Division of Publications,
Utah Agricultural Experiment Station,
Logan, Utah

Mimeograph Sheet No.
April 1, 1936

UTAH COOPERATIVE SNOW SURVEYS

And

WATER-SUPPLY FORECASTS

1936

Cooperators

Utah Agricultural Experiment Station

Utah State Engineer

United States Weather Bureau

United States Forest Service

United States Bureau of Agricultural Engineering

By

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with

Utah State Engineer Cooperating

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Mimeograph Sheet No.117
April 1936

WATER-SUPPLY FORECAST FOR UTAH, 1936

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In Utah, agriculture is dependent on irrigation and the entire economic and social structure of the people is built upon the adequacy and reliability of the water-supply. If there is any truth in the saying that "to be forewarned is to be forearmed", then a knowledge of the probable water-supply in advance of its occurrence is of great value in making the most complete utilization of the water when it comes. Water-supply forecasts provide this advance knowledge and form the basis of the planting program of the farmer, the generating program of the power company, and the water-conservation program of the municipality.

In Utah, approximately 80 per cent of the runoff for April-September, inclusive, is derived from precipitation which falls on the high watersheds in the form of snow. This accumulated precipitation may be measured in advance of its appearance as runoff. For many years the Utah Agricultural Experiment Station has been studying the relationship of the accumulated snow cover to the runoff. Under cooperative agreement between the Utah Agricultural Experiment Station, the Utah State Engineer's Office, the United States Forest Service, and the United States Weather Bureau, the high watersheds of the state of Utah have been covered with a network of snow courses which are measured each spring at the end of the precipitation season. These snow surveys form the basis of the seasonal water-supply forecasts.

During the period from March 26 to April 1, snow surveys were completed at all of the snow courses. The snow-survey data at this time, therefore, may be taken as indicative of the April-September and July-September runoff with, of course, later modification of estimates in accordance with subsequent storms and temperature conditions.

This report presents:

1. Map of state showing location of snow courses.

2. Forecasts of July-September and April-September runoff for the streams on whose drainage areas snow surveys have been conducted for a sufficient number of years to make it possible to forecast stream-flow quantitatively.

3. A brief statement of conditions on other watersheds of the state, based on available records.

4. Tabulation showing water in storage as of April 1, 1935.

5. Results of the annual snow surveys, grouped according to stream basins.

BEAR RIVER

Above Bear Lake

Prior to 1935 there were no snow courses on this area. In 1935 a snow course was established near the Mill Creek Ranger Station(elevation, 9000 feet). Other snow courses outside the drainage which have been found representative of the conditions on Bear River are: Garden City Summit (9); Blacksmith Fork (8); and Lost Lake (28). These are all high-level snow courses. There are no low-level courses on this area, but precipitation records at Woodruff and Laketown show a valley precipitation to be above normal. A field survey made early in March showed a water content of approximately 10 inches in the snow on the valley floor. The water content of the snow cover at Lost Lake(elevation, 10,000 feet) shows a snow cover 160 per cent greater than in 1935 and 116 per cent of normal. The Blacksmith Fork course(elevation, 8400 feet) shows a water content 139 per cent of last year. The Garden City course shows a water content 207 per cent of last year and 115 per cent of normal. The course on the headwaters of Bear River below the Mill Creek Ranger station shows 14.2 inches of water, while the cover on April 1 at the Goodman Ranch contained 10 inches. The ground under the snow was dry at the beginning of the melting season, and it can be expected to absorb a considerable portion of the water from the snow. Measurements of soil moisture indicate that from 4 to 8 inches of water in the snow will be absorbed during melting to prime the soil. The exact amount will depend upon the rate of melting. The abundance of low snow this year will tend to offset absorption losses so that a greater net yield of water from the high snow can be expected. The following tabulation shows the April-September runoff of Bear River above Harer (Idaho) and the total annual inflow from Bear River to Bear Lake for the period 1930 to 1935, inclusive.

Year	Runoff in Acre-feet at Harer(Idaho) April-September	
1930	199,000	
1931	50,500	
1932	272,700	
1933	154,100	
1934	19,000	
1935	117,800	
1936	300,000	(Estimated)

With the abundance of low snow to prime the soil a precipitation above normal during April and May may increase the yield of Bear River to Bear Lake up to 330,000 acre-feet during 1936.

Bear Lake Drainage

The snow courses at Garden City Summit and Blacksmith Fork, together with the precipitation on the valley floor, are indicative of the snow cover on the Bear Lake Drainage. The season of 1935-36 has been marked by a dry fall and early winter, with an abundance of precipitation during January and February accompanied by high winds. The cover over the Bear Lake Valley floor is continuous and heavy. Random measurements during early March indicated a water content of approximately 12 inches on the valley floor. The measurement at the Garden City Summit course shows a water content 207 per cent of last year and 115 per cent above normal. At Blacksmith Fork the cover is 139 per cent of last year. The soil under the snow is not frozen, but the abundance of low snow will quickly prime the soil and a considerable early yield

from this low cover can be expected. The following tabulation shows the total runoff from the Bear Lake tributary streams in acre-feet for the 1930-35 period, inclusive.

Year	(Acre-feet) Yield Bear Lake Drainage to Bear Lake	
1930	77,000	
1931	36,900	
1932	108,000	
1933	94,300	
1934	31,200	
1935	55,200	
1936	120,000	(Estimated)

A normal or above-normal precipitation during April and May will probably increase this yield from 5000 to 10,000 acre-feet, while absence of spring rains and slow rate of melting will probably reduce it by similar amounts.

