATIVE SNOW DEPTH AND WATER CONTENT
IN THE FIVE DRAINAGE BASINS OF THE
GREAT SALT LAKE DRAINAGE SYSTEM[a]

Drainage Basin	Station	May 1, 1962		15 Year Ave. Water Cont. (Inches)
		Snow Depth (Inches)	Water Content (Inches)	
Upper Bear	Hayden Fork	38	16.3	14.0
	Poison Meadows	86	37.1	29.8
Lower Bear	Garden City Smt.	21	9.1	14.0
	Liberty Springs	79	39.2	-
	Steep Hollow #1	67	33.6	-
	Steep Hollow #2	27	13.0	-
Weber-Ogden	Ben Lomond Peak	76	39.7	29.3
	Mount Ogden	63	31.6	27.6
	Smith-Morehouse	10	4.1	5.0
	Trial Lake	68	32.4	28.5
Jordan River and Salt Lake	Farmington Canyon	49	21.5	19.3
	Parleys Canyon Smt.	13.4	5.0	9.9
	Silver Lake	61.7	30.2	24.2
Utah Lake	Hobblecreek Summit	13	5.6	4.1
	Timpanogos Divide	40	18.2	18.7
	Daniels-Strawberry	20	7.7	6.4

[a]Utah Water and Power Board, Developing a State Water Plan, Salt Lake City, 1964.

TABLE 2

MEAN ANNUAL PRECIPITATION FIGURES FOR STATIONS WEST OF THE WASATCH MOUNTAINS

Stations Near Crest	Stations 0-5 Miles West	Stations 6-15 Miles West	Stations 16-40Miles West	Stations 50 + Miles West
Snake Creek 24.63	Payson 18.47	Tremonton . 13.85	St. John . . . 10.69	Terrace . 4.67
Strawberry . 28.03 Tunnel	Richmond 21.65	Corinne. . . 12.56	Promontory . 8.47	Wendover . 4.20
High Line . . 26.74 City Creek	American Fork . 17.66	Elberta . . . 11.06	Mosida . . . 10.79	Lucin . . . 5.15
Huntsville. . 20.72	Lower Mill . . . 22.16 Creek	Garland. . . 14.70	Grantsville . 11.66	Kelton. . . 6.44
Park City . . 20.09	Maplewood . . . 21.90	Lehi 15.31	Blue Creek . 8.18	Lemay. . . 4.32

[a]Data from: U.S. Department of Agriculture, Yearbook of Agriculture, 1941, Washington, U.S. Government Printing Office.

TABLE 3

ANNUAL PRECIPITATION FOR THREE STATIONS
ALONG THE WASATCH FRONT[a]
1871-1920

Year	Salt Lake City Elev. 4408'	Ogden Elev. 4310'	Provo Elev. 4532'
1870	-	-	-
1871	-	10.99	-
1872	-	6.54	-
1873	-	16.42	-
1874	-	12.30	-
1875	23.67	20.69	-
1876	21.28	14.80	-
1877	16.35	13.95	-
1878	19.75	15.11	-
1879	13.11	12.35	-
1880	10.94	10.24	-
1881	16.88	10.56	-
1882	15.98	10.96	-
1883	14.24	10.98	-
1884	17.52	19.49	-
1885	19.69	19.40	-
1886	18.89	12.60	-
1887	11.66	9.14	-
1888	13.62	12.03	-
1889	18.46	16.91	-
1890	10.33	17.63	-
1891	15.92	23.11	10.81
1892	14.08	15.57	12.38
1893	17.35	16.03	10.88
1894	15.27	13.71	8.94
1895	11.95	12.09	10.02
1896	18.42	14.35	-

TABLE 3--Continued

Year	Salt Lake City Elev. 4408'	Ogden Elev. 4310'	Provo Elev. 4532'
1897	16.74	16.65	-
1898	16.09	13.64	13.95
1899	17.57	13.53	15.77
1900	11.53	12.53	8.73
1901	16.08	13.80	11.21
1902	11.41	12.79	9.69
1903	14.62	9.91	12.31
1904	16.31	15.97	15.32
1905	14.23	17.00	16.66
1906	21.28	22.86	20.93
1907	19.22	19.23	21.75
1908	20.85	20.44	17.07
1909	19.68	24.81	20.00
1910	11.25	11.80	12.55
1911	15.13	18.69	17.12
1912	19.19	18.56	18.10
1913	16.69	20.89	19.17
1914	16.69	-	16.41
1915	14.49	17.31	16.99
1916	16.06	20.24	20.56
1917	14.17	14.14	14.39
1918	16.11	13.02	18.29
1919	13.42	17.52	14.08
1920	21.56	21.24	21.82
Mean	16.23	15.20	15.06

[a]Data From: U.S.D.A., Weather Bureau, Summary of the Data for the U.S. by Sections, Vol. 1, Washington, Government Printing Office, 1920.

Wasatch (table 2). Cedar Fort, which is fifteen miles west of the Wasatch Front receives very little benefit from the orographic effect. This small town resembles many of the settlements in the basin and range country of the Great Basin. Here, rainfall is not sufficient to provide any kind of support except grazing, mining, and a limited dry-farming activity. Fairfield, Tooele, Grantsville, Stockton, Bingham, and Corinne are other towns located west of the orographic benefits of the Wasatch Range. Fairfield was originally supported by a military post, Camp Floyd, but relys wholly on grazing industries today. Tooele was established as a grazing center in the first year of Mormon occupation of the Great Basin and has since been additionally supported by government ordnance operations. Grantsville owes its life to grazing and a little dry-farming in areas of high water tables, while Stockton is a decadent remnant of a mining town. Bingham flourished as a result of mining, but has dis-appeared to make room for the rails and heavy equipment of Kennecott's open pit mine. Corinne gained life and growth from the trans-continental railroad, but when the main depots moved to Ogden, Corinne declined.

Today less than one percent of the population of Utah lives west of the Wasatch oasis in the Great Basin, most people being nestled up against the Wasatch Front in a north-south strip 130 miles long and two to eighteen miles wide where higher natural rainfall and collected mountain waters make intensive settlement possible on easily irrigated land. Here in 1847, the climate, soils, and natural vegetation held a great potential for future colonization.

Temperatures and Growing Season

The July average temperature along the Wasatch Front is 74.9°F., while January averages 27.7°F. (Map 3). The length of the growing season ranges from 192 days at Salt Lake City to 124 days at Provo.

Precipitation

Though most of the rainfall along the Wasatch Front comes during the winter and early spring before the growing season commences, rain-producing fronts and convectional storms are not entirely absent even in mid-summer and produce appreciable precipitation, especially in the mountain watersheds (Map 3). Meanwhile, the melting, and subsequent distribution, of winter snows continues into mid-summer as well. The amount and regime of the precipitation varies greatly at the different stations along the Wasatch Front.

Stream Flow

The amount of water in the streams during any given season is a variable factor which has been a primary concern of irrigators since the first year of settlement. By 1869 the irrigators had found, according to G. K. Gilbert of the United States Geological Survey, "that many of the streams have increased in volume since the settlement of the country".[20] Gilbert measured the stream flow carefully and proved that this impression was correct.

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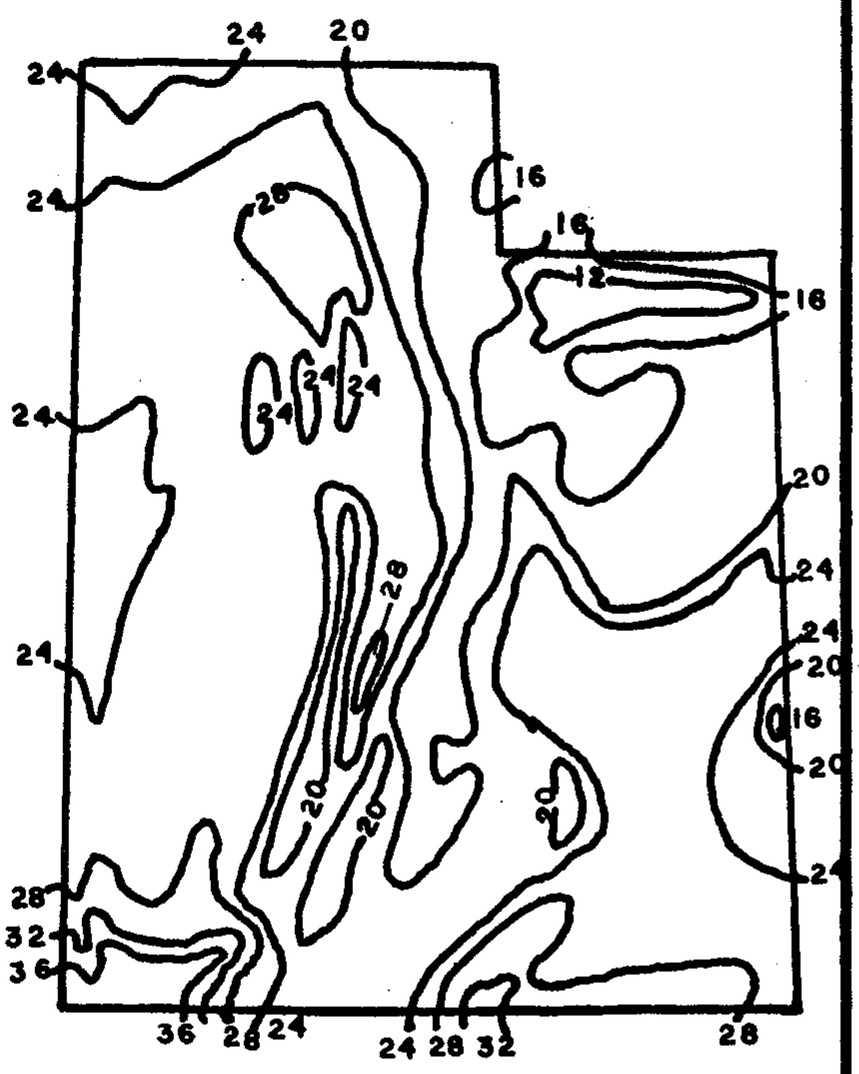
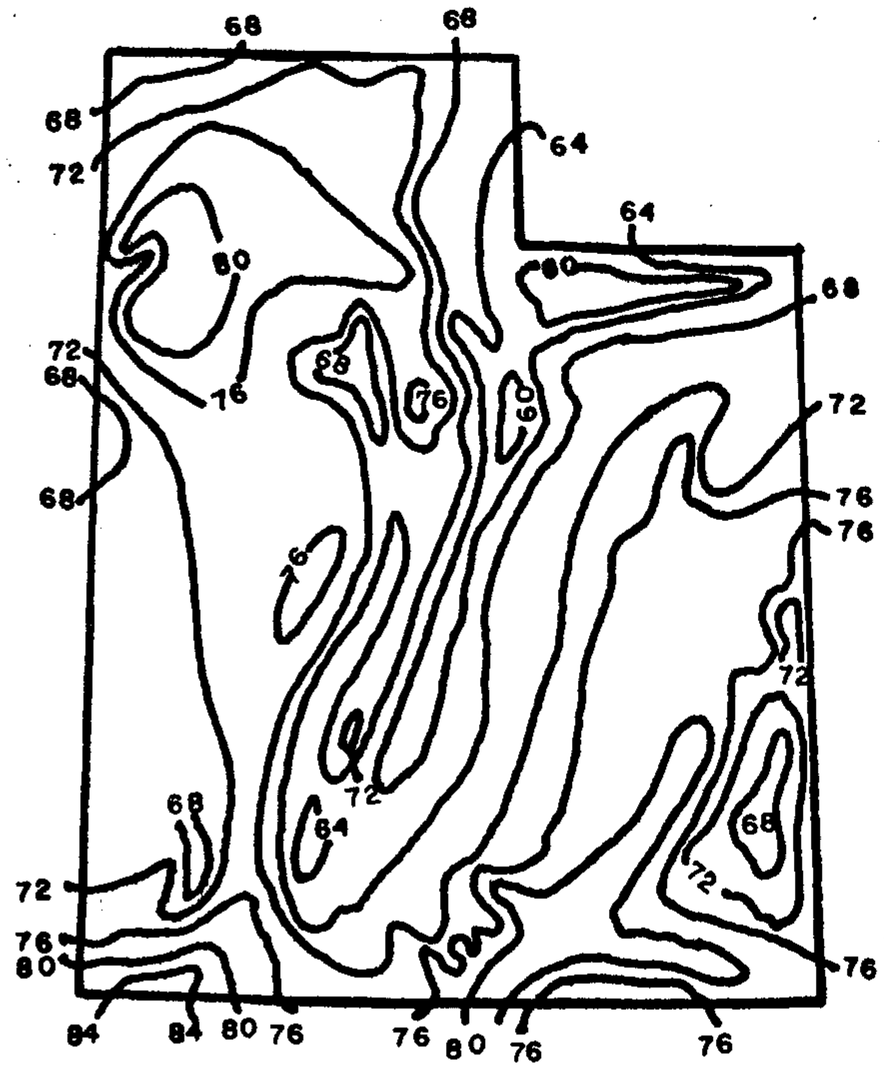
[20] G.K. Gilbert, Lands of the Arid Region of the United States, J. W. Powell, ed., (Washington Govt. Printing Office, 1879) p. 57.

UTAH: TEMPERATURE & PRECIPITATION

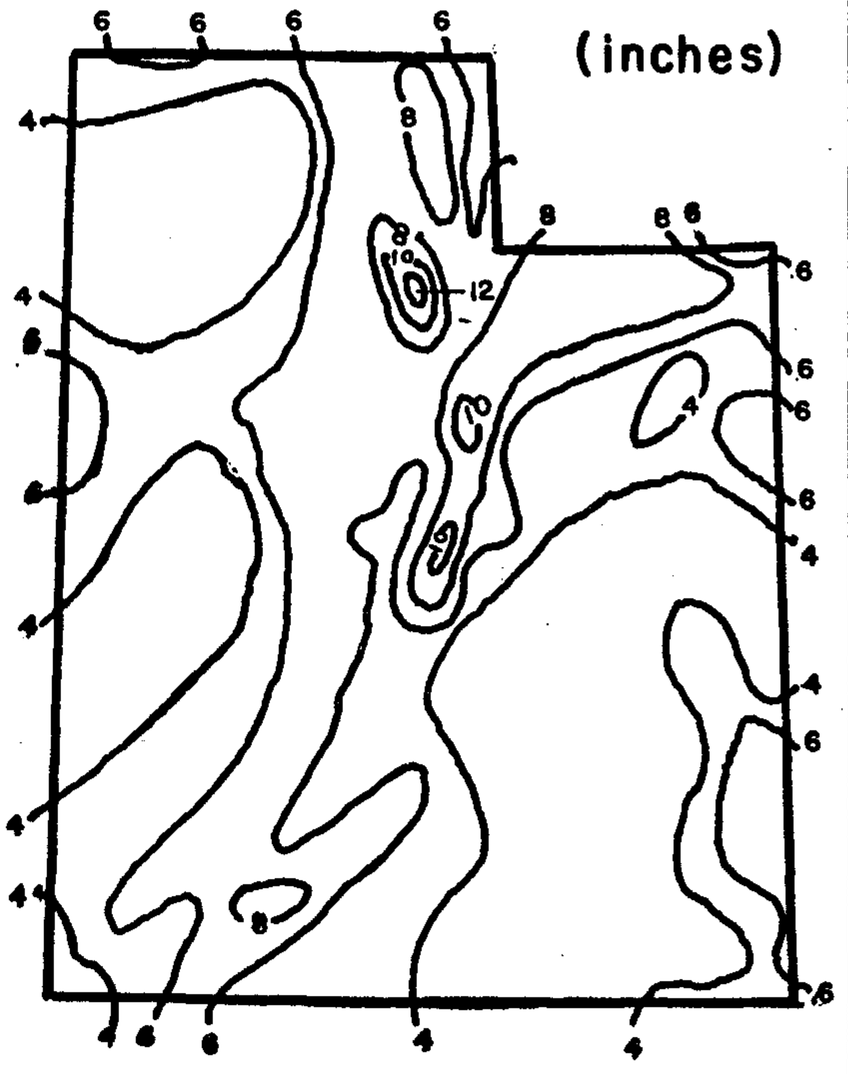
AVERAGE JANUARY TEMP.



AVERAGE JULY TEMP.

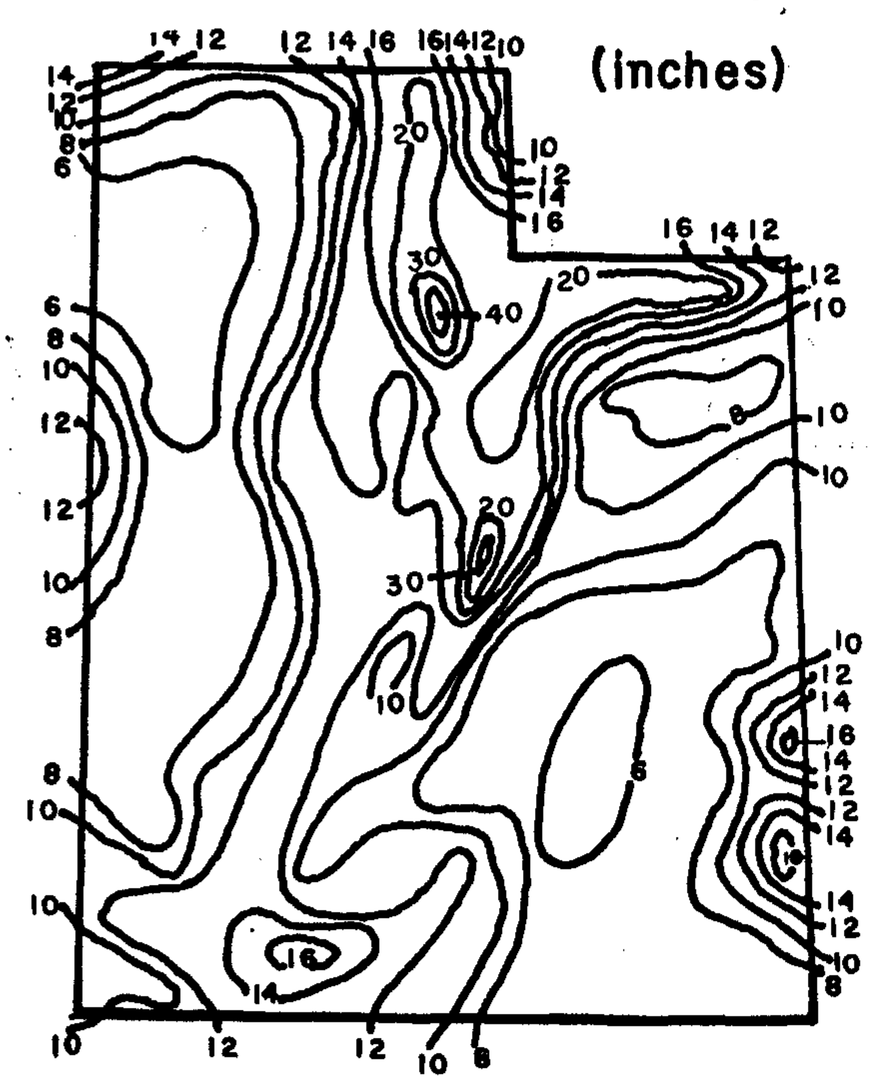


AVE. WARM-SEASON PRECIP. (inches)



APRIL-SEPT. INCLUSIVE

AVE. ANNUAL PRECIP. (inches)



AFTER U.S.D.A. "YEARBOOK OF AGRICULTURE," 1941

MAP 3

Many of the Saints attributed this increased water supply to an intercession of God in their favor. Others mistakenly believed that by improving and irrigating the land, more water was evaporated into the air to be returned in increased precipitation.

