

REPORT OF SNOW COVER ON THE PROVO, WEBER, AND SALT LAKE WATERSHEDS¹

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George D. Clyde
Irrigation Engineer, Utah Agricultural Experiment Station

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Provo River Watershed, February 4-5, 1934

Heber Valley practically bare. Area between Kamas and Keetley bare. Snow patchy in bottom of canyon between Heber and Woodlands. All east and south slopes bare below 7500 feet elevation. The soil is absorbing all the water that leaves the snow and there is little or no surface runoff. All streams are running clear.

There was no snow on the road up Beaver Creek above Kamas for a distance of 5 miles. All south and east slopes in Beaver Creek watershed are bare and the soil drying out fast. At the Beaver Creek Ranger Station (elevation, 7500 feet) snow cover averaged 14.5 inches and water content 3.74 inches. Water was leaving the snow quite rapidly, but it was all being absorbed by the soil. The snow was very granular, a condition which is characteristic of the snow during the spring melting season.

The snow cover gradually increased with elevation up to 18 inches at the Beaver Creek Summit (elevation, 7800 feet) and then decreased to 12 inches at the North Fork crossing. The water content of the snow at these points was 5.1 and 3.4 inches, respectively.

At the Soapstone Ranger Station (elevation, 8000 feet), the snow cover was contained 14 inches deep and $\frac{7}{4}$ inches of water, with all the south slopes bare, a light cover on the north slopes and melting in progress. The soil was absorbing the melt and no surface runoff was reaching the streams.

¹ This survey was made possible by the cooperation of Salt Lake City, which furnished transportation and an assistant.

At Shady Dell (elevation, 8100 feet) the snow cover average was 16 inches with 4.5 inches of water. Melting was in progress and the water was being absorbed by the soil. Snow was very granular. South and east slopes were bare. Surface soil was wet but open cuts showed a fairly dry soil about 12 inches below the surface, which indicates that the soil was not yet fully primed.

At Red Pine Flat (elevation, 8300 feet) the snow averaged 17 inches in depth and contained 4.8 inches of water. The snow was soft and granular. Melting was in progress and soil was absorbing all the water.

Horses were ridden to an elevation of 9150 feet and stopped at a point opposite Cox's Camp on account of depth of snow. The snow at this point was 23 inches deep and contained 5.4 inches of water. The snow was soft and of a uniform granular texture. Water was beginning to leave the snow. The soil was absorbing it as fast as it came.

At the Upper Bridge (elevation, 9350 feet) there were 27 inches of snow containing 7.2 inches of water. The ground was dry under the snow and no melting was taking place. The snow was very granular and a slight increase in temperature will start melting. On February 22, 1931, there were 24 inches of snow at the Upper Bridge. The water content was not determined.

At the Lost Creek Junction (elevation, 9750 feet) the depth was only 26 inches, but it contained the same amount of water as at the Upper Bridge. No melting had taken place and ground was dry underneath the snow.

At the Highway Junction between Lake Tryol and Lost Lake (elevation, 9830 feet) there were 31 inches of snow containing 8.6 inches of water. Melting had not yet begun and the ground was dry under the snow.

The Lake Tryol snow course is located at an elevation of 10,000 feet and covers a distance of 1350 feet. Measurements of depth and water content were made at 50-foot intervals. This course has been measured regularly on April 1 since 1931 and miscellaneous measurements have been made in the vicinity of this

course in the spring each year since 1916. No measurements have been made on February 1st, prior to this year. In 1931 Mr. Olegg closed the gates on the Lakes on February 22. He said the depth at that time was about the same as this year but that the snow was much drier. On February 4, 1934, the Lake Tryol snow course showed an average depth of snow of 36 inches, containing 10.5 inches of water. This course crosses a broad meadow which in ordinary years is quite wet. This year the soil is dry and dusty under the snow. This condition of the soil is due to the exceptionally dry fall and the fact that the ground froze hard before the first snows came. Workmen at the Lakes left on November 10, at which time about 6 inches of snow were on the ground. Ice froze 1 foot thick on Lake Tryol before snow came. Forest Ranger Morgen Parke reports that many springs and small lakes dried up last fall; these were never known to go dry before.

