THE GASPEREAU VALLEY

OF KINGS COUNTY, NOVA SCOTIA

A Map Folio with Text

HUGH MILLWARD

with Benoit Ouellette and Peter Ricketts

Hugh Millward: Fieldwork, library research, map compilation, graphic design, text, and production

Benoit Ouellette: Cartographic drafting, design assistance

Peter Ricketts: Fieldwork, map compilation, and text for plate 4

ATLANTIC REGION GEOGRAPHICAL STUDIES, NO.4

DEPT. OF GEOGRAPHY, SAINT MARY'S UNIVERSITY

HALIFAX, NOVA SCOTIA, CANADA B3H 3C3

1985

Print version OCLC Number 1019349720

Digital version produced 2021

CONTENTS

PREFACE

The Gaspereau valley of Kings County is a microcosm of Nova Scotia. Here both the physical and human geography of the province are present in miniature, so that we can see clearly the two-way relationships between environment and human activity. The valley, therefore, is important as a unit of study, and it is for this reason that this volume of maps and text has been produced.

Within the compass of this small river valley -- the study area is only 14 km long -- one finds four of the province's major bedrock formations, each of which has influenced the morphology or shape of the land. There are strong connections between the bedrock and soil development, and both have a bearing on the land suitability for agricultural exploitation.

The lower valley is extremely fertile by Nova Scotia standards, and has a long history of farming settlement, while the upper valley and the valley flanks have either never been cleared, or were cleared late and then abandoned. Forestry and forest products were the economic mainstay of the upper valley, and have been complemented more recently by hydro-electric power generation. Until recently, the Gaspereau area mirrored the economic role of the province as a whole, as a "hewer of wood and drawer of water." But, as in other areas of the province, resource industries are employing fewer people, and the valley is becoming a bedroom community for commuters to nearby towns.

Most of the maps presented in this volume represent a "snapshot" of the valley in 1982. They build on each other to provide a detailed picture of both physical and human characteristics, and allow us to infer much about the causal relationships between them. Large-scale land use maps form the central feature of this folio, since land use is the ultimate expression of the land-owner's evaluation of his property's resources and location. Elements of process may be inferred from many of the maps, but are explicitly considered only for the cadastral system (property boundaries), land abandonment, and population change. It is hoped that this folio will serve a useful function as a teaching aid in high school and university geography courses, and in courses in Canadian and Atlantic Canada studies.

The maps and text are arranged to tell a coherent story, though their value will be increased if they are complemented by topographic maps and, particularly, a field trip to the area (an itinerary for which is briefly outlined in the text to plate 2). In addition, this folio may be useful as a model for studies of other small areas. The detailed notes on compilation should allow a similar set of thematic maps to be constructed for any local area, and the preparation of such a folio would be an involving and educationally worthwhile class project.

Acknowledgements

Sincere thanks are extended to Mr. Benoit Ouellette, cartographer in the Saint Mary's geography department, for his skillful drafting of the plates, and for his advice on the details of graphic design. I would also like to thank Dr. Douglas Day, who first introduced me to the Gaspereau valley, and encouraged me to publish this folio as part of the Atlantic Region Geographical Studies series. I am grateful to Dr. Peter Ricketts for producing the map and text for plate 4, thus helping to round out this study on the physical side.

Note on the 2021 Digital Version

This version contains all of the original text and artwork, and should be viewed as an historical document. The human geography of the valley has changed considerably since the 1982/83 fieldwork, but no attempt has been made to update the information. However, a few minor corrections have been made to the text. High-resolution digital images of the map plates can be obtained from geography@smu.ca

PLATE 1: THE REGIONAL SETTING

1A Topography

The Gaspereau River rises from rnany sources on the Atlantic Upland plateau of Nova Scotia. This plateau, a Cretaceous erosion surface which has been tilted and then glacially scoured, is highest along the locally-named South Mountain, and dips gently south-eastwards. Drainage on the plateau is deranged and, largely as a consequence, many lakes have been created through damning for power purposes (e.g., Gaspereau Lake, Aylesford Lake, and Black River Lake).The Gaspereau River, Halfway River, and West Avon have cut back vigorously westwards from the Avon River through soft sedimentary rocks, to create broad indented valleys. The Gaspereau has also cut down hrough the harder slates to the west, to create a gorge-like upper valley.

