Ground Snow Loads for Idaho – 2015 Edition

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PREFACE

The American National Standards Institute and subsequently, the American Society of Civil Engineers mapped the ground snow loads for the nation, but deferred to local knowledge and case studies in the western U.S   As a result many of the western states have written reports to describe the ground snow loads produced by the varied terrain and complex weather patterns. In 1976 we published the first comprehensive report of ground snow loads for Idaho, which was updated in 1986 with an expanded data base and loads associated with a two percent chance that the value will be exceeded in a given year (also known as a 50-year mean recurrence interval); we used a three percent chance in the 1976 study.

The database for this 2015 study contains 31 additional years of record from the National Weather Service (NWS) and the National Resources Conservation Service (NRCS), formerly the Soil Conservation Service (SCS). We used a total of 408 stations within Idaho and 260 additional stations located in bordering states. As in the 1986 study we used the Rocky Mountain Conversion Density (RMCD) to obtain loads from the snow depths recorded by the NWS Coop stations, and mapped the Normalized Ground Snow Loads (NGSL). Appendix 1 lists the ground snow loads for Idaho towns and cities by county. Several areas exhibited exceptions to the mapped values; consequently we have provided Appendix 2 that compares the 1976, 1986 and 2015 loads, and it includes notes to aid in interpreting any mapping exceptions and/or values that have changed significantly from previous studies. We envision that the notes will be useful to the user in interpreting loads for sites that are not specifically documented.

The 31 years of additional data, plus new Idaho stations and also stations from bordering states produced results slightly different from those of our previous studies as shown in Appendix 2. For this study, the counties of Ada, Bannock, Benewah, Bingham, Butte, Clark, Clearwater, Jefferson, Jerome, Minidoka, and Payette did not show significant changes from the 1986 report. The Washington-Idaho State line shows improved agreement for towns near the state border. Also, there are differences in the studies at the Idaho-Oregon border and at the Idaho-Montana border. Since this study focuses only on the ground snow loads, we have not included information on the ground-to-roof conversion factors, which can be found in the ASCE/SEI 7 Standard.

We urge our readers to use the information with care. The uncertainties associated with snow should suggest that the scatter in the data could be large in spite of our many efforts. For unusual structures or siting we suggest that all available information be considered in determining the snow loads. Finally, we remind the user that the design snow loads are the ultimate responsibility of the person in charge of the project. This document is not legally binding. The user is urged to verify ground snow load values with the local authority having jurisdiction.

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By

Hussain Al Hatailah, Bruce R. Godfrey, Richard J. Nielsen, and Ronald L. Sack

1.0 Introduction

Snow loading can constitute the most severe test of structural integrity for structures that are constructed in areas where large accumulations of snow are encountered. Economical structural design in these areas requires an accurate prediction of the ground snow, plus an understanding of how the snow is distributed on the structures. The Natural Resources Conservation Service (NRCS) and the National Weather Service (NWS) are the two principal agencies gathering ground snow data in the western U.S. (the *West)*. The American Society of Civil Engineers (ASCE) has mapped the ground snow loads for the U.S. (ASCE/SEI 7-10 2010) but has not defined ground snow loads in most of the *West*, where the national standard defers to local knowledge and case studies. The varied terrain and complex weather patterns in the *West* result in extreme variations in ground snow between the valleys, plains and mountains; it is insufficient to rely on simplified measures such as using a standard lapse rate.

2.0 The First Idaho Study–1976

The first comprehensive study of ground snow for Idaho (Rusten 1976, Sack, Rusten and Molnau 1976. and Rusten, Sack and Molnau 1980) used data from 279 snow course stations of the Soil Conservation Service (SCS), which is now the NRCS. All of these stations were in Idaho with the exception of 28 in Montana and seven in Wyoming. Each snow course had seven or more years of record. Maximum-recorded weights of snow on the ground were selected from records taken during the seasons from 1927 to 1975. The annual maximum values of snow-water equivalent for each station were analyzed for a 30-year mean recurrence interval (MRI, i.e., an annual probability of 0.033 that the ground snow is exceeded) using a log Pearson type III frequency analysis. Additionally snow depth data were used from 126 National Weather Service (NWS) stations within the state. These data were also analyzed for a 30-year MRI. But these data can only yield useful results if a specific gravity is assigned to the depths. Canada initially adopted a constant specific gravity of 0.192 for all locations and added the maximum 24-hour rain occurring during the winter months. The 1976 Idaho study used a value of 0.385 to convert the NWS depths to loads. The value of 0.385 was obtained from the mean specific gravity of the 270 SCS stations within the region. The NWS depth data were used only if the SCS data were sparse in a particular location. The station-specific extreme values were spatially extrapolated using normalized ground snow loads (NGSL). Normalized ground snow load (NGSL) contours are used by Idaho, Montana, and Washington. For this technique the snow load at each measurement site (in units of force per area) is divided by the elevation of the station in feet to give a quasi-normalized quantity in units of psf/ft. These quantities appear to have no obvious physical significance, but the process in effect reduces the entire area to a common base elevation. This procedure masks out the effect of the environment on the snowmaking mechanism and gives single-valued contours that are impossible to obtain without normalization. The ground-to-roof conversion factors recommended in the 1976 study were those obtained by the National Research Council of Canada and published in the American National Standards Institute A58.1-1972 (ANSI 1972).

3.0 The Second Idaho Study–1986

Various factors prompted updating the 1976 Idaho study. This was an opportunity to: (a) update all annual maxima for the Idaho SCS and NWS stations; (b) include more stations from surrounding states and (c) examine the issue of an appropriate specific gravity for the NWS snow depth data. We used a total of 514 stations from both SCS and NWS for the 1986 study. The 375 SCS stations were composed of 234 from Idaho, 93 from Montana, 30 from Oregon and 18 from Washington. All Idaho snow courses included in the study had a minimum of 10 years of record. The maximum-recorded weights of snow on the ground were selected from records taken during the following snow seasons: Idaho (1927-1983); Montana (1922-1974); Oregon (1928-1972); and Washington (1915-1969). Additionally, snow depth data were available from 138 NWS stations in Idaho (1927-1981) plus the first-order station in Spokane, Washington. The Idaho NWS first-order stations in Boise, Lewiston, and Pocatello are included in the total NWS Idaho stations.

The 1982 countrywide ANSI map is based on an annual probability of being exceeded equal to 0.02 (50-year MRI), and we envisioned that the Idaho map should use this same MRI. Annual probabilities of being exceeded ranging from 0.01 to 0.04 have been used in the United States, but the trend is to standardize on the single value of 0.02. The MRI is the reciprocal of the annual probability of being exceeded. Thus, a 50-year MRI corresponds to an annual probability of being exceeded of 2 percent. It is important to note, for example, that during a 50-year period, there is a 63.6 percent chance of exceeding the value designated by the 2 percent annual probability of exceedance. In order to conform to the value used in the *West* and also in the *Standard* for this report the annual maximum values of snow-water equivalent for each station were analyzed for a 50-year MRI using a log Pearson type III frequency analysis. Additionally snow depth data were used from 126 NWS stations within the state. These data were also analyzed for a 50-year MRI, as were the depths and snow-water equivalent for the first-order Spokane station and the three Idaho first-order stations.