The entire watershed above 9000 feet elevation is exceptionally dry and a considerable amount of water from the snow will be required to prime the soil. The high snows go off late and usually rather slowly and, therefore, contribute little toward the high spring runoff. The irrigation season is usually in full swing when the high snows begin to come out. This is particularly true if the spring rains are deficient and the low snow cover is light.

Snow surveys are made each month beginning January 1 at each of the 4 key courses -- Mt. Logan, Silver Lake, Daniel's Creek-Strawberry Summit, and Great Basin Experiment Station at Ephraim. These courses show that the accumulation of water in the snow cover on February 1 should equal approximately 43, 52, 50, and 52 per cent, respectively of the April 1st measurement. Therefore, it is estimated that the February 1st accumulation at Lake Tryol should also be about 50 per cent. Based on three years' snow cover record and 27 years' streamflow record, it is estimated that the normal April 1st accumulation at Lake Tryol should be 33.5 inches of water. The accumulation February 1, 1934 was 10.5 inches, or only 31.4 per cent of the normal. In 1933 the April 1st accumulation was 20.0 inches and in 1932 it was 29.3 inches. The present water

accumulation at Lake Tryol is, therefore, approximately one-half what it was last year on April 1st and one-third what it was on April 1st in 1932.

The low snows and spring rains furnish the high pre-irrigation season runoff, and there is at present the greatest deficiency of low snow in the history of the state. The oldest residents claim they have never experienced anything like it. This absence of low snow is not confined to the Provo but is common on all of the watersheds of the state.

It is possible to get enough precipitation during February, March, and April to overcome the present deficiency of water accumulation on the watersheds. Such a precipitation occurred in 1920. That year the deficiency up to February 1 was similar to this year. The February-March-April precipitation, however, was 10 inches at Heber as compared to an average of 5.4 inches. This precipitation occurred as rain in the valleys and as snow on the high watersheds. It caused a tremendous runoff during May and June on the Provo River. However, 1920 was the only year in 40 years when such a condition occurred.

It has not yet been found possible to predict precipitation more than about 48 hours in advance of its occurrence and, therefore, it is not possible to predict the precipitation during the next 3 months.

Weber River Watershed -- February 1, 1934

The snow cover conditions on the Weber River watershed are very similar to those on the Provo. The Weber River watershed has a larger portion of its watershed below 9000 feet elevation than does the Provo and, therefore, its total yield will probably be less in proportion than the Provo. With a deficient low snow cover the Echo Reservoir will have to draw more from high snow storage and, therefore, there will be less water available for diversion to the Provo.

Salt Lake Watersheds -- February 1, 1934

The accumulation of water on the Salt Lake watersheds, except that of Parley's Canyon, gives promise of a yield from the high snows about equal to that in 1933, provided the February-March-April precipitation is normal. The deficient low snow cover will probably reduce the spring flow and seriously reduce the storage in the Mt. Dell reservoir.

SUMMARY

On February 1, 1934 there was a serious shortage of low snow on the Provo, Weber, and Salt Lake watersheds. The south and east slopes were bare and drying out up to approximately 8000 feet elevation. Premature melting was taking place on all watersheds up to 9000 feet elevation, and the soil under the snow, which was dry from lack of fall rains, was absorbing the moisture as fast as it left the snow. No surface runoff was reaching the streams. The snow cover above 9000 feet had a water content approximately equal to that a year ago, but it is still short of a normal accumulation by from 20 to 30 per cent.

With a normal February-March precipitation, the water-supply for the natural flow users should be approximately the same as in 1933; however, with the marked deficiency of accumulated water below 9000 feet elevation and the present premature melting of the low snow, it is extremely doubtful if there will be much water available for storage unless the precipitation during February, March, and April is exceptionally excessive.

WATER CONTENT OF SNOW COVER
PROVO RIVER WATERSHED.

<u>Station</u>	<u>Elevation</u>	<u>Water Content In Inches</u>			
		<u>April 1</u> <u>1931</u>	<u>April 1</u> <u>1932</u>	<u>April 1</u> <u>1933</u>	<u>Feb. 1</u> <u>1934</u>
Beaver Creek R. S.	7,600	1.7	9.8	5.4	3.7
Soapstone R. S.	8,000	4.8	14.1	8.3	4.0
Big Pine Flat	8,200				4.8
Coxes Camp	9,150				5.4
Upper Bridge	9,350				7.2
Lost Lake- Lake Tryol	9,830				8.8
Lake Tryol	10,000	11.0	29.3	20.0	10.5

NOTE:

1. Melting in progress February 3 up to 9,000 feet elevation. Soil absorbing all water. Soil not saturated.
2. All east and south slopes bare.
3. Soil very dry under snow above 9,000 feet elevation.
4. River open all the way to Upper Bridge.