The lower Gaspereau valley is divided from the composite "valley" of the Cornwallis (actually a structural feature) by the flat-topped Wolfville Ridge. This is an outlier of the South Mountain separated by the downcutting action of the river, just as the Kentville Ridge was separatedby Dodge Brook.

In its lowest reaches, the Gaspereau river runs over a coastal plain which is greatly affected by the high tides of the Minas Basin. Extensive mud flats are exposed at low tide, and large portions of salt marsh, such as Grand Pré, have been rendered productive by dyking.

1B Geology

The oldest rocks in the Gaspereau valley area are the Meguma group, composed of the Goldenville formation (grey sandstone, or greywacke, and slate) and the overlying Halifax formation (slate and siltstone). These were formed in the Cambrian and early Ordovician periods.Several formations of Devonian and Silurian age rest over the Halifax in the upper Gaspereau valley: tuff, siltstone and slate occur in each of the New Canaan, Kentville, and White Rock formations, and the White Rock is distinguished by the presence of quartzite (hence the name) . On the Atlantic Upland plateau, upstream from the incised upper valley, are the granite rocks which intruded into the Megurna group during the late Devonian and early Carboniferous periods.

In the east and north of the map area, younger and less folded rocks rest unconformably over the Halifax formation. The Horton group (early Carboniferous) in this area is composed of sandstone, shale, dolomite and conglomerate. Brooks are cutting deeply incised gulleys into the shales on the south side of the Gaspereau valley.

Above the Horton group lie the anhydrite, gypsum, siltstone, and limestone of the strongly folded and faulted Windsor group, none of which appear in the Gaspereau valley. In the very lowest reaches of the Gaspereau are rocks of the Fundy group, formed in the late Triassic. The Wolfville formation, comprising red siltstone, sandstone, and conglomerate, is easily eroded, but has allowed the development of a thick soil layer.

1C Agricultural Capability

The quality of the land for agriculture is dependent on a variety of physical factors relating to the soil, topography, and climate. The map shows the Canada Land Inventory classification, which is based largely on soil characteristics (such as permeability, drainage, depth, fertility, salinity and stoniness) but also reflects limitations such as flooding or excessive slope.

The pattern of soil capability is strongly related to bedrock geology. Areas of granite intrusions have no capability, while the upland areas of the Horton Formation have thin dry soils of class 4. The class 4 soils west of Kentville are not related to bedrock; they are poorly developed soils on stabilized sand dunes.

While nearly all lands of class 4 or better were extensively settled and farmed during the nineteenth century, modern commercial farming is largely restricted to soils of class 2 and 3 (no class 1 soils

occur in Nova Scotia). Thus, a good deal of abandonment has occurred on the class 4 soils. Except for the Wolfville Ridge, the best soils occur in the lowlands, and farmers have generally looked askance at the higher ground; for this reason, land abandonment has been general on the South Mountain, despite large areas of class 3 soils.

1D Generalized Land Use

The Annapolis valley (i.e., the entire lowland from Annapolis Royal to Avonport) is famous for its apple production. The orchards were developed to their maximum extent in the late nineteenth century, with the principal market being Great Britain. After a long period of decline the industry has now stabilized, and many new orchards have been planted to maintain production. Most orchards are situated on the best soils (class 2) in gently rolling lowland areas; the most extensive tracts are at the northern base of the Wolfville Ridge, on the flanks of the Kentville Ridge, and on the intervale between the Canard River and Habitant Creek. In the Gaspereau valley, orchards are scattered along the valley sides wherever slopes are less than 8 degrees.