Probable Rise of Bear Lake Level

It is estimated that the probable total rise of the level of Bear Lake during 1936 will be 6 feet, which represents approximately 300,000 acre-feet, exclusive of evaporation during the period of rise.

CACHE VALLEY STREAMS

Cub River Drainage

Measurements on the Franklin Basin snow course are representative of the snow cover on the Cub River watershed. This year there is an abundance of low snow on this watershed, and the high cover, as measured at Franklin Basin, has a water content of 39.7 inches as compared with 24.4 inches last year, with a long-time normal of 37.8 inches. The soil under the snow is open and quite dry. The abundance of low snow, however, will offset the dry condition of the soil and good yield of water can be expected. With normal temperatures and precipitation during April and May, the runoff from Cub River this year will probably exceed that in 1935 by 60 per cent. The abundance of low snow constitutes a potential flood, and a rapid rise in temperature with spring rains will cause exceptionally high water. Precautions should be taken to clear the channel of obstructions and to repair headgates for the protection of the canals.

Maple, High, Summit, and Providence Creeks

These drainage areas are all on the west side of the Bear River Range and are relatively short and steep. There is an abundance of low snow on these watersheds and a heavy high cover. The winter flow of these streams has been considerably higher than last year. The ground under the snow is open but quite dry. The low snow will yield high early runoff, while the high snow will maintain a good late-season supply, provided the spring temperatures and precipitation are normal. Unusually early high water can be expected from all of these streams and precautions should be taken to clear the channels and to repair control works to prevent damage. The April - September runoff from these streams can be expected to exceed that of

last year by at least 50 per cent.

Logan River Drainage

An extremely light precipitation fell on the Logan River drainage up to January 1, 1936. This deficient precipitation left the watershed in an extremely dry condition. The heavy precipitation of January and February overcame the early deficiency of precipitation, but it fell on dry ground and a considerable portion of it will be lost to runoff through absorption. To offset this absorption, there was on April 1 an abundance of low snow on the watershed. This low snow will increase materially the yield of early high water and perhaps cause damaging flood conditions, if proper precautions are not taken to clear the stream channels and to repair diversion works. Up to April 1 there has been little melting and the streams have not yet started to rise.

The annual snow surveys of the Logan River watershed present quite a different picture from that of a year ago(1935). At all stations the snow cover is much heavier this year, and the low cover as measured at Tony Grove Ranger Station (elevation, 6250 feet) is approximately twice that of any year in the past 12-year period. The low stations averaged approximately 200 per cent of their long-time mean. The high stations averaged 103 per cent of their long-time mean. These measurements indicate a snow storage approximating 1.65 times that on the same watershed a year ago and approaches the snow storage available on April 1, 1932. Keeping in mind the probable losses due to absorption and the extremely heavy low snow, it is estimated that the yield from the Logan River watershed during the period April - September will be approximately 200,000 acre-feet. It may go as low as 180,000 acre-feet or as high as 210,000 acre-feet. The runoff for the period from July to September is estimated as being approximately 60,000 acre-feet with a probable maximum and minimum of 65,000, 55,000 acre feet respectively. Normal or above-normal temperatures and precipitation during April and May will increase these estimates, whereas a deficient precipitation during April and May, together with a cold spring, will materially reduce them.

The abundance of low snow on the Logan River watershed at the present constitutes a potential flood. A rapid rise in temperature, together with the spring rains, will cause the rapid melting of the low snow cover and create extremely high water on the Logan River. It may discharge a peak flow of 2000 c.f.s. Precautionary measures should be taken to clear the Logan River of unnecessary obstructions in the channel, to remove the flash boards from the diversion dams, and to repair headgates and control works in anticipation of possible excessive high water. It is estimated that the late-season flow during 1936 will not be less than 150 c.f.s.

Blacksmith Fork

Precipitation per unit of area on the Blacksmith Fork watershed is less than that on the Logan River watershed. The Blacksmith Fork snow course has been measured for five years and has been found to be fairly representative of snow cover conditions on this watershed. This year, in addition to the Blacksmith snow course, the snow cover at the Blake Ranger Station(elevation, 8000 feet) has been measured as well as at the Monte Cristo Ranger Station(elevation,9000 feet). The Blacksmith Fork course shows a snow cover containing 16.3 inches of water, which is 140 per cent of the cover in 1935. The snow cover at the Monte Cristo and Blake Ranger Stations shows a water content of 39.6, 22.1 inches, respectively. Precipitation on this watershed fell on a dry soil, and a considerable portion of the water will be absorbed in priming the soil. Measurements indicate that probably no more than 5 inches of water will be required for this purpose during a normal melting season. The runoff to be expected from the Blacksmith Fork River during the season of 1935 will closely

approach that of 1932. It is estimated that the discharge from the Blacksmith Fork River during the period from April to September will be approximately 82,000 acre-feet, with a possible maximum and minimum of 87,000 and 75,000 acre-feet, respectively. It is estimated that the July - September discharge will be approximately 23,000 acre-feet, with a probable maximum and minimum of 25,000 and 20,000 acre-feet, respectively. The variations above or below the estimated quantity will be due to above or below normal spring precipitation and temperature.