UTAH COOPERATIVE SNOW SURVEYS

Instrument Station	United States Weather Bureau		United States Forest Service		
Survey Course	Length of Course	Elevation	Local Drainage	Main Drainage	Party Making Survey

Sevier Lake Watershed

R.S.	ss-26-200	8700	Cottonwood Creek	San Pitch	Forest Service
Basin - Huntington	ss-25-500	9750	Cottonwood - Huntington	San Pitch	Forest Service
(Oaks) R.S.	ss- 7-100	7400	Ephraim Creek	San Pitch	Forest Service
Headquarters	ss-13-100	8700	Ephraim Creek	San Pitch	Forest Service
Meadows	ss-29-100	9800	Ephraim Creek	San Pitch	Forest Service
Alpine	ss- 9-100	10,200	Ephraim Creek	San Pitch	Forest Service
ny R.S.	ss-26- 50	8700	Salina Creek	Sevier River	Forest Service
	ss-20-100	9000	Otter Creek - Fremont	Sevier River	Forest Service
Escalante Summit	None	9500	Sevier (East Fork) Escalante	Sevier River	Forest Service
nt R.S.	ss-35-100	7500	Virgin River - Swains Creek	Sevier River	Forest Service
lley	ss-20-250	9300	Mammoth Creek	Sevier River	Forest Service
l Lake		8400	Panguitch Creek	Sevier River	Water Comm.
Mine	ss-32-100	9350	Clear Creek	Sevier River	Water Comm.
- Chalk Creek	ss-33- 50	9000	Chalk Creek	Sevier Lake	Water Comm.
s Valley	ss-25-100	8300	Beaver River	Sevier Lake	Telluride Power Co.
ck		8599	Beaver River	Sevier Lake	Telluride Power Co.
at - Cedar Breaks	ss-18-100	9300	Coal Creek - Virgin River	Coal Creek	Water Comm.
Flat	ss-22-100	9300	Coal Creek - " "	Coal Creek	Water Comm.

UTAH COOPERATIVE SNOW SURVEYS

Station	Length	Elevation	Local Drainage	Main Drainage	Party Making Survey
Colorado River Watershed					
Green River	8000	8000	Green River	Green River	Forest Service
Middle Fork Deaver	7000	7000	Middle Fork Deaver	Green River	Forest Service
Little Lost Creek	6000	6000	Little Lost Creek	Green River	Forest Service
Wintermute Creek	5000	5000	Wintermute Creek	Green River	Forest Service
Rapids Creek	4000	4000	Rapids Creek	Green River	Forest Service
Lake Fork	3000	3000	Lake Fork	Duchesne River	Forest Service
Denise Creek - Strawberry L.	2100	2100	Denise Creek - Strawberry L.	" "	Forest Service
Indian Creek	1200	1200	Indian Creek	" "	Forest Service
Concepcion Creek	900	900	Concepcion Creek	Price River	Forest Service
Concepcion Creek	800	800	Concepcion Creek	Price River	Forest Service
Crematorium - Washington	7750	7750	Crematorium - Washington	San Rafael	Forest Service
Snake Creek	10,000	10,000	Snake Creek	San Rafael	Forest Service
Snake Creek	10,000	10,000	Snake Creek	San Rafael	Forest Service
French Creek	9000	9000	French Creek	Colorado	Forest Service
Colorado	7500	7500	Colorado	Colorado	Forest Service
Virginian - Snake Creek	7000	7000	Virginian - Snake Creek	Colorado	Water Comm.
Colorado	6000	6000	Colorado	Colorado	Water Comm.
Colorado	5000	5000	Colorado	Colorado	Forest Service
Colorado	4500	4500	Colorado	Colorado	Forest Service
Colorado	4000	4000	Colorado	Colorado	Forest Service
Colorado	3000	3000	Colorado	Colorado	Forest Service

WATER-SUPPLY FORECAST FOR UTAH, 1934

George D. Clyde, Irrigation Engineer,
Utah Agricultural Experiment Station

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.

