

WATER-SUPPLY FORECAST FOR UTAH, 1931*

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Bear River Area

The Bear River Area includes all that portion of the state north of Ogden Valley and east of Boxelder County. The seasonal snow survey over the watersheds of this area was made March 28 to April 2, inclusive. The survey covered an area about 40 miles long and most of the observations were made above 8000 feet elevation. The principal streams draining this area are: Logan River, Cub River, Blacksmith Fork River, Little Bear River, Bear River, High Creek, Summit Creek, and several smaller creeks. Bear River is affected only by that portion of the area draining eastward into Bear Lake.

The groundwater storage on these watersheds is badly depleted. Many springs are dry or nearly so. The winter flow of the Logan River has been the least in the past 13 years. The river reached a minimum of 82 c.f.s. in March and has now recovered to 139 c.f.s., showing that some melting has taken place.

The depth and water-content of the snow cover was obtained by measuring over representative courses. Seven snow courses were measured, giving a total of 185 observations. Most of these courses have been measured for the past 7 years.

The Franklin Basin course is located at the extreme north end of the Logan River Watershed at an elevation of 8300 feet and is representative of the Cub River watershed as well as the Logan. The Garden City Creek course is located at the head of Garden City Creek Canyon on the Bear Lake drainage at an elevation of 8200 feet. The Tony Grove Lake Course is located on the east side of the main Bear River Range and drains east into Logan River. It is 8300 feet high and is representative of the creeks draining west into Cache Valley. The Tony Grove Ranger Station course is at elevation 6250 feet in Logan Canyon. It is representative of the lower areas over the entire watershed. The Mt. Logan course is located about 15 miles south of Tony Grove Lake at 9000 feet elevation. This course is representative of Logan and Blacksmith Fork areas. Spring Hollow No. 4 and Spring Hollow No. 3 are near the Mt. Logan course, but 1000 and 2000 feet lower in elevation, respectively.

On April 1 there was practically no snow cover below 6500 feet elevation and the south slopes were bare up to 7500 feet elevation. The snow was of very low density and granular in structure. For the past 7 years the snow density on April 1 has averaged 36.8 per cent, while this year it averaged only 27.0 per cent.

Bear Lake Drainage.— The water content of the snow cover on the Bear Lake drainage as indicated by the snow course at the head of Garden City Canyon is only 4.4 inches, or 20.6 per cent of the last 7 year average. It is only 23

* These forecasts are based on the Utah cooperative snow surveys made under the direction of the Utah Agricultural Experiment Station, United States Forest Service, and the United States Weather Bureau, cooperating.

per cent of the cover in 1930. A very low runoff from the Bear Lake drainage can be expected in 1931.

Cub River Drainage.- The Franklin Basin Snow Course is fairly representative of the snow cover on the Cub River Watershed. The snow cover at Franklin Basin this year has a water content of 14.9 inches as compared to a 7-year average of 27.9 inches, or 53.4 per cent. The density is low and the ground will probably absorb considerable of the water, thus depleting the runoff. Only about 50 per cent of the last 7-year average flow can be expected from Cub River this year or a little more than one-half that received last year.

Maple Creek, High Creek, Summit Creek, Providence Creek, etc.- These drainage areas are short and steep. The snow cover is practically all gone below 7500 feet elevation. The flow of these streams on April 1 this year was about equal to that on the same date last year. There is a very deficient snow storage on these drainages. The Franklin Basin and Tony Grove Lake courses are on the east slope where the snow cover is heavier than on the west slope. Even on these courses there is only about 50 per cent of snow storage that was there last year and 48.9 per cent of the last 7-year average. A few warm days may bring up the flow in these small streams, but there is not sufficient snow storage to maintain them for any great length of time. The late season flow can be expected to reach a record low and the high water will probably be over by the middle of May or by the first of June.

Logan River.- The Logan River is about 40 miles long, lies in a general north-south direction, and drains an area of about 220 square miles. Less than one square mile lies below 5000 feet elevation and less than 9 per cent below 6000 feet elevation. Sixty-eight per cent of the area lies above 7000 feet. Due to its location, geological structure, topography and vegetal cover the Logan drainage is believed to be the most productive of water per unit of area of any drainage in the state.