Gilbert's inquiry seemed to lend more support to the former than to the latter supposition. His investigation led to conclusions embracing two probable causes of the increased stream volume: 1) a temporary increase in rainfall and 2) changes in the drainage basin brought about by man. Gilbert's methods of supporting his conclusions were based on scientifically sound investigation. He realized the importance to the future of the region of finding the correct answer for the increased water supply:

> It is a matter of great importance to the agricultural interests, not only of Utah but of the whole district dependent on irrigation, that the cause or causes of this change shall be understood. Until they are known we cannot tell whether the present gain is an omen of future gain or of future loss, nor whether the future changes are within or beyond our control.[21]

The rise of Great Salt Lake provided Gilbert and others visible proof of the presence of additional water in this portion of the Great Basin (map 5). He correctly surmised that the evaporation from the surface of the lake was in close balance with the inflow and that each year the lake would either gain or lose volume depending upon the precipitation for that year.

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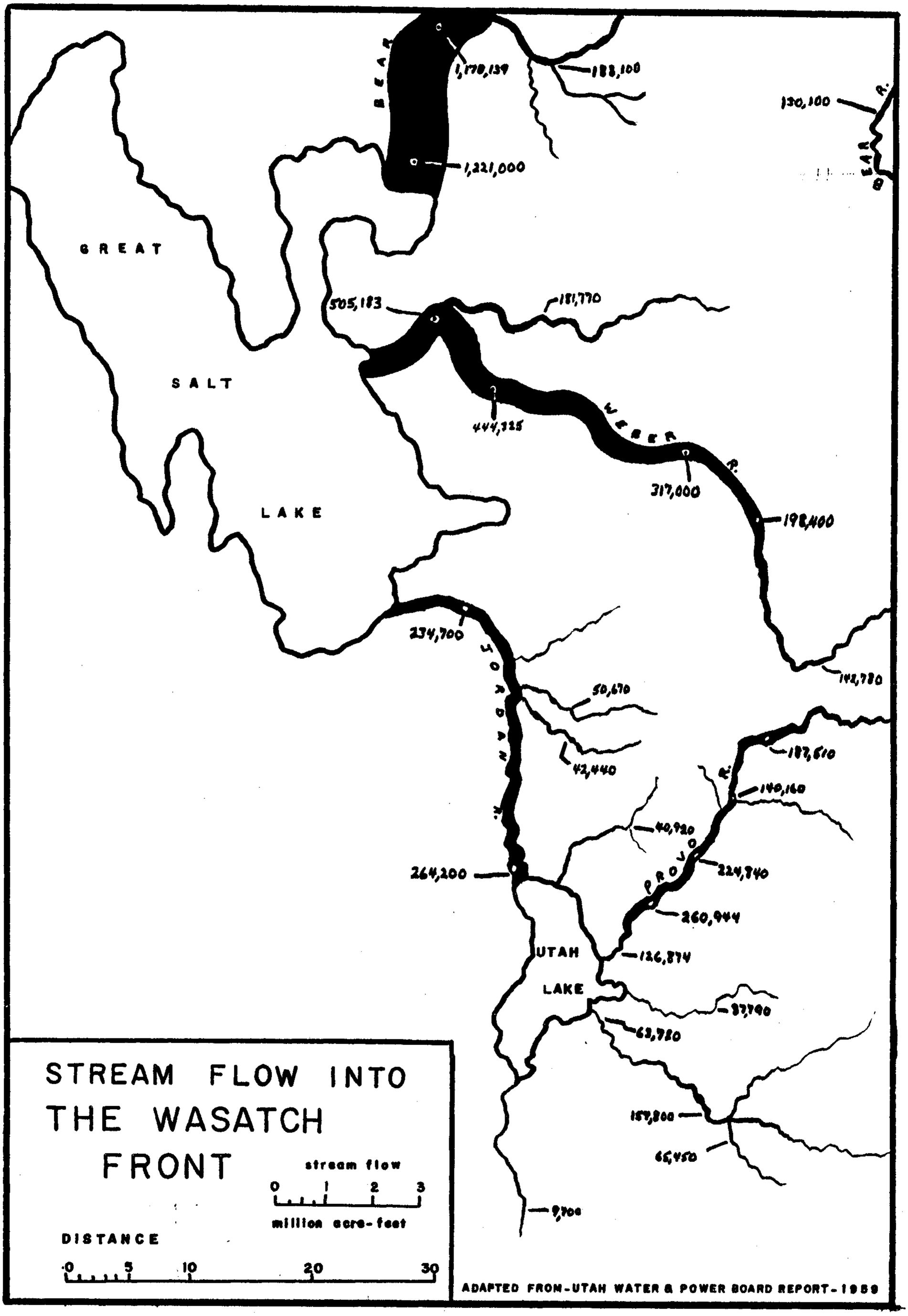
[21] Ibid.


BEAR
1,170,139
188,100
130,100
BEAR R.
1,221,000
GREAT
505,183
181,770
SALT
444,325
WEBER R.
317,000
198,400
LAKE
234,700
JORDAN R.
50,670
142,780
42,440
187,610
140,160
40,920
264,200
PROVO R.
224,740
260,944
UTAH
126,874
LAKE
37,190
63,720
157,800
65,950
9,700
STREAM FLOW INTO THE WASATCH FRONT
stream flow
0 1 2 3
million acre-feet
DISTANCE
0 5 10 20 30
ADAPTED FROM-UTAH WATER & POWER BOARD REPORT-1959

MAP 4

Gilbert rejected certain popular theories, such as the one suggesting that upheavals of the land, which sometimes accompany earthquakes, might have changed the form of the lake bed and displaced from some region the water that has overflowed others.[22] One of the most popular theories of the day that "rainfall follows the plow" was quickly dismissed. Gilbert had suggested that the increased rainfall was temporary; i.e. a secular variation in rainfall was taking place. A hundred years of weather and lake observations in the arid and semi-arid West (see table 3 and map 5) have demonstrated that precipitation patterns follow a series of cycles; a period of wetter years is followed by a succession of relatively "dry" years. The western Great Plains, for example, were settled during a wet cycle; but with the onset of a dry cycle in the 1930's, the soil literally dried up and blew away. This lack of dependability in rainfall and, consequently in water supply was one of the hazards that had to be met with in settling the margins of the Great Basin.

Concerning the possiblity of man's increasing the stream flow by his activities, J. W. Powell,[23] Cyrus Thomas,[24] and Gilbert[25] all agreed that, to a limited extent, this was possible. By cultivating the soil and destroying the natural vegetation man has affected the run-off.

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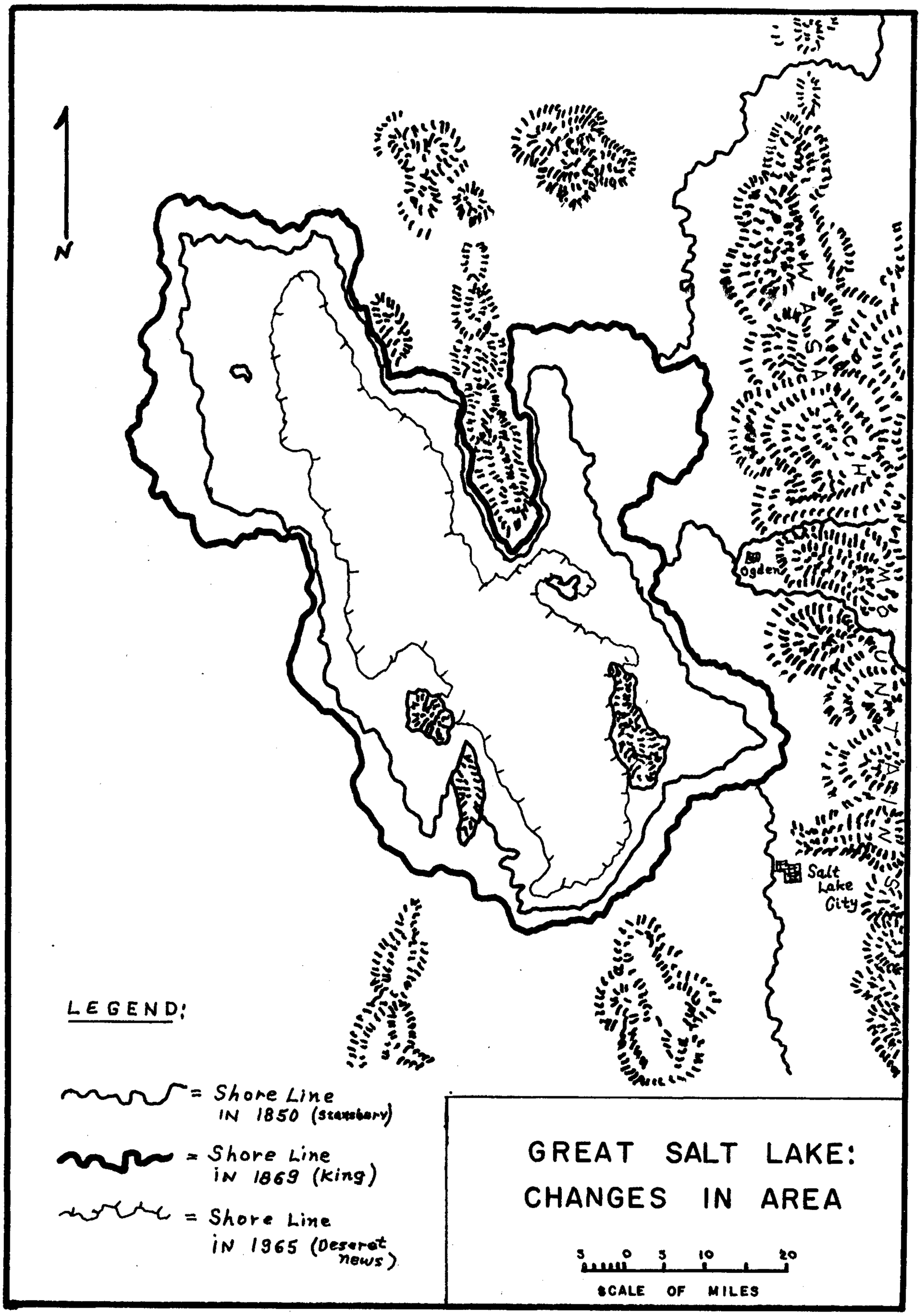
[22] Ibid., p. 67

[23] Ibid., p. 92

[24] Ibid., p. 14

[25] Ibid., p. 58


N
WASATCH MOUNTAINS
Ogden
Salt Lake City
LEGEND:
= Shore Line IN 1850 (Stansbury)
= Shore Line IN 1869 (King)
= Shore Line IN 1965 (Deseret News)
GREAT SALT LAKE: CHANGES IN AREA
5 0 5 10 20
SCALE OF MILES

MAP 5

He has opened out springs, so that they would run more freely, he has impounded the water in vast reservoirs, he has grazed his animals on the slopes and impaired the water sheds, he has placed the water in canals and ditches.

Another important factor in water supply along the Wasatch Front is the yearly variability of precipitation. Reference to table 3 shows that few years are very close to the average values of precipitation. Even during the wet periods there is no guarantee of sufficient snow and rain to water the season's crops. Two or three wet years may be followed by an extremely dry one. An example of this is found in the early years of the present century when in 1909 the entire state of Utah averaged 19.31 inches of precipitation, then in 1910 the average dropped sharply to 11.16 inches. In 1869, of course, there was no reliable way to predict the amount of precipitation the farmers could expect. Even today meteorologists do not fully understand the pattern of precipitation variability in the arid lands. But man has introduced one great innovation to alleviate the harrassed irrigator and this is the impounding of vast amounts of potential irrigation water in great reservoirs large enough to smooth out the effects of annual, though not secular, variation in precipitation. This is the only significant factor that has enabled large amounts of land to be brought into use in the Wasatch Front since 1869, and future reclamation and storage projects seem to be the key to any future expansion of agriculture in the area. At any rate by 1869 the Mormons had justified their faith that the Wasatch waters would be sufficient to grow their crops and give them a measure of

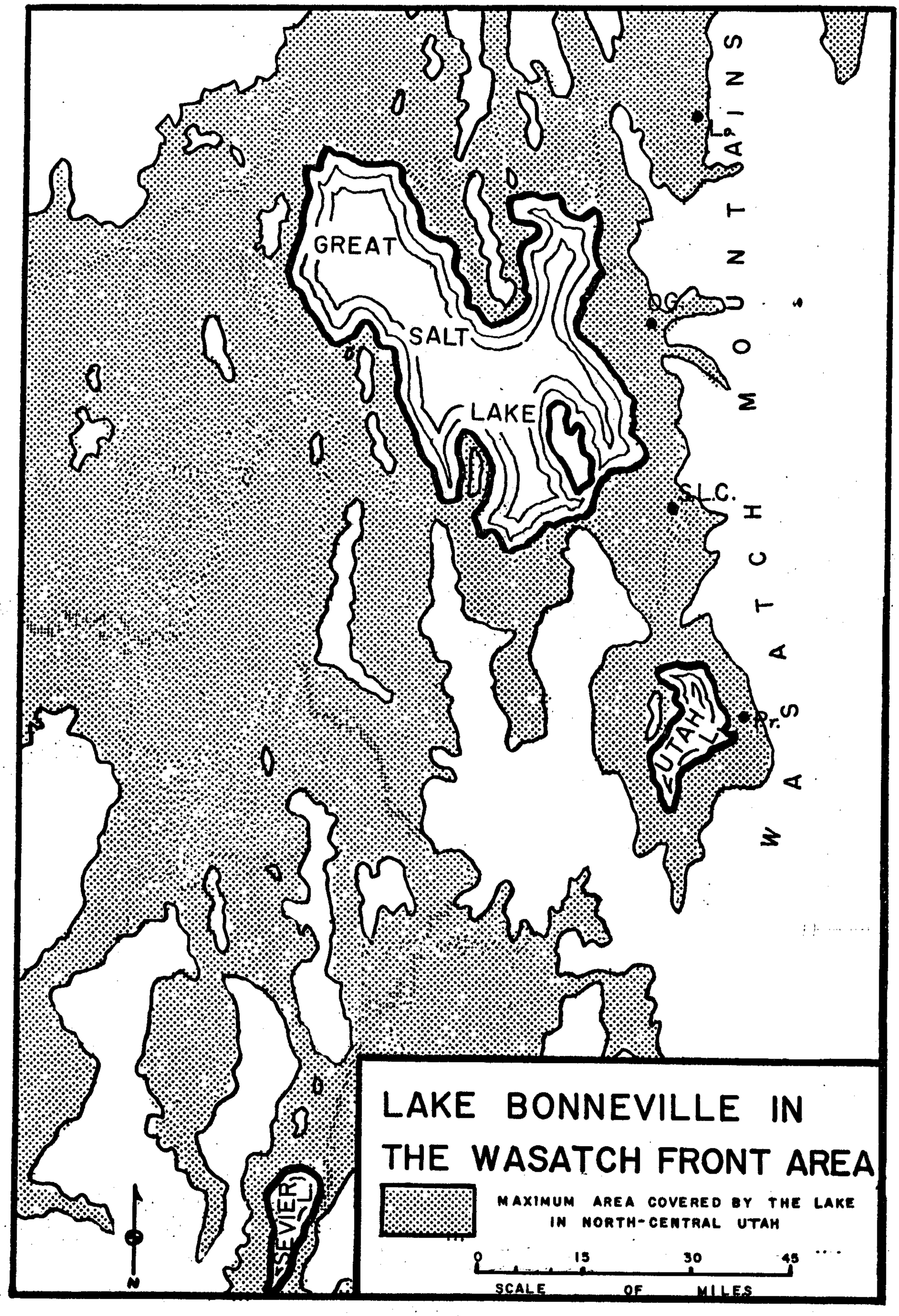
economic independence.

Soils

Climatic factors, of course, were not the only things to be taken into consideration in the settlement of the Wasatch Front. An important locator for the early communities was the nature of the soils.

Soils of the Wasatch Front are chiefly derived from alluvial and lacustrine deposits. Close to the mountain front the lake-formed deposits are often several hundred feet deep and are usually well drained. Farther west brown desert soils blend in with the thin veneer of lake deposits. In many places along the Wasatch Front the deep well-drained lake soils have had more recent stream-deposited material superimposed upon them in the form of alluvial fans. These fans were well-drained and usually contained fertile soils, therefore, the Mormons often chose to locate their communities on or near these fans. Great sloping fans are typical of the arid lands, but early explorers and surveyors must have been surprised to see the flat-topped deltas spreading out from the base of the larger canyons. In 1847, the Mormons applied the descriptive name "benches" to these particular features of their new home. The term has persisted in lay usage to this day. The Mormons merely described these features and left the genetic speculations to government explorers and surveyors, such as Stansbury, Gunnison, Beckwith, King, Simpson, Wheeler, and Powell.

In Quaternary times a more humid climate existed in the Great


GREAT
SALT
LAKE
WASATCH MOUNTAINS
S.L.C.
UTAH L.
Pr.
SEVIER L.
N
LAKE BONNEVILLE IN
THE WASATCH FRONT AREA
MAXIMUM AREA COVERED BY THE LAKE
IN NORTH-CENTRAL UTAH
0 15 30 45
SCALE OF MILES

MAP 6

Basin and many of its valleys were filled with lakes. The largest of these, Lake Bonneville had a maximum length of 346 miles and a width of 145 miles with an area of 19,750 square miles, including all of the present Wasatch Front oasis. It is against the Wasatch Mountains where large rivers brought vast amounts of sediment to the lake that sedimentation and shoreline features are most pronounced. From 1879 to 1883 G.K. Gilbert studied the remnants of the great Pleistocene Lake and published his reports to the world. Today shorelines stand 1000 feet above the floor of the oasis. Yet the great lake stood not at one level, but at several during a period of climatic and diastrophic change. During times when the precipitation, evaporation, and drainage were in a state of balance, the level of the lake stood still and topographic features were carved by wave action or deposited by rivers. And so there is not one, but a series of several shorelines of the ancient lake discernable along the base of the Wasatch Mountains.