Approximately 80 per cent of the runoff for April-September, inclusive, in Utah 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 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 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 2, 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. 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.
2. A brief statement of conditions on other watersheds of the state, based on available records.
3. Results of the annual snow surveys grouped according to stream basins.

Bear River Area above Bear Lake:

There are no snow courses on this area, but the Blacks' Fork course and the Lost Lake course are just over the divides on the south and west, respectively, of the headwaters of the Bear River. These snow courses (with elevations of 9500 and 10500 feet, respectively) show a water content 75 per cent of last year; however, there is practically no snow below the 8000-foot elevation. The density of the snow is low, indicating that melting is in progress. There is no frost in the ground; therefore, absorption losses will be high; runoff during 1934 will probably not exceed 60 per cent of that of 1933.

Bear Lake Drainage:

There was no snow in Bear Lake Valley on March 30, 1934, and most of the lower foothills were bare and dry. There has been considerable winter melting on this watershed and the absorption losses have been heavy. The water content of the snow cover at the Garden City Summit is only 28 per cent of that for 1933. Premature melting has reduced the water content of the snow cover, part of which will later appear as runoff. The probable contribution to Bear Lake from this area will be greater than indicated by the snow cover, but it is doubtful if it will exceed 40 per cent of that for 1933. The high-water elevation of Bear Lake is 5923.65 feet. The water surface now stands at 5910 feet elevation; the record low-water surface elevation is 5907 feet; 13.65 feet of water have been pumped from Bear Lake, and there is 3 feet to go to reach the record low.

Cub River Drainage:

Measurements on the Franklin Basin snow course are representative of the snow cover on the Cub River watershed. The snow cover at Franklin Basin this year has a water content of 12.6 inches as compared to 28.2 inches for 1933. Winter temperatures have been abnormally high and some winter melting has taken place. All low snow has melted without carrying any material surface runoff. With normal spring temperatures and April-May precipitation, the runoff from Cub River this year will probably not exceed 35 percent of that for 1933.

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 little snow on these watersheds below 8000 feet; the cover above that elevation is less than 50 percent of that for 1933. In spite of the premature winter melting, the runoff is not increasing. There will be no high water from these streams this spring, and these streams will probably reach their low summer flow by May 15 or June 1. The total summer runoff will probably not exceed 35 percent of 1933.

Logan River Drainage:

Light fall rains left the watershed in a dry open condition when snow began accumulating. The flow of springs and the late summer flow of the river indicated a depleted ground storage which is conducive to heavy absorption losses. Abnormally high winter temperatures caused premature melting on the lower areas and considerable winter melting on the higher areas. The total absence of low snow will materially reduce the effectiveness of any spring rains that might occur, as far as stream flow is concerned.

The snow pack on the high areas is 39 percent of a 37-year average and 51.8 percent of that in 1933. There is little snow below 7500 feet, so that no high water can be expected this spring and the April-July flow will be materially reduced. Based on a long-time-average-snow-cover-runoff relationship, the April-September runoff this year may be as low as 40,000 acre-feet and, even with heavy rains, will probably not exceed a total of 44,000 acre-feet as compared to 112,800 acre-feet for 1933. The July-September runoff will be proportionately better because it is dependent more largely upon the high snows. The July-September runoff will probably not exceed 21,000 acre-feet for 1934, and with light spring rains it may be as low as 17,000 acre-feet as compared to 41,000 acre-feet

for 1933. The water-supply from Logan River for 1934 will be considerably less than it was in 1931, the record low year. The maximum discharge will probably not exceed 300 c.f.s. as compared to 375 c.f.s. for 1931.

Blacksmith Fork:

The accumulated snow cover on the Blacksmith Fork watershed is less than on the Logan due to a higher absorption loss, which has resulted from premature winter melting. There was no snow at the Hardware ranch on April 1 this year and little snow on the hills up to about 8000 feet elevation. The high snow cover averages only about 29 percent of the long-time average and 50.3 percent of that for 1933.

The probable runoff during the period April-September, inclusive, will not exceed 22,000 acre-feet and may go as low as 18,000 acre-feet. The runoff for July-September, inclusive, will probably not exceed 7500 acre-feet. In spite of the early melting of the low snow and the premature melting of the high snow, the discharge of Blacksmith Fork has not increased. The maximum discharge from the Blacksmith Fork will probably not exceed 90 c.f.s. this season.

