

NEW ZEALAND METEOROLOGICAL SERVICE CIRCULAR NOTE

NO. 54

COMPARATIVE LIKELIHOOD OF RAIN IN VARIOUS DISTRICTS OF
THE NORTH ISLAND WITH GIVEN WIND DIRECTIONS.By E. A. Williamson.SUMMARY.

A series of situations was divided into groups according to the predominant rain-bearing wind in the North Island. The distribution of rainfall was then examined in each group, and the results incorporated in maps showing the comparative likelihood of rain in the various districts. Special points about each group are noted, with particular reference to the problems of radio forecasts.

The accompanying maps show the relative likelihood of rainfall in the various districts of the North Island with winds from a given direction.

They were prepared from the examination of a series of daily rainfall maps covering a period of fifteen months, on which rainfalls at all climatological and rainfall stations had been plotted. They were sorted into eight groups, according to the prevailing rain-bringing winds over the North Island during the period. To simplify the task of analysing the data, a number of maps were discarded in which the situation had been complex or variable. Each group was then arranged in order of increasing area of precipitation. Examination of the group then showed that if rain fell at all, it would usually fall in certain particular areas. As we pass to examples of more unsettled weather these areas become more extensive and in some groups new "centres" developed, until finally the whole North Island receives rainfall. The groups containing large numbers of maps (N.W., W., S.W. and S.) showed a tendency for definite stages in the spread of rainfall. Several maps would show approximately the same areas, then the next maps would show the same area plus another area, and so on. Individual exceptional maps would appear of course, but the general trend was quite clear. The areas marked 1, 2, 3, etc., on the attached maps show these stages, 1 representing the first stage, 2 the second stage and so on. With the remaining groups, (S.E., E., N.E. and N.) the number of maps was not so great, and the successive stages not so clearly marked. However, it was possible to designate the order of susceptibility to rainfall in the various districts.

The following notes discuss the individual groups with particular reference to the problems of preparing radio forecasts, especially when scattered rainfalls are expected.

South Winds.

The successive stages are very marked with southerlies. In the Gisborne district, the hills S.W. and N.E. of Gisborne itself are the most liable areas, and in the area around Waikaremoana. The Ruatoria-East Cape area escapes comparatively lightly. The difference should be capable of being forecasted, but the smallness of the area makes it hardly worth while. In Wairarapa, the Rimutakas and the coastal strip are very susceptible, also a small coastal area in Hawkes Bay south of Hastings. It should be noted that the Taihape district receives rainfall before Wanganui, Manawatu or Napier.

Southwest Winds.

The place in the sequence of Wellington and southern Wairarapa is doubtful. The weather there depends too much on the peculiarities of the individual southwesterly situation. In Northland the difference between the eastern and western coasts is very marked, and warrants differentiation in forecasts, especially when scattered showers are expected. In Auckland, Waikato and Waitomo this tendency is very slight. Showers are slightly heavier near the coast, and at times a small sheltered area appears near Cambridge and Putaruru, but as a rule the difference is not sufficiently marked to be forecast confidently, e.g. "scattered coastal showers." In Taranaki there is a difference at times between north Taranaki and south Taranaki, but the presence of a susceptible area around Awakino makes it inadvisable as a rule to make the distinction. The small sheltered area near Taumarunui is worth taking into consideration only in preparing "spot" forecasts, e.g. for farmers. In the Wanganui-Manawatu-Taihape area the distinction between the high country and the plains is very marked and fully warrants separate forecasts. The same applies to a lesser extent in the Bay of Plenty. There is an area between Opotiki and Tauranga which often escapes showers, but it is rather small for a separate forecast. In Gisborne and Hawkes Bay showers tend to be in the ranges with winds slightly west of southwest, near the coast with winds south of southwest.

West Winds.

With westerlies, the Taranaki-Taihape-Wanganui-Manawatu was difficult to classify as any tendency towards N.W. or S.W. produced quite a different rainfall pattern. With W.N.W. winds, north Taranaki and southern Manawatu became the susceptible areas and the remainder sheltered.

Northwest Winds.

The difference between the eastern and western halves of Northland and Auckland is sufficiently marked to be forecast. In Waikato, showers are most likely near the coast, but also likely near the eastern hills (Paeroa, Putaruru). In Taranaki isolated showers usually fall in the New Plymouth-Awakino coastal strip. When the rain is heavy, the heaviest falls are in a belt extending eastwards from Mount Egmont to National Park and along the ranges separating the basin of the Wanganui River from the north Taranaki coastal strip. The sheltering of the Taihape area is often clear enough to warrant separating it from Manawatu. In the Bay of Plenty and Rotorua-Taupo areas, scattered showers fall primarily in the Taupo area, and to a less extent, along a narrow belt corresponding roughly with the 1000 foot contour line. In Gisborne, Hawkes Bay and Wairarapa isolated showers are unusual. The tendency is for the rain band to extend gradually from the ranges out to the coast. In northern Manawatu, shower-rainfalls appeared heavier in a 25-mile coastal strip in northwesterlies, but heavier in the high country in westerlies. In neither case was the difference sufficiently marked to be forecast. In southern Manawatu, northwesterlies give the heavier rain in the ranges.

