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The Climat and Operational Weather at Boundary Bay Airport

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Boundary Bay is a de-activated military airfield 17 km. southeast of Vancouver International Airport. The Ministry of Transport is proposing to reopen it as a light plane airport to relieve some of the traffic conflict at Vancouver International. The writer has done some research into the weather recorded at Boundary Bay during its wartime operation and attempted to compare it with Vancouver for the same period.

The available data base is very sparse. Full aviation observations were taken only from late 1942 to mid 1945. Many of the early observations did not cover the whole 24 hours of the day but where comparisions are made care was taken to check exactly the same hours for each airport. A climatological station operated on the site from 1953 to 1971. From these records reasonable averages of temperature and precipitation are available.

The climate of Boundary Bay is typical west coast marine with a cool wet winter and warm relatively dry summer. It is well situated to be protected by the Olympic and Vancouver Island Mountains while escaping most of the rain belt at the approach to the Coast Mountains. The average annual precipitation is 90.55 cm. compared to 106.81 cm. for Vancouver International. The total for December is 5 times the total for July.

The temperature is warm but not hot in summer and cool in winter with no extremes. The average annual temperature is 9.3 degrees Celsius, slightly less than the 9.8 degrees at the International Airport.

When the visibility is 3 miles or greater and the ceiling is 1000 feet or more, the weather is referred to as VFR (visual flight rule) weather. When either visibility or ceiling are below the limits the weather is said to be below VFR or IFR (instrument flight rule) weather. These names are used regardless of the occurrence of precipitation, wind or other things normally considered to be "weather". IFR is further subdivided into three sub categories: Category I with ceiling of 0 - 100 feet and/or visibility of 0 - 3/8 miles; Category II with ceiling of 200 - 400 feet and/or visibility of 1/2 - 3/4 miles; and Category III which has a ceiling of 500 - 900 feet and/or visibility of 1 - 2½ miles.

Each hourly observation for the two years 1943 and 1944 has been reviewed and classified as Category I, II, III, or VFR. Table 1 AND 2 AND VANCOUVER show the percentage of IFR weather at Boundary Bay for the two years by category for each month of the year. The percentage of time the weather was below VFR varied from a negligible 0.7% in May to a hefty 36.8% in October FOR BOUNDARY BAY. Generally speaking the months March through August had weather favourable for VFR flight. For the months September through February the incidence of below VFR weather was common enough to interrupt flight activities for significant periods of time. A longer period of records would likely show some changes but the general trend of very good VFR weather in the summer with frequent below VFR conditions in the winter would still stand.

It is also worth noting which wind directions are not accompanied by a preponderance of poor flying weather. The southwest quadrant is particularly favoured and low visibilities and ceilings are seldom a problem if the wind is from this quadrant, i.e. south through west. The southeast and northwest quadrants are reasonably good. There were a couple of months when they were rather high but much of this may be due to the problem of a short period of records. Northeast is definitely the worst wind direction for poor weather along with calm.

It is interesting to ponder some of the reasons for this. The open water of Boundary Bay lies just south of the field and this might be expected to act as a vertible incubator for fog. The hill at Point Roberts might be just high enough to block the flow of fog from Georgia Strait into Boundary Bay. On the other hand it might merely steer the circulation around so that fog carried in from the water actually arrives at the airfield from the east or northeast. The same could be speculated about the hill at White Rock.

The large flat area to the northeast is particularly favourable to the formation of radiation fog, especially Burn's Bog which is only 2 km. from the field and covers over 50 square km. The land is equally flat to the west with no obstruction to block inflow from the Strait of Georgia. However on the west coast, westerly winds are most commonly associated with cold frontal passages which give brisk winds, clearing skies and good visibility.

The difference in total observations of below VFR weather at the two airports was rather impressive. (FIG. 1) It was assumed before starting that the two would be almost similar with Vancouver having possibly slightly better weather since it is closer to open water and less susceptable to stagnation. The figures compiled show that the incidence of below VFR weather at Vancouver exceeds Boundary Bay in almost every month and every category. The difference is not large for Category I 666 to 783 but when the totals for all IFR categories are counted they show 1818 for Boundary Bay to 2833 for Vancouver. In other words Vancouver had 56% more weather which was unsuitable for VFR flying than Boundary Bay. This in spite of the fact that the two airports are only 17 km. apart and the only natural obstructions between them are occasional trees.