The snow depths recorded for the majority of the NWS stations, that is for the Cooperative Observation Network (i.e., NWS Coop stations) constitute a potentially useful set of information, but their use requires an estimate of the specific gravity of the snow at each station to convert the NWS depths to loads. The methodology used by ANSI for the United States involved plotting the 50-year MRI ground snow depths against the 50-year MRI ground snow loads for the 184 first-order NWS stations. The resulting nonlinear regression curve relating these extreme values was used to predict ground snow loads for the NWS Coop stations nationwide.

It was envisioned that the value of the specific gravity of 0.385 used in the 1976 Idaho study is probably accurate for mountainous locations where the snow compacts throughout the winter, but it is probably not representative for sites in valleys and plains where the snow remains on the ground for only a short period. Therefore, for the 1986 study of Idaho we fit a bilinear distribution to data from 3,000 Western SCS stations with over five years of record (Sheikh-Taheri, 1985). The relationships developed were dubbed the Rocky Mountain Conversion Density (RMCD) and are expressed as follows and shown in Fig. 1:

$$p_g = 0.90h_g \qquad \text{for } h_g \leq 22 \text{ in.}$$

and (3.1)

$$p_g = 2.36h_g - 31.9 \qquad \text{for } h_g \geq 22 \text{ in.}$$

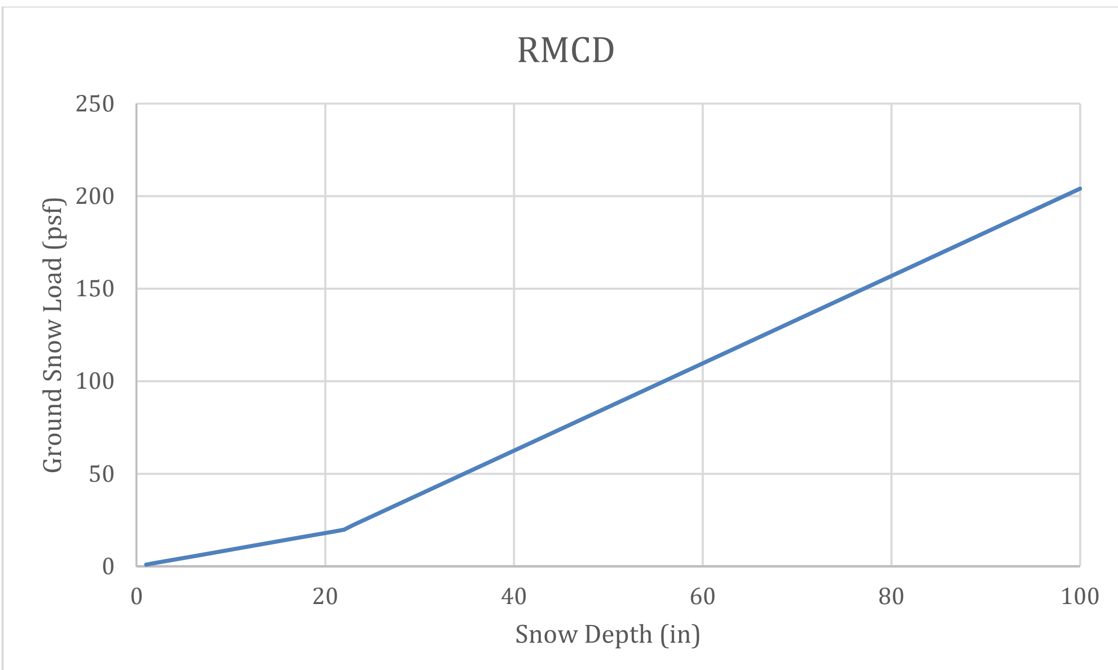

Figure 3.1: The Rocky Mountain Conversion Density

Where p_g is the ground snow load in lb/ft^2 and h_g is the snow depth in inches. For depths less than 22 in. this gives a specific gravity of 0.175 and for depths greater than 22 in. the specific gravity is variable. Note that a specific gravity of 0.385 from the 1976 study would require $h_g = 89$ in., which yields $p_g = 178$ psf.

For the 1986 study we mapped the NGSL using the computer program SURFACE II to generate a contour map of NGSL (Sheikh-Taheri 1985).

3.1 Exceptions for the 1986 Idaho Report

Some exceptions to the contour lines were noted during the mapping process. The map produced ground snow loads for cities and towns; these loads were compared to the input data to check the accuracy of the mapping. We checked the areas that were not represented accurately by the contours and studied these in more detail. One such area was Coeur d'Alene where the RMCD proved to be inadequate for predicting snow loads from the snow depths of the NWS. Therefore, we obtained a factor to convert the maximum depth to the maximum load at this station. The maximum annual water equivalents were selected from the Spokane first-order NWS station for the past 28 years and the 50-year MRI value was calculated. Similarly, maximum annual snow depths were analyzed and the 50-year MRI snow depth was obtained. Both extreme values were computed using the log Pearson type III frequency analysis. A conversion factor of 0.233 was calculated for Spokane by dividing the extreme value of water equivalent by the extreme value of depth. This value was applied to the NWS depth at the Coeur d'Alene station. Snow-water equivalents for Boise, Lewiston and Pocatello were used at these first-order stations and the NWS values were disregarded.

Another type of exception was noted for locations where the NGSL was known and could not be represented by a contour line. One of these exceptions occurred at Riggins (a NWS Coop station) and another at Bear Mountain (a SCS station). The NGSL for Riggins is 0.005, and the contour lines around this town were between 0.025 and 0.030. Similarly, the value of NGSL for Bear Mountain is 0.120, and the contours around it have a value of 0.055. Since the contour interval is 0.005, this difference in values cannot be shown without adding more contours, which is untenable. Therefore, the value of the NGSL for such locations were noted as exceptions, and these are represented on the map by a + sign accompanied by the NGSL value. The map and report are available online (Sack and Sheikh-Taheri 1986).

4.0 The 2015 Idaho Study

The 1986 study included the records up to 1983 and excluded stations with fewer than ten years of data; whereas this 2015 study includes 31 more years of record from the NWS and NRCS, plus it incorporates stations introduced since 1983 and also the SNOTEL stations. This study also includes 260 stations from the neighboring States of Montana, Nevada, Oregon, Utah and Washington. Details of this study and all the metadata for Idaho are contained in a M.S. thesis (Hussain Al Hatailah 2015).

The NRCS records data consisting of snow-water equivalent through the snow course monthly measurements and the SNOTEL stations, which are continuously monitored remotely. The NWS maintains the Coop stations where only snow depths are measured daily; they also support the first-order stations, which measure daily snow depth and weight. For this study we used the snow records with ten years or more of data shown in Table 4.1.

Table 4.1: Snow Stations for 2015 Idaho Report

State	NWS	NRCS
Idaho	138*	270
Montana	3	92
Nevada	2	38
Oregon	0	33
Utah	2	17
Wyoming	0	44
Washington	8**	21

- 260 Stations for Border States.

Notes:

*Includes 3 NWS First-Order Stations.

**Includes 1 NWS First-Order Station.

Annual NWS maximum snow depths (converted to snow loads using the RMCD) and annual NRCS maximum snow-water equivalent were analyzed using the log Pearson type III extreme-value distribution to yield the 50-year MRI ground snow loads. The 50-year MRI ground snow loads were divided by the station elevation in feet to yield the NGSL in psf/ft.