The snow courses at Franklin Basin, Tony Grove Lake, and Mt. Logan are representative of the snow cover above 7500 feet elevation, and the Spring Hollow and Tony Grove Ranger Station courses are an index to the low snow. The average snow cover at the three high stations for the past 7 years is 30.8 inches depth of water. The average snow cover at these three stations this year is 14.4 inches depth of water or 46.7 per cent.

During the last 34 years the average runoff in acre-feet for the irrigation season, April 1 to September 1, has been 172,600. During the past 7 years, the period over which snow surveys have been made, the average has been only 125,200 acre-feet. The last 7 years have been in a distinct dry cycle. The snow cover this year is only 46.7 per cent of the last 7-year average. Due to watershed losses and spring precipitation it is found that a 47 per cent snow cover does not necessarily mean 47 per cent runoff. If the snow cover be plotted against the runoff, it is found that a 46.7 per cent snow cover on April 1 can be expected to yield approximately 57 per cent runoff. This is equal to about 72,000 acre-feet, or 15,000 acre-feet lower than any year in the past 34 years.

Logan River was discharging on April 1, 1931, about the same as on April 1, 1930. A sudden continued rise in temperature may increase the flow to a maximum of 500 c.f.s., but it will be of short duration. The present snow cover indicates that the low water stage will be reached during early June, and that unless abnormally heavy rains occur an acute shortage will be felt during July, August, and September.

The Smith-Morehouse snow course this year measured 6.6 inches depth of water as compared with 10.6 inches in 1930 and with 13.3 inches in 1929. The Redden Mine course measured 8.6 inches as compared with 19.2 inches in 1930. The Holliday Park-Long Lake divide course, being much higher, measured 15.9 inches depth this year.

The average April-September runoff for the period 1924-30, inclusive, was 123,540 acre-feet. With the high level snow cover only 50 per cent of that in 1930, the probable runoff during the April-September period in 1931 will not exceed 60 per cent of the 1930 runoff.

Salt Lake City Watershed

Snow-stake measurements have been made in Brighton Basin, Big Cottonwood Canyon, for many years. This year, in addition to the regular measurements in Brighton Basin, a snow course was established across the meadows near Silver Lake. The average water content of the snow cover in Brighton Basin for the past 14 years is 23.4 inches depth. In 1930 there was 22.4 inches depth, while on April 1, 1931, there was only 12.1 inches depth. This is 54 per cent that of 1930 and 52 per cent that of the 14-year average. There was a marked deficiency of high snow and the low snow was fairly well depleted on April 1. Snow measurements this year indicate that Salt Lake City faces a water shortage such as has never occurred before in the history of the record.

Utah Lake Drainage

Provo River.- Snow-survey courses were established on the Provo River this year. Some snow-depth measurements have been made prior to this by Mr. Clegg of the Provo Reservoir Company. Although no direct comparisons are possible, the snow cover on the headwaters of the Provo River are apparently only about 50 per cent of 1930.

The April-September runoff at the mouth of Provo Canyon since 1924 has averaged 149,270 acre-feet. For 1930 the runoff was 122,050 acre-feet. Based on snow-cover measurements in Daniels Creek (on headwaters of the Weber) and on one year's record on the headwaters of the Provo, it is quite probable that the discharge of the Provo River this year will be between 80,000 and 90,000 acre-feet.

Hobble Creek, Spanish Fork River, Payson Creek, etc.- There are no snow courses established as yet on any of these streams. Based on surveys made on adjacent watersheds, observations made in Spanish Fork Canyon after the April 1st storm, the runoff from these streams will be a little higher in proportion than from either those north or south. A heavy snow cover fell on the ranges immediately to the north and south of Spanish Fork Canyon but did not extend more than 10 or 15 miles either way.