North Winds.

The number of examples found did not make further subdivision of area 1 possible. When northerly rain becomes widespread, certain areas (indicated on the map) become particularly liable to heavy falls.

Northeast Winds.

The number of examples does not make it possible to be very definite about the boundaries between areas 3, 4 and 5. Moreover, it appears characteristic of northeasterly rain that separate ...

areas of rain will appear to the south of the main rain-band in the north. In Northland, Bay of Plenty, Gisborne, Hawkes Bay and Wairarapa, the tendency for rain to fall near the coast is very marked. Further, northern Gisborne often receives scattered rain when southern Gisborne receives none.

East and Southeast Winds.

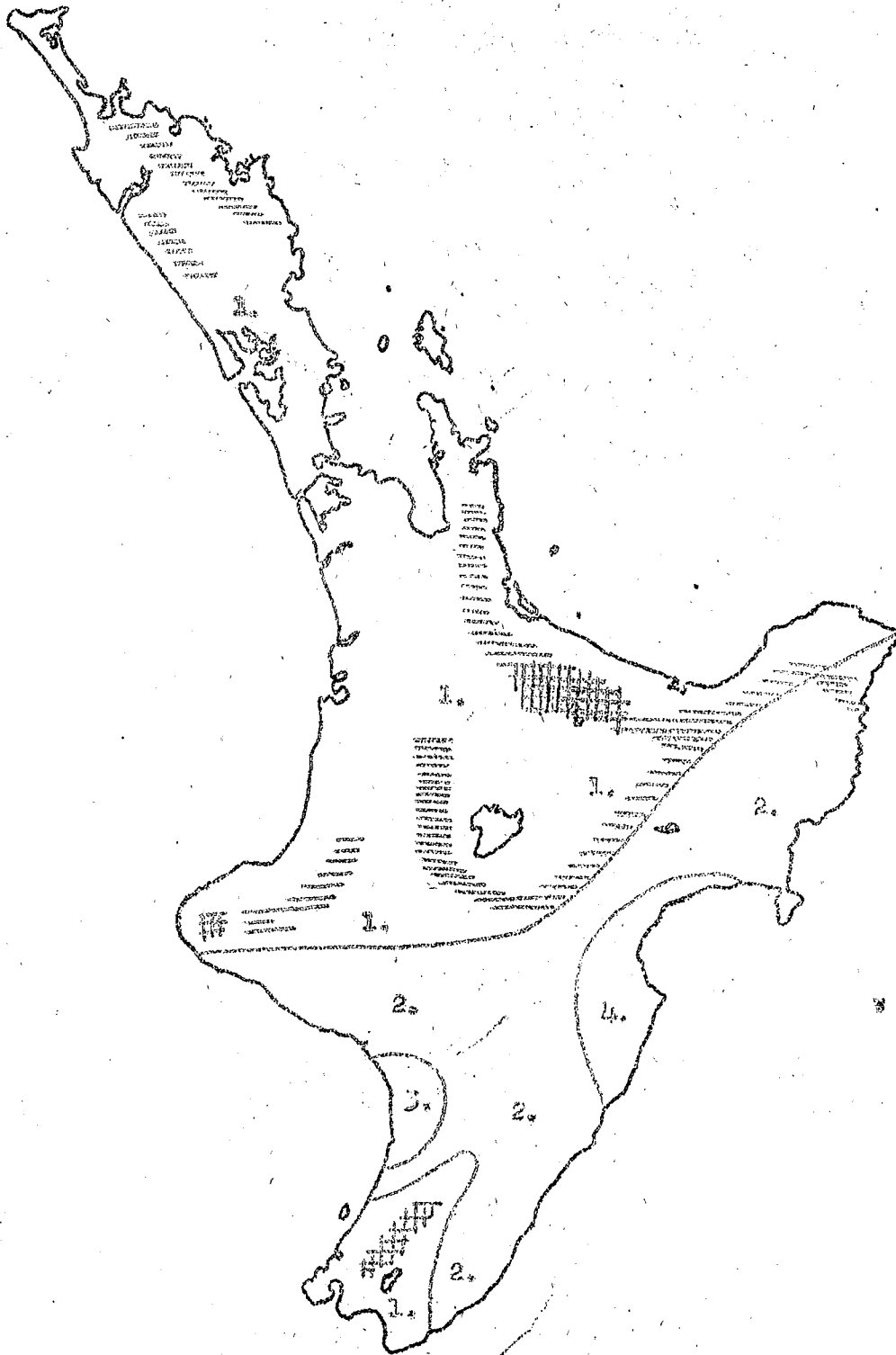
Northland has slightly heavier rain in the east. However showers extend right to the west, even when scattered. In Gisborne and Hawkes Bay rain is most likely in the foothills. In the Gisborne district these extend practically to the coast, and there is also a susceptible area around Waikaremoana. The hills near the coast south of Napier also appear adequate to produce a few points. If rain is expected to be scattered, it seems inadvisable to try to forecast it as "in the hills" or "near the coast." In Wairarapa, isolated falls occur all over the district, not merely near the coast.