Most of the areas drained by dykes (Grand Pré, and stretches along the lower Gaspereau, Cornwallis, Canard, and Habitant) are too wet for field crops, but excellent as pasture. Arable farming occurs on well-drained soils of classes 2 and 3, usually interspersed with orchards. Corn (for silage) is a major crop, although more traditional are tame grasses (for hay and forage) and potatoes. Hay is also cropped from native grasses on the poorer soils, and from salt grasses on the unprotected marshes.

Woodland is held in small private woodlots. Hardwood is sold commercially for home heating, and softwood feeds local sawmills (two of which are in the Gaspereau valley).

Compilation

1A 1:250,000 N.T.S. sheet 211-1 (edition 3 MCE Series A 501) and sheet 21A (edition 1 ASE Series A 501).

1B 1: 500,000 Geological Map of the Province of Nova Scotia, comp, by J. Duncan Keppie (Dept. of Mines and Energy, Nova Scotia, 1979).

Geological Highway Map of Nova Scotia, by J.P. Bujak and H.V. Donahue, Jr. (Halifax: Atlantic Geoscience Society, Special Publication No. 1, 1980).

1: 506,880 Metallic Mineral Map of the Province of Nova Scotia, comp. by Ernest A. Buehren (Dept. of Mines, Nova Scotia, 1966)

1: 506,880 Industrial Mineral Map of the Province of Nova Scotia, comp. by Ernest A. Buehren (Dept. of Mines, Nova Scotia, 1966).

1C 1: 250,000 Canada Land Inventory, Soil Capability for Agriculture (Queen's Printer, 1968), sheets 2 IH (Amherst) and 2 IA (Annapolis).

1D 1: 250,000 Land Use Series (Geographical Branch, Dept. of Mining and Technical Surveys, Canada) , sheet 21H (published 1964), and sheet 21A (published 1964).

References

Topography:

J.W. Goldthwait, *Physiography of Nova Scotia* (Ottawa: Canada Geological Survey, Memoir No. 140, 1924).

D.B. Cann, J.I. MacDougall and J.D. Hilchey, *Soil Survey of Kings County, Nova Scotia* (Truro: Report no. 15, Nova Scotia Soil Survey, 1965).

Geology: D.G. Crosby, *Wolfville map area, Nova Scotia* (Ottawa: Geologic Survey of Canada, Mem. 325, 1962). 67 pp and 1:63, 360 map.