American Fork Canyon.- For the past five years, snow-cover measurements have been made at a snow stake near the Dutchman Ranger Station in American Fork Canyon. This year a snowsurvey course was established across the Flats near the Ranger Station. The average snow cover/contains only 7.3 inches of water, or about 50 per cent of that in 1930. Snow-cover measurements available indicate that the April-September runoff this year will be between 50 and 60 per cent that of 1930.

Uinta Basin Streams

The Uinta Basin watersheds are well covered with snow courses all above the 8000-foot elevation. The Lake Fork Mountain course (elevation, 10,500 feet), the Paradise Park course (elevation, 10,500 feet), the Mosby Mountain course (elevation, 9500 feet), and the King's Cabin course (elevation, 8800 feet) furnish a splendid

This year the snow cover is 14.2 inches of water. The past 5 years was

index of the seasonal flow of Uinta Basin streams. These snow courses are 2 years old and prior to their establishment snowstake measurements were made. In addition to these courses, there is a course at the head of Strawberry River and one at the head of Indian Canyon. The 1931 measurements indicate a snow cover 64 per cent of the average and approximately 53 per cent of 1930. The snow cover is more deficient at 10,500 feet elevation than it is at 9000 feet elevation. Due to this shortage of high snow and to the fact that much of the low snow had been depleted by April 1, not more than 60 per cent of the 1930 runoff can be expected during the season of 1931.

Daggett County Streams

Only two snow courses have been established on the north side of the Uinta Mountains. One of these is located on Black's Fork and the other on Beaver Fork above the Hole-in-the-Rock Ranger Station. The former course has been measured for 2 years and the latter for one year. These measurements indicate the snow cover on April 1, 1931, to be about 50 per cent that of 1930.

Price River, Huntington, Ferron, and Cottonwood Creeks

These streams drain the north end and the east side of the Wasatch Plateau in central Utah. For several years snow surveys have been made which are representative of conditions on these watersheds. Price River and Huntington Creek are covered by the snow courses at the head of Gooseberry Creek and Huntington Creek. Ferron and Cottonwood Creeks are represented by the snow courses on the head of Seeley Creek and at the Alpine Ranger Station.

The average water content of the snow cover at the head of the Price River and Huntington Creek for the past four years is 24.2 inches depth. On April 1, 1931, the snow cover averaged only 10.8 inches depth, or 44 per cent of the average. The snow cover this year is approximately 56 per cent of that in 1930.

There is a marked deficiency of snow on the high areas. This, together with the early depletion of the low snow, points toward a rather severe water shortage during the season of 1931. It is reported that there are only about 6000 acre-feet in the Pleasant Valley Reservoir and that about 34 c.f.s. are running in with 30 c.f.s. running out. In light of a pending severe late season water shortage, storage water should be conserved wherever possible.

Ferron and Cottonwood Creeks are represented by the snow courses near the head of Seeley Creek. The average snow cover at the Alpine Ranger Station on April 1 contained 20 inches depth of water and at the Seeley Creek Ranger Station it contained 18.4 inches of water. The 1931 snow cover contained 10 inches of water at Alpine and 9.8 inches at Seeley Creek, or slightly over 50 per cent of the average. As compared to the 1930 snow cover, it equals about 65 per cent. The snow cover on April 1, 1931, was by far the least of any year in the past ten years and a severe water shortage can be expected on these streams during June, July, and August.

Sanpete Valley Area

The streams supplying water to Sanpete Valley for the most part drain off the west side of the Wasatch Plateau. The 1931 snow cover on April 1, 1931, as represented by some six snow courses along the Wasatch Plateau, is only 47 per cent of the average and 55 per cent of that in 1930. Based on the snow cover on April 1, 1931, Sanpete Valley faces the most severe water shortage of any year in the past ten years. Unless abnormally heavy summer rains occur, the late-season flow of Sanpete Valley streams will reach a minimum not experienced before.

pared to 1930, but indications are that the runoff from Fillmore watersheds will approach nearer the 1930 runoff than any watersheds in the state, except possible Hobbie Creek and Spanish Fork River.

Summary

Summarizing the entire state, it is doubtful that the runoff will exceed 60 per cent of the average, and with a subnormal spring precipitation it may go as low as 50 per cent.