An attempt was made to classify the South Island on the same lines, but failed. As a rule, it did not appear possible to associate the rainfall over the South Island with a single wind direction for the twenty-four hours. The direction of the winds before and after fronts, and the extent of the area traversed by the fronts all had a marked influence on the rainfall pattern.

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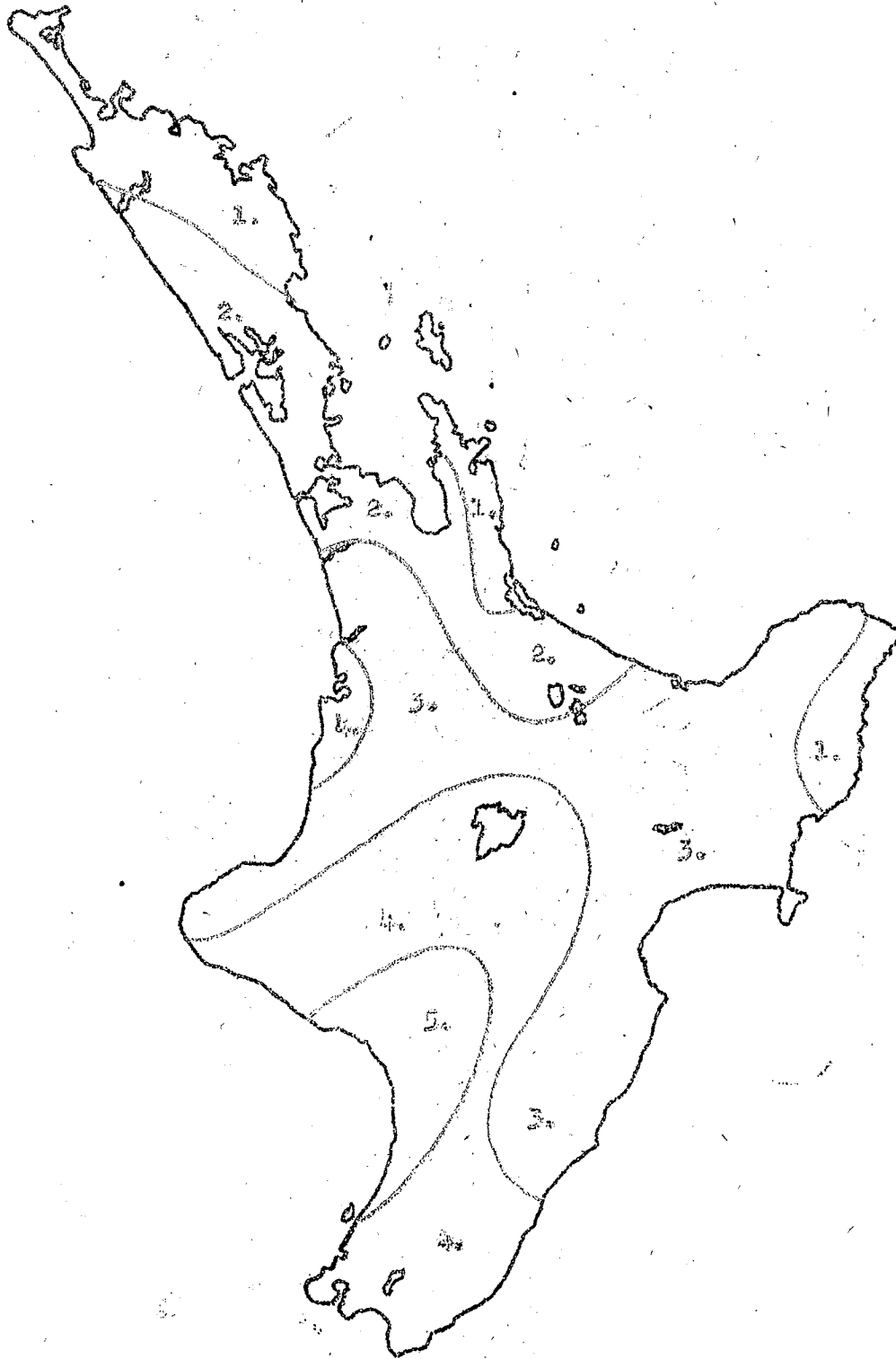