ArcGIS for Desktop (ESRI 2014) was used to develop a model to produce a map showing the NGSL for the State of Idaho. Metadata for each weather station, including longitude, latitude, elevation, and the 50-year MRI NGSL were imported into ArcGIS to create two layers: one containing station elevations less than or equal to 4,000 feet and one containing station elevations greater than 4,000 feet. The Inverse Distance Weighting (IDW) surface interpolation tool was used to produce an interpolated raster surface from each station point layer. A raster surface is a grid of equally sized cells where each cell contains a NGSL value. The IDW algorithm uses a weighting function to interpolate the value of the NGSL grid cells at locations between stations. The weighting function is the inverse of the average distance (D) between the snow stations and the grid location raised to a power value p (i.e., $1/D^p$). A weighting factor of $1/D^2$ was employed for relatively flat areas (elevations less than or equal to 4,000 ft) and $1/D^6$ was used for regions with highly varying terrain (elevations greater than 4,000 ft). The weighting factor $1/D^6$ reduces the weight of more distant stations on the NGSL at a grid location, which is appropriate for highly varying terrain in mountainous areas. Upon completion of the interpolation step, two raster surfaces having grid cell sizes of 3000 meters by 3000 meters were created.

Digital elevation data (USGS 2014) having a 10 by 10-meter grid cell size were resampled to 3000 by 3000 meters to vertically align with the interpolated raster surfaces that were created. Initially, the digital elevation data were used to select grid cells having elevation values less than or equal for 4,000 feet from the $1/D^2$ interpolated raster surface. Second, the digital elevation data were used to select grid cells having elevation values greater than 4,000 ft from the $1/D^6$ interpolated raster surface. The two data sets were subsequently merged together to produce a single IDW interpolated raster surface. The merged data set contained five pixels having no data. Four of the pixels were approximately 2.5 miles south of Castleford and one pixel was about six miles southeast of Twin Falls. A tool within ArcGIS was used to calculate the NGSL values for the five pixels that contained no data by estimating the value from neighboring cells. The resulting raster surface was subsequently clipped at the State of Idaho boundary. The raster surface was then converted to a vector polygon data set and the exceptions, detailed in Section 4.1, were incorporated to produce the final data set.

A map service makes georeferenced map images available over the Internet. The final NGSL data set was published as a map service to facilitate use and explorability of the data. An HTML/JavaScript web mapping application was developed using the Google Maps JavaScript Application Programming Interface (API) Version 3 and the ArcGIS Server Link for Google Maps API Version 3. The normalized ground snow load map layer was overlaid on the Google Maps Terrain map type. An opacity slider was added to allow users to adjust the transparency of the normalized ground snow load map layer in order to see more clearly the underlying terrain.

Additionally, users are able to search for a location by entering a town name, a latitude/longitude (in decimal degrees), or a street address. A ground snow load for the location will be displayed for the user. Additionally, users can navigate around the map by zooming in/out and moving north/south/east/west and then clicking a location on the map to determine a ground snow load value for the selected location. The latitude and longitude, elevation, normalized ground snow load, and ground snow load are displayed for the user for any selected location. The latitude and longitude, as well as the elevation value, for any location are determined from the Google Maps API. The ground snow load in psf is determined by multiplying the normalized ground snow load by the elevation in feet.

4.1 Exceptions for the 2015 Study

Just as in the 1986 study, we noted several exceptions to the values obtained from a strict adherence to the map values. The NWS Coop station for the City of Coeur d'Alene, which is located 35 miles east of the first-order Spokane station, registers a 50-year MRI snow depth of 42 in. Using the RMCD we calculate a ground load of 67 psf, which gives a specific gravity of 0.308. The Spokane NWS first-order station gives a 50-year MRI depth of 30 in, with a snow-water equivalent (SWE) of 7.55 in., which translates to a specific gravity of 0.2517. We can conclude that the RMCD gives a specific gravity that is not appropriate for Coeur d'Alene because it is derived using data from SCS stations, which are located primarily in the mountainous areas. Using the specific gravity of 0.2517 and a depth of 42 in. for Coeur d'Alene gives a ground snow load of 40 psf. To resolve this anomaly we mapped the area in Kootenai County using the snow depths from the East Ragged Saddle Station, using the specific gravity for Spokane. These two approaches both gave a ground snow load of 43 psf for Coeur d'Alene. But the two approaches gave slightly differing values for other towns in the county (see Appendices 1 and 2). The right-hand column in Appendices 1 and 2 for Kootenai County gives the ground snow load ignoring the data from the East Ragged Saddle Station for comparison.

We encountered an additional anomaly in Bannock County for the cities of Pocatello, which has a NWS first-order station, and Chubbuck, which is four miles north of Pocatello. The mapping gave ground snow loads of 45 psf for both towns. But using the depth and snow-water equivalent values at the Pocatello Regional airport we calculated a 50-year MRI snow load of 31 psf, which we prescribed for both cities.

Since ground snow loads differ from our current calculations and those done in 1976 and 1986, we have annotated the listing of ground snow loads for Idaho cities and towns in Appendix 1. For many locations we have provided notes with rationale for these values by noting the location of NWS and SCS stations near the town/city. The results from the three Idaho studies are documented In Appendix 2.

5.0 Summary and Conclusions

The 31 years of additional data, plus new Idaho stations and also stations from the neighboring states produced results slightly different from those of the 1986 study. In Appendix 2 we have included the values from the 1976 report, but since the 30-year MRI value was used in that early study, we have multiplied the ground loads by 1.15 to approximately convert them to 50-year MRI values. For this 2015 study the counties of Ada, Bannock, Benewah, Bingham, Butte, Clark, Clearwater, Jefferson, Jerome, Minidoka, and Payette did not experience great changes from the 1986 study. Adams County had an approximate average decrease of 30% in their snow loads. The Washington-Idaho State line shows improved agreement for towns near the state border. Also, there generally are differences in the studies for neighboring States at the Idaho-Oregon and Idaho-Montana borders. The ground snow loads for towns/cities for all Idaho counties are tabulated in Appendix 1.

Since this 2015 Idaho report focuses only on the ground snow loads, we have not included the ground-to-roof conversion factors. We refer the user of this report to the ASCE/SEI 7 *Standard* (ASCE/SEI 7-10) to obtain roof design snow loads where factors such as exposure, thermal properties, and importance are defined and quantified. Also ASCE/SEI 7 offers design information for myriad effects such as roof slope, unbalanced loads, drifting, roof projections, sliding snow, rain on snow, ponding, and others.

We conclude that the 2015 Idaho ground snow load study provides engineers, architects, contractors and building officials with the most current and accurate information available to ensure the health and welfare of the public. But we acknowledge that the uncertainties associated with snow suggest that the scatter in the data may be large in spite of our best efforts. Also, the authority having jurisdiction must approve ground snow loads for sites that are not specifically defined in this report. Ground snow load determination for such sites must be based on an extreme value statistical analysis of data available in the vicinity of the site using a value with a 2 percent annual probability of being exceeded (i.e., 50-year MRI). And finally we remind the user of this report that the design snow loads are the ultimate responsibility of the person in charge of the project.

6.0 References

Al Hatailah, Hussain, (2015). "Ground Snow Loads for the State of Idaho." M.S. Thesis, Department of Civil Engineering, University of Idaho, Moscow, ID.

American National Standards Institute (ANSI), (1982), "Building Code Requirements for Minimum Design Loads in Buildings and Other Structures." ANSI A58.1-1982, New York, NY.

American Society of Civil Engineers (ASCE). (2010). "Minimum design loads for buildings and other structures." ASCE/SEI 7-10-2010, Reston, VA.