Toward the center of the oasis valleys, the deep, well-drained lacustrine soils give way to a more alkaline, poorly-drained sediment. Here we see that, even though the soils have had a great effect on settlement, this settlement has also had some effect on the soils. Irrigation on the higher slopes has washed mineral salts into these poorly-drained lower lands, and has raised the water table to the extent that they can no longer be used for any activity other than grazing. Very few communities were established on these poorly-drained lower lands because they did not dry out as early in the spring and delayed planting. Air drainage

in the lower parts of the valleys also caused early frosts and shortened the growing season. These factors resulted in location of villages and fields on the lower, more gently-sloping parts of the well-drained alluvial fans, (a) because of ease of irrigating these gentle slopes, and (b) because they were well-drained and hence workable earlier in spring and were usually not prone to alkali build-up.

The upper lacustrine terraces were not used extensively for cropping until much later when high-line canals were built. In 1869 Provo bench, Mapleton bench, Cottonwood bench, and the other lacustrine deltas had only a small fraction of their present fruit and grain production; but nevertheless were beginning to be occupied.

Natural Vegetation

One of the most notable changes brought about by the presence of the Mormon settlers in the Wasatch oasis is found in the alteration of the natural vegetation. Many descriptions of the natural vegetation in the Salt Lake Oasis before Mormon settlement occured are available. Some of these have been noted earlier in this chapter. Preuss said "there is a magnificent growth of grass"[26] in Utah Valley; and Fremont described the area as "generally covered with good bunch grass".[27] Jim Bridger told Brigham Young that "there is an abundance of blue grass and red and

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[26]See p. 5

[27]Ibid.

white clover".[28] One of the first Mormons to enter the valley, Orson Pratt, said: "A very great variety of green grass, and very luxuriant, covered the bottoms for miles where the soil was sufficiently damp. . ."[29] But as they proceeded toward the western side of the valley, "the soil began to assume a more sterile appearance".[30] Most of the accounts described the grass as existing near the streams and mountains on the eastern side of the valley while the western parts were more desolate.[31]

In 1869 the U.S. Department of Agriculture stated that "the Salt Lake Basin, Utah, when settled by the Mormons 22 years ago, was a waste of sand and sagebrush."[32] It is not surprising that such a description of the Oasis was made in 1869; for by this time, those areas not irrigated had become sagebrush deserts. The principal factor in the change of many areas from grassland to sage desert was over-grazing. The sage plants could not sprout and grow in the shade of the bunch grass, but when hungry sheep and cattle removed the grass, it was replaced by the less desirable plants. In 1869 there was a great contrast between the irrigated crop land and the barren slopes of sagebrush. In addition

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[28]See p. 7

[29]Leland Hargrave Creer, The Founding of an Empire, (Bookcraft, Salt Lake City, Utah, 1947), p. 304.

[30]Ibid., p. 305

[31]O. F. Whitney, History of Utah, 4 vol., (Salt Lake City, 1892-1904) I, 325-326.

[32]U.S. Dept. Agriculture, Annual Report, 1869, pp. 431-432.

fine pasture land near Great Salt Lake was converted to alkaline swamps of salt grass by the downward percolation of irrigation water. Nevertheless irrigation water had to be continually applied, for it was the life blood of civilization in the Wasatch Front oasis. Regulating and administering this vital resource was the most important business of the Mormon settlers in 1869.

CHAPTER II

APPLYING WATER TO THE LAND

By 1869 the greater part of the easily irrigable land of the Wasatch Front had been taken up.[1] The Mormons had already developed a pattern of watering systems that was in turn complex and yet relatively efficient. They had built over one-third of all of Utah's present-day irrigation lateral ditches at this early date, and nearly one-third of all her main ditches or canals.[2]

Constructing the Canals

Methods and Difficulties

Streams running down the steep rocky canyons of the Wasatch Front were relatively easy to divert. Dams were built by filling the stream with willows, rock and earth. In this way the surface of the stream could be raised until the water would flow into a canal. These dams and canals were usually located well up the canyons so that a maximum area could be irrigated by gravity-fed open ditches. Hand tools and hand labor were

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[1] C. Langdon White, "The Salt Lake Oasis", Journal of Geography, (vol. 27, p. 6).

[2] U.S. Bureau of the Census, Fourteenth Census of the United States: 1920, Compendium.

used to etch the canals along the rocky mountainsides.

Because resources were limited, some of the early canals required three or four years to build. The men would work on the canals for only a few months in the year, and would then spend the rest of their time away from home trying to earn sustenance for their families until water could be brought to the land. To span a ravine, it was necessary for men and oxen to dump tons of earth fill into the chasm so that the canal could go on top with no grade change. In some cases, such as that of the Bear River Canal, great wooden aqueducts were built across the ravines; but these were expensive and required much time and timber to build. Lack of means usually forced the earliest settlers to run the canal down the ravine and irrigate only the more limited lower parts of the valley.

In each town it was the settlers' responsibility to determine how much land the topography and their resources would permit them to irrigate with prudence. They did not have the supplies, the funds, the equipment, or the time to construct the highline canals now used in Utah to irrigate good land in the higher elevations of the valleys. To have attempted this would probably have meant starvation. Instead, it was the usual policy to construct a canal at a lower level which would irrigate a smaller acreage until more settlers came and a new canal could be economically built at a higher level. As a result of this piecemeal development, in many places in Utah one finds the land irrigated by several small canal systems, each system operating at a different elevation

range.[3]

All of the early canals were open ditches, and it was often very difficult for the colonists to build the canals at a grade that would enable the water to flow evenly. In some of the larger communities, survey instruments were available for this purpose; but in others, the settlers had to rely on their own ingenuity to secure the proper grade. One method was to make a crude level by filling a pan with water and sighting over its edges along the canal route to a pole with the height of the top of the pan marked upon it. Another method was to fill a bottle full of water and attach it to a square-edged timber; this could be laid upon the ground and used as a spirit level. By these methods the settlers tried to determine whether the water would flow in the canal.[4]

In most of the early canals seepage was a serious problem. In some of the rocky places the water seeped out as fast as it ran in. The method of calking these areas was to haul wagonloads of clay to the canal and dump these into the crevices where the water was escaping. Often the clay was distributed evenly over the floor of the canal; then, when the water was turned in it forced the clay into the pores and sealed them shut. To stop the leakage, it sometimes was necessary to drive oxen along the

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[3] George Thomas, Development of Institutions Under Irrigation, N. Y. MacMillan Co., 1920, p. 20.

[4] Ibid., p. 21.

floor of the canal while the clay was wet.

In the lowlands levees had to be built along the canals. This necessitated the use of wagonloads of soil and much handwork with pick and shovel.[5]

Cooperative efforts

The diversion of the larger streams flowing from the Wasatch Front required the cooperative efforts of entire communities. These early systems were generally small although some of the longest canals reached a length of ten to twenty miles; and by 1869, there were several of these longer canals. As all planned to use the water all were required to help in the construction of the system. All available men in a community were called by the bishop to aid in the construction and there were usually large groups of men working on a canal at the same time. Such community service was given willingly for the men, besides providing the lifeblood of their settlements, were responding to a tradition of community responsibility and unity.

After the lands of a site had been divided among the projected settlements, it was frequently found necessary to build a main canal to supply water to two or more towns. In this case, the men of all the towns conerned worked upon the canal from its source to the point where the farmland of the first town ended. Then an accounting of the work was made and the water was apportioned among the different towns accordingly. At that point the workers from the first town reached would quit work on the main canal

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[5] Ibid., p. 22.

and those from the remaining community or communities would complete the work.[6] From these main canals, usually located in and near the mouths of the canyons, several smaller or lateral canals were built to irrigate plots below. These laterals were further subdivided to the level of the ditches of individual farmers. The same principle of water and labor apportionment was followed to this level.

Drainage

After the first few years of irrigating in the Wasatch Front valleys, it became apparent that a drainage problem existed. The farmers who had been tilling the lands close to Utah Lake or Great Salt Lake found that their soils were becoming saturated with salts and water. Irrigation water, being applied in the higher parts of the valleys, percolated down to these bottom lands, bringing dissolved mineral salts with it. The resulting raised water table and alkalinity of soils rendered these lands unsuitable for cultivation.[7] By 1869, if these poorly-drained lands were being used at all, it was as pastureland. Even today in Utah most of these lands are used for pasture, industrial sites, game refuges, or are not used at all. In some small areas drainage of these saturated lands has been successfully improved. However, in 1869 such improvement had not been commenced.

The Pattern of Irrigation in 1869

There are five major drainage basins that empty into the Great

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[6] Ibid., p. 23

[7] White, p. 7

Salt Lake. From south to north they are 1) Utah Lake, 2) Jordan River and Salt Lake, 3) Weber--Ogden, 4) Lower Bear, 5) Upper Bear.[8] All except the Upper Bear were used extensively for irrigation by the Mormons in 1869. In this year irrigated land in the Wasatch Front comprised nearly 170,000 acres. (See page 53).

Utah Lake

Six major streams flow into the Utah Lake from the Wasatch Mountains. By 1869 each of these had been successfully diverted for irrigation purposes (map 7). The largest stream, the Provo River,[9] cuts completely through the Wasatch Range, and a large part of its water originates in the Uinta Mountains to the East. In 1869 the largest community of the valley, Provo, was watered by five major canals; four from the east bank and one from the west bank of the Provo River. In addition a high-line canal was under construction near the base of the mountains to the east. The Provo Bench, a flat-top delta (see p. 30), was watered by one main canal with several laterals in use or under construction. Four major canals brought waters from the American Fork to the lands of three communities in the north end of the valley: Lehi, American Fork, and Pleasant Grove. The more limited waters of Dry Creek were used by Lehi and Alpine. South of

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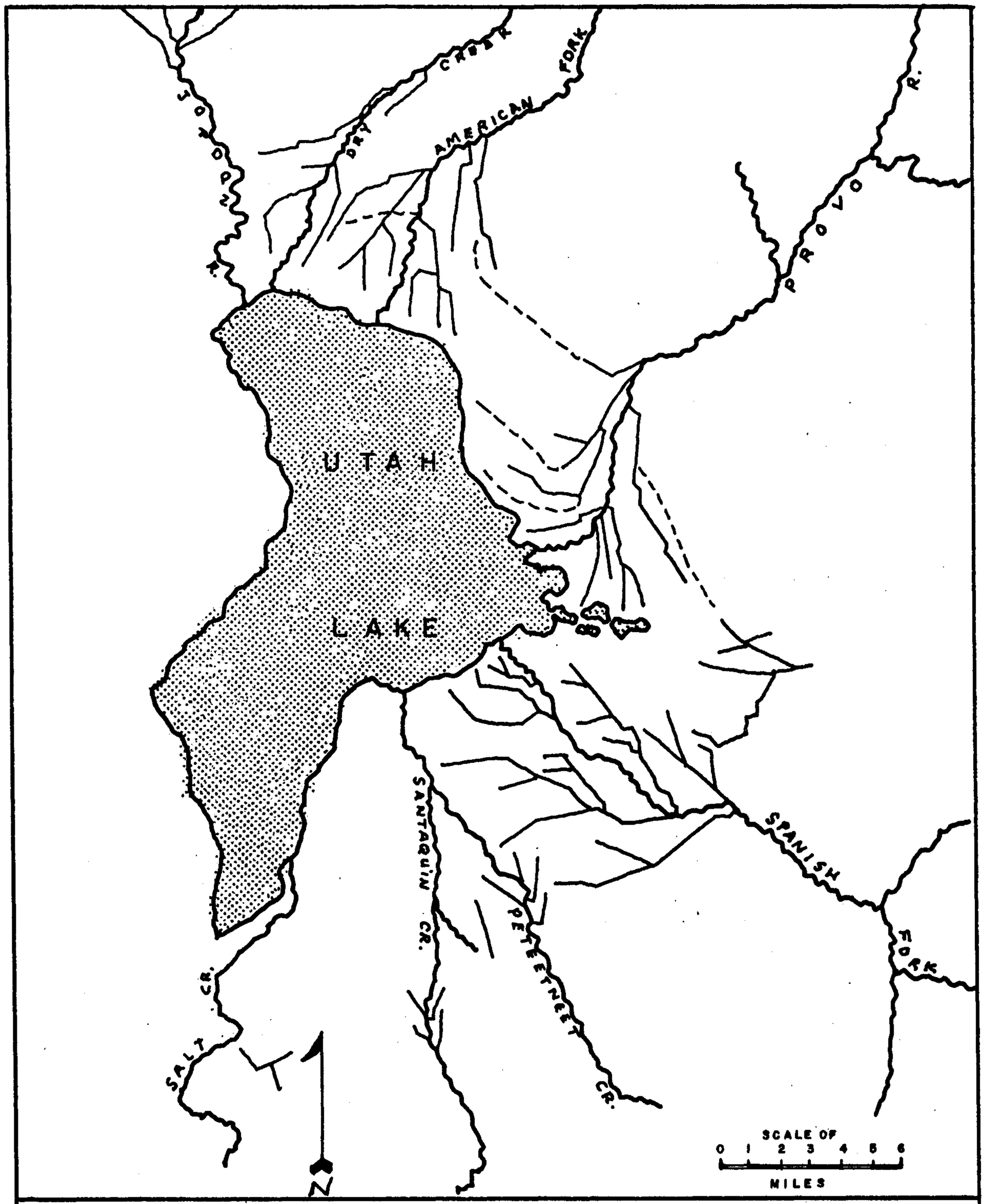
[8]Utah Water and Power Board, Developing a State Water Plan, Salt Lake City, 1964.

[9]On many contemporary maps of the 1860's and 1870's the name Timpanogos River was recorded in place of Provo River. This was an adaptation of an earlier Indian name for the river.



IRRIGATION & DRAINAGE SYSTEM OF UTAH VALLEY-1869*

= RIVER = CANAL = CANAL UNDER CONSTR.

*AFTER U.S.D.A.-O.E.S. BULTN. NO. 124 & U.S. SENATE DOC. Y4-129R

MAP 7

Provo three canals from Hobble Creek watered Springville and Mapleton. Five main canals and several laterals diverted the waters of Spanish Fork Creek onto the land of the south end of the valley, while a few smaller canals diverted the limited waters of Santaquin and Peteetneet Creeks to the lands of Payson and Santaquin.

In 1869, there was a great deal of speculation that a canal would be built connecting Utah Lake with the Great Salt Lake to the north. Plans had been drawn up for such a canal, but it was never built.[10]

Jordan River and Salt Lake

Several canals were built to divert the waters of the Jordan River as it flowed northward between Utah Lake and Great Salt Lake (Map 8). In 1869 these canals were restricted to the narrow valley of the meandering Jordan. Within a decade canals were to be built farther upstream in the Jordan Narrows, bringing water to the desolate western and southern portions of Salt Lake Valley. Two major streams bring water from deep canyons in the Wasatch Mountains to the east. These streams, Big and Little Cottonwood Creeks, were diverted severely as were other minor streams on the east slope of the valley. This system, along with the Jordan bottoms, allowed the Salt Lake Valley to become by 1869 one of the most intensively irrigated parts of the Wasatch Front.[11]

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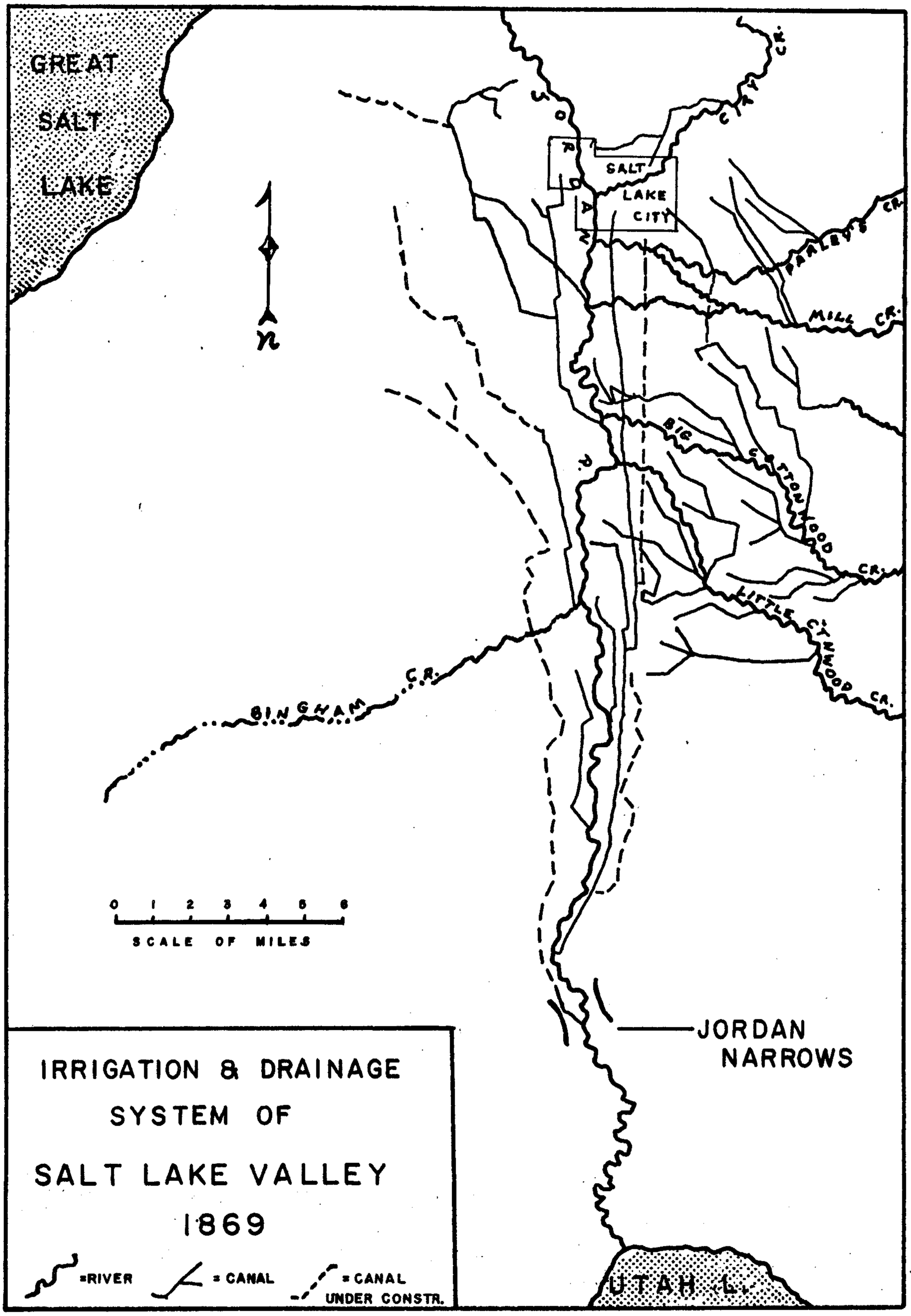
[10] U.S. Dept. of Agriculture, Annual Report, 1869, pp. 431-432.