Little Bear River:

The Little Bear River watershed has a lower average elevation than the Blacksmith Fork. The absorption losses resulting from premature melting will be greater this year and the available high snow cover less. There are no stream-flow records available on this stream and, therefore, the runoff cannot be predicted in acre-feet. The April-September, inclusive, runoff will probably not exceed 40 percent of that for 1933; the July-September, inclusive, runoff will probably not exceed 45 percent of that for 1933. There will be no spring high water on this stream this year.

Ogden River Area:

There are no satisfactory snow courses on the Ogden River, but the snow cover on the Blacksmith Fork and the Weber River indicates runoff from the Ogden River in 1934 slightly less than that for 1931; it probably will not exceed 15,000 acre-feet for the period April-September and 4800 acre-feet for the period July-September.

Weber River Area:

The major portion of the water in the Weber River comes from four main branches: Chalk Creek, Lost Creek, East Canyon, and Main Weber (above Oakley). Snow courses on this watershed are located at Smith and Morehouse, Redden Mine, Beaver Creek, Nursery, Parley's Canyon Summit, and Washington-Long Lake on the headwaters of the Provo. Parley's Canyon Summit is a new course; therefore, the forecast this year is based on the other four courses. There is no low snow, but the high snow is slightly better than it was in 1931. The April-September runoff at Oakley for 1934 will probably not exceed 43,000 acre-feet and may be as low as 40,000 acre-feet, provided spring and summer rains are deficient. The prospects are proportionately better for the July-September runoff. This runoff will probably reach 32.1 percent of the 1903-33 average, or 9600 acre-feet. Deficient spring and summer rains and high temperatures may reduce this by 1000

acre-feet. The Echo Reservoir now contains only about 36,000 acre-feet and will probably not fill to more than 50,000 acre-feet out of 74,000 acre-feet capacity. The East Canyon Reservoir has a capacity of 28,000 acre-feet and is now about one-half full. It probably will not fill to more than 18,000 acre-feet.

Salt Lake City Watershed:

Conditions on the Salt Lake watershed are slightly better than on the Weber. The high snow cover is approximately 65 percent of that in 1933 and 50 percent of the long-time average. The April-September runoff will probably not exceed 40 percent of 1933 on account of the deficiency in low snow, whereas the July-September runoff will probably reach 60 percent of the 1933 flow, and with normal spring rains may slightly exceed this amount.

Provo River Watershed:

Snow courses on the Provo River are located at Daniels Creek Summit, Soapstone Ranger Station, Lake Tryol, Lost Lake, Washington-Long Lake and the Beaver Creek Nursery on Beaver Creek. The snow cover on the Provo watershed this year is almost entirely absent below 8000 feet; above 8000 feet, it is only 47 percent of the 1905-1933 average. The average snow cover over the entire watershed is approximately 31 percent. The absence of low snow indicates that no high water on the Provo can be expected and, therefore, no flood runoff into Utah Lake. The April-September runoff at Provo in 1934 will probably not exceed 62,000 acre-feet as compared to 115,760 acre-feet in 1933; it may be as much as 4000 acre-feet or less, if spring rains are deficient and temperatures high. The July-September runoff will probably not exceed 25,000 acre-feet as compared to 34,000 acre-feet in 1933; this runoff may be reduced as much as 3000 acre-feet if spring and summer rains are deficient and temperatures high.

American Fork River Drainage:

The snow cover at the Dutchman Ranger Station in American Fork Canyon shows a water content only 26.3 percent of that for 1933. There has been considerable winter melting and the low snow has all been absorbed by the soil without causing an increase in the discharge of the river. There will be no high water in American Fork River for 1934, and the total April-September flow will probably not exceed 25 percent of that for 1933.

Hobble Creek, Spanish Fork River, Payson Creek, etc.:

The low snow is all gone on these areas, with only a small area at higher elevations. There are no snow courses on these areas except one established this year at the west portal of the Strawberry Tunnel. This course had no snow on it on April 1. Based on snow cover conditions on adjoining watersheds, the April-September runoff from these streams will not exceed 40 percent of that in 1933 and there will be no spring high water.