NORTH WINDS



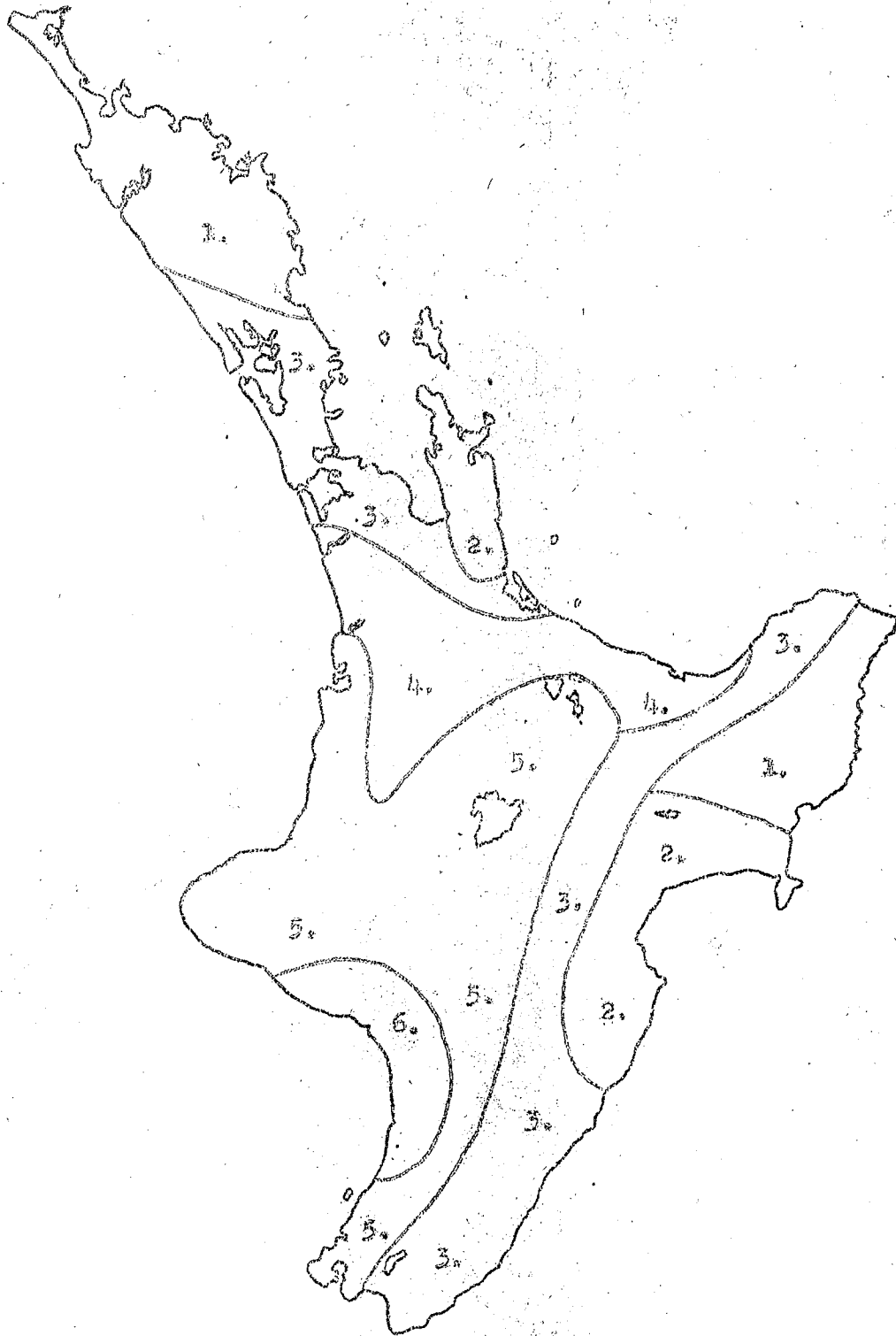
Regions receiving heaviest rain when rain is widespread.

Next heaviest rainfall.