[11] The most extensively irrigated portion of the Wasatch Front in 1869 was Utah Valley (see map 10).


GREAT
SALT
LAKE
N
SALT
LAKE
CITY
CANYON CR.
PARLEY'S CR.
MILL CR.
BIG COTTONWOOD CR.
LITTLE COTTONWOOD CR.
BINGHAM C.R.
JORDAN
NARROWS
UTAH L.
0 1 2 3 4 5 6
SCALE OF MILES
IRRIGATION & DRAINAGE
SYSTEM OF
SALT LAKE VALLEY
1869
=RIVER
= CANAL
= CANAL
UNDER CONSTR.

MAP 8

Weber--Ogden

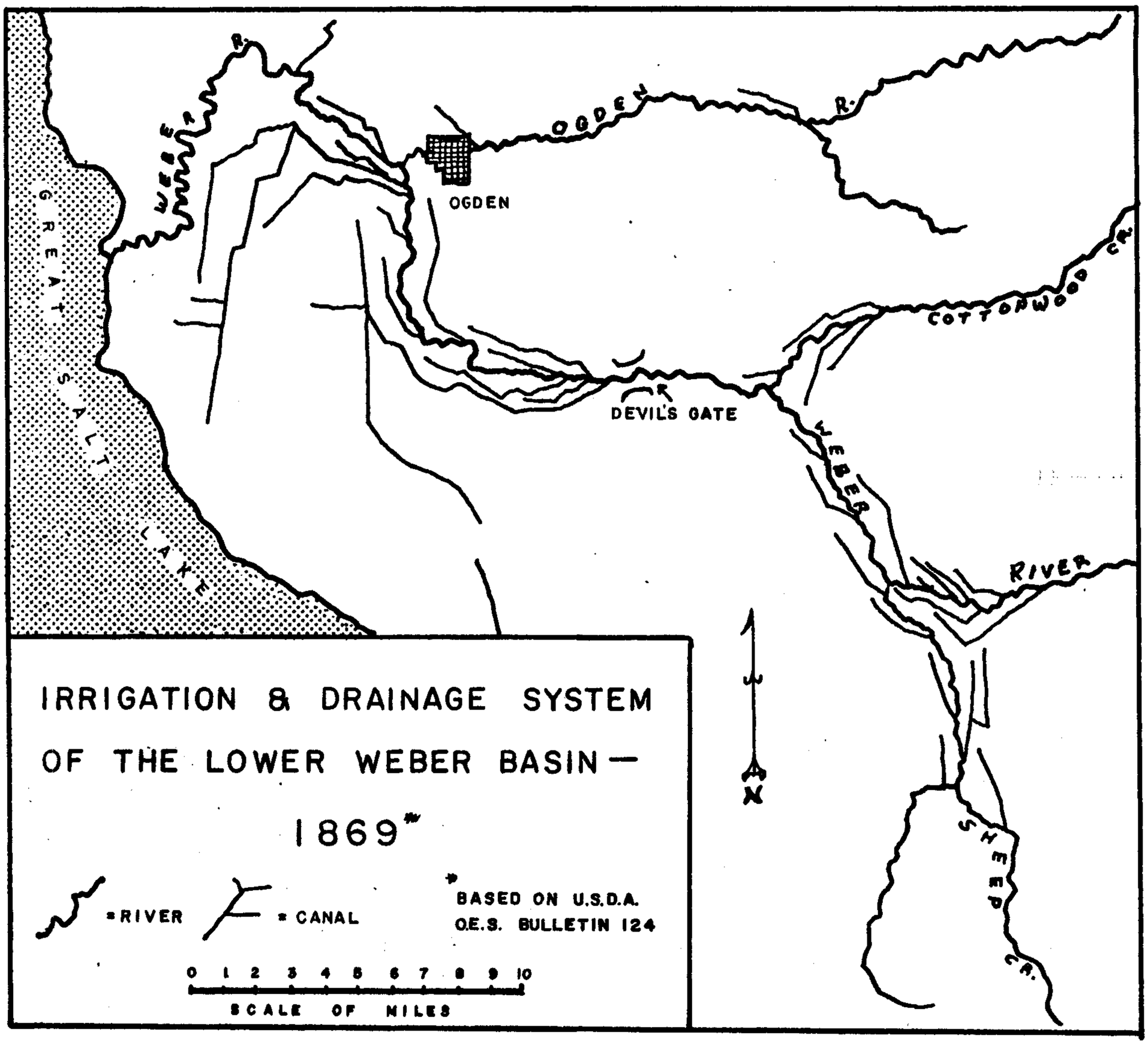
Most of the canals along the lower Weber River were restricted to the narrow stream valley that extended far to the west of the mouth of Weber Canyon or to the flat plain between Ogden and the Great Salt Lake (Map 9). The narrow stricture near the mouth of Weber Canyon, known as Devil's Gate, prevented the building of a high-line canal to water the foot-hill areas. Consequently a large part of the settlement and farming activity has occurred out on the plain south and west of Ogden City. The city itself was located on an alluvial fan near the mountains and was watered by the Ogden River. East of Devil's Gate the valley of the Weber River widens out and many canals were built by the early settlers most of them paralleling the river or one of its tributaries.

Lower Bear

Irrigation along the Bear River was just beginning to experience a period of growth in 1869. The Bear River canal, one of the engineering marvels of the time, was not yet completed, even though great aqueducts and tunnels had been built. A main canal watered the slopes north of Brigham City, but attempts at irrigation along a major tributary, the Malade River, had failed because of brackish water. The Little Bear, Logan, and Blacksmith Fork in Cache Valley were little used at this point because of the fine grazing lands that still existed in that area.

Upper Bear

The Upper Bear River and tributaries had not been diverted for purposes of irrigation in 1869.


GREAT SALT LAKE
OGDEN
OGDEN R.
DEVIL'S GATE
COTTONWOOD C.
WEBER
RIVER
WEBER R.
IRRIGATION & DRAINAGE SYSTEM
OF THE LOWER WEBER BASIN—
1869*
=RIVER
= CANAL
*BASED ON U.S.D.A.
O.E.S. BULLETIN 124
0 1 2 3 4 5 6 7 8 9 10
SCALE OF MILES

MAP 9

The greatest growth in irrigated land in the decade 1870-1880 occurred along the lower Bear River and in Cache Valley; nevertheless, by 1869, irrigation institutions had reached a fine point of development in the Wasatch Front as a whole.

Organization and Administration of Irrigation

In the diary of Orson Pratt July 22, 1849 we find recorded:

> Streams from the mountains and springs were very abundant, the water excellent, and generally with gravel bottoms, a great variety of green grass, and very luxuriant, covered the bottoms for miles where the soil was sufficiently damp, but in other places, although the soil was good, yet the grass had nearly dried up for want of moisture.[12]

The next day the advanced group came to City Creek at the present site of Salt Lake City and proceeded to establish a settlement:

> We appointed various committees to attend to different branches of business, preparatory to putting in crops, and in about two hours after our arrival we began to plow, and the same afternoon built a dam to irrigate the soil, which at the spot where we were plowing was exceedingly dry . . . this forenoon commenced planting our potatoes; after which we turned the water upon them and gave them and the ground a good soaking.[13]

While the Mormons were not the first irrigators in Western North America,[14] the simple act described above had considerable significance.

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[12] Orson Pratt, Journal, Latter-Day Saints Mellential Star, 1849-50.

[13] Ibid.

[14] For an extensive discussion of the first irrigators in western North America see Thomas, pp. 11-13.

The Mormons were the first Anglo-Americans to develop an extensive civilization based on irrigation agriculture, their efforts gave wide publicity to irrigation and they were among the first people in the United States to develop practices, customs and laws pertaining to and governing the use of water. Elwood Mead has commented on this latter:

> [B. Young] made agriculture the foundation industry of his people. In this respect, the beginnings of Utah were different from those of every other arid state. Here, agriculture was from the first the principle industry; in many of the others it was, at the outset, a mere incident. Because of its paramount importance, the laws and customs under which it was developed had early a careful consideration and took a different trend from the beginnings in other states. Colorado and California borrowed their early water laws and customs from the miners; Utah made hers first hand.[15]

Effective organization in the development and use of the vital resource was the prerequisite to success.

The Mormon Policy of Public Control of Irrigation

The Mormons found themselves in a new land, developing a new set of rules for an old technique, irrigation. In this unique situation they quickly adopted a policy of cooperative activity and public control as a method of building and administering irrigation canals and water works. (See p. 39). This has continued to be the policy of the Territory and the State, with a few notable exceptions, until the present time.[16] This

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[15]Elwood Mead, Irrigation Institutions, (New York, The Macmillian Company, 1910) p. 220.

[16]Thomas, pp. 18-19.

principle of public control[17] seems to have worked well.

Initially, public control of irrigation meant church control. When L. D. S. church leaders decided to colonize a new area, they not only called the desired number of new settlers but also chose the leader of the new settlement. Chosen not only for their religious zeal, but also for their secular abilities,[18] this leader, or bishop, and his two counsellors directed the spiritual and temporal affairs of the new community. Among these temporal affairs was the direction and administration of irrigation. Accordingly, public control of irrigation in early Utah meant church control because the Mormon Church was the only effective public institution of the time.

However, legal right of control was soon placed in other hands. In 1852 the first territorial legislature of Utah met. The new secular body declared:

> The county courts shall . . . have control of all timber, water privileges, or any watercourse or creek, to grant mill sites, and exercise such powers as in their judgment shall best preserve the timber and subserve the interests of the settlements in the distribution of water for irrigation or other purposes. Grants of rights held under legislative authority shall not be interfered with.[19]

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[17] Concerning the subject of public controls one writer has said: "All studies of irrigation lead to one conclusion--that some public control of the water supply is necessary to the best use of the resources of an arid country." Elwood Mead, Report of Irrigation Investigations in Utah, (Washington, Govt. Printing Office, 1903), p. 19.

[18] Thomas, pp. 19-20.

[19] Territorial Laws of Utah, Chap. 1, sec. 38, approved Feb. 4, 1852.

In commenting on this initial legislation Dr. Mead wrote:

> We have here, then, at the very beginning of irrigation development in this country, the recognition of public ownership, the granting of rights by an executive board which was familiar with the facts, and the protection of the rights granted by the board making the grants. Irrigation law has not gone beyond this today, except in the matter of detail.
>
> For twenty-eight years this was the only water-right law of the territory.[20]

According to the law the courts were to grant rights to the streams of the county, appoint water masters to enforce their decrees, refuse petitions for rights when streams had been exhausted, and settle controversies over the use of water. These statutory provisions mirror closely the prior experience of the Mormon legislators.

This, of course, was not the only legislation affecting the use of Utah's waters. Frequently in granting town charters, the legislature included in the charter the right to control all canals and streams flowing through their corporate limits.

The legislature and courts were slack in administering their powers, however, and parties were usually allowed to divert and use water without restriction. Most of the present rights to water were acquired under this implied permission and the job of enforcing the irrigation laws as well as interpreting them was usually left to the local church leaders.

One of the first officials in a new settlement was the water master. He was usually appointed by the bishop and approved by a raised-hand vote

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[20]Mead, Irrigation Institutions, p. 222.

and in many instances this continued to be the case after legal right of appointment was vested in the county courts of the community. After the canal's completion by cooperative methods, the water master was put in control. The settlers were poor, the wages were low and sometimes the responsibility was great. His primary duties were: to see that the water was kept in the canal by preventing the canal from leaking or breaking; to call out the water users for repairs on the canal; to notify each irrigator of the time for his turn to use the water, and to see that the farmer's headgate was closed at the end of his turn; and in the spring to call the irrigators together to hear a report of the past season.[21]

Local Operation of the System

With public ownership of water being accepted as state and church policy and the initiative left to the individual communities, the people of the Wasatch Front set out to distribute this resource in a just way.

Because a continuous flow to all of the irrigators would deplete the stream completely in its upper stages the Wasatch communities used the water in rotation. So much time was allowed for each acre or water right held by the farmer, or so much time for every dollar invested in constructing the canal. The turns were usually from one to two weeks apart, the local pattern being determined at a general meeting of all of the irrigators, or scheduled by the water master.

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[21] Ibid., p. 25.

Each spring the canals were cleaned and repaired. Sometimes the individual farmer worked at a set wage until he had worked off his share of the cleaning and repairing charge. Another method was for a committee to select certain areas of the canal for each irrigator to clean, then notify each of his particular assignment. A day was then set for the work to be completed and inspected by the water master. The farmer usually did his own work for there was very little money for hired labor.[22]

The Status of Irrigation in 1869

It has been said that thousands of canals built in Utah belong to the communities. This is true if the meaning is understood. They did not belong to the community as a corporate body but in the sense that each settler was the owner of the land and in order to secure the necessary water to make it fruitful he had to own a share in the canal, which he secured as a rule by his own labor. Because early settlers were poor, hired labor played practically no part in canal construction. Each settler possessed a small farm and that made close settlement possible and supplied the necessary labor to build canals. If the settlers had been allowed to claim all the land they wanted the territory would have been held by a comparatively few people who, poor as they were could not have supplied the labor to take out the water and the soil would have remained sterile and fruitless and a shortage of food would have prevailed. With the close settlement plan the farmers supplied the labor themselves to build the canals and reclaim the land. So that the thousands of miles of canals of early Utah were built without bonded indebtedness of any kind. They were built by the farmers, owned by the farmers, and operated by the farmers. In fact, they constitute one of the greatest and most successful community or cooperative undertakings in the history of America.[23]

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[22] Ibid., p. 26.

[23] Ibid., p. 27.

This was the status of irrigation in the Wasatch Front in 1869. There was no need to change it and changes were slow in coming. In 1869 the people of the Wasatch Front oasis were largely of one faith. Controversies over water, as well as many other differences, were settled through church courts. This led to a delay in the legal definition of the rights to water and it wasn't until the early years of the twentieth century that the Utahns found it necessary to establish a foundation for these rights other than agreements between themselves.

By 1869 according to a report to the Utah Legislature the people of the state had constructed 215 canals of a total length of about 1000 miles at an estimated cost of $1,700 per mile. The building of sub-ditches had cost almost as much as the main canals. Most of the water, which irrigated the 167,000 acres of land, was cooperatively owned. The pioneer leaders anticipating a large and compact population--just as many people as the mountain streams could support--early adopted the policy of prohibiting any one person from taking more water than that for which he had immediate use.[24] Under the Mormon system the settlers had built 383 diverting dams; 27 storage dams; 570 main ditches with a capacity of 4,868 second-feet and a total length of 1,123 miles; 1,280 lateral ditches with a total length of 1,041 miles; and 54 reservoirs with a capacity of 3,419 acre-feet. In addition the settlers were operating flow-

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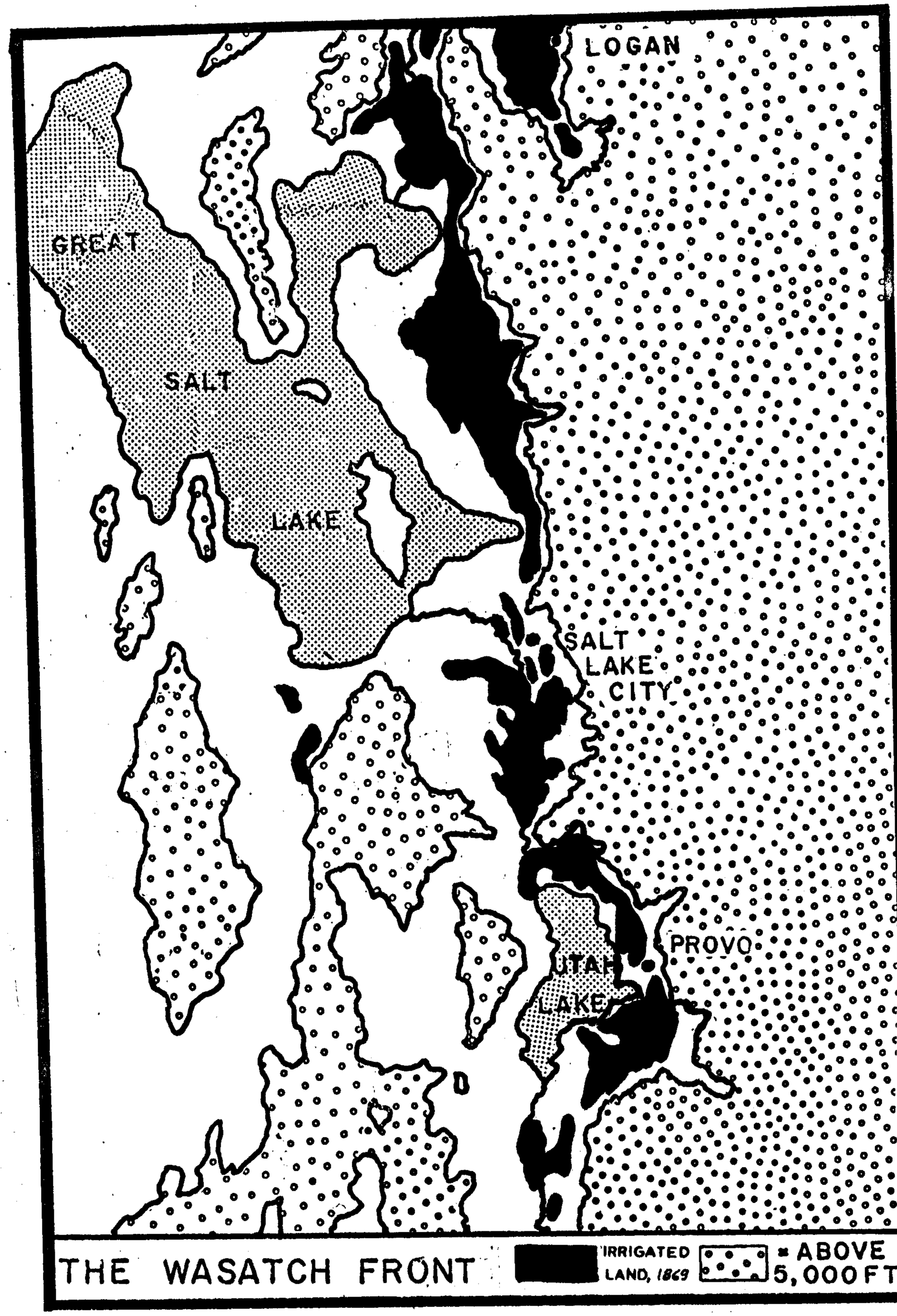
[24]Hunter, p. 261.


LOGAN
GREAT
SALT
LAKE
SALT
LAKE
CITY
PROVO
UTAH
LAKE
THE WASATCH FRONT
IRRIGATED LAND, 1869
= ABOVE 5,000 FT.

MAP 10

ing wells, pumping wells and pumping plants.[27] All this was accomplished in just 22 years by a group of Americans who had never before practised the ancient device of irrigation agriculture.