Plate 1

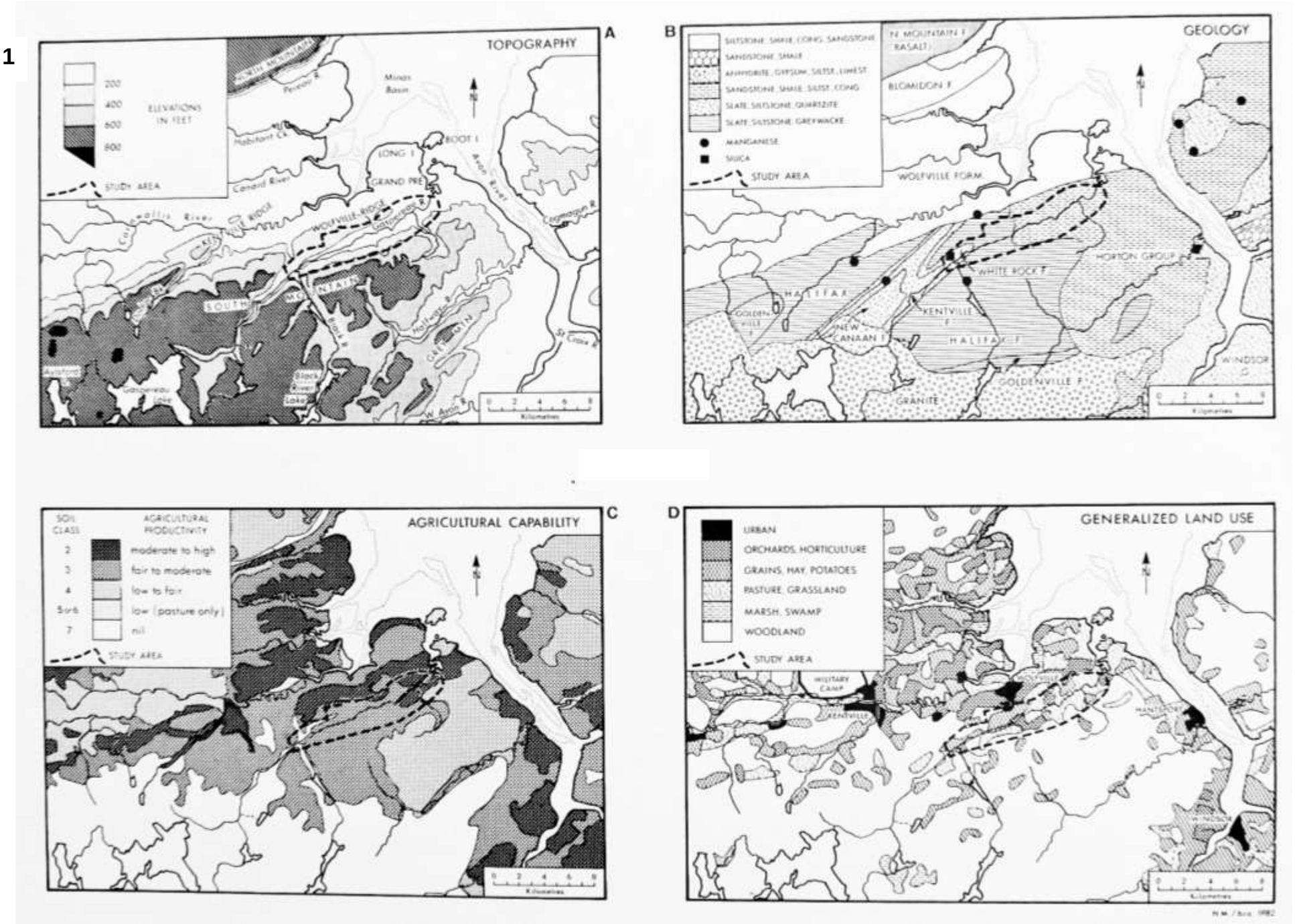

A
TOPOGRAPHY
ELEVATIONS IN FEET
200
400
600
800
STUDY AREA
B
GEOLOGY
STUDY AREA
MANGANESE
SILICA
WOLFVILLE FORM
HORTON GROUP
WHITE ROCK F
HALIFAX
KENTVILLE F
HALIFAX F
GOLDENVILLE F
GRANITE
WINDSOR
C
AGRICULTURAL CAPABILITY
SOIL CLASS
AGRICULTURAL PRODUCTIVITY
2 moderate to high
3 fair to moderate
4 low to fair
5 or 6 low (pasture only)
7 nil
STUDY AREA
D
GENERALIZED LAND USE
URBAN
ORCHARDS, HORTICULTURE
GRAINS, HAY, POTATOES
PASTURE, GRASSLAND
MARSH, SWAMP
WOODLAND
STUDY AREA
MILITARY CAMP
KENTVILLE
WOLFVILLE

PLATE 2: TOPOGRAPHY, DRAINAGE, AND SLOPE

These maps provide two different methods of visualizing the form and character of the Gaspereau valley. As shown on map 1B, the river has created its valley by cutting down through soft rocks of the Horton group in the east, and harder rocks of the Halifax, White Rock and Kentville formations in the west. As one would expect, the river has fashioned a wider, gentler valley in the soft sandstones and shales, and a steeper, more constrained valley in the slates, schists and quartzite. Further upstream still, the river has etched only the suspicion of a valley into the hard granite of the Atlantic Upland.

The Study Area

The area defined as "the Gaspereau Valley" for the purposes of this map folio is shown by the bold dashed lines. This area has been delimited on the basis of its coherence and distinctiveness as both a landscape feature and a human ecological unit. Justifying the boundary first on a landscape basis, the line approximates the height of land along the Wolfville Ridge (though for convenience it largely follows the 101 limited-access highway), and separates the drainage areas of the Gaspereau and Cornwallis rivers. On the South Mountain, the margin is defined by a line just above the steepest part of the valley side, thus approximating the skyline as seen from the north side of the valley floor (again, for convenience, this boundary largely follows a power transmission line).