NORTHEAST WINDS

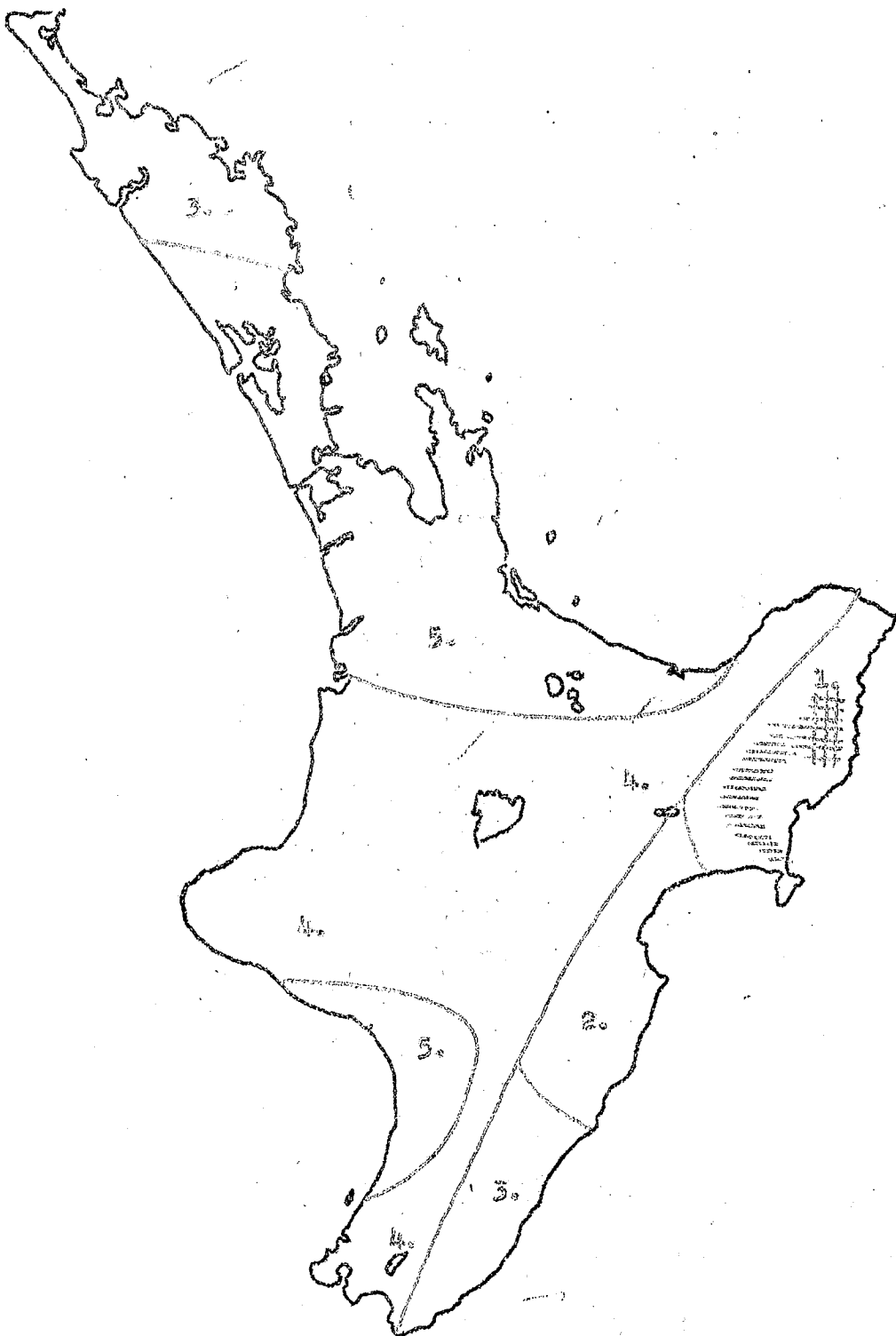
SCALE
50 miles : 1 inch.