With plenty of water available along the Wasatch Front in the early years the Saints had set about irrigating the land to provide the products necessary to sustain life. By the year of the "iron horse" the Mormon agricultural system was highly developed though oriented to local consumption.

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[27] Fourteenth Census of the United States, Compendium

CHAPTER III

THE AGRICULTURAL PATTERN IN 1869

An observer entering the Wasatch Front Oasis in 1869 would have found most of the communities nestled against the foothills of the Wasatch Mountains, often perched upon an alluvial fan near the mouth of a great canyon from which a stream emptied down the slope of the fan. These compact communities, varying in population from 200 to 12,000, contained the homes of the farmers of the small farms averaging only thirty acres, scattered within a two to five mile radius of the town. These intensively-used farms produced mostly cereal grains, alfalfa and potatoes. Some, principally those located high up on a fan or on the flat "benches" near the mountains had fruit orchards; while most of the farmers owned some cattle and sheep. The dry western and poorly-drained lower parts of the valleys served as winter pastures and in the spring one might meet large herds of sheep moving up the canyons to their summer pastures in the mountains. Traveling through Davis and Box Elder Counties, one might see some evidence of pioneer dry-farming activity with its alternating fields of fallow land. Finally, moving on to the west, the observer very soon would have entered a sterile country of playas and sparsely vegetated block mountains. Leaving the "green strip" behind, he would not see its likeness until he had crossed the barren interior basin to

the foot of the Sierra Nevada.

Land Tenure

Before 1869, the Wasatch farmers did not have legal title to the land they occupied. When the Mormons entered the Salt Lake Valley July 21, 1847 it belonged to Mexico.[1] With the signing of the treaty of Guadelupe-Hidalgo on February 2, 1848 the Wasatch Front became part of the area ceded to the United States and was technically under control of military authorities of the United States.[2] In practice, however, no effective Federal authority existed in the early period, and it was the practice of the Church to administer law in the land. The only claimants to the land were a few scattered Indian tribes who neither knew nor cared which national government claimed the land, but were disturbed by the presence of the newly arrived squatters.

After Utah became a territory it was many years before all Indian claims to the lands were satisfied and the Indians were removed to reservations.[3] To the Indians the Mormons were trespassers on their land; to the United States government they were squatters. Yet they settled on the land, irrigated, cultivated, and made the desert blossom into a home

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[1] Although they entered Mexican territory, the Mormons' loyalties were unquestionably with the United States as is attested by the march of the Mormon Battalion and by their own declaration in the January 20, 1846 issue of their own publication; Times and Seasons.

[2] Thomas, p. 30.

[3] At the close of the Blackhawk War in 1867, the last of the Indians in Central Utah were removed to a reservation in the Uintah Basin.

for themselves and their children.

Early Land Law

It is likely that the founders of the State of Deseret, recognizing that the land belonged to the Federal Government and could not be disposed of by the state even if it were admitted to the Union, purposely left any provisions concerning the land out of their constitution. In 1850, Congress passed an act establishing the Territory of Utah. This act, like the above constitution, did not grant the territorial legislature any authority over land, water or timber. Nevertheless, the governor and assembly exercised almost unrestricted power over these resources. The territorial government seemed to recognize that grants of land made by it were subject to the superior title of the Federal Government and that legally the occupants of such lands were still only squatters. The inhabitants were, however, allowed to consume the water and use the timber with very few restrictions.

The difficulties of occupying the land legally were many:

> From July 24, 1847, the date of the entrance of the pioneers into the Salt Lake Valley, to April 1, 1869, a period of almost twenty-two years, it was impossible to locate upon a piece of land according to the land laws of the United States or to undertake to secure title to it through a government patent. The office of the Surveyor General of Utah was created February 17, 1855, but on June 30, 1862, the Utah and Colorado offices were consolidated and the records moved to Denver. The office was not opened again in Utah until 1868, and a United States Land Office was not open for business until April 1, 1869.[4]

Nevertheless, beginning in 1869 the farmers finally gained title to their

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[4]Thomas, p. 32.

small parcels of land:

> In March 1869, a United States Land Office was established at Salt Lake City and on April 1, claimants began to enter the land which many of them had cultivated for over 20 years. It was an interesting bit of history to know how this was accomplished under the existing land laws of the United States, considering the small areas claimed by the Utah farmer. In many instances, from sixteen to thirty claimants were in possession of a hundred and sixty acres of land; especially was this true when the land lay near a town. The plan followed was for the interested parties in any given quarter section to meet and determine under which law they should attempt to secure title. After this was done, one member of the claimants was chosen to enter the land for the benefit of himself and the others. Sometimes the agreement included an understanding that the entryman in addition to securing title to his own claim should be compensated for the loss of his homestead or pre-emption right as the case may be.[5]

Methods Used by Church Leaders in Apportioning Land

Since the Mormon Church was the only effective authority that existed along the Wasatch Front in the early years, it was necessary that the Church organize the system of colonizing the land. Brigham Young knew that the temporal welfare of the Saints had to be maintained in order to keep their spiritual accord. This may help one to understand why the farmers were instructed to live in villages and travel to their farms each day. They thus remained a united group under the leadership of the bishop or other authorities of the Church. Such an arrangement also provided for protection from the Indian menace and for the easy initiation of cooperative activities, such as the building of irrigation canals.

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[5] Ibid., p. 40.

Size of Farms

The leaders of the Church established an important precept regarding the size of the farms. The holding of single man or a head of a family was limited according to the needs of those dependent upon him. The amount of irrigable land in proportion to the population of the town was also taken into consideration. Naturally, this factor made for a small acreage for each holder in some of the less favored villages, but every attempt was made to give a fair and just distribution of the land. Sometimes there just was not enough of this watered land to feed properly the families, and the community or general church was called on to help out. Land speculation was not allowed in the early days, so the gaining of additional amounts of land depended entirely upon the Church and the cooperative projects of the members.

> Brigham Young intended that the irrigator should own his own land and construct his own canal; and although his system of small farm units and cooperative labor maybe open to the objection that it means a multiplicity of canals taken from natural streams at a greatly increased cost of construction and maintenance, it is certainly more enduring irrigation economy than one which encourages speculation and enables the lender of a mortgage to reap the appreciation and accruing from the enhanced value of land and water. By suppressing these secret attempts at speculation. . . the Church authorities established a precedent that has become as binding as an unwritten law. As a result, the people of Utah are secure in their control of natural, monopolies and are firmly established in their ownership of unmortgaged land.[6]

As has been mentioned earlier the average size of farms in 1869 was

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[6]Chas. H. Brough, Irrigation in Utah, (Baltimore, Johns Hopkins Press, 1898).

thirty acres. No farmer owned more land than he and his family could work and, ideally at least, no farmer owned less land than he needed to provide sustenance for his family.

Economic Growth on the Wasatch Farms

Growth of Trade

Because of the small size of the farms and the meager funds and facilities of the settlers, agriculture in the early years was practiced on a semi-subsistence basis. There was a great deal of between-farm exchanging of products and services and even some between-town trade going on. By 1869 improvement of the roads had stepped up this latter activity considerably. Some of this activity was conducted for general welfare purposes under the auspices of the Church, and some can be attributed to the tradition of free enterprise that had come with the pioneers across the plains. A serious impediment to trade at this time was the lack of suitable money tokens. Wheat, along with whatever cash was available from emigrants, was a principle means of exchange, as is evidenced by the following newspaper advertisement: "For sale--for cash or wheat, two good English lever watches. McVear and Barlow".[7]

The arrival of the iron horse from the East in May 1869 certainly put the spark to the fuel of economic growth in the Wasatch Front.

> The great highways of commerce thus established brought with them a large interchange of traffic and an increased

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[7] Deseret News, Salt Lake City, February 22, 1961.

> demand for labor occasioned by this traffic. Opportunities for employment and the widening of eastern markets to receive the products of Utah's soil encouraged immigration, and immigration meant even better facilities for the transfer of goods than the internal agricultural trade had heretofore fostered.[8]

Table 4 illustrates the economic growth of Utah's agricultural activities in the years immediately following the railroad's completion. In all cases, the big jump was during the decade 1870 to 1880, the years immediately following the completion of the transcontinental railroad. It is interesting to note that the average size of irrigated farms more than doubled during these years, partly as a result of speculation, only to drop to a pre-railroad low in 1880-1890 as the farmers discovered they could run a smaller commerically-oriented irrigated farm more efficiently than a larger one. Land values more than tripled during the immediate post-railroad decade as did the value of implements and machinery, which became more easily attainable. Production on these farms was also on the increase (table 5, p. 64).

Agricultural Activities in 1869

Irrigated Cereal Grains and Vegetables

Cereal grains continued to dominate the economy of the Mormon oasis in the year of the "Golden Spike". Utah produced nearly 600,000 bushels of wheat in the summer of 1869, a feat exceeded only by California and Oregon in the western states and territories. Corn, oats and barley

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[8]Brough, p. 47.

TABLE 4

INCREASE IN NUMBER, ACREAGE, VALUE OF PRODUCTS AND IMPLEMENTS OF IRRIGATED FARMS 1850-1890[a]

Year	No. of Irrigated Farms	Ave. Size Acres	Total Land in Farms, Acres				Value of Irrigated Farms	Value of Products Irr. Farms	Value of Implements & Machinery
			Improved	Unimproved	Under Cultivation	Irrigated			
1850	926	51	16,333	30,516	14,566	10,300	$ 943,055	278,109	84,288
1860	3,635	25	77,219	12,692	38,187	36,368	3,092,951	546,000	242,889
1870	4,908	30	118,755	29,606	64,765	58,936	4,739,126	1,973,142	291,390
1880	9,425	69	416,105	239,419	298,151	225,173	18,268,569	3,337.410	946,753
1890	10,517	27	548,223	775,482	306,043	263,473	36,381,270	4,891,460	1,164,660

[a]Compiled from Seventh, Eighth, Ninth, Tenth, and Eleventh United States Census Report.

TABLE 5

INCREASED PRODUCTION
OF PRINCIPAL CROPS IN UTAH 1850-1890[a]

Year	Wheat bu.	Corn bu.	Oats bu.	Barley bu.	Rye bu.	Potatoes bu.	Hay bu.
1850	107,702	9,899	10,900	1,799	210	44,020	4,805
1860	384,892	90,482	63,211	9,976	754	141,001	19,235
1870	558,473	95,577	65,650	49,117	1,312	323,808	27,305
1880	1,169,199	163,637	418,082	217,140	9,605	573,595	92,735
1890	1,515,464	85,020	597,947	163,318	33,928	519,720	301,901

[a]Compiled from Seventh, Eigth, Ninth, Tenth, and Eleventh United States Census Reports.

were also important pre-railroad products. The growing of flax had been almost completely abandoned by 1869, although the Utah valleys had produced 4,343 pounds of this product in 1860. In the pre-sugar beet days of 1869 Utah produced 67,446 gallons of sorghum molasses. The Irish potato was the only important vegetable crop in 1869 and it remained for the post-railroad era to develop Utah's present lucrative vegetable industry.[9]

Wet Lands

The map (p. 54) of irrigated land along the Wasatch Front also shows portions of the oasis that were not irrigated or cultivated in 1869. These are the "wet lands" (see p. 32 Chapter I) that were taken out of use early in the pioneer period because of the rising ground water table and the high degree of mineralization caused by irrigation in the higher portions of the valleys. These lands, consisting mostly of salt-grass swamps or sage flats, were mostly located on the margins of Great Salt Lake or Utah Lake. The wet lands did not go unused. They served as the winter grazing grounds for numerous sheep and summer pasturage for cattle and horses. The practice of moving the herds of sheep from a valley winter range to a mountain summer range (transhumance) was adopted by the Mormon settlers after only two winters in the Wasatch Front. As the number of sheep increased the practice grew into a tremendous semi-annual migration of animals. In the fall of 1869 Utah stockmen brought 59,672 sheep down from the summer range in the mountains from which 109,018 pounds of wool were removed

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[9] Ibid.

the following spring. The market for animal products provided by the railroad brought a tremendous upswing in livestock in the Wasatch oasis. Utah's neat cattle population soared to 190,934 in 1870.[10]

Orchard Products

The story of the rise of orchard products in Utah is no less spectacular than that of livestock. Orcharding had a much slower start. The first settlers in the Salt Lake Valley did not attempt to grow fruit trees in the early years. Early experiments were not successful as spring frosts destroyed a high percentage of the fruit before it had a chance to mature. Many easterners and foreign immigrants were not convinced that fruit such as apples, peaches, pears, apricots, and prunes could not be grown successfully; and by 1860 fruit trees were being grown high on the slopes of the fans and well-drained tops of the deltas or benches. These were areas of air drainage and the late frosts were much less likely to occur here than in the lower parts of the valleys. Revenue from orchard products went from none in 1850 to a modest $9,281 in 1860, and an encouraging $43,938 in 1870[11]

Non-Irrigated Agriculture

Because of the apparent success of irrigated agriculture, I think it is fair to conclude that very few people in Utah had given any serious consideration to farming without irrigation. Some farmers however, had

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[10] Ibid.

[11] Ibid.

succeeded in bringing in a crop without the provision of surface water, while many areas along the Wasatch Front were underlain by ground water that could be brought to the surface by wells (Map 11). Most of these localities were naturally irrigated by sub-surface water; but in others, actual experiments in scientific dry farming were being conducted.

G. K. Gilbert made these observations in 1876-1877:

> The general rule that agriculture in Utah is dependent on artificial irrigation finds exception in two ways. First, there are some localities naturally irrigated; and second, there is at least one locality of which the local climate permits dry farming.
>
> Along the low banks of many streams there are fertile strips of land. The soil is in every case of a porous nature, and water from the stream percolates laterally and rises to the roots of the plants. Nearly all such lands are flooded in springtime and they are usually devoted to hay as an exclusive crop; but some of them are above ordinary floods and are suited for other uses. It rarely happens, however, that they are farmed without some irrigation, for the reason that the use of the convenient water renders the harvest more secure and abundant.[12]

Gilbert went on to explain that sometimes subterranean waters with no seeming connection with surface streams could create the same effect. He pointed out that there are two areas in Utah that seem to be irrigated naturally in this way. The first is at the western base of the Wasatch Mountains in a narrow strip eighteen miles in length. When this strip has been irrigated by surface waters the ordinary yield was two or three times that obtained without artificial irrigation. Nevertheless, a farmer could extract a living from this soil without irrigating. A similiar but

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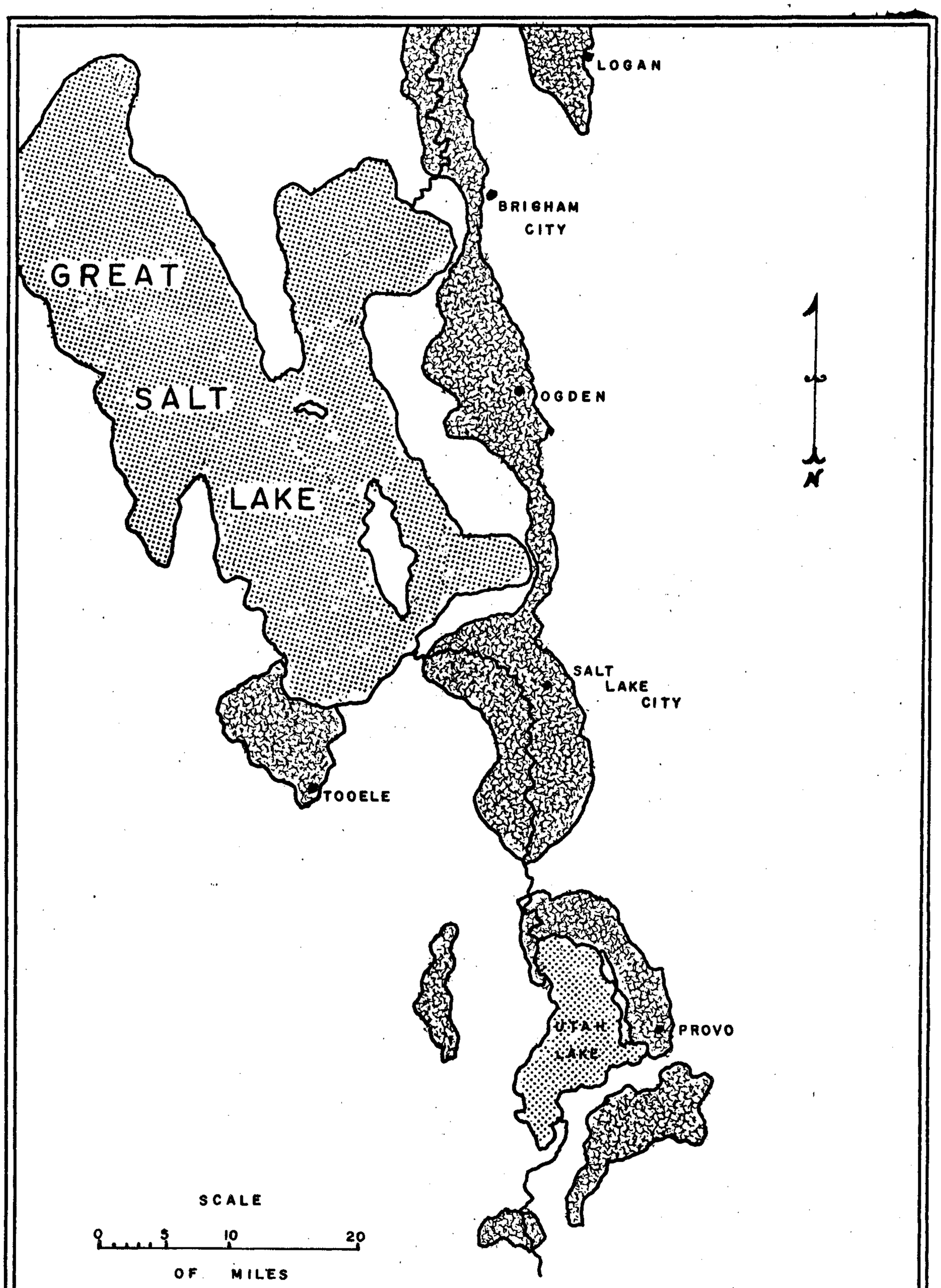
[12]Powell, p. 77.



THE WASATCH FRONT = GROUND-WATER AREAS

MAP II

narrower belt of land lies at the eastern base of the Promontory Range and a few others have been found. In at least one case Gilbert noted an area where the local climate seemed to be suited to dry farming:

> There is one region, where natural irrigation is out of the question, but where crops have nevertheless been secured. Bear River City was founded by a company of Danes, who brought the water of the Malade River to irrigate their fields. After repeated experiment they became satisfied that the water was so brackish as to be injurious instead of beneficial, and ceased to use it; and for a number of years they have obtained a meager subsistence by dry farming. A district lying south of Ogden and east of Great Salt Lake, and known as'the Sand Ridge", has recently been brought in use, and in 1876 and 1877 winter wheat was harvested with a yield variously reported as from 10 to 15 bushels per acre . . . Success has been restricted to the line of valleys which lie at the western base of the Wasatch Mountains and near the Great Salt Lake.[13]

Most of the successful attempts at true dry farming, however, date from the post railroad era.