Downstream, the study area begins at the Avonport bridge on highway 101 (location A), thereby excluding the tidal estuary and salt marsh to the north. The slope map shows the constriction of the floodplain which occurs at this point. Upstream, the study area is cut off at the point where the valley bottom ceases to exist, and the river runs instead through a youthful gorge. There is no road access to this gorge and, due to the woodlands of the plateau, one catches only tantalizing glimpses of it from the nearest roads. The study area boundaries also delimit, though less precisely, a distinct area of human settlement and land use, centred on the village of Gaspereau and the hamlets of Melanson and Wallbrook. From the location of the first cleared land on the valley floor (near J) to the point where the view downstream is closed by steep bluffs (D) lies a continuous stretch of open farmland, linked by roads on either side of the river, and by four bridges. The social coherence of this area, formerly strong, is being eroded by an influx of exurbanites (rural commuters) working in Wolfville, and by the increased propensity of valley dwellers to travel to Wolfville for goods and services.

Landscape Units

The Gaspereau valley can be divided into three distinct landscape units, each shielded from its neighbours and each with its own unique character. The major dividing point is at D, where the river channel runs through sandy bluffs, which allow no floodplain and no latitude for meander migration. The other main transition is at J (the White Rock Pond dam). This is the upstream limit

of the meander plain; above this point the river is cutting down vertically into hard Silurian rocks, while below it erosion into the Horton sandstones and shales is largely lateral. Between D and J is the valley proper -- a nine-kilometre stretch of open farmland which lays bare a U-shaped valley almost completely enclosed by steep wooded slopes. This central basin is itself divided into three sub-units, clearly apparent on the slope map; these are D to F (the Melanson bridge), F to H (the Gaspereau bridge), and H to J.

A Trip up the Valley

Looking upstream from the highway 101 bridge (A), the landscape is dominated by flat dykelands in the foreground and the forested plateau of the South Mountain on the skyline. The Wolfville ridge at this point is a shallow snout to one's right, marking the main valley. Travelling along the east bank towards the tower (near D), one encounters active erosion of unconsolidated banks at B and C, and sees the gash made by Curry Brook in the soft Horton shales and sandstones. This latter is the most visible of three main gorges (the others are formed by Harding Brook and Duncans

Brook) which are up to 50 m deep and extremely steep (up to 45 degrees). The gorge of the Harding Brook can be conveniently viewed from the road 500 m south of Melanson (at G).

From the hill at D the entire stretch of the main valley opens up briefly -- steep wooded sides of the South Mountain to the left, the flat valley floor ahead, and on the right the subdued contours of the Ridge, cloaked by orchards. Descending a little, one enters the Wallbrook sub-unit (D to F), centred on the Wallbrook bridge (E). Here, the river is still strongly tidal, and a dyke runs all along the north bank. The character of the valley changes again at the Melanson bridge, both in orientation and form. In this central sub-unit (F to H) the hills on either side become noticeably steeper, so that wooded and/or abandoned land is apparent on the Ridge as well as the South Mountain. Unexpectedly, though the valley is more deeply etched here, the meander plain remains just as wide, and the hills draw away somewhat: the sense of being in a bowl or basin is strong. The effect of the Minas Basin tides is felt as high as the confluence with Duncanson Brook, though floods due to snowmelt and ice-jamming can occur as high as the White Rock power station (I).

At the Gaspereau bridge (H) the river runs in a shallow pebbly bed as it crosses over to the north side of the floodplain. Keeping south of the river, one notes active erosion of the south bank, and an extremely flat and flood-prone area to the north, clearly indicated by several alternate river channels. The sub-unit H to I has a stark cross-section: both the South Mountain and Wolfville Ridge are very steep here, and close in on each other, yet the valley floor is flat almost from wall to wall. The geological reason for the altered landscape is the presence of harder, less erodible slates on the hills, although softer rocks still underlie the valley floor, which helps to account for the rapid narrowing of the floor in this section. The character of the upstream unit is fully established at J, where the White Rock formation cuts across the valley bottom. From here west, there is no room for roads, settlements, or farming in the valley; there is only the thin strip of White Rock Pond, and above that the river in its wild state.