EAST WINDS

SCALE

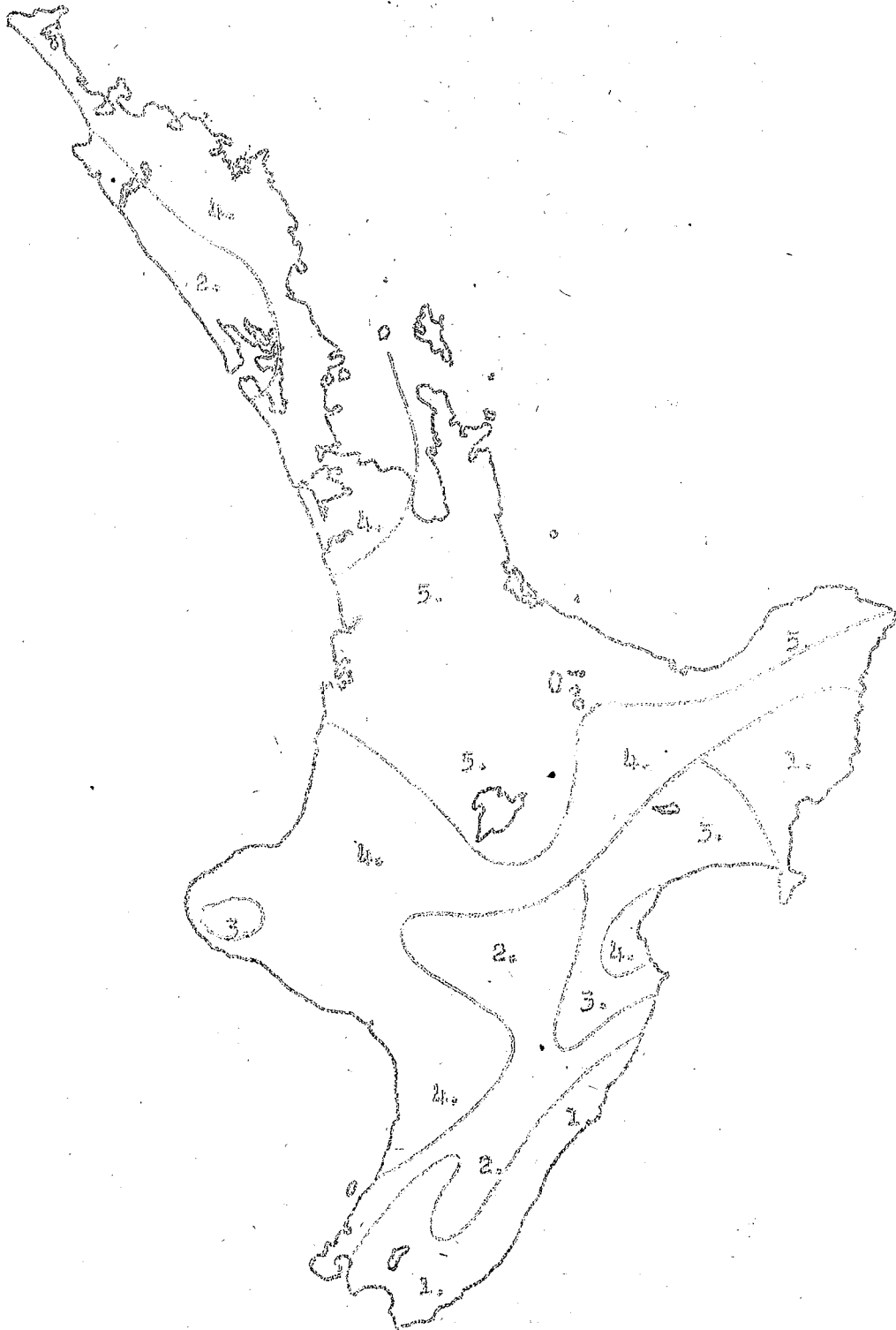
50 miles; 1 inch.



SOUTHEAST WINDS

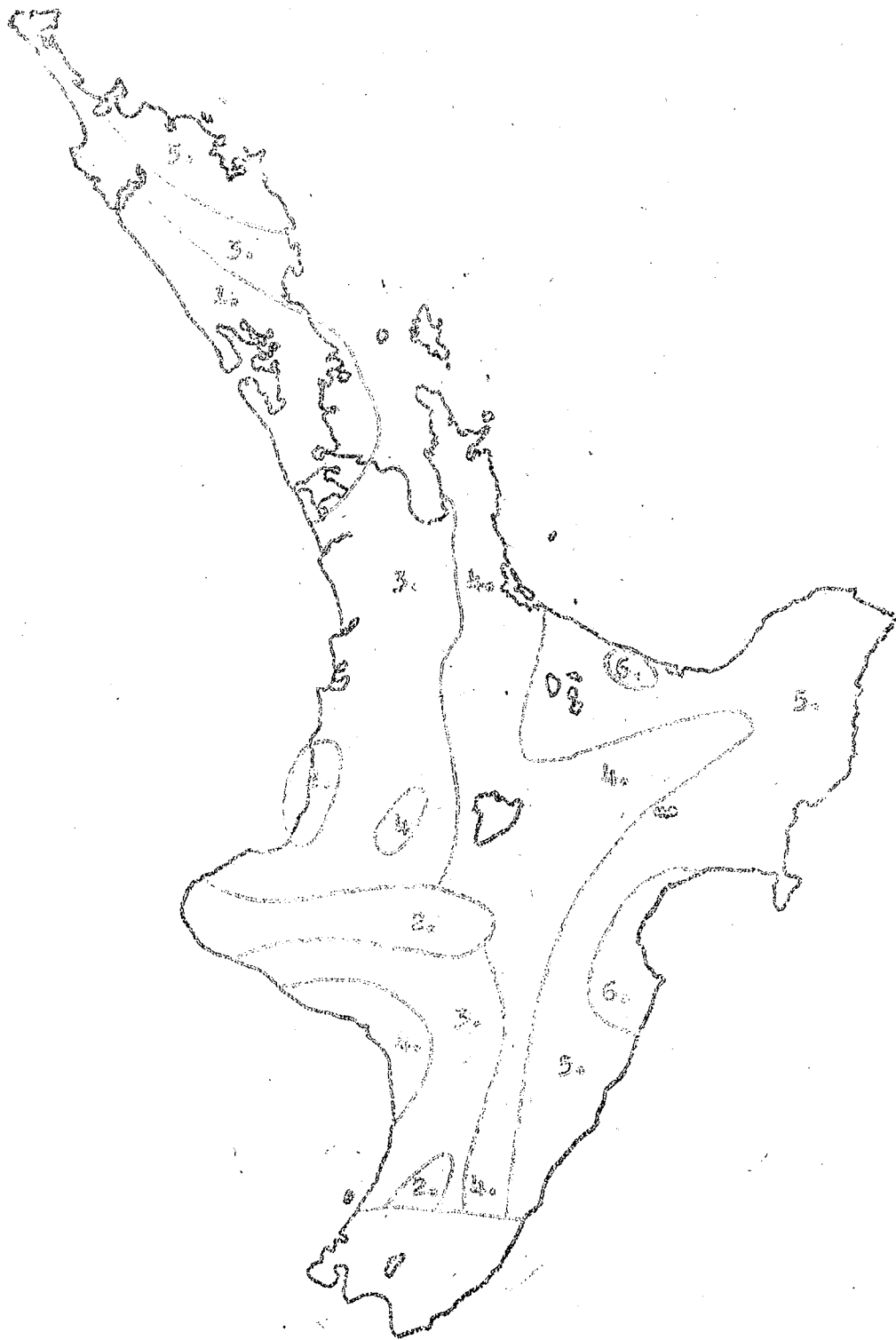
-  Area of heaviest rain when rain is general.
-  Next heaviest rainfalls when rain is general.