Strawberry Reservoir:

The Daniels Creek-Strawberry snow course near the headwaters of the Strawberry river shows a water content only 26 percent of that for 1933. The snow

cover at the east portal of the Strawberry Tunnel, established this year, shows a higher water content. The record is too short to predict the acre-feet of water that may be available for storage on the Strawberry Reservoir this year, but it will probably not exceed 40 percent of 1933 and may be considerably less, if the spring rains are deficient and temperatures high.

Uintah Basin Streams:

There are four snow courses on the south side of the Uintah Mountains which are indicative of the snow-cover conditions on this slope. There is a marked absence of low snow, but the high snow (above 9000 feet elevation) is approximately 74 percent of that for 1933. The high watersheds of the Uintah Basin streams are in a better position to supply late-season water than any other watersheds in the state, but due to absence of low snow there will be no spring high water. The total April-September runoff will probably not exceed 50 percent of that for 1933.

Daggett County Area:

There are two snow courses located on this area: One on the headwaters of Smith's Fork and the other above the Hole in the Rock Ranger Station. Both of these courses show a good high snow cover but no low snow. These streams should yield approximately 80 percent of their July-September flow for 1933 and 55 percent of their April-September runoff for 1933.

Price River and Huntington Creek:

These streams drain the north end and the east side of the Wasatch Plateau. Snow courses at the headwaters of Gooseberry and at the Indian Canyon summit are representative of conditions on the Price River. Snow courses near the headwaters of Gooseberry and Huntington Creek represent the conditions on Huntington Creek. The snow cover on the Price watershed at high elevation is 60 percent of that in 1933. The snow cover on the Huntington watershed is 62 percent of that for 1933. There is no low snow on either of these watersheds and little spring high water can be expected. The April-September runoff will probably not exceed 50 percent of that for 1933.

Sevier Valley Area:

There is no snow at Panguitch Lake as compared to 51.4 inches water content in 1933. At Harris Flat Ranger Station the average for 1934 is 2.5 inches as compared to 8.3 inches last year. At the Widstoe-Escalante Summit there are 2.1 inches of water as compared to 6.3 inches last year; at the Kimberley Mine there are 5.1 inches of water as compared to 10.1 inches last year. The average water content of the high snow cover is 28.4 percent of that for 1933. There is no low snow and there will be no spring runoff available for storage. Little water will be available for secondary rights. Water Commissioner McBride reports water prospects on the Sevier the poorest of any year since 1920.

San Pete County Area:

The high snow on the west side of the Wasatch Plateau averages about 60 percent of that for 1933. There is no low snow, and there will be no spring high water. The April-September runoff for the area should be approximately 50 percent of that for 1933.

Coal Creek and the Virgin River:

Two snow courses are located on the divide between the headwaters of the Virgin River and Coal Creek. The water content of the high snow patch on these watersheds this year averages 57 percent of that for 1933 and exceeds slightly that for 1931. There is no low snow and little high water can be expected. The April-September runoff will probably not exceed 45 percent of that in 1933.

Beaver River Area:

The Beaver River watershed has received proportionately more water this year than other areas in southern Utah. The high snow patch is 77 percent of last year. There is little low snow; consequently not much spring high water can be expected. The April-September will probably not exceed 60 percent of 1933.

Fillmore-Chalk Creek Area:

The snow patch on this area this year is only 57 percent of that for 1933. Little low snow will materially reduce the spring runoff and the total April-September runoff will probably not exceed 45 percent of that for 1933.

Mill Creek-Montezuma Creek Area:

The snow cover is practically gone on the Mill Creek watershed in the LaSal Mountains, but the snow patch at the Buckboard Flat snow course on Montezuma Creek shows nearly the same water content as for 1933.

Summary

The winter of 1933-34 has been the warmest on record in the state and the accumulated snow cover on the watersheds of the state is the least. Premature melting of snow on the high watersheds and complete melting of all snow on the low watersheds has caused excessive absorption losses. The bare dry condition of the lower ranges will materially reduce the effect of spring rains on runoff. No spring high water can be expected from any of the streams, and on most of the watersheds of the state the summer flow will vary from 25 to 50 percent of that for 1933. The Beaver River and Chalk Creek area have slightly better prospects.

It must be remembered that these comments on water-supply prospects for 1934 for the most part are based on relatively short records and, consequently will have to be modified as the melting season advances, provided abnormal conditions with respect to precipitation and temperature occur.