The reasons for this large difference can only be speculated. It is almost beyond argument that a longer period of comparison would show the airports more similar. The two years compared were not all together typical. See TABLE #2 Old timers say that 1944 was the foggiest year that anyone can remember in Vancouver. However that should apply to Boundary Bay as well. It is a well documented fact that the incidence of fog has been declining at Vancouver during the past four decades. Figure #2 illustrates the decline in fog from 1938 to 1969, with the maximum for 1943 and 1944 standing out.

The question is whether there has been a parallel improvement in the weather at Boundary Bay since the war years. If there has not, then Vancouver may now be just as good or better for VFR flying. Commonly accepted local logic says that much of the fog was caused by, or at least aggrevated by sawdust burning lumber mills along the Fraser River. The cessation of this sawdust burning it is argued, has reduced the available condensation nuclii and thus the fog. Such a strictly local effect might not have extended to Boundary Bay, at least not to the same degree.

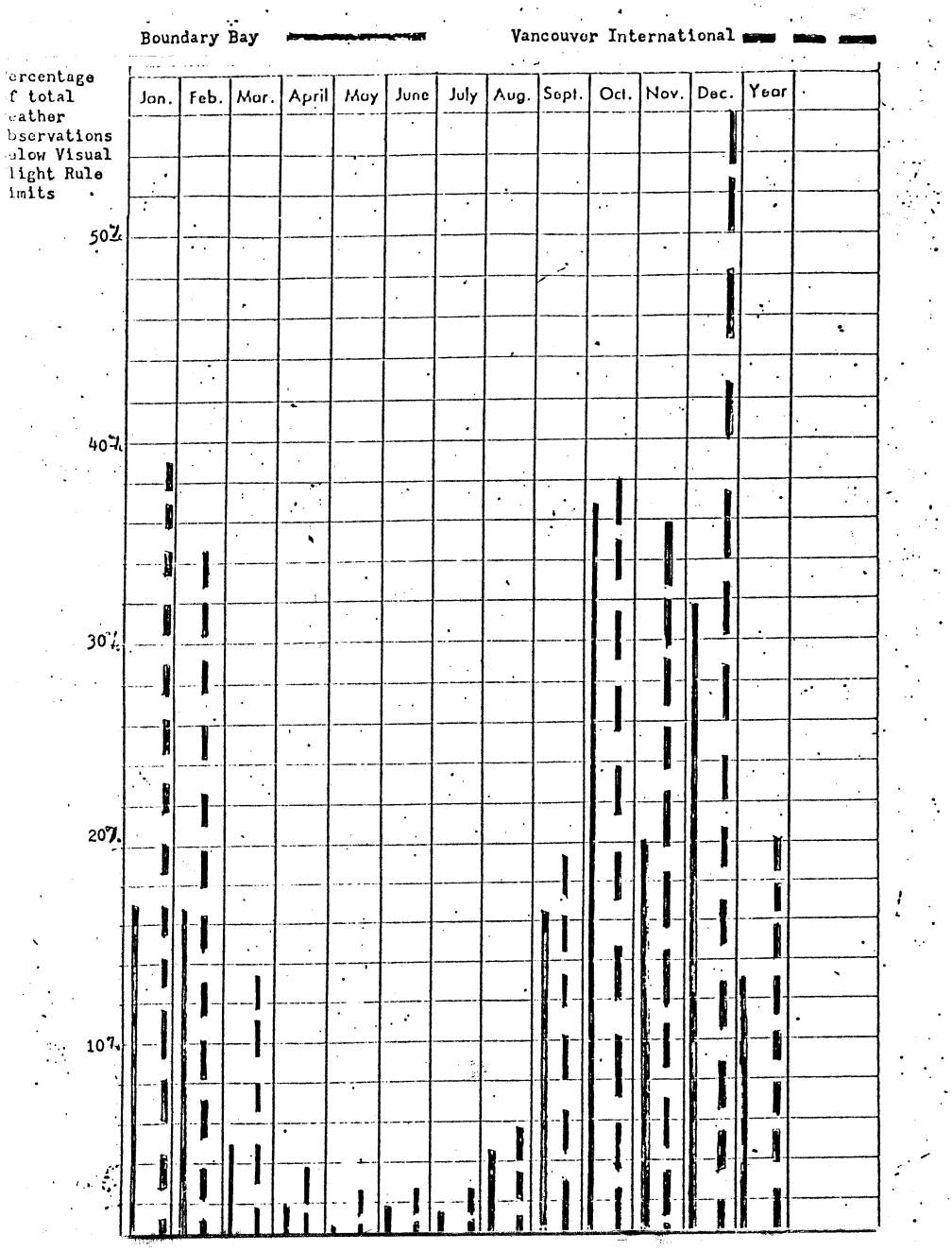
There is also the difficult to measure factor of urban development. During World War II the perfectly flat land surrounding both airports was mostly farmland. It was ideal for the formation of radiation fog. However with urbanization a minor heat island is created which makes the formation of inversions more difficult. Vancouver International is now largely surrounded by residential or industrial development although it is not densely developed. Boundary Bay airport is still largely surrounded by farm land or mixed rural/urban development. This development pattern should auger for slightly more improvement at Vancouver than at Boundary Bay.

