



# PACIFIC REGION TECHNICAL NOTES

81-015

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SNOWFALL FORECAST VERIFICATION 1980/81

OVER SOUTHWESTERN B.C.

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## INTRODUCTION

Snowfall amounts over southwestern B.C. during the winter of 1980/81 were decidedly skimpy. The first week of December was promising enough. During this period, most observing sites reported falls of 10 to 20 cm per 24 hours. By the second week, however, a long wave ridge became established over the province, and the drought (at least a snow drought) was on. Heavy rains near the end of the month washed away the remaining snowpack below the 1500 metre elevation.

The mild pattern continued throughout February and most of March. Dry periods of up to 10 days duration were interspersed with spells of rain or wet snow lasting between 1 and 3 days. Cooler, or more normal conditions returned during the last week of March when some periods of heavy snow were recorded. April was reasonably normal, with the expected convective snowfalls alternating with warmer spring sunbreaks.

## VERIFICATION OF SNOWFALL AMOUNTS

As in previous years, snowfall amounts have been divided into a series of ranges: 0, 0.1-10, 11-20, 21-50, and greater than 50 cm per 24 hour period. Only data from the core winter months (Dec. - March) were considered, since observational sets tend to be most complete during this period.

Verification results are displayed in a contingency table form. These are summarized into three categories. "Hits" occur when both the forecast and the observed snow amounts fall into the same range. "Near misses" result from the forecast landing in the adjacent observed range. "Misses" are recorded when the forecast amount is beyond the adjacent observed range.

## THE STATISTICAL GUIDANCE

For some years a statistical guidance program, known as MTNP1, has been available to the Special Weather Advisory Team (SWAT) forecaster. This program provides objective guidance for the prediction of 24 hour precipitation for three locations in southwestern B.C.; (Grouse, Whistler, and Allison Pass). MTNP1 can use a number of different predictors, however currently it has been programmed to use 1000 - 500 mb thickness and 850mb winds.

Figures 1-3 depict the past winters performance of the guidance package in the form of contingency tables. A summary statement appears to the right of each table. The results are not too different from those achieved in previous years. The percentage of hits varies from 45% at Whistler to 50% at Grouse.

#### THE SUBJECTIVE FORECAST OUTPUT

The predicted snowfall amounts in the PWC mountain forecasts are derived from subjective adjustments to the objective guidance (QPF's, MTNP1). Figures 4 to 6 are the contingency tables representing the verification of the subjective forecasts.

It must be noted that the 80% hits at Grouse was helped greatly by the preponderance of "zero forecast - zero occurrence" cases. The large number of zero snowfalls came about due to the combination of a mild winter with a relatively low-elevation site.

The trend of the percentage of hits for the subjective forecasts, since the winter of 1975/76, is shown for Grouse and Whistler by Figures 7 and 8. The erratic trace at Grouse is directly related to its low elevation and its proximity to the mild Pacific flows.

#### CONCLUSIONS

Accurate forecasting of snowfall amount in mountainous areas remains a difficult task. The statistical guidance method used at PWC to arrive at quantitative precipitation amounts shows some promise, but more development work is required before a satisfactory level of performance is achieved. Use of predictors other than 1000 - 500 mb thickness and the 850 mb winds for the MTNP1 program should be investigated. A list of the available predictors can be found in PRTN 79-015. It is safe to say, that in order to provide an adequate capability for reasonably accurate forecasts of snowfall amount in the mountains, knowledgeable meteorologists will be needed for some years yet.

#### REFERENCES

- Gigliotti, T.      PRTN 79-015 Examination of the PWC Mountain Forecast Program QPF.
- Puss, V.            PRTN 80-020 Verification of the Forecast Snow Amounts Over the South Coast Mountains.

CONTINGENCY TABLES OF STATISTICAL GUIDANCE FORECAST OF  
 PRECIPITATION AGAINST ACTUAL AMOUNTS  
 1980/81

**FIG. 1 GROUSE**

ACTUAL	FORECAST					TOTAL
	0	.1-10	11-20	21-50	>50	
0	31	5	6	2		44
.1-10	11	14	5	6		36
11-20	3	1	3	3		10
21-50	4	2		4		10
>50		1	3	1	1	6
<b>TOTAL</b>	49	23	17	16	1	106

Hits 53 = 50%  
 Near Miss 26 = 25%  
 Miss 27 = 25%

**FIG. 2 WHISTLER**

ACTUAL	FORECAST					TOTAL
	0	.1-10	11-20	21-50	>50	
0	28	14	6	2		50
.1-10	11	13	6	4		34
11-20	3	5	6	5		19
21-50	1	3		1		5
>50		1			1	2
<b>TOTAL</b>	43	36	18	12	1	110