SCALE
50 miles : 1 inch.



SOUTH WINDS

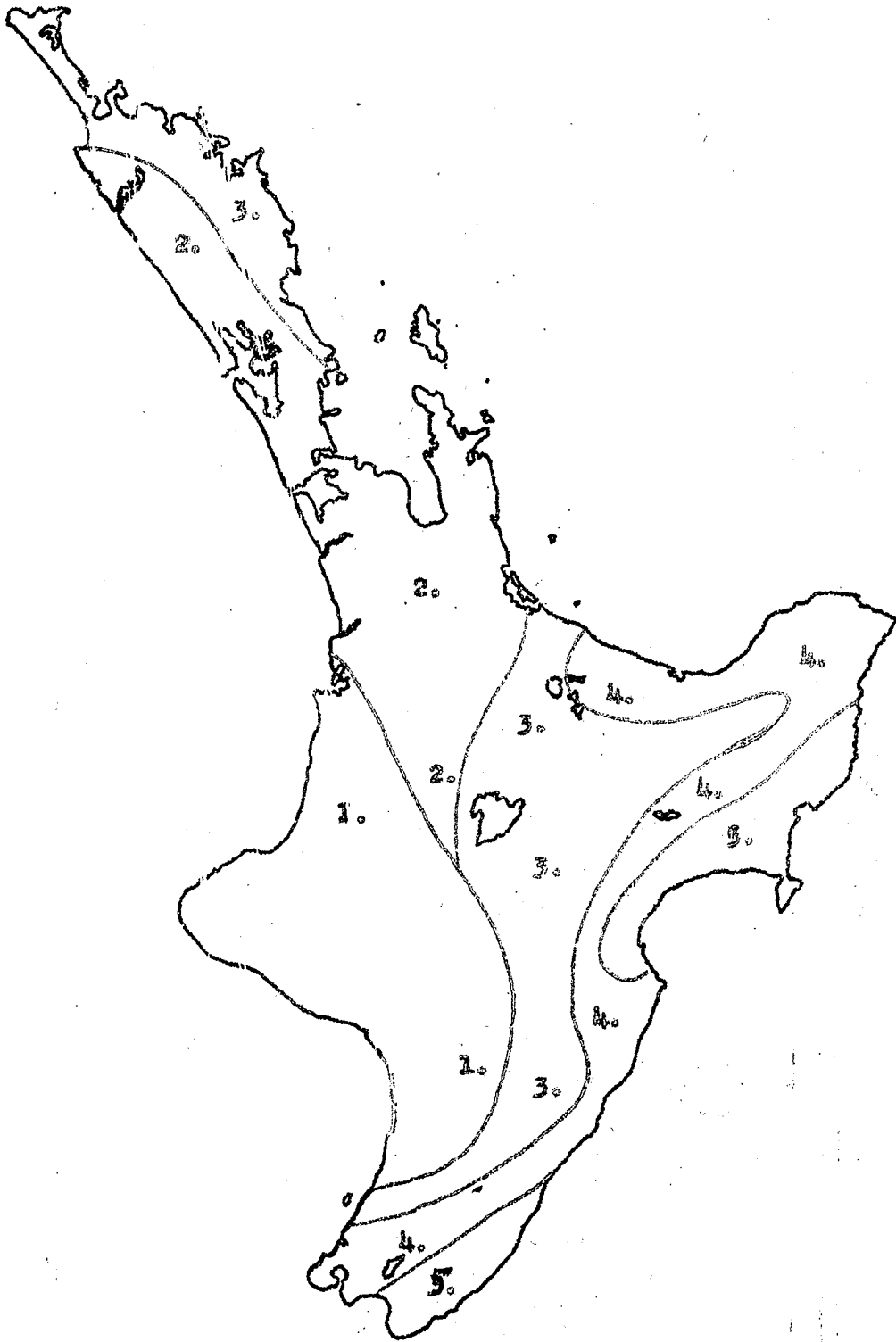
SCALE
50 miles : 1 inch.