Little Bear River

Little Bear River has a lower average elevation than Blacksmith Fork River. Up until this year there were no snow courses on this watershed. It is believed that the snow course at the Blake Ranger Station and the Monte Cristo Ranger Station represents the conditions on the upper regions of this drainage. Based on the snow cover at the Blacksmith Fork course, it is believed that the Little Bear River run-off during 1936 will be approximately 200 per cent of that in 1935. Melting is progressing to a slight degree on this watershed.

On April 1 the stream is rising, but it remains quite clear. Ordinarily by the first of April a considerable portion of the low snow has run off from this watershed. Low temperature during the latter part of March prevented this normal early runoff. The Hyrum Reservoir will fill as high as the authorities will permit, and a considerable portion of spring high water will be discharged through the spillway.

Weber River

The major portion of water in Weber River comes from the four main branches: Chalk Creek, Lost Creek, East Canyon, and the main Weber above Oakley. Snow courses on this watershed are located at Smith and Moorehouse, Redden Mine, Beaver Creek Nursery, Parleys Canyon Summit, and Washington-Longlake. In spite of the fact that there was a marked deficiency on this watershed up to the first of January, the copious storms during January and February, together with the March precipitation, overcame this deficiency. The water content of the snow cover, as indicated by the measurements at Smith and Moorehouse, Redden Mine, and Washington-Longlake, is approximately 194 per cent of that of last year. The Parley's Canyon snow course has been measured for only three years, and no normal has been established. However, the snow cover on this course is 1.6 times that on April 1, 1935. It is believed that the runoff from the East Fork of the Weber River will more than fill the East Canyon reservoir and bear the same relationship to the runoff in 1935 as that on the main river.

The 1934 runoff during the period from April to September at Oakley was 43,340 acre-feet; during 1935 it was 127,010 acre-feet. For corresponding years the July-September runoff was 6630 and 20,310 acre-feet. Based on a comparison with last year and 1932, the April-September runoff during 1936 should approximate 225,000 acre-feet and during July-September 30,000 acre-feet. Abnormal temperatures and precipitation during April and May will modify these estimates. It is believed that the following maximum or minimum runoff may be expected on the Weber River at Oakley during 1936.

P.H. Sorensen, Water Commissioner on the Weber River, estimates that the Echo and East Canyons reservoirs will fill even if there is a deficiency of precipitation during April and May and that there will be plenty of water to care for all rights during May and June without storage. The natural flow of July, August, and September, however, will be less than required, and those having no storage rights will suffer a water shortage during that period.

Ogden River

There are no satisfactory snow courses on the Ogden River, but the snow cover on the Blacksmith Fork and Weber watersheds indicate a probable runoff from the Ogden River from April to September of approximately 236 per cent of that in 1935. The July-September runoff will approximate 160 per cent of that in 1935. The abundance of low snow in Ogden Valley is conclusive evidence of a high early spring runoff from the Ogden River, and spring floods of high magnitude can be expected. The high snow, as indicated from the Monte Cristo snow courses, will supply under normal melting conditions a well-sustained-late-season runoff. It is estimated that the April-September runoff from the Ogden River in 1936 will approximate 110,000 acre-feet and that for July-September 9700 acre-feet, with a possible maximum and minimum of 115,000, 105,000 and 105,000 and 9000 acre-feet, respectively.

PRICE RIVER DRAINAGE

Price River supplies water for the area in the vicinity of Price, Helper, Wellington, and Cleveland in Carbon and Emery Counties. The Huntington-Horseshoe, Gooseberry Reservoir site, and the Mammoth-Cottonwood snow courses are located on the headwaters of this stream.

In 1935 two new snow courses were established in Pleasant Valley: One at Scofield(elevation, 7600 feet) and the other at Dry Valley Summit(elevation, 8000 feet). The drainage from all of these courses runs into the Scofield reservoir. The snow course on the Indian Canyon Summit represents the snow cover and runoff into Willow Creek which discharges into the Price River at Castlegate. The snow storage on the Price River watershed this year is 196 per cent greater than for 1935 and 113 per cent of a long-time average. The snow cover is uniform and continuous even on the southern slopes and there appears to have been little melting. That which has taken place has been absorbed by the dry soil underneath the snow. The absence of fall rains has left the soil in an unusually dry condition, and the losses from the snow cover by absorption can be expected to be relatively high. The snow is of a relative high density, and a rapid prolonged rise in temperature will yield considerable water for storage and a high flood runoff.

The storage in the Scofield reservoir on April 1, 1935 was 1000 acre-feet. This year there was a hold-over storage on April 1 of approximately 11,000 acre-feet. The heavy snow cover on upper Gooseberry and the relatively heavy cover on the lower elevations will probably yield 60,000 to 70,000 acre-feet above the Scofield reservoir. This will more than fill the Scofield reservoir to its allowable capacity and furnish early spring water for all users. An abnormally cold spring with subnormal precipitation will reduce the water available for storage to some small degree. The total April-September flow at Helper will probably reach 90,000 acre-feet during 1936.