Compilation

2A Topography and Drainage:

1: 50,000 topographic map sheet 21E/1W edition 4 ASE, Series A 791 (1967) (Ottawa: Surveys and Mapping Branch; Department of Energy, Mines and Resources).

2B Raisz and Henry Slope Map:

As above, with additional interpretative aid from Land Registration and Information Service Resource Series maps, and with a contour interval of 5 m (sheets at scale 1: 10,000 and 21E/01-v1, 21E/01-S3, 21H/01-R4, and 21H/01-R3). The method of slope mapping was devised by E. Raisz and J. Henry (1937) for an area in New England; the aim is to discern "areas of similar slope," which in effect means "areas having similarly-spaced contours." A brief summary is provided in Dickenson (1979), pp 229-234.

References

Dickenson, G. (1979) , *Maps and Air Photographs , 2nd ed.* (London: Edward Arnold).

Raisz, E. and J. Henry (1937), "An average slope map of Southern New England," *Geographical Review,* 27, pp 467-72.

Plate 2

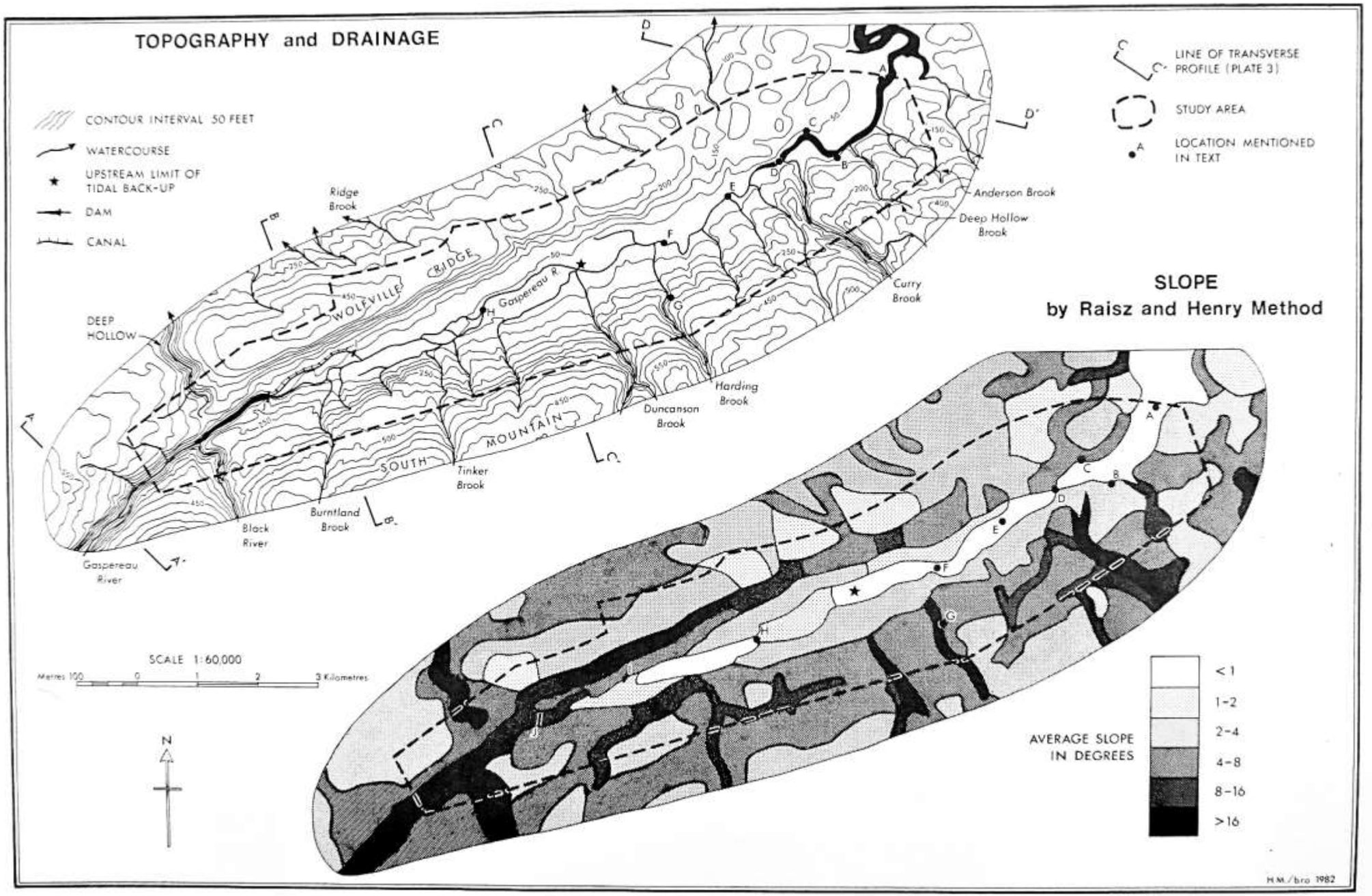

TOPOGRAPHY and DRAINAGE
CONTOUR INTERVAL 50 FEET
WATERCOURSE
UPSTREAM LIMIT OF TIDAL BACK-UP
DAM
CANAL
LINE OF TRANSVERSE PROFILE (PLATE 3)
STUDY AREA
LOCATION MENTIONED IN TEXT
SLOPE
by Raisz and Henry Method
Ridge Brook
Anderson Brook
Deep Hollow Brook
Curry Brook
DEEP HOLLOW
WOLFVILLE RIDGE
Gaspereau R.
Harding Brook
Duncanson Brook
SOUTH MOUNTAIN
Tinker Brook
Burntland Brook
Black River
Gaspereau River
SCALE 1:60,000
Metres 100 0 1 2 3 Kilometres
N
AVERAGE SLOPE IN DEGREES
< 1
1-2
2-4
4-8
8-16
>16
H.M./bro 1982

PLATE 3: PROFILES OF THE GASPEREAU AND BLACK RIVERS

Cross-Sectional Profiles