UTAH COOPERATIVE SNOW SURVEYS, 1933-34

Snow Survey Data for All Courses

Drainage Area and Snow Courses	Elevation (ft)	Date of Survey	Depth of Snow (in)	Density (%)	Water Content (in)	Corresponding Water Content Last Year (in)	Normal Seasonal Accumulated Water Content (in)	Seasonal Water Content to Date of Survey	Corresponding % of Normal Seasonal Water Content Last Year
American Fork Riv. Dutchman R.S.	8500	3/31/34	8.8	53.5	4.7	17.9	*		
Cottonwood Creek San Fitch River Mammoth R.S. Horseshoe Basin	8700 9700	3/31/34 3/30/34	30.6 41.5	34.6 36.8	10.6 15.3	20.0 22.5	* *		
Ephraim Creek G.B.E.S. Oaks G.B.E.S. Headqu. G.B.E.S. Meadows G.B.E.S. Alpine	7800 8700 9500 10200	4/5/34 4/5/34 4/5/34 4/5/34	0 29.7 44.24 41.44	C 36.6 30.6 33.9	0 10.84 13.51 14.0	6.3 15.3 21.4 19.0	* * * *		
Clear Creek Sevier Kimberley Mine	9000	3/2/34	18.3	30.0	5.5	10.1	*		
East Fork Sevier Fish Lake Widstoe Es. Sum. Harris Flat R.S. Panguitch Lake	8700 9500 7500 8000	3/29/34 3/28/34 3/28/34 3/26/34	No Snow 6.7 5.61 No Snow	31.3 44.6	2.1 2.5	3.0 6.3 8.29 5.4	* * * *		

* Record too short to establish normal.

UTAH COOPERATIVE SNOW SURVEYS 1933-34
Snow Survey Data for All Courses

Drainage Area and Snow Courses	Elevation (ft)	Date of Survey	Depth of Snow (in)	Density (%)	Water Content (in)	Corresponding Water Content Last Year (in)	Normal Seasonal Accumulated	Seasonal Water Content to Date of Survey
<u>Salina Creek</u> Gooseberry R.S.	8700	3/31/34	18.3	29.0	5.3	7.0	*	
<u>Chalk Creek</u> Fillmore Chalk Cr.	9000	3/24/34	23.2	31.0	7.2	12.5	*	
<u>Beaver River</u> Merchant's Valley	8900	3/28/34	13.08	36.7	4.8	6.2	*	
<u>Coal Creek</u> Coop Flat Jebster Flat	9100 9200	3/28/34 3/28/34	18.0 22.0	41.2 38.6	7.43 8.5	13.7 13.6	**	
<u>Uintah Basin</u> Daniels Creek Stray. Lake Fort Mt. Mosby Mt. Paradise Park Kings' Cabin	8100 10500 8900 10500 8900	3/30/34 3/28/34 3/28/34 3/28/34 3/29/34	10.3 20.9 20.0 23.3 14.4	34.0 20.6 30.0 32.6 29.1	3.5 4.3 6.0 7.6 4.2	13.6 8.4 8.5 9.7 4.31	* * * * *	
<u>Price River</u> Gooseberry Res. Mammoth R.S. Huntington Horseshoe Basin Indian Canyon	8800 8700 9700 9200	3/30/34 3/31/34 3/21/34 3/28/34	30.6 30.6 41.5 17.3	34.9 34.6 36.8 32.3	10.7 10.6 15.3 5.6	20.7 20.0 22.5 9.9	* * * *	

* Record too short to establish normal.