SOUTHWEST WINDS

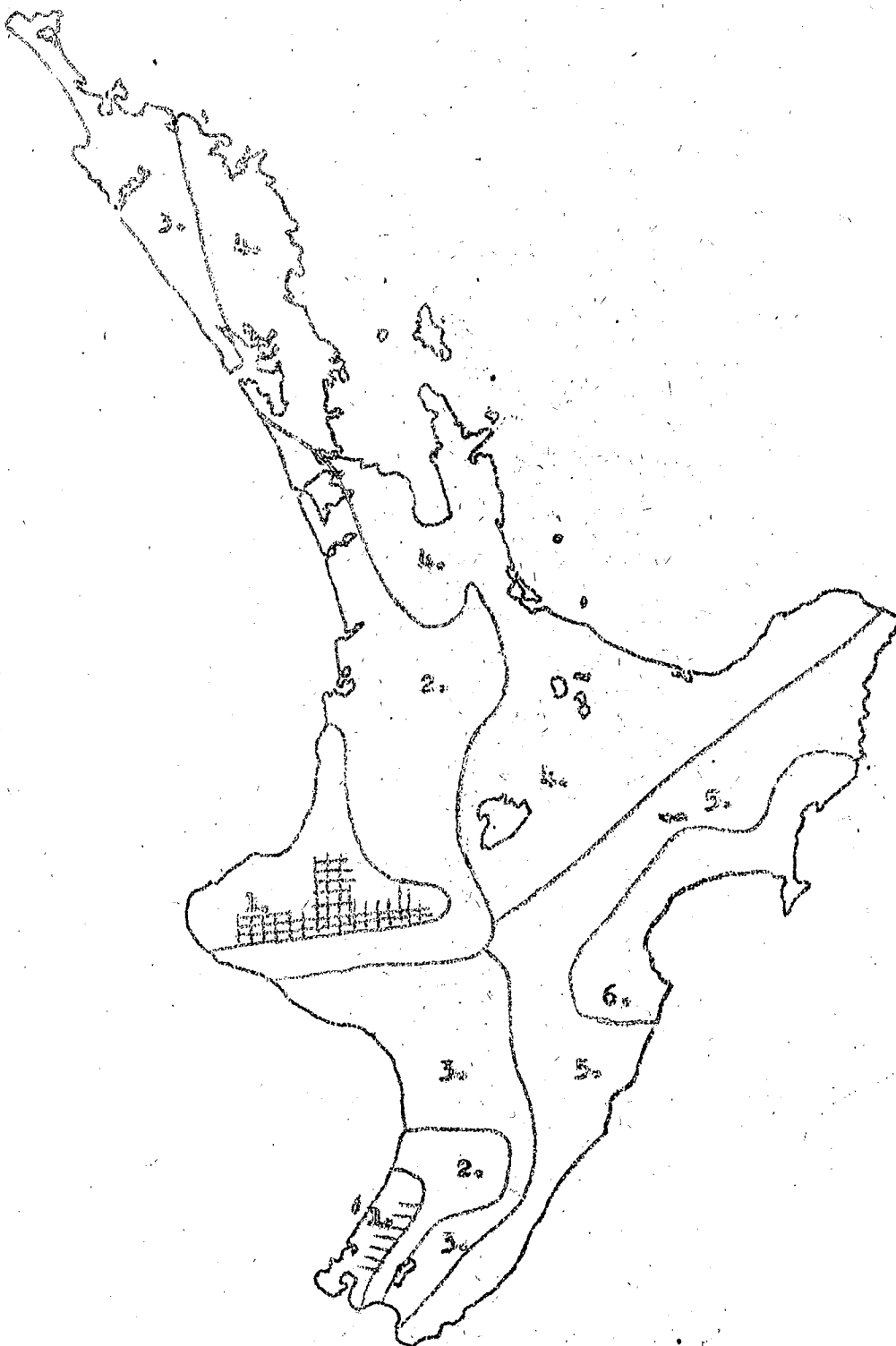
NOTE: These boundaries are not clear cut; i.e., if there is a general wind in 2, scattered rain is likely in 3.

SCALE
50 miles : 1 inch.





WEST WINDS

SCALE:
50 miles : 1 inch.



NORTHWEST WINDS

 Areas receiving heaviest rain when rain is widespread...

 Next heaviest rainfall when rain is widespread.

SCALE
 50 miles : 1 inch.