



# PACIFIC REGION TECHNICAL NOTES

83-009  
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## Experiment in Forecasting Without Numerical Models (Verification - Marine Forecasts)

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### INTRODUCTION

This is the second Technical Note dealing with the forecast experiment carried out at the Pacific Weather Centre during the period of November 29, 1982 to December 10, 1982. For further information on this experiment see Pacific Region Technical Notes 83-007 and 83-008.

### PROCEDURE

1. The following Marine Areas were verified:

South Coast - Georgia Strait, Juan de Fuca Strait, West Coast Vancouver Island, Johnstone Strait, Queen Charlotte Strait.

North Coast - Queen Charlotte Sound, Hecate Strait, Dixon Entrance, West Coast Charlottes.

2. Only the Marine Forecasts issued at 10 AM were verified. These forecasts have a valid period of 24 hours from issue time and a further outlook for an additional 24 hours. Only the wind speeds were verified.

3. The following wind speed ranges were defined:

#### Range

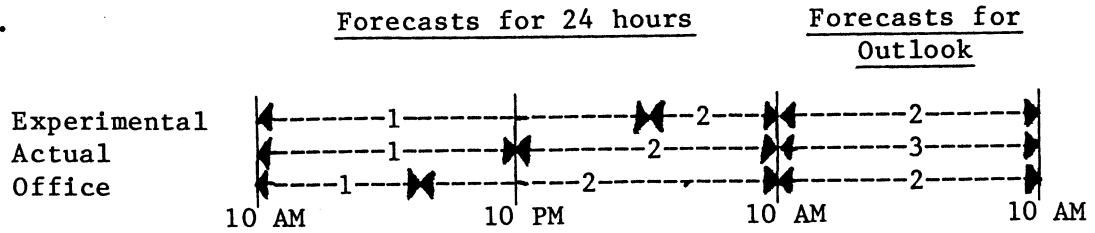
- |                      |                      |
|----------------------|----------------------|
| 1. 0-19 knots        | light to moderate    |
| 2. 20-34 knots       | small craft warnings |
| 3. 35-47 knots       | gales                |
| 4. 48 knots + higher | storm force          |

4. The following method of analysis was used for all areas:

- a) The actual winds (highest) were recorded and then plotted on graph paper in the appropriate defined ranges and for specified time intervals.
- b) The Experimental Team's forecasts were plotted on the same graph paper.

c) The office's forecasts were plotted on the same graph paper.

e.g.



The Experimental Team for Day-1

Forecast Range 1 and Range 1 was observed.  
Forecast Range 1 and Range 2 was observed.  
Forecast Range 2 and Range 2 was observed.

The Experimental Team for the Outlook

Forecast Range 2 and Range 3 observed.

A similar procedure was used for the office.

d) The results were tabulated and are presented in Table 1 to 8.

e) A completely subjective verification was also performed for determining the value of each forecast in relation to the other and this information is displayed in Table 9.

COMMENTS

1. The subjective evaluation suggests a slight edge to the office forecasts, mostly on the outlook.
2. The more objective evaluation shows little difference in the forecasts except possibly some slight edge for the office for the North Coast during the first 24 hours. However, the experimental team did under forecast the occurrence of gales; in fact they never forecast gales to start in the 24 hour forecast period. Gales, however, did occur on 5 days in the second half of the forecast period (last 12 hours).
3. Forecast wind directions were also examined but these were handled equally well by both forecast teams.
4. Similarly, outflow winds during the second half of the experiment were equally well predicted by both forecast teams.

Table 1

Experimental Team

South Coast

Today

| Wind Range Observed | Wind Range Forecast |     |     |     | Total |
|---------------------|---------------------|-----|-----|-----|-------|
|                     | (1)                 | (2) | (3) | (4) |       |
| (1)                 | 33                  | 6*  |     |     | 39    |
| (2)                 | 13                  | 15  | 3*  |     | 31    |
| (3)                 | 6                   | 7   | 5   |     | 18    |
| (4)                 |                     | 1   |     |     | 1     |
| Total               | 52                  | 29  | 8   | 0   | 89    |

% correct  $\frac{(53)}{(89)} = 60\%$

\*% correct allowing for one range lower error  $\frac{(62)}{(89)} = 70\%$

Table 2

Office

South Coast

Today

| Wind Range Observed | Wind Range Forecast |     |     |     | Total |
|---------------------|---------------------|-----|-----|-----|-------|
|                     | (1)                 | (2) | (3) | (4) |       |
| (1)                 | 36                  | 10* | 2   |     | 48    |
| (2)                 | 13                  | 24  | 6*  |     | 43    |
| (3)                 | 5                   | 9   | 8   |     | 22    |
| (4)                 |                     |     | 1   |     | 1     |
| Total               | 54                  | 43  | 17  | 0   | 114   |

% correct  $\frac{(68)}{(114)} = 60\%$

\*% correct allowing for one range lower error  $\frac{(82)}{(114)} = 72\%$

Wind Ranges

- (1) 0-19 knots
- (2) 20-34 knots
- (3) 35-47 knots
- (4) 48 knots and higher

Table 3

Experimental Team

North Coast  
Today

| Wind Range Observed | Wind Range Forecast |     |     |     | Total |
|---------------------|---------------------|-----|-----|-----|-------|
|                     | (1)                 | (2) | (3) | (4) |       |
| (1)                 | 27                  | 7*  |     |     | 34    |
| (2)                 | 17                  | 20  | 3*  |     | 40    |
| (3)                 | 4                   | 10  | 5   |     | 19    |
| (4)                 |                     |     |     |     | 0     |
| Total               | 48                  | 37  | 8   | 0   | 93    |