Huntington, Cottonwood, and Ferron Creeks

The Huntington, Cottonwood, and Ferron Creeks furnish water for the major portion of Emery County in the vicinity of Huntington, Castledale, Orangeville, Emery, and Ferron. The snow courses representing these watersheds are all high: The Huntington-Horseshoe(elevation, 9750 feet), the Great Basin(Alpine) Experiment Station(elevation, 10,200), and the Seeley Creek Ranger Station(elevation, 10,000 feet). These courses show a water content this year 154 per cent of 1935. Based on these measurements, the forementioned streams should yield in 1936 approximately 154 per cent of that in 1935. This would represent on the Huntington Creek approximately 75,000 acre-feet for the April-September period and 16,000 acre-feet for the April-July period.

SALT LAKE WATERSHEDS

These watersheds include City, Immigration, Parleys, Big Cottonwood, and Little Cottonwood Creeks. The only snow courses on these areas are those located at Lambs Canyon(elevation, 6000 feet), Parleys Canyon Summit(elevation, 7800), and Silver Lake(elevation, 8900 feet).

The measurements at Silver Lake indicate a snow cover approximately 169 per cent greater than in 1935; at Parleys Canyon Summit, it is 160 per cent of 1935; and at Lambs Canyon, it is 162 per cent of 1935. There is an abundance of low snow in these watersheds, and considerable high water can be expected from these streams.

All reservoirs on these watersheds will fill, and the Big Cottonwood Canyon streams are expected to yield approximately 54,000 acre-feet during the April-September period and 11,000 acre-feet from July to September. The abundance of low snow creates a potential flood condition on these watersheds, and precautionary measures should be immediately taken to remove obstructions from the natural channels and to prepare headgates and diversion works for proper control of the water.

Provo River and Utah Lake

Snow courses on the Provo River are located at Daniels Creek Summit, Soapstone Ranger Station, Lake Tryol, Washington Long Lake, Lost Lake, and the Beaver Creek nursery on Beaver Creek. The high snow courses indicate a snow storage 171 per cent greater than on April 1, 1935 and 117 per cent of the long-time average. In addition to the heavy high snow cover, there is an abundant low snow storage, the water content at Beaver Creek Nursery(elevation, 7500 feet) being 159 per cent of a long-time normal. The record at Beaver Creek Nursery shows a water content of 14 inches and at Soapstone Ranger Station(elevation, 8100 feet) a water content of 18.9 inches. At Daniels Creek Summit the snow contains 19.6 inches of water, as compared to 12.5 inches on the same date last year. There has been a minimum of winter melting The dry condition of the soil under the snow will absorb a considerable amount of water as the snow melts; in spite of this absorption, however, there is sufficient cover on the low watersheds to cause considerable high water during the spring. An early and rapid melting will precipitate flood flow on the Provo River. The probable runoff from the Provo River for the April-September period will be approximately 210,000 acre-feet and for the July-September period approximately 58,000 acre-feet. These estimates may be increased or decreased by as much as 10,000 acre-feet, depending on spring conditions. It is estimated that the discharge from the Provo River into the Utah Lake this year will amount to approximately 100,000 acre-feet. This contribution to Utah Lake, of course, is dependent upon the rate and time of melting. If the temperatures remain low, a larger portion of this flow will be diverted by primary rights on Provo River. If spring temperatures are high, high-flood flow can be expected with a greater contribution to Utah Lake.

On April 1, 1935, there was available to the Pelican Point pumps a total of 118,000 acre-feet. The lake is rising, and it is estimated that a total yield of 90,000 acre-feet may be expected this year from Utah Lake and Jordan River as compare to 72,000 acre-feet in 1935.

American Fork River

The snow cover on the American Fork River drainage is indicated by the snow measurements at Dutchman Ranger Station and at South Fork, Altamont, and Timpanogos Divide courses. The snow cover on all of these courses is especially heavy this year

SUMMARY

The Utah Cooperative Snow Surveys, which were completed over a network of approximately 80 courses on March 30, indicate a snow storage on the stat's watersheds above normal over northern and central Utah but considerably below normal on the Sevier River and in eastern Utah and about normal on the Virgin River and Coal Creek. There is an unusually heavy cover of low snow on the Price, Provo, Weber, Ogden, Logan, and Bear Rivers. This low cover is conducive to high spring flow, while the high cover will furnish a much larger late-season flow than for 1935.

There is little or no low snow on the Sevier on Uinta Basin streams. Water-supplies in these areas from natural flow will be less than in 1935, but there is more storage in the reservoirs than there was a year ago.

Heavy storms occurred during and for three or four days after the snow surveys were made. These storms contributed considerable water, but it is believed that they will not materially affect the forecast because April is normally a wet month.

The presence of a heavy low snow cover constitutes a potential flood on the northern and central Utah streams. The snow cover on April 1 was of high density. The excessive temperature during early April have increased the density to from 45 to 50 per cent and now (April 13), the water is leaving the snow rapidly over the low areas. The Ogden River has started its spring flood flow and will probably reach 3000 c.f.s. The Weber and Little Bear Rivers are rising rapidly. The Logan and Provo will come up a few days later. The large amount of water in snow storage on the low areas of these watersheds justifies the following warning:

1.- All owners of mountain reservoirs should examine their spillways and outlet works and should clean and repair trash racks and see that gate-operating devices are in working order.

2.- Stream channels should be cleaned of debris and headgates put in order to protect the canals.

3.- Canals should be cleaned so that they may be loaded to capacity to relieve peak-flood flow through lower areas.

There will be no serious water shortage in northern and central Utah during 1936, although the late summer's flow will be low and must be used carefully. In southern and eastern Utah there will be a water shortage, the extent of which will depend largely upon the spring and early summer precipitation. Water must be conserved and used carefully in these areas.