ESRI (Environmental Systems Resource Institute). 2014. ArcGIS for Desktop 10.2.2. ESRI, Redlands, CA.

Rusten, A. (1976) "Structural Snow Load Analysis," M.S. Thesis, Dept. of Civil Engineering, University of Idaho, Moscow, ID

Rusten, A., Sack, R.L., and Molnau, M. (1980). *Snow Load Analysis for Structures, J. Struct. Engrg.* (ASCE), Vol. 106, No. ST1, Proc. Paper 15102, January 1980, pp. 11-21.

Sack, R.L., & Sheik-Taheri, A. (1985). *Ground and Roof Snow Loads for Idaho*. Department of Civil Engineering, University of Idaho, Moscow, ID.
http://www.lib.uidaho.edu/digital/idahosnow/index.html
http://www.lib.uidaho.edu/digital/idahosnow/elevation.html (Last accessed May 8, 2015)

Sack, R.L, Rusten, A., & Molnau, M.P. (1976). *Snow loads for structures in Idaho.* University Press of Idaho, Idaho Research Foundation, Inc., Moscow, ID. ISBN 0-89301-033-2.

Sheikh-Taheri, A. (1985). "Ground Snow Loads for the State of Idaho, M.S. Thesis, Dept. of Civil Engineering, University of Idaho, Moscow, ID.

United States Geological Survey (USGS). (n.d). Retrieved April 22, 2015, from http://ned.usgs.gov/

Appendix 1. Ground Snow Loads for Idaho Cities and Towns—2015 Edition

County	City	Elevation (ft)	GSL (psf)
ADA			
	Boise	2681	**15**
	Eagle	2566	**18**
	Garden City	2673	**15**
	Kuna	2693	**14**
	Meridian	2605	**16**

ADAMS			
	Council	2967	**55**
	New Meadows	3868	**89**

BANNOCK			
	Arimo	4741	**78**
	Chubbuck	4467	**31***
	Downey	4862	**80**
	Inkom	4550	**112**
	Lava Hot Springs	4999	**79**
	McCammon	4770	**98**
	Pocatello	4463	**31***
***See Section 4.1 Exceptions for the 2015 Study**			

BEAR LAKE			
	Bloomington	5984	**53**
	Georgetown	6034	**118**
	Montpelier	5986	**45**
	Paris	5967	**76**
	St. Charles	5965	**35**

BENEWAH			
	Chatcolet	2129	**58**
	Plummer	2742	**63**
	St. Maries	2192	**59**
	Tensed	2562	**36**

County	City	Elevation (ft)	GSL (psf)
BINGHAM			
	Aberdeen	4403	**22**
	Basalt	4592	**45**
	Blackfoot	4498	**28**
	Firth	4567	**44**
	Shelley	4629	**35**
BLAINE			
	Bellevue	5183	**80**
	Hailey	5323	**82**
	Ketchum	5846	**92**
	Sun Valley	5954	**104**
BOISE			
	Crouch	3047	**46**
	Horseshoe Bend	2631	**28**
	Idaho City	3984	**109**
	Placerville	4323	**104**
BONNER			
	Clark Fork	2085	**71**
	Hope	2188	**69**
	Kootenai	2115	**57**
	Old Town	2115	**74**
	Ponderay	2124	**58**
	Priest River	2124	**73**
	Sandpoint	2101	**56**
BONNEVILLE			
	Ammon	4718	**24**
	Idaho Falls	4725	**23**
	Iona	4783	**23**
	Irwin	5325	**76**
	Swan Valley	5309	**58**
	Ucon	4807	**25**
BOUNDARY			
	Bonners Ferry	1895	**68**
	Moyie Springs	2209	**72**

County	City	Elevation (ft)	GSL (psf)
BUTTE			
	Arco	5325	**64**
CAMAS			
	Fairfield	5064	**71**
CANYON			
	Caldwell	2376	**18**
	Melba	2668	**14**
	Middleton	2400	**18**
	Nampa	2517	**15**
	Notus	2316	**17**
	Parma	2231	**24**
	Wilder	2428	**19**
CARIBOU			
	Bancroft	5415	**89**
	Grace	5534	**62**
	Soda Springs	5769	**70**
CASSIA			
	Albion	4724	**24**
	Burley	4159	**19**
	Declo	4218	**35**
	Malta	4517	**15**
	Oakley	4569	**16**
CLARK			
	Dubois	5145	**45**
	Spencer	5908	**90**
CLEARWATER			
	Elk River	2855	**138**
	Orofino	1017	**19**
	Pierce	3094	**125**
	Weippe	3014	**91**

County	City	Elevation (ft)	GSL (psf)
CUSTER			
	Challis	5253	**13**
	Clayton	5476	**112**
	Lost River	6221	**81**
	Mackay	5906	**89**
	Stanley	6265	**128**
ELMORE			
	Glenns Ferry	2563	**18**
	Mountain Home	3141	**15**
FRANKLIN			
	Clifton	4847	**79**
	Dayton	4823	**80**
	Franklin	4504	**56**
	Oxford	4794	**74**
	Preston	4715	**79**
	Weston	4741	**72**
FREMONT			
	Ashton	5260	**103**
	Drummond	5607	**114**
	Island Park	6294	**170**
	Newdale	5078	**41**
	Parker	4924	**45**
	St. Anthony	4963	**37**
	Teton	4946	**44**
	Warm River	5297	**108**
GEM			
	Emmett	2363	**15**
GOODING			
	Bliss	3268	**29**
	Gooding	3571	**27**
	Hagerman	2954	**24**
	Wendell	3433	**20**

County	City	Elevation (ft)	GSL (psf)	
IDAHO				
	Cottonwood	3496	57	
	Ferdinand	3722	60	
	Grangeville	3400	18	
	Kooskia	1291	25	
	Riggins	1820	18	
	Stites	1306	24	
	Whitebird	1580	22	
JEFFERSON				
	Hamer	4800	33	
	Lewisville	4795	30	
	Menan	4803	30	
	Mud Lake	4790	33	
	Rigby	4851	32	
	Ririe	4963	59	
	Roberts	4777	33	
JEROME				
	Eden	3954	18	
	Hazelton	4073	17	
	Jerome	3764	12	
KOOTENAI				
	Athol	2393	71*	69†
	Coeur d'Alene	2189	43*	43†
	Dalton Gardens	2265	52*	51†
	Harrison	2192	58*	55†
	Hauser	2213	100*	70†
	Hayden	2287	62*	58†
	Post Falls	2183	72*	59†
	Rathdrum	2211	87*	72†
	Spirit Lake	2569	96*	87†
	State Line	2105	80*	62†
	Worley	2661	64*	59†
*See Section 4.1 Exceptions for the 2015 Study				
†Ground Snow Loads ignoring East Ragged Saddle Station				

County	City	Elevation (ft)	GSL (psf)
LATAH			
	Bovill	2876	**108**
	Deary	2873	**86**
	Genesee	2680	**39**
	Juliaetta	1171	**26**
	Kendrick	1243	**29**
	Moscow	2580	**38**
	Potlatch	2546	**38**
	Troy	2487	**47**
LEMHI			
	Leadore	5973	**65**
	Patterson	6034	**52**
	Salmon	3943	**15**
LEWIS			
	Craigmont	3740	**66**
	Kamiah	1238	**25**
	Nezperce	3215	**21**
	Reubens	3527	**67**
	Winchester	3980	**71**
LINCOLN			
	Dietrich	4088	**57**
	Richfield	4298	**61**
	Shoshone	3964	**49**
MADISON			
	Rexburg	4863	**50**
	Sugar City	4892	**50**
MINIDOKA			
	Acequia	4165	**19**
	Heyburn	4146	**19**
	Minidoka	4282	**19**
	Paul	4146	**18**
	Rupert	4154	**18**