The Agricultural Pattern in the Wasatch Valleys in 1869

Utah Lake Basin

All of the communities in Utah Valley in 1869 were located along the streams that issue forth from the Wasatch and flow westward into Utah Lake. Near the lake were the wet lands which in this area were suitable for pasture, extending from one mile on the north to four miles away from the lake on the south. No permanent stream issues from the Lake Mountains to the west of Utah Lake, so the lands on that side of the valley

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[13] Ibid., p. 38.

lay empty and barren. The eastern portion of the valley, blessed with large benches and fans, constituted the most productive agricultural land of the territory. To the north and south of the largest community, Provo, (pop. 2384)[14] were the substantial settlements of Utah valley's "fertile crescent". This area accounted for 26 percent of the value of farm productions in the entire territory while having only 13 percent of the population. The Provo Bench even at this early date was dotted with producing fruit trees and farmers from this area sold $18,000 worth of apples, pears, apricots, peaches and cherries in the fall of 1869.[15] Large numbers of sheep, milk cows and beef cattle grazed the farms and the bottom-lands near the lake. The Utah valley farmers also owned 20 percent of Utah's horses and one-third of the swine. In the north and south centering around American Fork and Spanish Fork respectively were the great spring-wheat fields of Utah valley which produced 129,000 bushels in 1869 in addition to large quantities of oats and barley. Over one-third of Utah's corn was produced in the valley, while the area was also outstanding in production of potatoes, wool, dairy products and hay. In 1869, 25,586 gallons of sorghum molasses were produced on Utah valley farms, foreshadowing the days forty years hence, when sugar produced from beets would become a major industry of the valley.

Jordan River and Salt Lake

The Salt Lake Valley had been the early leader in agricultural

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[14] Ibid.

[15] Ninth Census, Productions of Agriculture.

production in Utah Territory; but, by 1869 Salt Lake County stood in fifth place among Utah's counties in total value of agricultural production. Market gardens and orchards were beginning to be established to feed the 18,000 residents of the valley, most of whom dwelled in the Mormon capital. Beef, dairy cattle and swine were raised in the Jordan valley, while the slopes to the south and west were brought into production of wheat. Some corn was grown near the city along with peas, beans, and potatoes. Most of the western and southern portions of the valley remained barren because of the lack of irrigation water. Streams from the Oquirrh Mountains to the west were scant in volume and the great irrigation canals to divert water at the Jordan Narrows were still in the planning stage. The northwestern sector of Salt Lake Valley remained empty and barren with a high water table resting beneath the salt grass or salt flats.

North of the Salt Lake Valley between the Salt Lake Basin and the Weber Basin was the narrow stretch of land of Davis County. Located between the Great Salt Lake on the west and the Wasatch Range on the east, this strip of rich farmland was relatively close to the urban concentration of Salt Lake City. Davis County was the market-gardening area of the Wasatch Front in 1869, producing over 50 percent of all market-garden products in the territory. In addition, orchard products were making good progress on the alluvial fans of the Davis strip.

Weber-Ogden Basin

The city of Ogden (pop. 3127)[16] was the only major settlement in

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[16]Ninth Census, Compendium

this basin that was located close to the Wasatch Mountains (see p. 45). Out on the plain south and west of Ogden was the second largest concentration of cultivated land in the oasis. Here spring wheat, corn, and barley were grown and the milk cow was the principal stock animal. The concentration of wheat and the availability of transportation foreshadowed the growth of the flour-milling industry; which at this time was second to Provo in the territory. Northeast of Ogden was a great alluvial fan which the settlers had found too rocky and steep for crops. In 1869 this fan began to be used for orchards.

Lower Bear River Basin

Many of the early Mormon settlers had been attracted to the grassy meadows of Cache Valley, or the well-drained slopes near the mouth of the Bear River. By 1869 twenty-three substantial farming communities had been established in these locales.

The largest settlement in Cache Valley was Logan (pop. 1757).[17] while several smaller communities were clustered around the rim of the valley. In the center of the valley the Bear River and its tributaries meandered back and forth across a low-lying grassy plain. In the winter over 3,000 sheep occupied the grass lands, along with nearly 800 milk cows and 400 horses. On the slopes above the valley center there were no orchards or forests; but fields of spring wheat, oats and corn occupied the

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[17] Ibid.

well-drained lands. Wheat, wool and butter were the outstanding agricultural products of the valley.

Brigham City (pop. 1315)[18] was the center of early agricultural activities near the mouth of the Bear River. The fans and terraces near the mountain front north and south of Brigham City were spread with fields of spring wheat, winter wheat, potatoes, barley and corn. Very little hay was grown in the northern end of the Wasatch oasis in 1869, but sheep and cattle were kept on the grasslands near the meandering Bear River's terminus. Tremonton and Garland were chiefly stock and dairy locales producing butter and some cheese. Northward along the Malade River nearly 400 acres of dry-farmed wheat were grown. Yields, however were poor and the risk of drought great.

A Contemporary Description

> The Deseret Agricultural and Manufacturing Society reported, in 1868, an expenditure for irrigation in one year of $246,938. Number of acres irrigated, 93,799. The acreage of Utah crops is given as follows: In cereals 80,518 acreas; sorghum 1,817 acres; root crops 6,839 acres; cotton 166 acres; meadows 29,876 acres; apple orchards 906 acres; peach orchards 1,011; grapes 75 acres; currents 195 acres; a canal in course of construction by a stock company, is to connect Utah Lake and Salt Lake for purposes of irrigation and mill power.
>
> The Salt Lake Basin, Utah, when settled by the Mormons 22 years ago, was a waste of sand and sagebrush; but, through irrigation and cultivation the soil of a large part of the valley has already been made equal in produtiveness to the richest lands of the more eastern states. Reverend Dr. Prime,

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[18] Ibid.

of New York, who has recently traversed that region, speaks of passing through 35 miles of cultivated fields presenting the most beautiful crops of wheat, as a staple production, ripening to harvest without a single drop of rain. The strong grains were so bright that they shown like silver in the sun light. As exceptional instances he learned that one acre had produced a crop of 93 bushels of wheat, and that 900 bushels had been grown on ten acres, the result of extreme care and planning, irrigation, manuring, and cultivation. Salt Lake City, which had neither tree or shrub when first settled by the Mormons, is now by the aid of its system of irrigation, adorned with great numbers of locust and cottonwood trees, the former raised from the seed, the latter transplanted from the mountain canyons. Every street has its stream of water, and every garden in the town is regularly watered under the direction of commissioners.[19]

The Wasatch Front farming communities were responsible for the greater part of Utah's economic growth. The close-knit units of social, religious, political, and economic integration accomplished the miracle of the blossoming of the desert as no other entity could have done.

If a visitor to the Wasatch oasis had stopped in 1869 in one of these Mormon communities, he would have seen much that was unlike the towns and villages of contemporary America. The next chapter will examine some of the institutions that made these communities unique.

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[19] U.S. Department of Agriculture, Annual Report, 1869, pp. 431-432.

CHAPTER IV

THE WASATCH COMMUNITIES

The pattern of agricultural settlement along the Wasatch Front was unique in the West. Frontier settlement of the Middle-west and the High Plains resulted in scattered farm dwellings, while Pacific coastal settlements were spread around harbors or along trade routes. But the pattern of settlement insisted on by Brigham Young and the other church leaders resulted in a series of compact villages. Their reasons for the establishment of this pattern were several: 1) clustered manpower provided protection against Indian raids, 2) the economic burden of utilizing a restricted physical environment was more easily carried, 3) a cooperative spirit aimed at individual growth and social cohesion was developed. In addition, many of the settlers were from an urban tradition, either in the villages of the eastern seaboard or in Europe.

In addition to having a unique form and pattern of location, the functional aspect of the Mormon villages was also rather unusual in the contemporary West. Each original settlement functioned as an almost entirely independent unit providing for most of the social, economic, religious and cultural needs of its citizens. Manufacturing and trade were launched upon by many of the communities as a cooperative effort of all of their members. The towns were cosmopolitan; Germans, Dutch,

Swedes, Scots, English and Irish all lived side-by-side in the city blocks. In addition farmers, bankers, tradesmen, teachers, all lived together in the same compact society and often shared the same wealth.

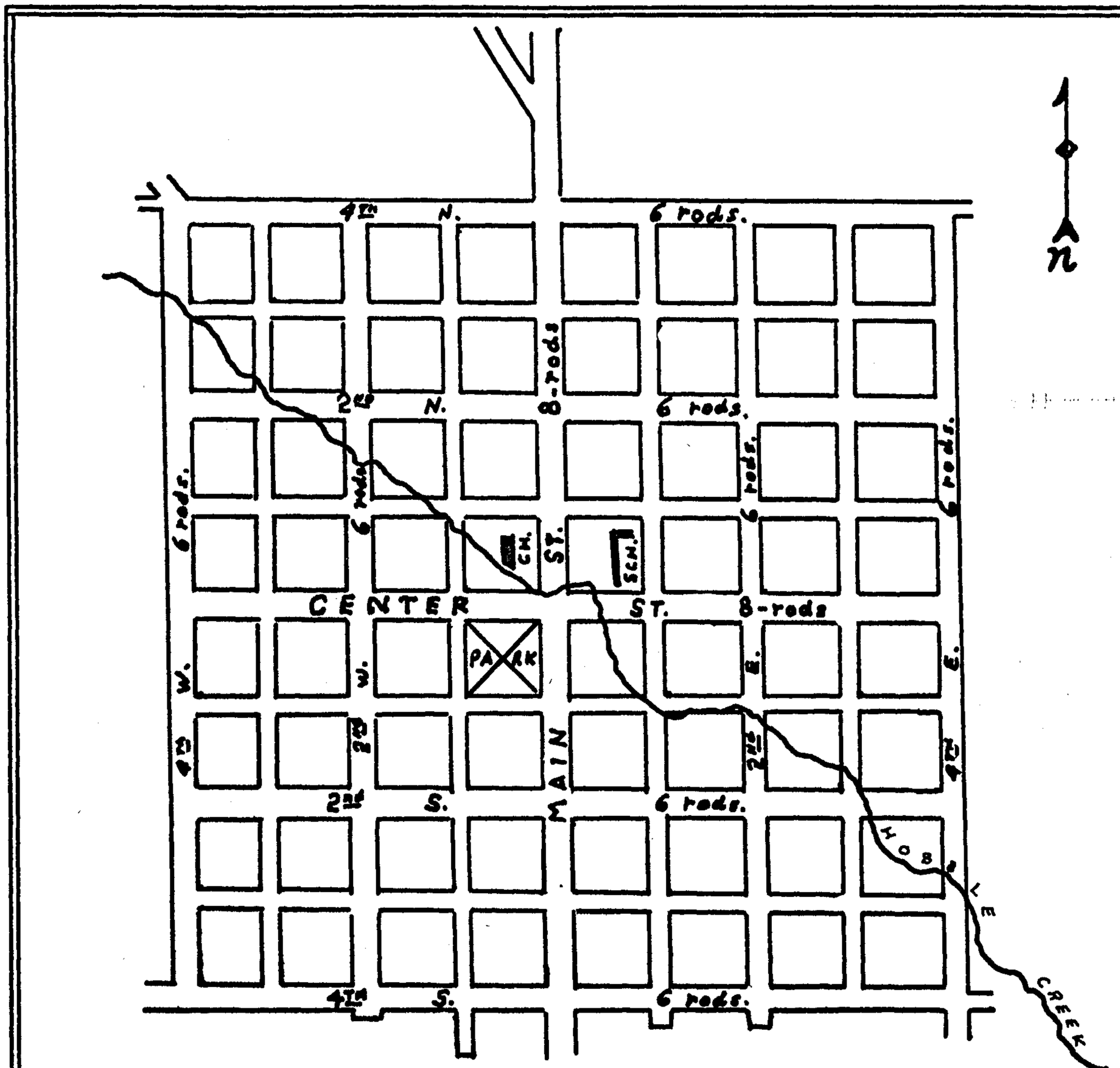
By 1869, however, many of these villages were trading extensively with each other. More efficient communications, better roads, mining activities, were all serving to bring these settlements out of their insular state. The coming of the trans-continental railroad further helped bring these towns into the network of world commerce.

Locational Pattern of Wasatch Front Villages

As has been mentioned in previous chapters, the first villages of Utah were located close to the Wasatch Front to take advantage of irrigation water; rich, well-drained soils; and thermal conditions adequate for a productive agriculture. The process of locating these villages along streams in well-drained bench lands resulted in a settlement about every five miles north and south along the western base of the Wasatch Mountains. Of the twenty-six towns listed on table 6 only four are not located adjacent to a stream and none are more than ten miles from the nearest neighbor-village.

Form of the Settlements

The Mormon towns characteristically had wide streets, running east-west and north-south, large city blocks of up to ten acres, a central "square" or park, and a civic center, and usually a tabernacle or church block (see map 12). No break in the grid pattern of these towns was effected



SPRINGVILLE

A "CITY OF ZION" PLAT IN UTAH - 1869

RDG

STREETS ARE 4, 6, & 8 RODS WIDE

BLOCKS WERE SUB-DIVIDED INTO 4 LOTS EACH

SCALE OF FEET

1000 0 1000 2000

MAP 12

TABLE 6

THE POPULATION OF COMMUNITIES
ALONG THE WASATCH FRONT IN 1870[a]

Richmond	817	Farmington	976
Smithfield	744	Kaysville	1422
Logan	1756	Salt Lake City	12854
Hyrum	708	Alpine	208
Bear River City	289	American Fork	1115
Brigham City	1315	Lehi	1058
Corrine	783	Pleasant Grove	930
Willard	552	Provo	2384
North Ogden	683	Springville	1661
Ogden	3127	Spanish Fork	1450
Plain City	440	Pond Town	353
Bountiful	1517	Payson	1436
Centerville	544	Santaquin	602

[a]Ninth Census, Compendium.

until the railroad was completed through them. Even then the rails were usually bent to conform to the pattern of the streets.

Distribution of Property

To understand the distribution of property in the Mormon communities it is necessary to examine the intent of the Mormon leader, Brigham Young. He designed that every man should be a land owner and no one a tenant. He also personally directed the colonization of each settlement by choosing the leaders or bishoprics; told how many settlers should go; where they should go; when they should go; what equipment they should take with them; and even what crops they should grow. After the first few years he was guided by the experience of his bishops in the settling of new colonies. By this method Young succeeded in virtually eliminating the trial and error method of settling separate colonies. The resulting Mormon philosophy was usually well-adapted to prevailing conditions. Had Utah Valley's grassland, for instance, been settled by other peoples they would likely have founded a ranching economy based chiefly on the grazing of beef cattle. They might not have considered how quickly the clump grass would disappear through over-grazing and drought. It is doubtful that concentrated permanent settlement in the area would have been successful without the intensive irrigated agriculture that the Mormons established.

Under the inspiration and guidance of their great leader the Mormons were assigned property in the villages as follows:

> Brigham Young recognized immediately the new property value acquired by water in irrigation-based communities. He realized that the land was valueless without the water and that with the limited supply of the latter, the land would have to be held in small parcels to be utilized efficiently, for irrigation agriculture required intensive tillage. He therefore divided the land so that each person got only as much as he could faithfully cultivate. To professional and business men he gave lots averaging one and one-fourth acres near the center of town; to mechanics and artisans he allotted plots of five acres a little farther out; and to farmers he assigned the ten, twenty, and sixty acre tracts in the country, the amount depending on the size of the family. Thus the division of land values was remarkably even, for what one man lacked in the area of his portion he gained by its location. . . by this means he established settlements on the available streams and pre-empted at an early date most of the territory occupied in the oasis today.[1]

Variations in Size

All of the settlements along the Wasatch Front in 1869 displayed roughly the same form and property organization as stated above. The chief differences between the villages were related to size. Size of streets varied from four to eight rods in width, and size of blocks varied from four to ten acres. The limiting factor in the size of the settlements was the ability of the natural environment to support the people in their irrigation-based economic organization. Of course, the amount of flat or gently-sloping land often had a great influence on the size of blocks and the width of streets, and the water supply helped determine the size of the farms.

Functions of Settlements

The Wasatch Oasis towns of 1869 showed greatest variety in their

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[1] C. Langdon White, "The Salt Lake Oasis", Journal of Geography, vol. 27, pp. 10-11, 1925.

functions. Even here, however, most of the functions were similar and directed to the same ends.

Religious

In 1869 each community of over 300 people had its own congregation and most of them had built their own chapel. Some of the larger towns had several congregations or "wards", each with a bishop at the head. At intervals along the Wasatch Front, towns were organized in groups of six to twelve wards. This ecclesiastical organization of communities was known as a stake, and the most successful of the towns was usually chosen as the stake center. Here, a building (tabernacle) was constructed with facilities for general meetings of all the members of the stake. A stake president was selected to preside over the group, which met in special conference every three months. Naturally, being a stake center further improved the position of a community; the most successful were usually chosen and the chosen ones became more successful, partly as a result of their stake function. Stake centers along the Wasatch Front in 1869 were: Logan, Brigham City, Ogden, Salt Lake City (four stakes in 1869) and Provo.

Social

The social growth of its members has always been one of the earmarks of the Mormon Church. In the villages the auxiliary organizations provided dances, plays, songfests, sports, lectures, and organized classes to further the social growth of their members. Today, the Church has

achieved world renown for these activities. In the larger towns attempts were made to bring in talented performers from the East, but the limited funds of the settlers in 1869 prevented much of this activity until a later date.

Dormitory

As has been mentioned earlier nearly all of the settlers of the Wasatch Front lived in these villages. The farmers slept there by night and traveled to the surrounding fields to work during the day. The activity of hostile Indians provided an early incentive to live in villages. By 1869 this hazard was largely removed (see footnote 3, p. 57) but the farmers remained in the towns. The desert was all around them and, as Langdon White expressed it: "No restless pioneer pushed out single-handed into the desert wilderness, for under the restrictive conditions imposed by nature, only a compact, cooperative society could prosper."[2]

Economic

The economic life of the Mormon settlers was also very similar from village to village. However, by 1869 there began to be enough variety for the villages readily to be classified by their economic functions (table 7).

Non-Agricultural Activities of Settlements

Table 7 is an expression of the principal functions of the Wasatch

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[2]Ibid., p. 11.