Another factor that is difficult to measure is change in the overall circulation of the area. Recent evidence put together by D. Falkner of the Pacific Scientific Services Unit supports the contention that much of the decrease in fog at Vancouver is a result in changes in the upper air circulation to create better ventilation along the southern B.C. coast. A change of this magnitude would apply to Boundary Bay just as well as Vancouver.

One can only take a middle road and assign a portion of the cause to each of the factors listed. This would yield a result of reduced fog at both airports with the greater reduction at Vancouver. The question of whether Vancouver has caught up to Boundary Bay will have to be answered by future comparisions. It seems unlikely to this writer that the difference of 56% would be completely over come. The precipitation pattern of the area still favours Boundary Bay.

FIG 1.

COMPARISON OF BELOW VFR WEATHER FOR THE YEARS 1943 AND 1944
BETWEEN BOUNDARY BAY AND VANCOUVER INTERNATIONAL



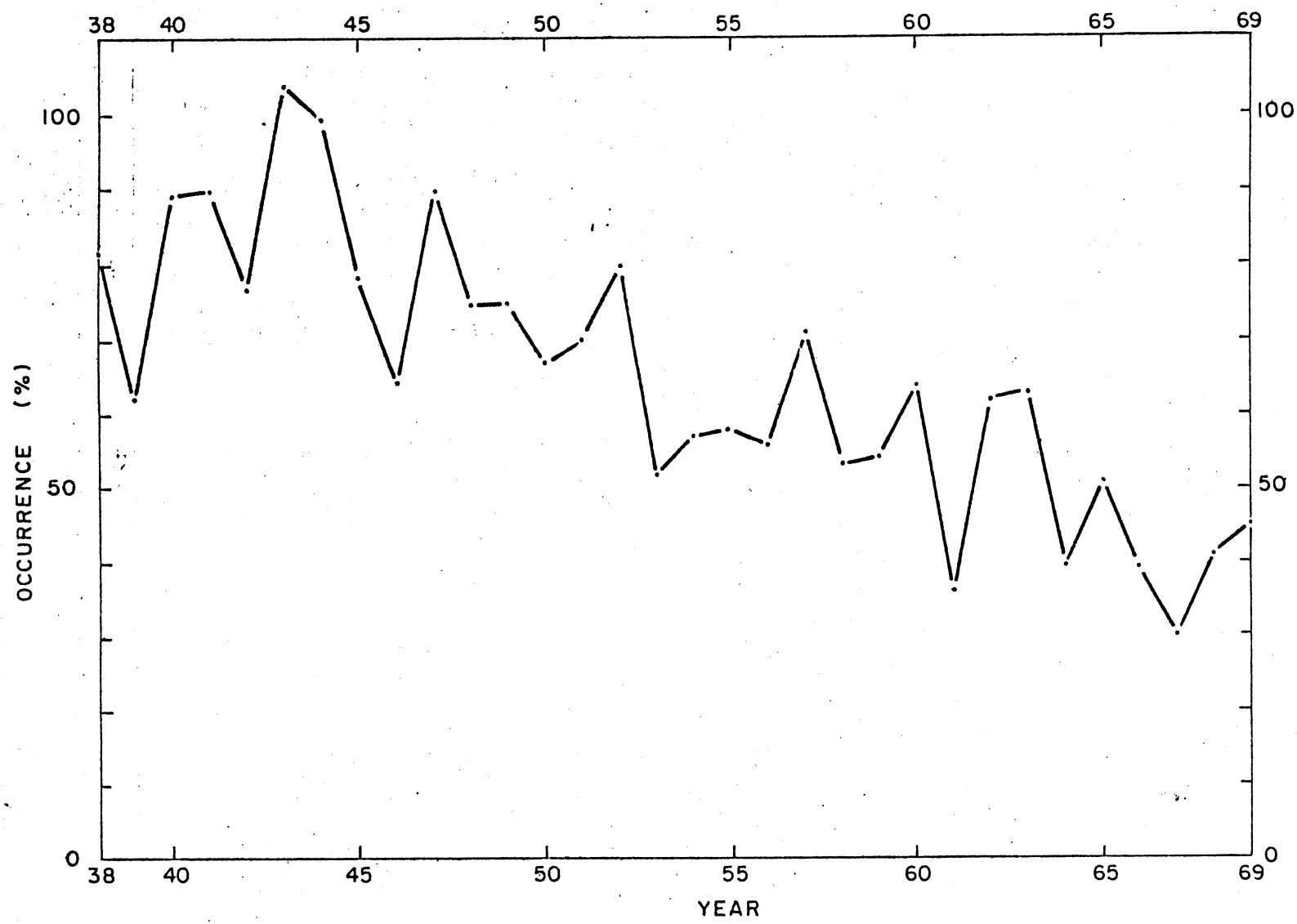


Figure 2.
Days With Fog.
VANCOUVER INTERNATIONAL