County	City	Elevation (ft)	GSL (psf)
NEZ PERCE			
	Culdesac	1644	**29**
	Lapwai	955	**15**
	Lewiston	994	**10**
	Peck	1102	**40**
ONEIDA			
	Malad City	4846	**109**
OWYHEE			
	Grand View	2354	**10**
	Homedale	2231	**16**
	Marsing	2301	**12**
PAYETTE			
	Fruitland	2226	**18**
	New Plymouth	2260	**19**
	Payette	2148	**17**
POWER			
	American Falls	4406	**24**
	Rockland	4656	**68**
SHOSHONE			
	Kellogg	2308	**39**
	Mullan	3277	**126**
	Osburn	2522	**83**
	Pinehurst	2222	**53**
	Smelterville	2224	**44**
	Wallace	2728	**107**
	Wardner	2658	**45**
TETON			
	Driggs	6109	**50**
	Tetonia	6066	**68**
	Victor	6213	**119**

County	City	Elevation (ft)	GSL (psf)
TWIN FALLS			
	Buhl	3769	**28**
	Castleford	3873	**35**
	Filer	3765	**18**
	Hansen	4033	**19**
	Hollister	4522	**12**
	Kimberly	3924	**14**
	Murtaugh	4084	**19**
	Twin Falls	3734	**15**
VALLEY			
	Cascade	4762	**76**
	Donnelly	4866	**78**
	McCall	5012	**157**
WASHINGTON			
	Cambridge	2661	**74**
	Midvale	2542	**57**
	Weiser	2129	**17**
SKI AREAS			
ADA COUNTY	**Bogus Basin Lodge**	6176	**137**
VALLEY COUNTY	**Brundage Mt. Lodge**	6038	**207**
BONNER COUNTY	**Schweitzer Basin Lodge**	4175	**243**
SHOSHONE COUNTY	**Silverhorn Lodge**	5040	**173**
BLAINE COUNTY	**Sun Valley Mt. Baldy**	9000	**197**

Appendix 2. Ground Snow Loads for Idaho Cities and Towns—1976; 1986; 2015

County	City	Elev. ft	Roof‡,§ 1976	Ground 1976	Ground 1986	Ground 2015	Note
ADA							
	Boise	2681	19	27	14	15	
	Eagle	2566	16	23	13	17	
	Garden City	2673	19	27	13	15	
	Kuna	2693	17	24	15	14	
	Meridian	2605	16	23	13	16	
ADAMS							
	Council	2967	86	124	87	55	1
	New Meadows	3868	93	134	126	89	2
BANNOCK							
	Arimo	4741	64	92	95	78	3
	Chubbuck	4467	36	52	37	31*	
	Downey	4862	58	83	70	80	
	Inkom	4550	72	104	91	112	
	Lava Hot Springs	4999	64	92	93	79	
	McCammon	4770	72	104	95	98	
	Pocatello	4463	39	56	45	31*	
*See Section 4.1 Exceptions for the 2015 Study							
BEAR LAKE							
	Bloomington	5984	57	82	90	53	4
	Georgetown	6034	67	96	102	118	5
	Montpelier	5986	48	69	59	45	6
	Paris	5967	57	82	90	76	7
	St. Charles	5965	48	69	90	36	8
BENEWAH							
	Chatcolet	2129	34	49	66	58	
	Plummer	2742	31	45	51	63	
	St. Maries	2192	54	78	82	59	9
	Tensed	2562	31	45	38	36	
BINGHAM							
	Aberdeen	4403	35	50	22	22	
	Basalt	4592	18	26	55	45	
	Blackfoot	4498	29	42	23	28	
	Firth	4567	22	32	46	44	
	Shelley	4629	26	37	49	35	10

‡1976 roof loads are based on a 30-year MRI; all other loads are based on a 50-year MRI.
§1976 roof loads are 80% of the 1976 ground snow loads.

County	City	Elev. ft	Roof‡,§ 1976	Ground 1976	Ground 1986	Ground 2015	Note
BLAINE							
	Bellevue	5183	62	89	88	80	
	Hailey	5323	64	92	107	82	11
	Ketchum	5846	94	135	118	92	12
	Sun Valley	5954	95	137	118	104	13
BOISE							
	Crouch	3047	48	69	70	46	14
	Horseshoe Bend	2631	37	53	51	28	15
	Idaho City	3984	91	131	104	109	
	Placerville	4323	86	124	108	104	
BONNER							
	Clark Fork	2085	83	119	115	71	16
	Hope	2188	81	116	113	69	17
	Kootenai	2115	85	122	111	57	18
	Old Town	2115	52	75	76	74	
	Ponderay	2124	83	119	108	58	19
	Priest River	2124	50	72	73	73	
	Sandpoint	2101	75	108	104	56	20
BONNEVILLE							
	Ammon	4718	26	37	50	24	21
	Idaho Falls	4725	30	43	47	23	22
	Iona	4783	27	39	49	23	23
	Irwin	5325	68	98	76	76	
	Swan Valley	5309	68	98	73	58	
	Ucon	4807	23	33	43	25	24
BOUNDRY							
	Bonners Ferry	1895	71	102	89	68	25
	Moyie Springs	2209	88	127	110	72	26
BUTTE							
	Arco	5325	43	62	75	64	
CAMAS							
	Fairfield	5064	61	88	101	71	27

‡1976 roof loads are based on a 30-year MRI; all other loads are based on a 50-year MRI.
§1976 roof loads are 80% of the 1976 ground snow loads.

County	City	Elev. ft	Roof‡,§ 1976	Ground 1976	Ground 1986	Ground 2015	Note
CANYON							
	Caldwell	2376	13	19	12	18	28
	Melba	2668	11	16	13	14	
	Middleton	2400	15	22	12	18	29
	Nampa	2517	14	20	12	15	
	Notus	2316	13	19	12	17	30
	Parma	2231	12	17	11	24	31
	Wilder	2428	12	17	12	19	32
CARIBOU							
	Bancroft	5415	43	62	81	89	33
	Grace	5534	44	63	83	62	34
	Soda Springs	5769	69	99	87	70	35
CASSIA							
	Albion	4724	23	33	24	24	
	Burley	4159	23	33	21	19	36
	Declo	4218	20	29	21	35	
	Malta	4517	33	47	33	15	37
	Oakley	4569	37	53	23	16	
CLARK							
	Dubois	5145	41	59	52	45	
	Spencer	5908	61	88	88	90	
CLEARWATER							
	Elk River	2855	103	148	143	138	
	Orofino	1017	25	36	23	19	
	Pierce	3094	72	104	108	125	
	Weippe	3014	39	56	91	91	
CUSTER							
	Challis	5253	59	85	26	13	39
	Clayton	5476	66	95	82	112	38
	Lost River	6221	74	106	93	81	
	Mackay	5906	61	88	75	89	40
	Stanley	6265	80	115	94	128	41
ELMORE							
	Glenns Ferry	3141	22	32	20	18	
	Mountain Home	2563	25	36	31	15	42

‡1976 roof loads are based on a 30-year MRI; all other loads are based on a 50-year MRI.
§1976 roof loads are 80% of the 1976 ground snow loads.