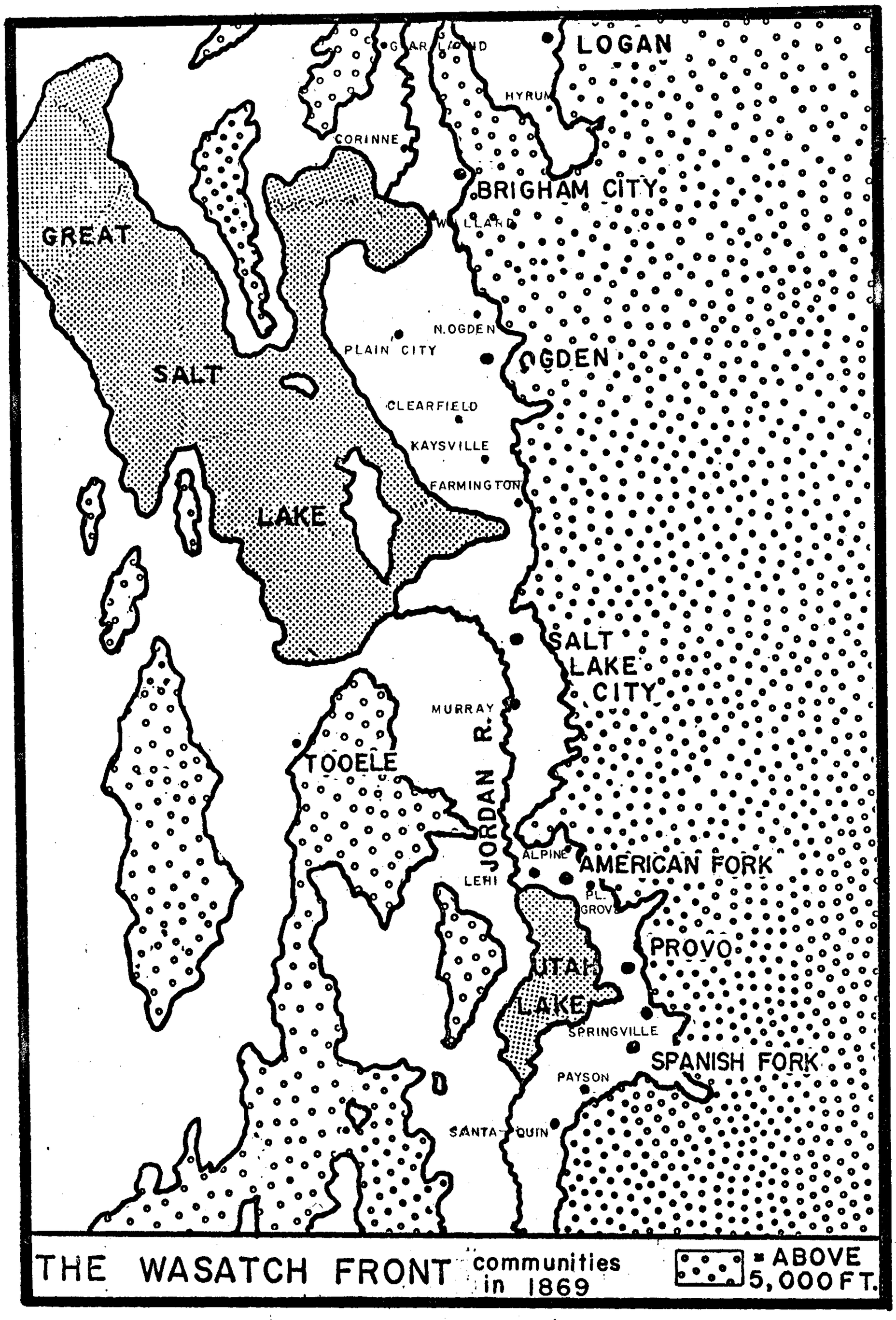
TABLE 7

FUNCTIONAL CLASSIFICATION
OF WASATCH FRONT VILLAGES: 1869

City	Functions	City	Functions	City	Functions
Richmond	A, g[b]	Ogden	CS, T, M, R, D, o	Alpine	A, o
Smithfield	A, g	Plain City	G, a	American Fork	A, O, r
Logan	D, CS, A, G, R	Bountiful	A	Lehi	A, G, d
Hyrum	A, G, d	Centerville	A, G	Pleasant Grove	A
Bear River City	G, a	Farmington	CS, A, g, d	Provo	R, M, G, CS, A, d, t,
Paradise	G	Kaysville	G, a, d	Springville	A, g, t
Brigham City	CS, R, m, a	Salt Lake City	CS, T, O, R, W, M, G	Spanish Fork	A, d, g, r, o
Corrine	T, r, w	Bingham	O, r	Pond Town	A, g
Willard	A	Tooele	G, o, r	Payson	A, g, r
North Ogden	A	Draper	G, o	Santaquin	A, o

[a]Factors determining functional code: CS= County Seat, R= Retail business center, A= Agricultural center (crops), G= Grazing industry--wool, meat, W= Wholesale, M= Manufacturing and milling, D= Dairy, T= Transportation center, O= mining center.

[b]caps. = principal function, lower case = secondary function.


GARLAND
LOGAN
HYRUM
CORINNE
BRIGHAM CITY
WILLARD
GREAT
SALT
LAKE
N.OGDEN
PLAIN CITY
OGDEN
CLEARFIELD
KAYSVILLE
FARMINGTON
SALT
LAKE
CITY
MURRAY
TOOELE
JORDAN R.
ALPINE
AMERICAN FORK
LEHI
PL.
GROVE
PROVO
UTAH
LAKE
SPRINGVILLE
SPANISH FORK
PAYSON
SANTAQUIN
THE WASATCH FRONT communities in 1869
= ABOVE 5,000 FT.

MAP 13

Front communities. While the original agricultural function of these towns and villages was still dominant, at this date some of the larger communities were engaged in diverse non-agricultural activities. Among these activities that can be listed as non-agricultural are business and trade, transportation, manufacturing and mining.

Business and Trade

Business life flourished in these towns even before the coming of the locomotive. A description of Brigham City, Utah, written in 1874 tells much of the concentration of activities in this county seat of Box Elder County, and is taken as typical of conditions just prior to the arrival of the railroad:

> Brigham City . . . is one of the handsomest and best situated little towns in the Territory, occupying a portion of the "bench" land east of Great Salt Lake, and near the mouth of Box Elder and Wellsville Canyon. It is embowered in shade and fruit trees, and in the late Spring, or through the Summer and early Autumn, presents a very beautiful appearance. It has one hotel, Colonel Chester Loveland, proprietor; and the principal business of the place is done upon the co-operative plan. The Brigham City Co-operative Institution, with 372 share-holders, and a paid-up capital of $120,000, has a store for general merchandise, doing the largest business in the place, a woolen factory, a tannery, a boot and shoe factory, a blacksmith and wagon department, a meat market, a dairy-farm, where a large quantity of butter and cheese is made for home consumption and exportation, a cattle-herd, a sheep-herd, two saw mills, and one shingle, lathe and picket-mill, all in successful operation. The institution is managed by a president, and a board of seven directors; elected annually by the directors. Over each department there is a superintendent, who has the immediate oversight of it. In Brigham City there are also two furniture factories.[3]

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[3] Edward L. Sloan, ed., Gazeteer of Utah and Salt Lake City Directory-1874, Salt Lake Herald Publishing Company, 1874, p. 55.

The co-operative mentioned and many others like it along the Wasatch Front were all patterned after the original Zion's Co-operative Mercantile Institution founded by Brigham Young in Salt Lake City in 1869.[4]

The city of Provo boasted two architects, six attorneys, two bakeries, five blacksmith shops, two boarding houses, three butchers, a cooper, a drug store, three flour mills, a cooperative department store, a furniture manufacturer, two clothing stores, three groceries, three hotels, two surveyors, two lumber and coal dealers, a musical merchandise store, three notaries public, four painters, a paper hanger, three physicians, a potter, two provisioners, two saddle and harness makers, three saloons, a billiards, two tailors, a telegraph office, a tinware and metal roofing shop, a wagon shop, and a watch maker.[5]

One might ask where the pioneers found the necessary skills to run blacksmith shops, dairy farms, woolen factories, tanneries, shoe factories, meat markets, saw mills, flouring mills and lathes. Table 8 gives some of the characteristics of the population in Utah in 1869. Many of the original emigrants were artisans rather than farmers and the numerous foreign immigrants in the Wasatch Front communities further added to the diversified character of local skills, education, and backgrounds. The great welding force, of course, was the church.

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[4] Z. C. M. I., as it came to be called, is still in existence today, as are many other of the "co-ops". e.g. Chipman's Co-operative Mercantile is still the commercial hub of American Fork, Utah, today. In the case of the parent store the "Co-operative" aspect of the business no longer exists.

[5] Sloan, p. 84.

TABLE 8

SOME CHARACTERISTICS
OF THE POPULATION OF UTAH IN 1869[a]

PLACE OF BIRTH

China	446	Austria	4	Illinois	2105
Denmark	4957	Belgium	2	Iowa	1492
France	63	Bohemia	3	Massachusetts	492
Germany	358	British America	687	Missouri	908
Great Britain	20,772	Hungary	1	New York	2247
Holland	122	Mexico	8	Ohio	1133
Norway	613	Poland	11	Pennsylvania	1315
So. Europe	78	Russia	13	Territories	157
Sweden	1790	West Indies	3	Utah	41,426
Switzerland	509	Total For. Born	30,702	Total U.S. Born	56,084

OCCUPATIONS

Agricultural	Professional & Personal Svcs.
21,517	5,317
Trade & Transport	Mfg., Mechanical, & Mining
1,665	4,107

[a]Ninth Census of the U.S., Compendium.

Trade between the communities in the pre-railroad era was relatively light. This was a reflection, not only of the difficulties of transportation and great distances involved, but also of the internal self-sufficiency of these communities. The driving of the Golden Spike at Promontory was a significant event in the development of trade and manufacturing in Utah. The Mormons completed trunk lines running the length of the Wasatch Front within nine years following that event, and even in 1874 the locomotives could travel south to American Fork and north to Brigham City. The total value of manufactured products doubled with the population in the decade 1860-1870, but in the post-railroad years of 1870-1880, due mostly to the coming of the railroad and the completion of the trunk lines, manufactures doubled again while the population increased by only 65 percent (see table 9).

Manufacturing in 1869

The leading manufacturing industry in the Wasatch settlements of 1869, flour milling and grist mill products, had a very great connection with both the water and the land. This industry produced 27 percent of Utah's manufactured products and owned nearly half of all of the manufacturing materials. Second in importance, interestingly enough, was the sawing of lumber, while not far behind was the production of woolen goods.[6] The Wasatch Front had 74.4 percent of the territory's manufacturing

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[6]Ninth Census of U.S., Compendium.

establishments in 1870 and produced 80 percent of her manufactured goods. The largest woolen mill was at Provo. This mill was established in 1858 and went into full operation in four new buildings in 1870. The following description, written in 1874, will serve to demonstrate the progress of the woolen industry to that date:

> The Provo woolen mills is a notable feature of the city, being the largest establishment of the kind in the west. The buildings number four; one 140 x 60 feet, four stories high; one 130 x 30 feet, two and a half stories high; one 70 x 30 feet; and one 60 x 30 feet. There are in the mills four "mules"; [spinning machines] with 3,240 spindles, machinery for carding, dyeing and preparing 2,000 lbs. of wool per day; and a hundred and fifteen looms, broad and narrow, which turn out superior fabrics. Two hundred and ten thousand dollars is the amount invested in this enterprise, which is conducted on the cooperative principal.[7]

Provo also had three flour mills located within the limits of the city; while Ogden, destined to become a leading milling center in the West, had only two. Once again the coming of the Pacific Railroad to Ogden brought on a phenomenal growth, not only as a milling center but also as a trade and transportation hub. Salt Lake City, which was the population center of the Wasatch Front and was connected by the Utah Northern Railroad with Ogden and the Pacific Railroad in 1870, remained the leading manufacturing center of Utah in the post-railroad era. The "City of the Saints", with only 17.6 percent of the population produced 26 percent of all manufactured goods in the territory in 1880 and accounted for nearly half of the manufacturing of the Wasatch Front. Other leading manufacturing cities along

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[7]Sloan, pp. 95-96.

the Front were Brigham City, Bountiful, Kaysville, Lehi, Springville and Payson. Attempts, in 1862, to establish a beet-sugar industry at Salt Lake City failed, but a quarter of a century later one of America's first successful sugar beet factories was operating at Lehi. All of the towns mentioned above were reached by trunk railroad connections by the end of the first decade of the railroad era in Utah.

TABLE 9

MANUFACTURING IN UTAH, 1850-1880[a]

Year	Establishments	Wages Paid	Value of Materials	Value Prod.
1850	14	$ 9,984	$ 337,381	$ 291,220
1860	148	231,701	439,512	900,153
1870	533	395,265	1,238,252	2,343,019
1880	640	858,863	2,561,737	4,324,992

[a]Ninth Census of the United States, Compendium.

Mining

Effective transportation was the key to another important activity in Utah. By 1869 most of Utah's metallic mining districts had been discovered. Although a variety of non-metallic minerals had been used by the pioneers,[8] there were several challenging problems to the development of

[8]In 1869, mines in Summit County near Coalville produced 5,500 tons of bituminus coal, and the Mormons had also developed some coal mines in Sanpete County.

the ores containing metals.

Attitude of Church Leaders

Initially, the most important obstacle to the development of mining industries was the official attitude of the Church. Brigham Young had emphasized severely the need for the Saints to rely on the land and not seek speculative gain. In addition there was a limited market for the metals in the territory in 1869 and other markets lay far to the east or west across vast stretches of deserts, plains, or mountains. The chief problem then, as recognized by the Mormon leaders, was the need for cheap transportation to distant areas. Because of these attitudes Utah was unique in the inter-mountain west in developing first an agricultural economy and secondarily her mining resources. This is a reverse of the pattern followed in Colorado, Nevada, Idaho, Montana, Arizona, and Wyoming.

Expansion of Mining Activities

Two developments of the 1860's helped break the unwritten embargo on mining activities. The first development was connected with the activities of non-Mormons in Utah. In the early years of the decade these were chiefly soldiers stationed at Camp Floyd, just south of the Oquirrh Mountains in Utah County, or at Camp Douglas near Salt Lake City. These soldiers found rich deposits of silver, lead, and copper in the Oquirrhs and began explorations in the Wasatch, looking for precious metals. Other non-Mormons in the Wasatch communities began to prospect the mountains and set up mining claims.

The second development was the completion of the Pacific Railroad at the close of the decade. After this event cheap transportation was available. In addition, the rails provided a source for technological knowledge and capital, both of which were lacking and necessary for the development of Utah's mineral resources. The coming of the railroad brought a great expansion of mining activity in Utah, (see table 10) not only by the non-Mormons but also by the Church itself.

> When a solid agricultural foundation had been laid, Brigham Young could also see that Utah's possibilities in farming and livestock were limited by lack of water--that only a small portion of the state's surface could be cultivated. He recognized [that] if Utah were to grow and prosper it must produce the raw materials of industry. Accordingly, in 1873 he wrote the editor of the New York Herald, calling attention to Utah's natural resources and inviting eastern capital to enter the Territory and provide the means for establishment of mining and manufacturing enterprises.[9]

Under Church auspices the coal mines in Summit County were developed for the benefit of the Saints, and later coal explorations in now productive Carbon and Emery Counties were begun by the Church.

> The Territorial Legislature, in 1854, offered a reward of $1,000 for the first discovery of coal near Salt Lake City. This mineral had been found in 1849-1850 near the little town of Wales in Sanpete County, but the transportation problem prevented utilization in the Salt Lake City area. The reward failed to bring results until 1863 when Summit County's first mine was opened at Coalville, and coal was sold to the people of Salt Lake Valley at $40.00 per ton. The Winter Quarters mine first to open in what is now Carbon County, began operations in 1878.[10]

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[9]Utah Mining Assoc., Utah's Mining Industry, (Salt Lake City, Utah, 1955) p. 5

[10]Ibid., pp. 5-6.

The Mormon settlers developed the iron mines near Cedar City in southwestern Utah with their rich deposits of magnetite ore.

> As early as 1849-50 an exploration party, headed by Parley P. Pratt, discovered iron ore near Cedar City. A crude foundry was built and operated for a short time in 1852-53.[11]

Meanwhile other interests began to bring gold, silver, iron, copper, lead and antimony from the Northern Utah mountains. The first organized mining district was the West Mountain District,[12] in 1863; but with the completion of the great over-land railroad and the Utah trunk lines, "prospecting was generally entered upon and districts were organized as the discoveries warranted them."[13]

A description of one of the early Utah mining towns shows a striking contrast to the Mormon "valley towns".

> The mining town of the district, Lewiston, centrally located near the summit of the Oquirrh Range, contains a post office, one store, two saloons, a meat market and a good hotel.[14]

Fate of Mining Towns

Most of these mining towns have been abandoned, and are the "ghost" towns of the Oquirrh and Wasatch Mountains. Such abandoned towns are: Ophir, Mercur, Diamond, and Silver City. Other towns, such as Bingham, have been moved down the canyons, and occupy areas near the edge of the

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[12] Present site of the world's largest open-pit copper mine at Bingham, Utah.

[13] Sloan, p. 112.

[14] Ibid., p. 119.

[11] Ibid.

TABLE 10

A SUMMARY OF UTAH MINING DISTRICTS, 1874[a]

District	Location	Date Organized	Principal Ores
Adams	7 mi. N.E. of Salt Lake City	1873	Lead, antimony, silver
American Fork	American Fork Canyon	1871	Lead, silver, gold
Camp Floyd	S. Oquirrhs, near Fairfield	1870	Silver, antimony copper, cinnabar
Clifton	75 mi. S.W. of Salt Lake City	1870	Lead, Silver, gold, copper
Columbia	S.W. Utah County	1872	Lead, iron
Little Cottonwood	East of Salt Lake Valley near Alta	1868	Silver, lead, gold
Big Cottonwood	25 mi. S.E. of Salt Lake City	1868	Silver, lead
Lucin	140 mi. west of Corinne		Lead, iron, copper
New Foundland	80 mi. N.W. Grantsville	1873	Copper, silver, gold, lead, iron
Ohio	6 mi. south Marysvale 200 mi. south SLC	1868	Silver, gold
Ophir	56 mi. south SLC near Ophir	1870	Silver, antimony lead, copper
Parley's Park	30 east SLC near Park City		Lead, silver, gold
Rush Valley	West of SLC near Stockton	1864	Lead, silver, copper

TABLE 10--Continued

District	Location	Date Organized	Principal Ores
Star	214 mi. S.W. SLC Beaver County	1873	Copper, silver, lead, platinum
Nebo	85 mi. south SLC	1869	Lead
Tintic	So. Utah County near Eureka	1869	Copper, silver, gold, lead, antimony, arsenic, native copper
West Mountain	Bingham Canyon	1863	Copper, lead, silver, gold
Draper	No. East of American Fork	1872	Copper, silver, iron
Hot Springs	No. East of SLC	1870	Silver, Iron
Island	Fremont Island	1871	Copper, silver
Ogden Junction		1871	Iron, zinc, antimony
Pinto	Iron County near Cedar City		Iron, zinc, silver, coal
Snake Creek	West of Heber City		Copper

[a]Compiled from Sloan, pp. 92-119.

valleys, while others, such as Park City and Alta have been converted into prosperous recreational centers.