TABLE #1

BOUNDARY BAY, B.C.

PERCENTAGE OF IFR OBSERVATIONS BY CATEGORY 1943 AND 1944

MONTH	CAT I	CAT II or lower	CAT III or lower
JAN.	3.2	7.9	15.6
FEB.	5.5	8.5	16.8
MAR.	0.3	1.6	4.8
APR.	0.1	0.2	2.0
MAY			0.7
JUNE		0.1	1.8
JULY		0.2	1.6
AUG.	0.9	2.0	4.4
SEP.	5.0	8.8	16.4
OCT.	13.2	20.3	36.8
NOV.	6.2	9.7	20.2
DEC.	23.1	26.0	31.7
YEAR	4.9	7.2	13.3

TABLE # 2 VANCOUVER, B.C.

PERCENTAGE OF IFR OBSERVATIONS BY CATEGORY 1943 AND 1944

MONTH	CAT I	CAT II or lower	CAT III or lower
JAN.	5.1	11.8	39.2
FEB.	6.8	13.8	34.4
MAR.	0.7	2.3	13.4
APR.		0.7	3.8
MAY			2.5
JUNE		0.2	2.6
JULY	0.1	0.6	2.6
AUG.	0.7	1.5	5.7
SEP.	4.2	8.2	19.5
OCT.	14.4	20.0	38.0
NOV.	10.2	16.2	35.8
DEC.	25.5	36.2	56.0
YEAR	5.7	9.3	20.8

TABLE 3 VANCOUVER, B.C.

COMPARISON - 1943-44 PERIOD TO 1957-1976 PERIOD

PERCENTAGE OF TOTAL OBSERVATIONS IN IFR CATEGORIES

MONTH	1943-44 PERIOD	1957-76 PERIOD	% 57-76/43-44
JAN.	39.2	22.5	57%
FEB.	34.4	14.6	42%
MAR.	13.4	5.4	40%
APR.	3.8	2.7	71%
MAY	2.5	2.1	84%
JUNE	2.6	2.1	81%
JULY	2.6	1.8	69%
AUG.	5.7	4.7	82%
SEP.	19.5	11.2	57%
OCT.	38.0	18.5	49%
NOV.	35.8	18.0	50%
DEC.	56.0	21.1	38%