AERIAL SURVEY OF ASPEN FOREST CONDITIONS NEAR GRANDE PRAIRIE, ALBERTA

by

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File Report
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Background

In September, 1991, a visit was made to the farm of Mr. Henry Pirker, near Debolt, Alberta. The purpose of the visit was to view on-site tree decline conditions claimed by Mr. Pirker, and to identify possible causes for the decline. The main tree species of concern on Mr. Pirker's farm and on adjacent areas are trembling aspen and balsam poplar.

The visit was arranged by Mr. D. Law (Alberta Forest Service, Grande Prairie Forest District) who accompanied Mr. H. Gates and myself. At the time of the visit, we were given a tour of the farm to examine tree, shrub and other vegetation conditions at several locations on the farm property. The sites included at least three locations where dead, dying and declining symptoms of aspen and poplar were observed.

One of the claims by Mr. Pirker was that the vegetation decline was contributed, at least in part, to air pollutant emissions from the Procter and Gamble Cellulose Ltd. plant, located on the Wapiti River about 35 km southwest of Mr. Pirker's farm. It was suggested at the time that an aerial overview of the aspen forest conditions in the vicinity of Mr. Pirker's farm and on forested areas adjacent to the Smoky and Wapiti rivers, both upstream and downstream from the Procter and Gamble plant, would provide useful comparative information. It was further suggested that mapped areas showing chlorotic (yellowing) foliage and dead and dying aspen stands would provide criteria symptomatic of forest decline, and indicate patterns that might suggest certain causal agents such as forest tent caterpillar defoliations, drought, frost or air-borne pollutants.

Aerial Survey Procedure and Conditions

An aerial survey was conducted on August 5, 1992, in a helicopter provided by the Alberta Forest Service. Observations of aspen forest conditions were made by Mr. H. Gates and myself, and selected sites along the flight path were photographed for illustration. The aircraft was flown at 100-200 m above tree tops. The starting point of the flight was at the Debolt Ranger Station, and proceeded northwesterly along the Smoky River to Kleskun Creek, then southwesterly along the Wapiti River to Pipestone Creek, and back to the Debolt Ranger Station (see attached Map showing the survey flight path). Weather conditions throughout the flight were sunny and calm.

Aspen Forest Conditions

The path of flight, starting from Debolt, passed over several farmsteads, including the property of Mr. Henry Pirker (see Map and Photo 2). Residual aspen and balsam poplar stands and shelterbelts are a common feature on most of the farmsteads. Photos 1, 2 and 3 illustrate many of the symptoms of aspen and poplar decline associated with these stands. Individual tree and small patches of tree mortality and top dieback are apparent and occur most commonly along the margins of fields, roads and stand openings, and adjacent to farm buildings. Narrow belts of aspen stands between fields or along roadsides and fencelines also tend to show higher levels of mortality than do larger

contiguous areas (see Photos 3 and 4).

A number of causes can be suggested that likely contribute to this decline of aspen and poplar farm woodlots and shelterbelts. These include drought, late spring frosts, the effects of cattle grazing on soil compaction and root injury, altered drainage and soil moisture through various farm activities, and recent defoliations by the forest tent caterpillar. In addition, stand maturity, the presence of root and stem decay organisms and aspen clonal variation may also be contributing factors.

Photos 4 and 5 illustrate larger contiguous aspen forests along the valley of the Smoky River (see locations on Map); both areas may be influenced minimally by agriculture activity. However, some aspen mortality, perhaps as high as 10%, is apparent and appears to be related to site, stand maturity and clonal variation. The approximate locations and relative size of these areas of decline are shown on the attached Map.

The mapped areas adjacent to the Wapiti River, upstream from Goodwin, indicate locations and approximate boundaries of stands showing significant amounts (ie., 10% or more) of dead or dying aspen (see shaded areas on Map). Most of the aspen forests surveyed between Goodwin and Grovedale appeared to lie on non-agricultural lands and therefore tree decline in these areas should not be influenced by agricultural activities. The pattern of mortality occurred in solid patches, suggestive of clonal susceptibility, while in other areas mortality and top dieback appeared to be more general, occurring within stands as well as around the margin of stand openings. No specific causal agent(s) can be attributed to this mortality, although drought, forest tent caterpillar defoliations, late spring frosts, root and stem decays and air pollutant emissions may all be contributing factors.