The following tables show a brief summary of the snow cover, reservoir storage, and water-supply that may be expected from the principal watersheds of the state during 1936:

Table I — FORECAST SUMMARY —

NAME OF STREAM OR BASIN	Run-off 1000's Acre Feet								Expected Run-off for 1936 in Per cent of 1935	
	1936 (est.)		1935		1934		1933			
	I	II	I	II	I	II	I	II	I	II
BEAR RIVER										
Harer, Idaho	300.0		117.8		19.0		154.0		256	
*Bear Lake Drainage	110.0		55.2		31.0		94.8		200	
CACHE VALLEY STREAMS										
Miscellaneous Small Streams									160	
Logan River	190.0	60.0	114.5	36.3	50.7	16.5	112.8	40.8	166	165
Blacksmith Fork River	82.0	23.0	35.5	11.3	18.5	8.0	47.9	16.5	230	200
Little Bear River									200	210
WEBER RIVER										
South Fork of Ogden River	110.0	9.7	46.6	6.1	12.3	4.3	62.8	7.6	236	160
Weber River at Oakley	225.0	30.0	127.0	20.3	43.3	6.6	120.3	17.3	177	150
SALT LAKE CITY WATERSHED										
Big Cottonwood Creek	54.0	11.0	33.7	6.8	12.8	2.4	38.2	7.7	160	
PROVO RIVER AND UTAH LAKE										
American Fork River									200	200
Provo River	210.0	58.0	125.3	34.2	37.3	14.2	115.7	34.0	168	169
Hobble Creek									200	200
Spanish Fork River									180	180
SEVIER RIVER										
San Pitch Tributaries									160	160
Salina Creek									95	90
Clear Creek									90	90
East Fork of Sevier									60	60
INDEPENDENT STREAMS										
Fillmore Streams									98	98
Beaver River	43.0	8.0	30.6	6.9	9.6	2.7	26.4	6.6	140	116
Coal Creek									90	95
UINTA BASIN STREAMS										
Duchesne River at Tabiona	100.0	20.0	73.7	15.9	38.2	10.2	71.3	15.8	136	126
Lake Fork at Myton	85.0	4.0	34.3	3.2	1.8	0.3	31.0	1.8	100	125
Whiterocks Creek at Whiterocks	56.0	14.0	55.7	14.0	21.1	8.4	47.1	15.6	85	100
Ashley Creek at Vernal	50.0	11.0	53.5	12.9	23.1	8.0	36.6	10.4	103	85

* Total for year October to September

I - April to September, inclusive
II - July to September, inclusive

Table I (Cont.)

-- FORECAST SUMMARY --

NAME OF STREAM OR BASIN	Run-off in 1000's Acre Feet								Expected Run-off for 1936 in Per cent of 1935	
	1936 (est.)		1935		1934		1933			
	I	II	I	II	I	II	I	II	I	II
NORTH SIDE UINTA MOUNTAINS									143	
PRICE RIVER										
Price River	90.0		44.9	20.9	16.3	4.2	54.8	26.7	200	
Huntington Creek	75.0	16.0	53.3	13.2	15.9	3.6	54.2	13.1	141	121
Cottonwood Creek			69.6	9.9	17.7	3.2	26.8	14.9		
VIRGIN RIVER										
Virgin River	128.2	33.2	89.0	17.6	33.7	15.9	62.4	20.7	144	189
LA SAL MOUNTAINS										
Mill Creek									54	
MONTICELLO AREA										
Montezuma Creek									50	