County	City	Elev. ft	Roof‡,§ 1976	Ground 1976	Ground 1986	Ground 2015	Note
FRANKLIN							
	Clifton	4847	39	56	53	79	43
	Dayton	4823	39	56	48	80	44
	Franklin	4504	36	52	56	56	
	Oxford	4794	38	55	58	74	45
	Preston	4715	38	55	47	79	46
	Weston	4741	37	53	51	72	47
FREMONT							
	Ashton	5260	76	109	85	103	48
	Drummond	5607	83	119	92	114	49
	Island Park	6294	146	210	171	170	
	Newdale	5078	53	76	51	41	50
	Parker	4924	47	68	44	45	
	St. Anthony	4963	50	72	50	37	51
	Teton	4946	48	69	45	44	
	Warm River	5297	89	128	106	108	
GEM							
	Emmett	2363	19	27	20	15	52
GOODING							
	Bliss	3268	29	42	24	29	
	Gooding	3571	34	49	29	27	
	Hagerman	2954	24	35	18	24	
	Wendell	3433	28	40	17	20	
IDAHO							
	Cottonwood	3496	49	70	55	57	
	Ferdinand	3722	54	78	65	60	
	Grangeville	3400	62	89	34	18	53
	Kooskia	1291	24	35	25	25	
	Riggins	1820	29	42	9	18	54
	Stites	1306	25	36	25	24	
	Whitebird	1580	19	27	26	22	
JEFFERSON							
	Hamer	4800	23	33	29	33	
	Lewisville	4795	19	27	37	30	
	Menan	4803	19	27	37	30	
	Mud Lake	4790	31	45	24	33	55
	Rigby	4851	19	27	41	32	
	Ririe	4963	24	35	50	59	56
	Roberts	4777	23	33	32	33	

‡1976 roof loads are based on a 30-year MRI; all other loads are based on a 50-year MRI.
§1976 roof loads are 80% of the 1976 ground snow loads.

County	City	Elev. ft	Roof‡,§ 1976	Ground 1976	Ground 1986	Ground 2015		Note
JEROME								
	Eden	3954	25	36	20	18		
	Hazelton	4073	26	37	20	17		
	Jerome	3764	30	43	19	12		57
KOOTENAI								
	Athol	2393	57	82	68	71*	69†	
	Coeur d'Alene	2189	49	70	60	43*	43†	
	Dalton Gardens	2265	55	79	67	52*	51†	
	Harrison	2192	32	46	64	58*	55†	
	Hauser	2213	34	49	55	100*	70†	
	Hayden	2287	55	79	63	62*	58†	
	Post Falls	2183	35	50	56	72*	59†	
	Rathdrum	2211	39	56	58	87*	72†	
	Spirit Lake	2569	51	73	72	96*	87†	
	State Line	2105	31	45	53	80*	62†	
	Worley	2661	34	49	62	64*	59†	
*See Section 4.1 Exceptions for the 2015 Study								
†Ground snow loads ignoring East Ragged Saddle Station								
LATAH								
	Bovill	2876	90	129	137	108		58
	Deary	2873	85	122	111	86		59
	Genesee	2680	32	46	54	39		60
	Juliaetta	1171	23	33	24	26		
	Kendrick	1243	30	43	31	29		
	Moscow	2580	31	45	64	38		61
	Potlatch	2546	48	69	50	38		62
	Troy	2487	61	88	70	47		63
LEMHI								
	Leadore	5973	48	69	60	65		
	Patterson	6034	48	69	60	52		
	Salmon	3943	45	65	40	15		64
LEWIS								
	Craigmont	3740	54	78	61	66		
	Kamiah	1238	20	29	24	25		
	Nezperce	3215	50	72	57	21		65
	Reubens	3527	42	60	56	67		
	Winchester	3980	56	81	60	71		66

‡1976 roof loads are based on a 30-year MRI; all other loads are based on a 50-year MRI.
§1976 roof loads are 80% of the 1976 ground snow loads.

County	City	Elev. ft	Roof‡,§ 1976	Ground 1976	Ground 1986	Ground 2015	Note
LINCOLN							
	Dietrich	4088	36	52	29	57	67
	Richfield	4298	41	59	39	61	68
	Shoshone	3964	38	55	32	49	69
MADISON							
	Rexburg	4863	35	50	40	50	70
	Sugar City	4892	43	62	42	50	71
MINIDOKA							
	Acequia	4165	30	43	21	19	
	Heyburn	4146	23	33	21	19	
	Minidoka	4282	34	49	21	19	
	Paul	4146	27	39	21	18	
	Rupert	4154	27	39	21	18	
NEZ PERCE							
	Culdesac	1644	20	29	22	29	
	Lapwai	955	12	17	12	15	
	Lewiston	994	10	14	7	10	
	Peck	1102	22	32	24	40	72
ONEIDA							
	Malad City	4846	38	55	47	109	73
OWYHEE							
	Grand View	2354	13	19	21	10	74
	Homedale	2231	11	16	11	16	
	Marsing	2301	11	16	11	12	
PAYETTE							
	Fruitland	2226	18	26	18	18	
	New Plymouth	2260	16	23	17	19	
	Payette	2148	19	27	19	17	
POWER							
	American Falls	4406	25	36	22	24	
	Rockland	4656	30	43	42	68	75
SHOSHONE							
	Kellogg	2308	55	79	95	39	76
	Mullan	3277	105	151	164	126	77
	Osburn	2522	61	88	118	83	78
	Pinehurst	2222	71	102	90	53	79
	Smelterville	2224	88	127	91	44	80
	Wallace	2728	74	106	137	107	
	Wardner	2658	90	129	113	45	81

‡1976 roof loads are based on a 30-year MRI; all other loads are based on a 50-year MRI.
§1976 roof loads are 80% of the 1976 ground snow loads.

County	City	Elev. ft	Roof‡,§ 1976	Ground 1976	Ground 1986	Ground 2015	Note
TETON							
	Driggs	6109	98	141	104	50	82
	Tetonia	6066	97	139	97	68	83
	Victor	6213	99	142	99	119	
TWIN FALLS							
	Buhl	3769	21	30	19	27	84
	Castleford	3873	19	27	19	35	85
	Filer	3765	22	32	20	18	
	Hansen	4033	22	32	20	19	
	Hollister	4522	25	36	23	12	86
	Kimberly	3924	22	32	20	14	
	Murtaugh	4084	21	30	20	19	
	Twin Falls	3734	24	35	19	15	
VALLEY							
	Cascade	4762	96	138	110	76	87
	Donnelly	4866	101	145	195	78	88
	McCall	5012	117	168	151	157	89
WASHINGTON							
	Cambridge	2661	85	122	83	74	90
	Midvale	2542	39	56	70	57	91
	Weiser	2129	22	32	32	17	92
SKI AREAS							
Ada Co.	Bogus Basin Lodge	6176	164	236	93	137	93
Valley Co.	Brundage Mt. Lodge	6038	193	277	194	207	94
Bonner Co.	Schweitzer Basin Lodge	4175	188	270	235	243	95
Shoshone Co.	Silverhorn Lodge	5040	202	290	217	173	96
Blaine Co.	Sun Valley Mt. Baldy	9000	158	227	188	197	97

‡1976 roof loads are based on a 30-year MRI; all other loads are based on a 50-year MRI.
§1976 roof loads are 80% of the 1976 ground snow loads.