It is noteworthy that the forest tent caterpillar occurred extensively and caused moderate-to-severe levels of defoliation of aspen forests south and southeast of Grande Prairie during the period 1979 to 1989 (Forestry Canada, Forest Insect and Disease Survey annual reports). In addition, some defoliation of aspen by the Bruce spanworm occurred south of Grande Prairie in 1990. While the Forest Insect and Disease Survey records are not specific enough to show a defoliation history for individual stands adjacent to the Wapiti River, most of the areas of dead and dying aspen (shaded areas on Map) have likely sustained at least 4 to 6 years of moderate or severe defoliation between 1979 and 1990.

The results of this survey indicate areas where particularly aspen mortality and stand decline are relatively severe (ie., at least 30% or more mortality in some stands) and occur extensively within the area mapped adjacent to the Wapiti and Smoky rivers. Some areas of chlorotic-like discolored aspen foliage were observed, but no distinct pattern could be determined. Additionally, there appeared to be little or no mortality in the coniferous stands (lodgepole pine, white and black spruces) within the surveyed area. While it was not possible to idenify stress factors contributing to the decline, the degree of mortality would appear to be severe enough to warrant a more detailed assessment, perhaps through establishment of a series of ground monitoring plots.

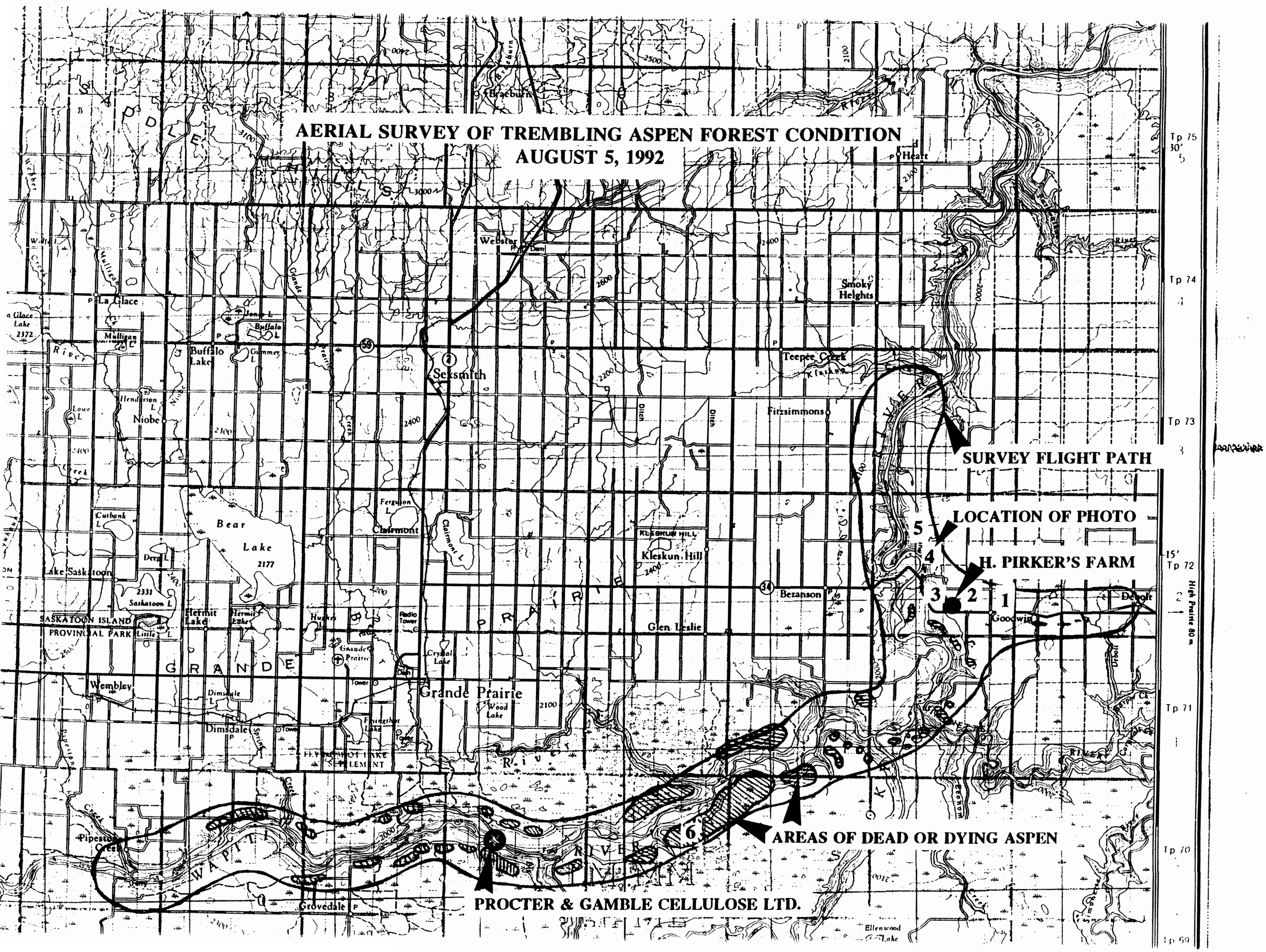
AERIAL SURVEY OF TREMBLING ASPEN FOREST CONDITION
AUGUST 5, 1992
SURVEY FLIGHT PATH
LOCATION OF PHOTO
H. PIRKER'S FARM
AREAS OF DEAD OR DYING ASPEN
PROCTER & GAMBLE CELLULOSE LTD.
1
2
3
4
5
6
Tp 75
Tp 74
Tp 73
Tp 72
Tp 71
Tp 70
Tp 69
Bracburn
Heart
Webster
Smoky Heights
La Glace
Buffalo Lake
Teepee Creek
Sexsmith
Niobe
Fitzsimmons
Bear Lake
Clairmont
Kleskun Hill
Bezanson
Lake Saskatoon
Saskatoon L
Hermit Lake
SASKATOON ISLAND
PROVINCIAL PARK
Glen Leslie
Goodwin
Debolt
Grande Prairie
Wembley
Dimsdale
Wood Lake
Pipestone Creek
Grovedale
Ellenwood Lake
G R A N D E
P R A I R I E
W A P I T I
R I V E R