I - April to September inclusive
II - July to September inclusive

Table II

COMPARISON OF RUNOFF FROM PRINCIPAL UTAH STREAMS

Name of Stream	April - September Runoff									July - September								
	Average	1933		1934		1935		1936 (est.)		Average	1933		1934		1935		1936 (est.)	
	Apr.-Sept in A.F.	A.F.	% of Mean	A.F.	% of Mean	A.F.	% of Mean	A.F.	% of Mean	Jul.-Sep in A.F.	A.F.	% of Mean	A.F.	% of Mean	A.F.	% of Mean	A.F.	% of Mean
Logan River at Logan	165.2	112.7	68.2	50.7	30.7	1146	69.4	200	121	54.6	40.8	74.7	16.5	30.2	36.4	66.7	60	110
Blacksmith Fork at Hyrum	75.8	47.9	63.2	18.5	24.4	35.5	46.8	82.0	108	25.1	16.6	66.1	8.06	32.1	11.3	45.0	23.0	92
Weber River at Oakley	150.5	120.3	79.8	43.3	28.8	127.	84.4	225	150	31.3	17.3	55.3	6.6	21.1	20.3	64.8	30.0	96
Ogden River, S.Fork Near Huntsville	63.6	62.8	98.7	12.3	19.3	46.6	73.3	110	173	8.5	7.6	89.4	4.3	50.6	6.1	71.8	9.7	114
Provo River at Provo	190.8	1157	60.6	37.3	19.6	1253	65.7	210	110	52.0	33.9	65.1	14.2	27.3	34.2	65.7	58.0	110
Price River near Helper	84.9	54.8	64.6	16.3	19.2	44.9	52.9	90	106	16.5	26.7	162	4.2	25.4	20.9	127		
Ashley Creek near Vernal	67.4	36.6	54.3	23.1	34.3	53.5	74.9	50	74	16.7	10.4	62.2	8.0	48.5	12.9	77.2	11.0	66
Whiterocks River near Whiterocks	67.6	47.1	69.2	21.1	31.2	55.7	82.5	56	83	23.8	15.6	65.6	8.4	35.2	14.0	58.8	14.0	59
Huntington Creek near Huntington	62.2	54.3	87.2	15.9	25.6	53.3	85.6	75.0	112	15.8	13.1	82.9	3.6	22.8	13.2	83.5	16.0	101
Beaver River at Beaver	33.4	26.5	79.4	9.6	28.8	30.6	91.6	43	129	7.4	6.7	90.6	2.7	36.5	6.9	93.2	8.0	108
Duchesne at Tabonia	126.7	71.3	56.2	38.2	30.1	73.7	58.2	100	79	30.7	15.8	51.5	10.2	33.2	15.9	51.8	20.0	65
Uintah River near Neola	99.7	67.8	68.0	31.4	31.5	81.1	81.4	80	80	38.4	25.4	66.2	14.8	38.5	31.2	81.2	32.0	83
Salt Creek near Nephi	11.5	10.4	90.4	3.4	29.6	14.3	124	25	215	3.0	2.2	73.4	1.2	40.0	3.9	130	7.0	233
Big Cottonwood near Salt Lake City	45.9	38.3	83.4	12.8	27.9	12.8	27.9	54	118	11.9	7.7	64.7	2.4	20.2	2.4	20.2	11.0	92
Virgin River at Virgin	128.2	62.4	48.6	33.7	26.3	89.0	69.5	87	68	33.2	20.7	62.4	15.9	47.9	17.6	53	17.0	51
Lake Fork at Myton	84.6	31.0	36.6	1.8	2.1	34.3	50.5	85.0	101	25.8	1.9	7.4	0.3	1.2	3.2	12.8	4.0	16

Table III

AVAILABLE STORAGE IN RESERVOIRS

Acre feet April 1, (1932-1936)

Reservoir	Content April 1 in Acre Feet 1932	1933	1934	1935	1936	Total Capacity
Bear Lake	384,050	563,050	492,000	149.250	71,000	1,440,000
East Canyon		19,000	14,700	7,300	17,400*	38,000
Echo	9,050	25,000	35,800	25,500	14,200	74,000
Big Cottonwood		940	375	275	230	1,680
Otter Creek			17,600	14,600	17,050	52,600
Piute	39,300	40,650	27,600	26,600	39,630	92,400
Sevier Bridge	49,200	59,500	48,200	28,600	40,200	236,000
Rocky Ford	12,500	10,250	8,500	6,200	10,266	25,300
Scofield	2,000	11,000	10,000	2,000	11,000	44,000
Strawberry		13,730	8,430	12,660	15,060	265,000
Utah Lake	353,000	200,000	246,000	118,000	141,000	830,000

* 13,200 Ac. Ft. Holdover

UTAH COOPERATIVE SNOW SURVEYS - 1935 - 36

(Data for all Snow Courses)

SNOW COURSES BY DRAINAGE AREAS	Course No.	Elevation (Feet)	Date of Survey	Depth of Snow (Inches)	Water Content of Snow (Inches)	Density In Per cent	Corresponding Water Content			Normal Water Content in Snow To April 1 (Inches)	Water Content of Snow on Date of Survey (% of Normal)	Corresponding Per cent Last Year	Moisture Condition Under Snow
							1933	1934	1935				
CACHE VALLEY STREAMS:													
Franklin Basin(Idaho)	1	8200	3/29/36	103	39.7	38.6	28.2	12.6	24.4	37.8	104	64.5	Dry
Emmigrant Summit(Ida.)	1-A	7700											
Slug Creek Divide "	1-B	7300											
Tony Grove Lake	2	8300	3/27/36	133.1	50.5	38.0	38.4	19.2	29.1	46.8	108	62.1	Dry
Tony Grove R. S.	3	6250	3/26/36	50.8	21.5	42.5	13.1	[illegible]	8.6	9.9	216	86.8	Wet
Spring Hollow No.3	4	7000	3/28/36	60.6	20.6	34.0	15.5	[illegible]	14.5	20.7	100	70.0	Wet
Spring Hollow No.4	5	8000	3/28/36	110.3	34.8	31.5	25.6	12.4	28.9	33.1	95	87.3	Dry
Mount Logan	6	9000	3/28/36	113.9	38.3	37.6	28.4	18.2	27.9	41.0	92	68.5	Dry
Smithfield Spring	7	7500											
Blacksmith Fork	8	8400	3/30/36	50.4	16.3	32.4	15.0	5.5	11.7				Dry
Garden City Summit	9	8200	3/30/36	97.4	33.9	33.8	17.7	4.9	16.4	30.4	101	53.9	Moist
BEAR RIVER:													
Garden City Summit	9	8200	3/30/36	97.4	33.9	34.8	17.7	4.9	16.4	30.4	101	53.9	Moist
Headwaters of Bear R.	10	8500	3/31/36	55.3	14.2	25.8			7.8				
OGDEN RIVER:													
Wheeler Basin	11	6400							9.9				
Hurtsville-Wheeler Divide	11-A	5800	4/1/36	58.6	18.1	30.9			4.4				
Mount Ogden	11-B	8000											
Lost Creek-Ogden River Divide	11-C												
Morte Cristo R. S.	12	9000	3/28/36	90.1	39.6	43.5	--	--	--				Dry
Blake Ranger Station	12-A	8000	3/29/36	64.5	22.1	34.3							Dry
WEBER RIVER:													
Lost Creek-Ogden River Divide	11-C												