% correct  $\frac{(52)}{(93)} = 56\%$

\*% correct allowing for one range lower error  $\frac{(62)}{(93)} = 67\%$

Table 4

Office

North Coast  
Today

| Wind Range Observed | Wind Range Forecast |     |     |     | Total |
|---------------------|---------------------|-----|-----|-----|-------|
|                     | (1)                 | (2) | (3) | (4) |       |
| (1)                 | 28                  | 3*  |     |     | 31    |
| (2)                 | 9                   | 29  | 10* |     | 48    |
| (3)                 | 4                   | 8   | 7   |     | 19    |
| (4)                 |                     |     |     |     | 0     |
| Total               | 41                  | 40  | 17  | 0   | 98    |

% correct  $\frac{(68)}{(98)} = 65\%$

\*% correct allowing for one range lower error  $\frac{(77)}{(98)} = 72\%$

Wind Ranges

- (1) 0-19 knots
- (2) 20-34 knots
- (3) 35-47 knots
- (4) 48 knots and higher

Table 5

Experimental Team

South Coast  
Outlook

|                        |       | Wind Range Forecast |     |     |     |       |
|------------------------|-------|---------------------|-----|-----|-----|-------|
|                        |       | (1)                 | (2) | (3) | (4) | Total |
| Wind Range<br>Observed | (1)   | 17                  | 6*  |     |     | 23    |
|                        | (2)   | 11                  | 12  | 1*  |     | 24    |
|                        | (3)   | 8                   | 5   |     |     | 13    |
|                        | (4)   |                     |     |     |     | 0     |
|                        | Total | 36                  | 23  | 1   | 0   | 60    |

$$\% \text{ correct } \frac{(29)}{(60)} = 48\%$$

$$*\% \text{ correct allowing for one range lower error } \frac{(36)}{(60)} = 60\%$$

Table 6

Office

South Coast  
Outlook

|                        |       | Wind Range Forecast |     |     |     |       |
|------------------------|-------|---------------------|-----|-----|-----|-------|
|                        |       | (1)                 | (2) | (3) | (4) | Total |
| Wind Range<br>Observed | (1)   | 18                  | 16* |     |     | 34    |
|                        | (2)   | 13                  | 19  | 4*  |     | 36    |
|                        | (3)   | 9                   | 9   | 4   |     | 22    |
|                        | (4)   |                     |     |     |     | 0     |
|                        | Total | 40                  | 44  | 8   | 0   | 92    |

$$\% \text{ correct } \frac{(41)}{(92)} = 45\%$$

$$*\% \text{ correct allowing for one range lower error } \frac{(61)}{(92)} = 66\%$$

Wind Ranges

- (1) 0-19 knots
- (2) 20-34 knots
- (3) 35-47 knots
- (4) 48 knots and higher

Table 7

Experimental Team

North Coast  
Outlook

|                        |       | Wind Range Forecast |     |     |     |       |
|------------------------|-------|---------------------|-----|-----|-----|-------|
|                        |       | (1)                 | (2) | (3) | (4) | Total |
| Wind Range<br>Observed | (1)   | 10                  | 9*  | 2   |     | 21    |
|                        | (2)   | 8                   | 16  | 4*  |     | 28    |
|                        | (3)   | 9                   | 6   | 1   |     | 16    |
|                        | (4)   |                     |     |     |     | 0     |
|                        | Total | 27                  | 31  | 7   | 0   | 65    |

$$\% \text{ correct } \frac{(27)}{(65)} = 42\%$$

$$*\% \text{ correct allowing for one range lower error } \frac{(40)}{(65)} = 62\%$$

Table 8

Office

North Coast  
Outlook

|                        |       | Wind Range Forecast |     |     |     |       |
|------------------------|-------|---------------------|-----|-----|-----|-------|
|                        |       | (1)                 | (2) | (3) | (4) | Total |
| Wind Range<br>Observed | (1)   | 15                  | 6   |     |     | 21    |
|                        | (2)   | 6                   | 19  | 1   | 3   | 29    |
|                        | (3)   | 4                   | 12  |     | 3   | 19    |
|                        | (4)   |                     |     |     |     | 0     |
|                        | Total | 25                  | 37  | 1   | 6   | 69    |

$$\% \text{ correct } \frac{(34)}{(69)} = 49\%$$

$$*\% \text{ correct allowing for one range lower error } \frac{(44)}{(69)} = 64\%$$

Wind Ranges

- (1) 0-19 knots
- (2) 20-34 knots
- (3) 35-47 knots
- (4) 48 knots and higher

Table 9

Subjective Assessment of Marine Forecasts (40 Forecasts)

|                          | <u>South Coast</u><br><u>Day-1</u> |     | <u>North Coast</u><br><u>Day-1</u> |     | <u>South Coast</u><br><u>Outlook</u> |     | <u>North Coast</u><br><u>Outlook</u> |     |
|--------------------------|------------------------------------|-----|------------------------------------|-----|--------------------------------------|-----|--------------------------------------|-----|
|                          | Number                             | %   | Number                             | %   | Number                               | %   | Number                               | %   |
| Experimental Team better | 8                                  | 20  | 12                                 | 30  | 4                                    | 10  | 4                                    | 10  |
| Office better            | 13                                 | 33  | 18                                 | 45  | 19                                   | 48  | 24                                   | 60  |
| Forecasts about the same | 19                                 | 47  | 10                                 | 25  | 17                                   | 42  | 12                                   | 30  |
| Total                    | 40                                 | 100 | 40                                 | 100 | 40                                   | 100 | 40                                   | 100 |