Photo 1

Photo 2

Photo 3

Photo 4

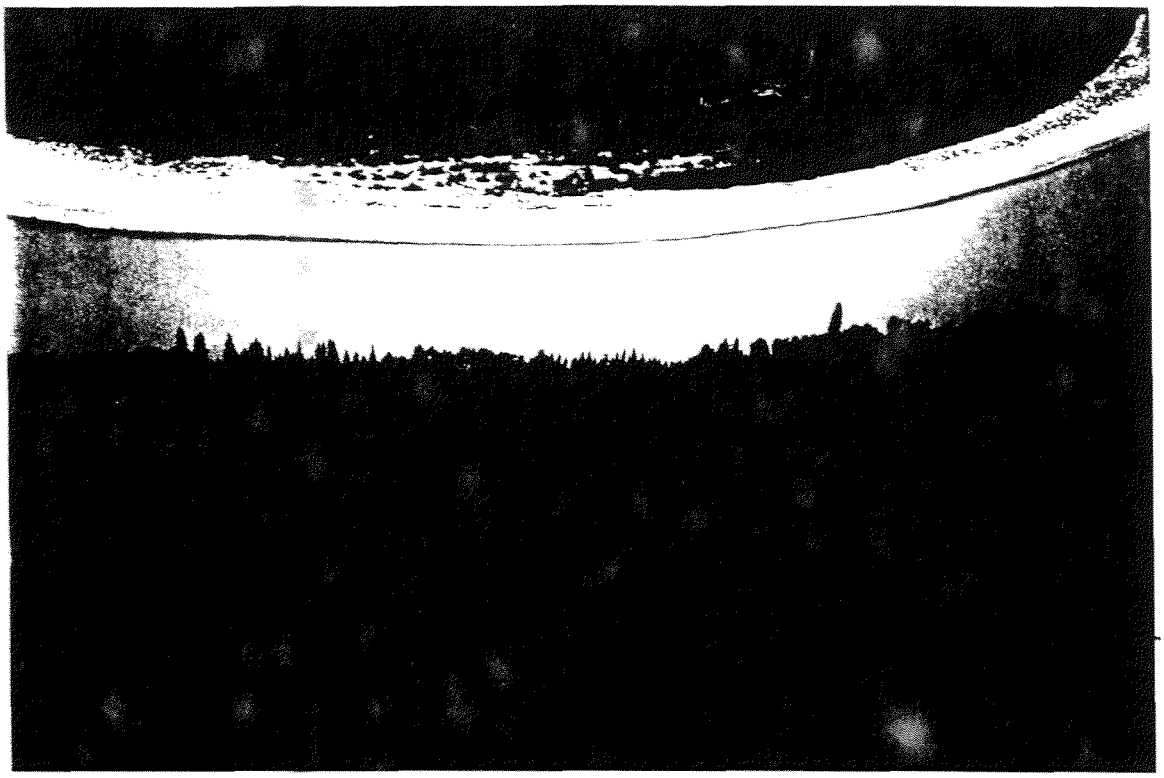

Photo 5

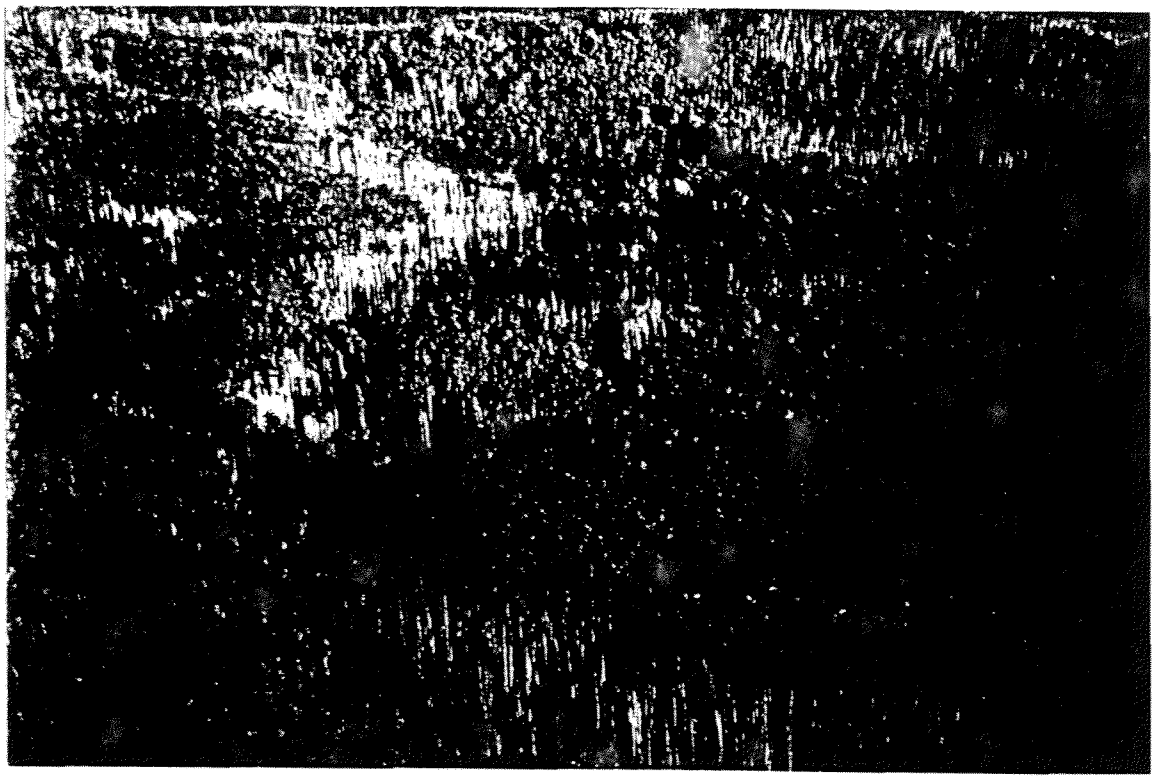

Photo 6