UTAH COOPERATIVE SNOW SURVEYS 1933-34

Snow Survey Data for All Courses

Drainage Area and Snow Courses	Elevation (ft)	Date of Survey	Depth of Snow (in)	Density (%)	Water Content (in)	Corresponding Water Content Last Year (in)	Normal Seasonal Accumulated Water Content (in)	Seasonal Water Content Date of Survey (%)	Corresponding % of Normal Seasonal Water Content Last Year
<u>Cub River</u> - Franklin Basin	8200	4/1/34	38.6	32.9	12.6	28.2	37.8	33.3	74.6
<u>Logan River</u> - Franklin Basin Tony Grove Lake Tony Grove R.S. Mt. Logan Spring Hollow No. 3 Spring Hollow No. 4	8200	4/1/34	38.6	32.6	12.6	28.2	37.8	33.3	74.6
	8300	3/31/34	52.9	36.3	19.2	38.4	46.8	40.7	82.0
	6250	3/31/34	No Snow			13.1	9.9	0	132.0
	9000	3/3/34	51.6	35.3	18.2	28.4	41.0	44.5	69.4
	7000	3/31/34	No Snow		0	15.5	20.7	0	75.0
8000	3/31/34	35.6	34.8	12.4	25.6	33.1	37.5	77.5	
<u>Blacksmith</u> - Mt. Logan Blacks Fork	9000	3/31/34	51.6	35.3	18.2	28.4	41.0	44.5	69.4
	9000	3/31/34	18.8	29.4	5.5	15.0	29.8	18.4	50.4
<u>Ogden River</u> - Huntsville-Weber Monte Cristo	6170	3/31/34	No Snow				*		
	7000	3/31/34	No Snow						
<u>Weber River</u> - Smith & Morehouse Redden Mine Beaver Creek Nurs.	7600	3/29/34	10.3	32.0	3.3	11.8	16.8	19.7	70.2
	8700	3/29/34	24.2	41.4	10.0	18.4	29.5	33.9	62.4
	7500	3/29/34	No Snow				*		

* Record too short to establish normal.

UTAH COOPERATIVE SNOW SURVEYS, 1933-34

Snow Survey Data for All Courses

Drainage Area and Snow Courses	Elevation (ft)	Date of Survey	Depth of Snow (in.)	Density (%)	Water Content (in)	Corresponding Water Content Last Year (in)	Normal Seasonal Accumulated Water Content (in)	Seasonal Water Content to Date of Survey (%)	Corresponding % of Normal Seasonal Content Last Year
<u>Seeley Creek</u> Seeley Creek R.S.	10000	4/4/34	37.4	28.0	10.5	17.7	*		
<u>Mill Creek</u> LaSal Mountains	9000	3/29/34	Patches			7.5	*		
<u>Montezuma Creek</u> Buckboard Flat	9000	3/26/34	25.8	21.3	6.5	6.5	*		
<u>Virgin River</u> Harris Flat R.S. C oop Flat W ebster Flat	7500 9500 9200	3/28/34 3/28/34 3/28/34	5.61 18.6 22.0	44.6 41.0 38.6	2.5 7.4 8.5	8.29 13.7 13.6	* * *		

* Record too short to establish normal.

UTAH COOPERATIVE SNOW SURVEYS, 1933-34

Snow Survey Data for All Courses

Drainage Area and Snow Courses	Elevation (ft.)	Date of Survey	Depth of Snow (in.)	Density (%)	Water Content (in.)	Corresponding Water Content Last Year	Normal Seasonal Accumulated Water Content (in.)	Seasonal Water Content to Date of Survey (%)	Corresponding % of Normal Seasonal Water Content Last Year
Bear Lake Drain. Garden City Crk.	8200	3/30/34	14.8	33.0	4.88	17.7	*		
Bear River above Bear Lake	9500	3/29/34	20.33	31.2	6.33	8.8	*		
Flack's Fork	9300	3/27/34	15.9	23.3	3.7	4.0	*		
Hole in Rock	10000	3/31/34	45.0	33.5	15.2	18.5	31.4	48.5	59.0
Lost Lake									
PROVO RIVER									
Soapstone Rgr. St.	7800	3/29/34	Patches	--	2.5	8.3	15.3	16.3	54.2
Lake Tryol	9850	3/30/34	46.0	35.6	16.4	20.0	33.8	48.5	59.0
Lost Lake	10000	3/31/34	45.0	33.5	15.2	18.5	31.4	48.5	59.0
Washington Long L	9900	3/31/34	52.8	34.8	18.4	23.7	41.4	44.5	57.2
Daniel Cr. Straw.	8100	1/2/34	10.3	34.0	3.5	13.6	23.4	14.9	58.0
East Portal	8000	3/30/34	23.6	34.0	8.04		*		
Strawberry									
Big Cottonwood Cr.	8700	3/23/34	46.8	35.2	16.5	25.0	32.0	51.5	78.0
Silver Lake	7700	3/28/34	13.5	32.6	4.4		*		
Parley's Canyon									

* Record too short to establish normal.