UTAH COOPERATIVE SNOW SURVEYS - 1935 - 36

(Data for all Snow Courses)

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							1933	1934	1935				
WEBER RIVER: (Cont'd)													
Parley's Canyon Summit	15	7800	3/28/36	62.3	24.0	38.5	--	4.4	15.0				Dry
Beaver Creek Nursery	24	7500	3/25/36	37.1	14.0	37.8	5.4	--	6.2	8.8	159	70.5	Moist
Washington Long Lake	27	10300	3/27/36	109.0	43.5	40.0	23.7	18.4	28.0	39.2	111	71.4	Dry
Airway Beacon-Chalk Cr.	29	7600	3/30/36	34.8	12.9	37.0	--	--	1.8				Dry
Smith and Morehouse	30	7600	3/27/36	52.1	19.3	37.0	11.8	3.3	8.8	16.8	115	19.7	Dry
Redden Mine	31	8600	3/25/36	76.3	27.8	36.4	18.4	10.0	12.8	29.5	123	43.4	Dry
SALT LAKE WATERSHEDS:													
Parrish Creek Summit	13	8000	3/26/36	92.6	37.7	40.7	--	---	19.0				Dry
Wasatch Branch Exp.Sta.	13-A	8400	3/27/36	97.0	42.0	43.4							Moist
Lamb's Canyon	14	6000	3/30/36	50.9	23.7	44.8	--	--	14.1				
Parley's Canyon Summit	15	7800	3/28/36	62.3	24.0	38.5	--	4.4	15.0				Dry
Silver Lake	16	8900	3/31/36	103.0	35.5	34.5	25.1	16.1	21.0				Dry
PROVO RIVER & UTAH LAKE:													
Dutchman Ranger Station	17	8000	3/30/36	70.8	28.7	40.5	17.9	4.7	9.6	15.3			Dry
Cove Camp	18	5000											
South Fork Ranger S.	19	6100	3/27/36	27.2	10.6	39.0			4.0				Moist
Altamont	20	7300	3/28/36	53.6	22.4	41.8			11.6				Moist
Timpanogos Loop Road Divide	21	8000	3/28/36	72.4	28.1	38.8			16.6				Dry
Hobble Creek Divide	22	7000	3/29/36	52.4	20.7	39.6							Wet
Daniels-Strawberry Sum.	23	8100	3/28/36	57.9	19.6	34.0	13.6	3.5	12.7				Wet
Beaver Creek Nursery	24	7500	3/24/36	31.7	14.0	44.0	5.4		6.2	8.8	159	70.3	Wet
Soapstone Ranger Sta.	25	8100	3/25/36	53.7	18.9	35.2	8.3	2.5	9.0	14.4	131	62.5	Moist
Lake Tryol	26	9900	3/26/36	99.2	37.2	37.5	20.0	16.4	23.5	31.8	117	74.0	Dry
Washington Long Lake	27	10300	3/27/36	109.2	43.5	40.0	23.7	18.4	28.0	39.2	111	71.4	Dry
Lost Lake	28	10000	3/27/36	87.7	34.5	39.4	18.5	15.2	21.5	29.6	117	72.7	Dry

UTAH COOPERATIVE SNOW SURVEYS - 1935 - 36
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							1933	1934	1935				
PROVO RIVER & UTAH LAKE: (Cont'd)													
West Portal-Strawberry Tunnel	32	7500	—	—	—	—	—	—	10.0	—	—	—	—
STRAWBERRY RESERVOIR:													
Daniels-Strawberry Sum.	23	8100	3/28/36	59.7	19.4	33.0	13.6	3.5	12.5				Moist
Strawberry State Road Camp	23-A	7800											
East Portal	33	7600	3/28/36	51.4	19.2	37.3		6.8	9.02				
East Portal-Strawberry Divide	33-A	8000	3/28/36	81.1	31.7	38.8		8.0	19.3				
NORTH SIDE UINTAH MTS.:													
Blacks Fork	34	9500	3/31/36	54.3	15.1	37.8	8.8	6.3	7.1				
Hole In The Rock	35	9350	3/27/36	24.8	4.0	16.	4.0	3.6	2.8				Dry
SOUTH SIDE UINTAH MTS.:													
Lake Fork Mountain	36	10500	3/31/36	67.8	7.9	11.7	8.4	4.3	10.1	25.8	30.6	39.2	Dry
Moon Lake	36-A	7600											
Head of Duchesne River	36-B												
Paradise Park	37	10500	3/30/36	43.5	10.7	24.6	9.7	7.6	12.1	14.4	74.4	84.0	Dry
Mosby Mountain	38	9500	3/30/36	39.2	9.8	25.0	8.5	6.0	11.5	12.8	76.6	89.9	Moist
King's Cabin	39	8500	3/31/36	44.0	10.3	23.4	4.3	4.2	9.7	9.8	105.0	99.0	Dry
Indian Canyon	40	9100	3/28/36	33.0	8.3	25.	9.9	5.6	10.0				Moist
PRICE RIVER													
Indian Canyon	40	9100	3/28/36	33.0	8.3	25.	9.9	5.6	10.0				Moist
Gooseberry Reservoir	41	8800	3/28/36	78.0	33.5	43.	20.7	10.7	14.0	28.4	117.9	49.3	Dry
Mammouth Ranger Station	42	8700	3/28/36	86.6	33.7	39.	20.0	10.6	18.7	29.6	103.8	63.2	Dry
Scofield Reservoir	42-A	7600	3/28/36	28.7	11.8	41.			6.0				Wet
Dry Lake Divide	42-B	8000	3/28/36	38.7	13.2	34.							Wet
Huntington Horseshoe	43	9750	3/27/36	103.6	37.6	36.3	22.5	15.3	23.2	34.9	107.7	66.5	Dry