By 1869 Utah was well on her way to taking good advantage of her natural resources; water, soil, timber, non-metallic minerals and finally, precious and industrial metals. The railroad provided the ballast for the long-sought economic stability of the Mormon empire at the foot of the Wasatch Mountains.

Transportation and Communications

Transportation

There were good roads in Utah even before the railroads came. The Old Spanish Trail between Santa Fe and California ran through Utah and a division of it passed through the southern part of the Wasatch Front descending Spanish Fork Canyon to Utah Valley. It was from this point southwestward that a great road was built by the Mormons to facilitate trade between the communities of Utah and Southern California. The merchants of Salt Lake City often had their freight come by ship to San Bernardino, from where it was carried by wagon to Salt Lake City. Many of the cattle and sheep on Wasatch Front farms and ranches in 1869 had come along this road from Southern California. State Street in Salt Lake City was the northern end of a great road that ran southward through Utah Valley to Nephi and on into Sanpete Valley. This was the main artery of commerce before the completion of the railroad and continued to be used for local transportation in the post-railroad era.

After 1849 the great Overland Trail came through Utah and a road was established east and west from Salt Lake City. Before 1869, most of Utah's supplies came over this road with immigrant trains and later on the great freight and stage lines of the 1860's. Freight supply lines ran northward from Salt Lake City to the mining camps of Idaho and Montana.[15]

There is no question, however, that the railroad brought the greatest progress in trade and transportation to the Wasatch Front. During the month of June, 1855, the Deseret News ran this interesting advertisement:

> The subscriber begs leave to inform the citizens of Utah that the United States mail coach for passengers and parcels, will leave Hawkins Hotel in Great Salt Lake City every Thursday at 6:00 A.M. and arrive at Manti every Monday at 6:00 A.M. and will arrive at Great Salt Lake City every Wednesday at 6:00 P.M. Passengers or parcels . . . will be carried on reasonable terms.[16]

As indicated it took fifty-four hours to complete a trip between Manti and Salt Lake City before the railroad came. After the locomotives arrived in the Wasatch Front a passenger could come from San Francisco to Salt Lake City in less time than it took to come from Manti.

Communications

In 1869 the problem of communications between Utah and the East was greatly alleviated as the rails carried the U.S. Mail into the territory. Previous to this the trans-continental telegraph was the only effective rapid link between the territory and the population centers of

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[15] Levi Edgar Young, Chief Episodes in the History of Utah, (Chicago, the Lakeside Press, 1912) p. 36-37.

[16] The Deseret News, Salt Lake City, June, 1855.

the East. Upon the completion of the continent-spanning telegraph line at Salt Lake City in 1861 the Mormons organized the Deseret Telegraph Company; for the purpose of establishing more effective communication between their own settlements, as well as between those settlements and the outside world. The Civil War prevented receipt of the necessary equipment to operate a local telegraph system until 1866,[17] but by December of that year the telegraph lines had been stretched along the Wasatch Front and the telegraph continued to operate in the post-railroad era. The tapping of the keys of the telegraph spelled doom for the famed Pony Express, just as, three years later, the blast of the locomotive whistle sounded the death-knell of the overland stage. The Wasatch Front was caught right in the middle of both activities and was the scene of the dramatic events which followed.

Thus, the typical Mormon society gained economic strength from the events of late 1860's but became less easily identified as a unique entity. The fears of some--that this greater integration into the world's economic and social patterns would undermine the strength and solidarity of Mormonism--proved to be unfounded. In fact, the events of the years surrounding 1869 marked the beginning of a new era of strength and respect for the Saints from the Wasatch.

This thesis has made no attempt to describe all of the physical and cultural features of the Wasatch Front in 1869, nor has the scope of the work been entirely limited to that year or to any boundries. Rather, I have tried to bring out some of those things that have made the Wasatch

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[17]Kate Baird Carter, The Story of Telegraphy, (Salt Lake City, Utah Printing Company, 1961) p. 19.

Front unique; from the irrigated agriculture, to the stream flow, and even the mining. It seems certain that the year 1869, because of the completion of the transcontinental railroad, is a sort of datum point in the development of the great Mormon experiment in cooperative economics.

In the final chapter, I will attempt to give a description of the Wasatch Front in 1869, drawn from my background of research and personal observation of the area.

CHAPTER V

PANORAMA

THE SOUTHERN MARGINS

The Old Spanish Trail, the southwestern extension of which was called the Mormon Trail in 1869, approached the Wasatch Front oasis from the southwest. From Nephi northward a good graded road was maintained by the territory. The southern Wasatch Front actually began at a small pass over some alluvial fans that stretched across the valley south of Santaquin. In 1869 this place was marked by the beginning of green fields irrigated by streams draining the Wasatch Mountains to the east which rise in an abrupt wall averaging 6,500 feet above the westward valleys. The Santaquin area was spread with fields of spring wheat, Indian corn, and potatoes.

Irrigation

The Wasatch Mountains carried a snow cap, into July, the waters from the melting snows feeding the streams that flow westward from the canyons into the oasis. Santaquin Creek and Peteetneet Creek were two of these streams that were being diverted into irrigation canals in 1869. Wiers were constructed across these creeks raising the water

level so that it would flow into the two main canals that were situated near the place where the waters left the mountains. As the water in these canals flowed toward the lower parts of the valley, it was diverted many times into lateral canals which were opened and closed to the flow by headgates. The laterals led past the farms of the irrigators where other headgates sent water into individual ditches and down the furrows in the potato, wheat and corn fields. This pattern was repeated many times on the creeks and rivers flowing from the Wasatch Mountains: north of Peteetneet Creek was the Spanish Fork with its five main canals, then Hobble Creek, Provo River, Battle Creek, American Fork, Dry Creek, Jordan River, Big and Little Cottonwood Creeks, Parley's Creek, Mill Creek, Weber River, Ogden River, Bear River, Malade River, Little Bear River, Blacksmith Fork and Logan River. All were turned onto the land of the Wasatch Front oasis.

At West Mountain, directly north of Santaquin, are some of the most striking lake-carved terraces to be found in the Great Basin. Here more than a dozen distinct lines can be identified, making the valley appear as a large reservoir drained of most of its water. North of this lone mountain is a large fresh water lake, a remnant of Lake Bonneville which, in Pleistocene times, had covered the whole valley with as much as 1,000 feet of lake water and had created the terraces of West Mountain. Looking to the east the Wasatch Mountains also bear strange markings of the ancient lake. Along the foot of the range some 1,000 feet above the valley floor there is a definite line which stretches

to the north and south almost unbroken for the entire length of the range. This line is a waterworn terrace also and it is marked by fossil beaches, faceted spurs, bars, and deltas. Across Spanish Fork toward Springville the old road passes another unusual landform feature. The usual alluvial fans are relatively abundant along the slopes of the mountains, but at Springville is found a large flat-topped bench. The feature is spread out at the foot of a great canyon in semi-circular fashion and is cut in two by a stream valley. This is evidence that the water that must have filled this valley in some time past had remained for a very long time at the level of this bench and that the stream coming from the great canyon to the east had deposited a large delta in the still waters of that lake. Other deltas at the same approximate level can be identified near Sandy, Salt Lake City, Provo, Ogden, Brigham City and Logan. The largest of these, Provo Bench, gives the name to the stage of the lake that stood at that level for so long.

Springville

Springville, a thriving community was located at the base of the delta first mentioned and took full advantage of several springs that brought fresh water to the surface. The waters of Hobble Creek were diverted down the slopes of a small alluvial fan to irrigate the fields surrounding Springville. In many ways the town was very typical of the Mormon settlements along the Wasatch. No farm houses stood out among the fields, all farmers living in the village and traveling to their farms each day to work. The wide straight streets were laid out in a grid

pattern based on the four points of the compass (see map 13). The two main streets, one oriented north-south and the other east-west, were eight rods wide. Other streets were six rods or four rods across. Around the town stood the remnants of an earth-fill wall, a testimony to the Indian wars, especially to Chief Blackhawk whose braves were finally moved to the reservation in the Uintah Basin in 1867. The blocks of the city were six acre rectangles and the lots were one acre each.

Provo

Six miles north of Springville was Provo, the county seat of Utah County and the first settlement in the valley. The population of Provo in 1869 was 2,384 and she was unquestionably the commercial core of Utah Valley, the most productive agricultural area in the territory. Provo was located at the base of a large delta and was watered by the Provo or Timpanogos River. As well as an agricultural settlement, Provo was an important commercial and industrial town. The Provo Times, published daily in 1869, bore reports of the newly-completed construction of four new buildings to house the Provo Woolen Mills. A wide range of other industries and services was available in Provo in this period, including flour mills, a variety of retail establishments, and the shops of artisans.

Provo Bench

North of Provo the old road climbed up on the Provo Bench, largest of the lacustrine deltas. Here and there young orchards dotted the flat-

topped bench and spring wheat and hay were grown on the rocky soils. To the west, at the base of the bench, were some of the finest pastures of the oasis. These were used for grazing of horses and milk and beef cattle. West of this the large shallow Utah Lake stretches nine miles wide and thirty miles long. The west side of the lake bore no resemblance to the eastern shore. Here sagebrush and bare desert soil ruled the landscape. No stream traverses the slopes of the lake mountains and the orographic storms of the near-Wasatch areas seldom extend west of the lake.

Jordan Narrows

The road passed northward through Stringtown, Pleasant Grove, American Fork. Along the base of another flat-topped bench between American Fork and Lehi were the first evidences of railroad activity in Utah Valley. Mormon elders, called by the church, were attempting to grade the road-bed between Salt Lake City and American Fork. This was to be the first leg of the Utah Southern Railroad trunk line. This section was in operation by 1872, progress on the road being impeded by the lack of track and ties. It took nearly three years for the rails to reach American Fork.

North of Lehi the road traveled beside the meandering Jordan River. This river transports water from Utah Lake to the Great Salt Lake in a journey of forty-three miles. The valley is interrupted north of Lehi by an east-west trending range of mountains (Traverse Range) through which is the northward-flowing Jordan River, which cuts a deep

canyon commonly called the Jordan Narrows. Here workers were laboring on one of the more ambitious projects of the territory's youth, the building of the Salt Lake and Jordan Canal. Harnessing the river was a tough job considering the equipment the settlers had to work with, and building the high-line canal out into the heart of Salt Lake Valley took another nine years after 1869. Farther downstream several smaller canals diverted water to the lower parts of Salt Lake Valley. In this area, too, were the work crews grading the railroad bed in preparation for the day when the great Pacific road would deliver the rails and hardware necessary to complete the local trunk lines.

SALT LAKE VALLEY

The Salt Lake Valley was almost entirely surrounded by mountains. To the south the Traverse Range separated Utah and Salt Lake Valleys, to the west the Oquirrhs flanked the valley and to the east were the majestic Wasatch Mountains with their ancient lake terraces. Nestled in a nook of the Wasatch was the "City of the Saints", Salt Lake City; and beyond the city the flat stretches of the Great Salt Lake and the salt flats. The valley itself was a large plain, the western half of which, in 1869, seemed as dry and sterile as the Sevier Desert, 100 miles to the southwest. Lines of cottonwood trees traced the paths of several streams entering the valley from the east and watering its eastern slopes. A few miles to the northeast of the Jordan Narrows was a tremendous alluvial fan which stretched half-way across the valley from the Wasatch Mountains nearly to the northward flowing Jordan. Eastward from this fan was a large U-shaped

canyon which penetrated deeply into the Wasatch Range. Travelers along the old road in 1869 probably did not guess that a great glacier one pushed down this canyon to the floor of the valley. Further north along the mountains several other spectacular canyons cut eastward into the Wasatch. Located along the streams which gorged from these canyons, were the Mormon communities, surrounded by irrigation works, cultivated land, and marked by the presence of poplars and cottonwoods. These communities and farms followed almost exactly the same pattern as those southward in Utah Valley.

Salt Lake City

With a population in 1869 of 12, 854 Salt Lake City was the largest of the Mormon towns. It was also the religious, political, commercial and cultural capital of the territory. Proceeding down the main street of the city one might have heard water running down the street. Examination would have shown that both sides of the street were lined with irrigation ditches, used even at night. The streets were wide and laid out in the typical grid pattern of the Mormon cities. In 1869 there were many impressive buildings in the city. Many of them were religious edifices, but commercial and manufacturing structures were also present. In the central square of the city there was a large oval-shaped tabernacle under construction and the foundation stones of solid granite for a huge rectangular temple had been placed.

DAVIS COUNTY

North of Salt Lake City and close to the mountains were some hot springs. From a hill above these springs one could look out upon the Great Salt Lake which was not easily visible from the city. The lake seemed to extend unendingly to the northwest and came very close to the Wasatch Mountain Front at a point just north of the warm springs. Well-worn shorelines were lacking, evidence that the lake was at a period of high water.

In Davis County along a cultivated valley between the lake and the Wasatch Mountains was an interesting pattern of land-use. The lands closer to the lake were too wet for cultivation and were used for pasture; the lands close to the mountains were cultivated and irrigated and supported a variety of crops including corn, wheat, Irish potatoes and beans. On the edge of the plain was an area that was being dry-farmed. On the fans and foothills farther up the mountain slopes were orchards of pears, apricots, cherries, apples, peaches and prunes; some of which were still small trees, having been imported from California and the East.

The mountain faces themselves supported greasewood, scrub oak and a variety of grasses, with very little timber in evidence on the westward facing slopes. Large herds of sheep were moved from their winter range in the valley to a mountain range for the summer. With the melting of winter snows the herds were quickly moved into the high pastures of the Wasatch.

Ogden

Farther north was the city of Ogden, which in 1869 was the scene of great excitement about the transcontinental railroad. The iron rails of the Union Pacific stretched through the city and the company had completed work to an area beyond the advanced camp at Corinne. At the same time the rails from the west were approaching Promontory. A gala celebration had been planned for the joining of the rails. Flood damage to the rail bed in Weber Canyon had occurred in April, but had been repaired and the rails were ready for the May 10th joining at Promontory.

THE NORTHERN MARGINS

Box Elder County

The road followed the rails for a great distance north of Ogden, skirting a large fan just north of that city. To the west was a large flat plain covered mostly by salt grass swamp and seemingly unfit for cultivation. Beyond this area were the waters of the Great Salt Lake. To the north was another area where the lake stood very close to the base of the Wasatch Mountains. To the west, across Bear River Bay, were the mountains of Promontory Point. At the apex of another alluvial fan, which rested at the base of a steep rugged limestone canyon and dipped gently into the lake; the road dropped toward another valley with several small settlements strung out along the base of the mountains. To the northwest was the tip of Willard Bay of the Great Salt Lake which is a diked reservoir today. Skirting the bay in 1869 the Union Pacific rails disappeared westward into the distant wilderness and an historic meeting

with destiny. A large river meandered toward the bay from the north. At the foot of the hill as the road descended into the valley were the tree-lined streets of Brigham City, which was located on a bench at the mouth of two canyons.

The Bear River

A few miles north of Brigham City the road intersected Bear River. On the left bank of the river a tributary stream wound across the valley. Some distance up this tributary could be seen the dry farms which would make the Malade region famous. Further along the road the valley of the Bear River became more deeply incised into the plain. The nature of this valley aroused speculation among many that a great dam could be constructed here to arrest the waters of the Bear River for irrigation, flood control and power production. This dam was never built. Near this point was a large canal which rounded the north end of the Wasatch Front and varied from eight to ten feet in width. The Bear River Canal was brought to irrigate the region around Brigham City and was one of the most impressive engineering works of the area.

Ascending a hill the road afforded a spectacular sight. To the north-east lay the three-hundred foot deep entrenchment of the Bear River and to the south the front wall of the Wasatch Mountains stretched into the distance. To the east were the grass covered bottoms of Cache Valley and northward the old stage road led into the Territory of Idaho. Along this road freight lines left the bounteous Wasatch Front loaded with supplies for the mining camps of Idaho and Montana. And so, the people

who had come to the arid West seeking mineral wealth were sent food and supplies by the Mormons who had come to the Great Basin seeking religious freedom and economic stability.

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ABSTRACT

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Scope and Purposes: This study is a geographical description of a specific area at a particular point in history. The year 1869 was chosen for the study of the Wasatch Front because it is a datum point; something to work from. Following the completion of the transcontinental railroad at Promontory, Utah, on May 10, 1869, the typically Mormon society at the Wasatch Front oasis began to be more rapidly integrated to the cultural and economic influences from the East. A geographic study of this area in 1869 focuses attention on the nature of the Mormon civilization and more fully illuminates the effect of progress on the area.

The Wasatch Front. The area at the eastern edge of the Great Basin was carefully studied by Mormon leaders before they arrived in the Salt Lake Valley. They felt that this area would be adequate for the development of a Mormon empire in the Far West. They desired only a measure of economic independence and freedom from their oppressors; their loyalties belonged to the United States. The Wasatch Mountains made it possible for an irrigated agricultural civilization to be established, as they provided snow storage and intensified orographic precipitation for the valleys below.

Irrigation. Mormons began irrigating the day they arrived in the Salt Lake Valley, and, by 1869, had developed a complex irrigation system.

Canals, laterals, and ditches brought water to almost all of the irrigable land in the Wasatch Front by 1869. The canals were built by cooperative efforts under the direction of the Latter-Day Saints Church.

Agriculture. Just as the Church did not own the water it administered, the settlers had no legal title to the land they occupied. The Wasatch Front was occupied in small parcels of intensive farm land. The major crops were wheat, corn, and potatoes. Much pasture land was utilized in the valleys and in the mountains for the grazing of sheep, cattle, and horses. The raising of orchard products and market gardening expanded rapidly following the completion of the Pacific railroad.

Communities. Nearly all Mormon farmers in 1869 lived in villages. These villages were located to take the fullest advantage of the physical environment, and settled under direct instruction from the leaders of the church. The settlements were usually laid out in a prescribed form known as the "City of Zion," and were the religious, social, cultural and economic centers of their respective farming areas.

Business and trade, which had grown slowly previous to the driving of the golden spike at Promontory, expanded rapidly in the post-railroad era. Thanks to the presence of many skilled immigrants, manufacturing grew steadily in the Wasatch communities, but development of mining was delayed until the efforts of non-Mormons and the coming of cheaper transportation broke the Mormon embargo on mining speculation.

Conclusions. By 1869, the Mormons had successfully colonized parts of the Great Basin. The most fruitful area was that which they had selected while still east of the Mississippi--the Wasatch Front. By turning water upon the land, they had made the desert blossom. When the railroad arrived, Mormons already had achieved much of the strength and solidarity for which they are noted today.