Notes:

1- Council station (NWS) has a 50-yr ground snow load of 55 psf and elevation of 2,943ft
2- New Meadows station (NWS) has a 50-yr ground snow load of 89 psf and elevation of 3,843ft
3- Dempsey Creek station (NRCS) is 6 miles to the east of Arimo, the station has a 50-yr ground snow load of 100 psf and an elevation of 6,100 ft,
4- Bloomington is located between two stations, Emigration Canyon Station (NRCS) 13 miles to the northwest of Bloomington and Lifton Pumping Station (NWS) 6 miles to the southeast of Bloomington. They have 50-yr ground snow load of 97 psf and 35 psf and elevations of 6,500 ft and 5,935 ft, respectively.
5- Slug Creek Divide station (NRCS) is located 6 miles to the northeast of Georgetown and has 50-yr ground snow load of 145 psf and elevation of 7,225 ft.
6- Montpelier RS station (NWS) is located in Montpelier and has 50-yr ground snow load of 45 psf and elevation of 5,960
7- Paris is located between two stations, Emigration Canyon Station (NRCS) 12 miles to the northwest of Bloomington and Lifton Pumping Station (NWS) 7 miles to the southeast of Bloomington. They have 50-yr ground snow load of 97 psf and 35 psf and elevation of 6,500 ft and 5,935 ft, respectively.
8- Lifton Pumping station (NWS) is located 3 miles to the east of St. Charles has a 50-yr ground snow load of 35 psf and an elevation of 5,935 ft.
9- Saint Maries station (NWS) has a 50-yr ground snow load of 58 psf and elevation of 2,151 ft
10- Idaho Falls Fanning FLD station (NWS) and Idaho Falls 2 ESE (NWS) is 7 miles and 8 miles to the north of Shelley and have 50-yr ground snow loads of 37 and 22 psf and elevation of 4,729 ft and 4,742ft, respectively.
11- Hailey 3NNW station (NWS) has 50-yr ground snow load of 84 psf and elevation of 5,424 ft
12- Ketchum RS (NRCS) has 50-yr ground snow load of 74 psf and elevation of 5,890 ft
13- Sun Valley Station (NWS) is located 0.3 miles to the north of Sun Valley and Ketchum RS (NRCS) is located 0.7 miles to the south of Sun Valley. They have 50-yr ground snow loads of 140 psf and 73 psf, respectively. The elevations are 5,820 ft and 5,890 ft respectively.
14- Garden Valley Station (NWS) is located 1 mile to the south of Crouch. It has 50-yr ground snow load of 46 and elevation of 3,100 ft.
15- Emmett 2E station (NWS) is located 13 miles to the southwest of Horseshoe Bend and it has a 50-yr ground snow load of 15 psf and elevation of 2,390 ft.
16- Cabinet Gorge station (NWS) is located 7 miles to the southeast of Clark Fork and has a 50-yr ground snow load of 77 psf and elevation of 2,173 ft.
17- Sandpoint Exp station (NRCS) and Sandpoint Exp Station (NWS) are located 12 miles to the west of Hope and they have a 50-yr ground snow load of 49 psf and 61 psf and elevation of 2,100 ft and 2,126 ft, respectively.

18- Sandpoint Exp station (NRCS) and Sandpoint Exp station (NWS) are located 2.5 miles from Kootenai and they have 50-yr ground snow loads of 49 psf and 61 psf, respectively and elevations of 2,100 ft and 2,126 ft, respectively.
19- Sandpoint Exp station (NRCS) and Sandpoint Exp station (NWS) are located 1.5 miles from Ponderay and they have 50-yr ground snow loads of 49 psf, and 61 psf, respectively and elevations of 2,100 ft and 2,126 ft, respectively.
20- Sandpoint Exp station (NRCS) and Sandpoint Exp station (NWS) have 50-yr ground snow loads of 49 psf and 61 psf, respectively and elevations of 2,100 ft and 2,126 ft, respectively.
21- Idaho Falls Fanning FLD station (NWS) is located 4 miles to the northeast of Ammon and has a 50-yr ground snow load of 22 psf and an elevation of 4,729 ft.
22- Idaho Falls Fanning FLD and Idaho Falls 2 ESE (NWS) have 50-yr ground snow loads of 37 and 22 psf, respectively.
23- Idaho Falls Fanning FLD station (NWS) is located 4 miles to the southwest of Iona and has a 50-yr ground snow load of 22 psf and an elevation of 4,729 ft.
24- Idaho Falls Fanning FLD station (NWS) is located 6 miles to the southwest of Ucon and has a 50-yr ground snow load of 22 psf.
25- Bonners Ferry station (NWS) has a 50-yr ground snow load of 75 psf and elevation of 2,075 ft
26- Bonners Ferry station (NWS) is located 7 miles to the southwest of Moyie Springs and has a 50-yr ground snow load of 75 psf and elevation of 2,075 ft
27- Fairfield RS (NWS) has a 50-yr ground snow load of 71 psf and an elevation of 5,565 ft.
28- Caldwell has a station (NWS) with a 50-yr ground snow load of 18.6 psf and an elevation of 2,370 ft.
29- Caldwell station (NWS) is located 4 miles to the southwest of Middleton and has a 50-yr ground snow load of 18.6 psf and an elevation of 2,370 ft.
30- Notus is located between two stations, Parma exp station (NWS) and Caldwell station (NWS). They have a 50-yr ground snow loads of 18 and 25 psf, with elevations of 2,290 ft. and 2,370 ft., respectively
31- Parma has a station (NWS) with 50-yr ground snow load of 25 psf and elevation 2,290 ft.
32- Parma Exp station (NWS) is located 8 miles north of Wilder and has a 50-yr ground snow load of 25 psf with an elevation of 2,290 ft..
33- Lower Pebble Station (NRCS) is located 9 miles to the west of Bancroft and has a 50-yr ground snow load of 113 psf and elevation of 5,780ft.
34- Grace station (NWS) has 50-yr ground snow load of 62 psf and an elevation of 5,500 ft.
35- Conda station (NWS) is located 5 miles to the northeast of Soda Springs and has 50-yr ground snow load of 71 psf and elevation of 6,204.
36- Burley Muni Airport Station (NWS) has a 50-yr ground snow load of 19 psf and an elevation of 4,142 ft.
37- Malta 4ESE station (NWS) is located 3 miles to the southeast of Malta and has a 50-yr ground snow load of 15 psf.