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							1933	1934	1935				
FILLMORE:													
Pine Creek-Chalk Creek	49	9000	3/28/36	44.0	10.7	24.4	12.5	7.2	10.9				Moist
HUNTINGTON, COTTONWOOD, & FERRON CREEKS:													
Huntington Horseshoe	43	9750	3/27/36	103.6	37.6	36.3	22.5	15.3	23.2	34.9	107.7	66.5	Dry
G. B. E. S. Alpine	47	10200	3/28/36	81.4	29.3	36.0	19.0	14.0	18.1	22.4	130.9	80.8	Dry
Seeley Creek Ranger Sta.	48	10000	3/28/36	71.4	26.1	36.6	17.7	10.5	18.9	19.7	127.8	91.0	Dry
SAN PITCH RIVER:													
Marmouth Ranger Station	42	8700	3/28/36	86.6	33.7	39.0	20.0	10.6	18.7	29.6	103.8	63.2	Dry
G.B.E.S. Oaks Ranger S.	44	7400	3/27/36	36.4	9.8	27.0	6.3	None	6.1				Wet
G.B.E.S. Headquarters	45	8700	3/27/36	68.5	23.5	37.0	15.3	10.8	14.4				Moist
G.B.E.S. Meadows	46	9800	3/28/36	81.9	28.1	34.3	21.4	13.5	19.4				Dry
G.B.E.S. Alpine	47	10200	3/28/36	81.4	29.3	36.0	19.0	14.0	18.1	22.4	130.9	80.8	Dry
SEVIER RIVER:													
Gooseberry Ranger Sta.	50	8700	3/30/36	32.7	9.5	25.6	7.0	5.3	10.0				Moist
Fish Lake	51	9000	3/31/36	19.1	7.6	39.8	3.0	None	5.9				
Kimberley Mine	52	9250	3/30/36	24.2	8.0	33.1	10.1	5.5	8.8				Dry
Widtsoe-Escalante Sum.	53	9500	3/30/36	15.3	5.0	32.6	6.3	2.1	9.5				Wet
Bryce Canyon	54	8000					--	--	8.4				
Panguitch Lake	55	8400	3/28/36	13.1	4.2	32.	5.4	None	6.5				Moist
Gravel Springs Junction	56	7000	4/1/36	10.6	3.3	31.2	--	--	6.0				
Harris Flat Ranger Sta.	57	7500	4/1/36	34.0	10.5	30.9	8.3	2.5	14.1	7.7	136.4	183	
Duck Creek Spring	58	8500	3/29/36	43.3	15.3	35.4	--	--	20.5				
Cedar Breaks	59	10300	3/28/36	68.0	24.3	35.8	--	--	23.1				
BEAVER RIVER:													
Merchants Valley	63	8600	3/27/36	37.8	14.9	39.4	6.2	4.8	11.1	10.9	136.6	101.8	Dry
Otter Lake	63-A	9000	3/28/36	54.0	18.0	33.3							Dry
Big Flat	63-B	10000	3/28/36	66.2	23.1	35.6							Dry

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							1933	1934	1935				
COAL CREEK:													
Cedar Breaks	59	10300	3/28/36	68.0	24.3	35.8	--	--	23.1				
Co-op Flat	60	9500	3/31/36	47.6	16.8	35.4	13.7	7.4	18.1	23.4	71.8	77.4	
Webster Flat	61	9200	3/30/36	48.3	18.7	38.7	13.6	8.5	18.0	22.6	82.8	79.7	
VIRGIN RIVER:													
Gravel Springs Junction	56	7000	4/1/36	10.6	3.3	31.1	--	--	6.0				
Harris Flat Ranger S.	57	7500	4/1/36	34.0	10.5	30.9	8.3	2.5	14.1	7.7	136.4	183	
Duck Creek Spring	58	8500	3/29/36	43.3	15.3	35.4	--	--	20.5				
Cedar Breaks	59	10300	3/28/36	68.0	24.3	35.8	--	--	23.1				
Co-op Flat	60	9500	3/31/36	47.6	16.8	35.4	13.7	7.4	18.1	23.4	71.8	77.4	
Webster Flat	61	9200	3/30/36	48.3	18.7	38.7	13.6	8.5	18.0	22.6	82.8	79.7	
SANTA CLARA RIVER:													
Deer Park-Pine Valley	62	9000	3/29/36	91.6			--	--	15.8				
LA SAL & BLUE MOUNTAIN:													
La Sal Mountain	64	9000	3/31/36	22.7	4.1	18.0	7.5	None	7.7				
Buckboard Flat	65	9500	3/30/36	28.2	7.9	28.0	6.5	6.5	15.9				