Hits 49 = 45%  
 Near Miss 41 = 37%  
 Miss 20 = 18%

**FIG. 3 ALLISON**

ACTUAL	FORECAST					TOTAL
	0	.1-10	11-20	21-50	>50	
0	34	20	3	5	1	63
.1-10	16	15	4	2		37
11-20		3	1	1		5
21-50				1		1
>50						
<b>TOTAL</b>	50	38	8	9	1	106

Hits 51 = 48%  
 Near Miss 44 = 42%  
 Miss 11 = 10%

CONTINGENCY TABLES OF ISSUED FORECAST SNOW AMOUNTS  
AGAINST ACTUAL AMOUNTS  
1980/81

FIG. 4 GROUSE

ACTUAL	FORECAST					TOTAL
	0	.1-10	11-20	21-50	>50	
0	78	7				85
.1-10	5	17	1			23
11-20	1	5	1	1		8
21-50		2	1			3
>50						
TOTAL	84	31	3	1		119

Hits 96 = 80%  
Near Miss 20 = 17%  
Miss 3 = 3%

FIG. 5 WHISTLER

ACTUAL	FORECAST					TOTAL
	0	.1-10	11-20	21-50	>50	
0	37	16				53
.1-10	8	37	3			48
11-20		9	6	2		17
21-50		1	2			3
>50						
TOTAL	45	63	11	2		121

Hits 80 = 66%  
Near Miss 40 = 33%  
Miss 1 = 1%

FIG. 6 ALLISON

ACTUAL	FORECAST					TOTAL
	0	.1-10	11-20	21-50	>50	
0	45	23	1			69
.1-10	6	19	6	1		32
11-20		4	2			6
21-50		1				1
>50						
TOTAL	51	47	9	1		108

Hits 66 = 61%  
Near Miss 39 = 36%  
Miss 3 = 3%

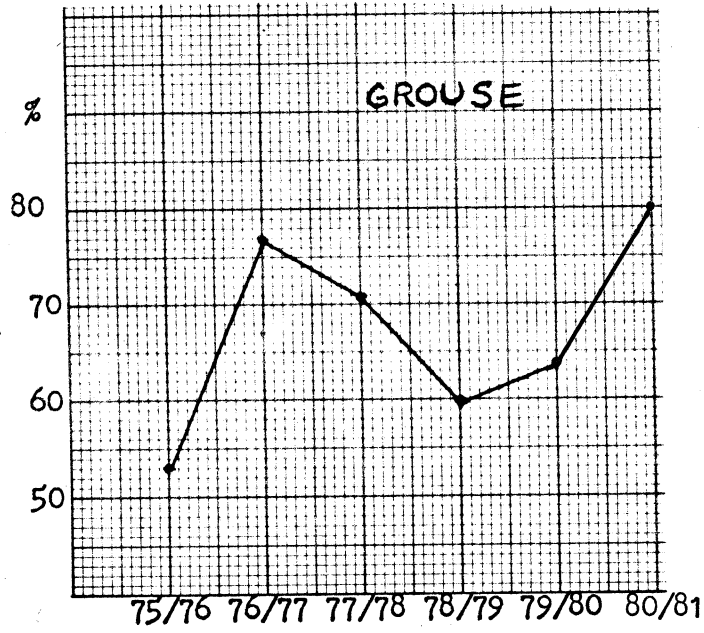


Figure 7.  
 Percentage of "Hits" at  
 Grouse Mountain over the  
 past 6 winters.

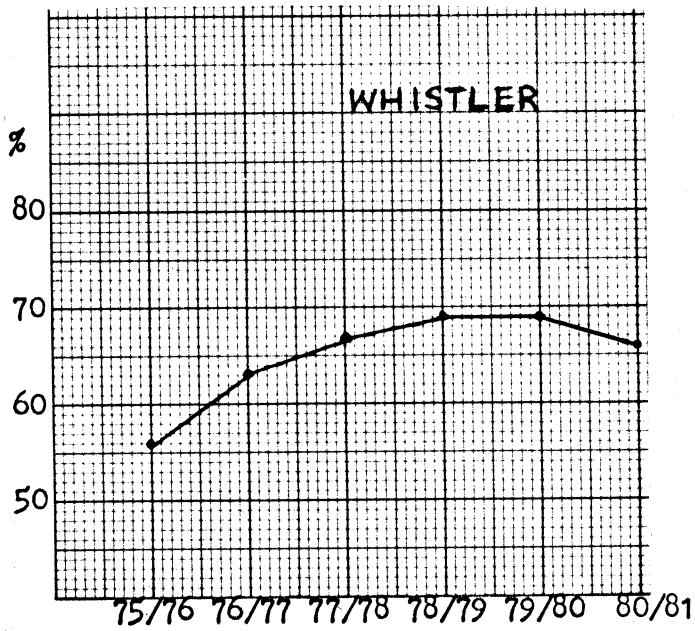


Figure 8.  
 Percentage of "Hits" at  
 Whistler over the past  
 6 winters.