38- Bruno Creek Station (NRCS) is located 9 miles to the northwest of Clayton and it has a 50-yr ground snow load of 163 and elevation of 7,920 ft.
39- Challis has a station (NWS) in the town that has a 50-yr ground snow load of 13 psf.
40- Mackay Lost River Ranger Station (NWS) has a 50-yr ground snow load of 89 psf and elevation of 5,897 ft.
41- Stanley Station (NWS) has ground snow load of 128 psf
42- Mountain Home has a station (NWS) with a 50-yr ground snow load of 13 psf.
43- Oxford Springs station (NRCS) is located 8 miles to the northwest of Clifton and Preston station (NWS) is located 9 miles to the southeast of Clifton; the stations have 50-yr ground snow loads of 103 psf and 89 psf and elevations of 6,740 and 4,800 ft respectively.
44- Preston station (NWS) is located 6 miles to the east of Dayton and has 50-yr ground snow load of 89 psf and elevation of 4,800 ft.
45- Oxford Springs station (NWS) is located 6 miles to the west of Oxford and has a 50-yr ground snow load and elevations of 103 psf and 6,740 ft.
46- Preston Station (NWS) has a 50-yr ground snow load of 89 psf.
47- Preston Station (NWS) is located 6 miles to the Northeast of Weston and has a 50-yr ground snow load of 89 psf and elevation of 4,800 ft.
48- Ashton station (NWS) has a 50-yr ground snow load of 106 psf and elevation of 5,212 ft.
49- Ashton Station (NWS) is located 4 miles to the north of Drummond and has a 50-yr ground snow load of 106 psf and elevation of 5,212 ft.
50- Sugar Station (NWS) is located 6 miles to the west of Newdale and has a 50-yr ground snow load of 50 psf and elevation of 4,925 ft.
51- Saint Anthony station (NWS) has a 50-yr ground snow load of 37 psf and elevation of 4,910 ft.
52- Emmett 2E station (NWS) has a 50-yr ground snow load of 15 psf and elevation of 2,390 ft.
53- Grangeville has a station (NWS) with 50-yr ground snow load of 16 psf.
54- Riggins has a station (NWS) with 50-yr ground snow load of 18 psf.
55- Hamer 4NW station (NWS) is 14 miles to the northeast of Mud Lake and it has a 50-yr ground snow load of 33 psf and elevation of 4,790 ft.
56- Sugar Station (NWS) is located 16 miles north of Ririe and has a 50-yr ground snow load of 50 psf and elevation of 4,925 ft.
57- Jerome station (NWS) has a 50-yr ground snow load of 11 psf and elevation of 3,740 ft.
58- Sherwin Station (NRCS) is located 7 miles to the northeast of Bovill and has a 50-yr ground snow load of 125 psf and elevation of 3,200 ft.
59- Deary is located in the center of three stations; Moscow U of I (NWS), Sherwin (NRCS) and Elk River 1 S (NWS). The stations have 50-yr ground snow loads of 42 psf, 125 psf and 143 psf, respectively. The station elevations are 2,660 ft, 3,200 ft, and 2,918 ft, respectively.
60- Moscow U of I station (NWS) is located 11 miles to the north of Genesee and it has a 50-yr ground snow load of 42 psf and elevation of 2,660 ft

61- Moscow U of I station (NWS) has a 50-yr ground snow load of 42 psf and elevation of 2,660 ft. the station is located 4 miles to the east of Moscow.
62- Potlatch 3NNE station (NWS) has a 50-yr ground snow load of 39 psf and elevation of 2,760 ft.
63- Moscow U of I station (NWS) is located 9 miles to the west of Troy and has a 50-yr ground snow load of 42 psf and elevation of 2,660 ft.
64- Salmon Lemhi Co AP station (NWS) has a 50-yr ground snow load of 15 psf at an elevation of 4,044 ft.
65- Nez Perce has a station (NWS) with a 50-yr ground snow load of 18 psf.
66- Winchester station (NWS) has snow load of 58 psf and elevation of 3,972 ft.
67- Richfield station (NWS) is 11 miles to the north of Dietrich and has a 50-yr ground snow load of 61 psf and an elevation of 4,282 ft.
68- Richfield station (NWS) has a 50-yr ground snow load of 61 psf and an elevation of 4,282 ft.
69- Richfield station (NWS) is 14 miles to the northeast of Shoshone and has a 50-yr ground snow load of 61 psf and an elevation of 4,282 ft.
70- Sugar station (NWS) is located 4 miles to the northeast of Rexburg and has a 50-yr ground snow load of 50 psf and elevation of 4,925 ft.
71- Sugar station (NWS) has a 50-yr ground snow load of 50 psf and elevation of 4,925 ft.
72- Dworshak Fish Hatchery station (NWS) is 6 mi. to the northeast of Peck and has a 50-yr ground snow load of 51 psf and an elevation of 995.
73- Malad station (NWS) has a 50-yr ground snow load of 111 psf at an elevation of 4,581 ft and Malad City Airport station (NWS) has a 50-yr ground snow load of 35 psf and elevation of 4,482 ft. The stations are three miles apart.
74- Grand View 4 NW (NWS) has a 50-yr ground snow load of 9 psf.
75- Arbon station (NWS) is located 15 miles to the southeast of Rockland and has a 50-yr ground snow load of 81 psf and elevation of 5,210 ft.
76- Kellogg has a station (NWS) with 50-yr ground snow load of 36 psf.
77- Mullan Pass station (NWS) has a 50-yr ground snow load of 140 psf and elevation of 3,586 ft.
78- Wallace Woodland Park Station (NWS) is located 4 miles to the southeast of Osburn and has a 50-yr ground snow load of 70 psf and elevation of 2,710 ft.
79- Kellogg station (NWS) is located 5 miles to the east of Pinehurst and Fourth of July Summit is located 14 miles to the west of Pinehurst. The stations have 50-yr ground snow loads of 36 psf and 93 psf and elevations of 2,377ft and 3,200ft, respectively.
80- Smelterville is 2 miles to the west of Kellogg.
81- Wardner is 1 mile from Kellogg.
82- Driggs has a station (NWS) with a 50-yr ground snow load of 50 psf.
83- Driggs station (NWS) is located 6 miles to the south of Tetonia and it has a 50-yr ground snow load of 50 psf and elevation of 6,120 ft.
84- Buhl is located in the center of 3 stations: Twin Falls (NWS), Jerome (NWS), and Castleford (NWS). The 50-yr ground snow loads are 16, 10 and 35 psf, respectively.

85- Castleford has a station (NWS) with a 50-yr ground snow load of 35 psf.
86- Hollister has a station (NWS) with a 50-yr snow load of 12 psf.
87- Cascade station (NWS) has a 50-yr ground snow load of 79 psf and elevation of 4,896 ft.
88- Long Valley Station (NRCS) is located 4 miles north of Donnelly and has a 50-yr ground snow load of 77 psf and elevation of 4,890 ft.
89- McCall has a station (NRCS) with 50-yr ground snow load of 167 psf and elevation of 5,020 ft; a McCall NWS station has a 50-yr snow load of 80 psf and an elevation of 5025 ft.
90- Cambridge station (NWS) has a 50-yr ground snow load of 74 psf and elevation of 2,650 ft.
91- Cambridge station (NWS) is located 7 miles to the south of Midvale and has a 50-yr ground snow load of 74 psf and elevation of 2,650 ft
92- Weiser has a station (NWS) with a 50-yr ground snow load of 17 psf.
93- Bogus Basin has 3 stations: Bogus Basin (NRCS), Bogus Basin Road (NRCS), and Deer Point (NWS). They have 50-yr ground snow loads of 213, 67 and 161 psf, respectively. The elevations are 6,340, 5,540 and 7,044 ft, respectively.
94- Brundage Mountain has two stations; Brundage Mountain (NRCS) and Brundage Reservoir (NRCS). The stations have 50-yr ground snow loads of 367 psf and 214 psf and elevations of 7,560 ft and 6,250 ft respectively.
95- Schweitzer Basin Lodge has a station with a 50-yr ground snow load of 364 psf and an elevation of 6,200 ft.
96- Kellogg Peak Station (NRCS) is located 1.5 to the west of Silverhorn Lodge and has a 50-yr ground snow load of 191 psf and elevation of 5,560 ft.
97- Mountain Baldy Station (NRCS) has a 50-yr ground snow load of 195 psf and an elevation of 8,920 ft.