The profiles shown in plate 3 illustrate many points made in the text accompanying plate 2. The cross sections (whose alignments are marked on plate 2) illustrate that the downstream valley is wider and gentler than the upstream portion. This is partly due to the particulars of the local geology: the Horton shales and sandstones occur on the valley floor below the White Rock power station, while harder slates and schists occur above it. As a consequence, meanders and lateral erosion are predominant on the soft rocks, while on the harder rocks the river is straight and cutting down vertically.

The changes in cross-sectional profiles as one progresses downstream are also quite typical of many river valleys. The "youthful" upstream portion, flowing rapidly due to the steep grade, does not meander but cuts downward (section A to A'). By contrast, the "mature" downstream sections, flowing more moderately, tend to meander and cut laterally to create a floodplain (sections B to B' and C to C'). Below Wall brook, strong tidal currents (particularly on the ebb tide due to the volume of impounded water) allow for considerable lateral erosion wherever the river swings to the edge of its floodplain (points B and C on plate 2A).

Longitudinal Profiles

The longitudinal profile shows the slope or gradient of a river. Most rivers tend to adjust this profile through time until it assumes a smooth concave slope (when the river is said to be "graded"). The Gaspereau is graded as far upstream as mile 23, just east of the Little River, where there appears to be a knickpoint. This may reflect the upstream limit of downcutting associated with rejuvenation. More significantly, the knickpoint is located at the boundary between hard granite to the west, and the more easily erodible White Rock formation (mostly slates and schists) to the east. The knickpoint should slowly progress westwards until the river is graded along its whole length.

The Gaspereau’s main tributary, the Black River, does not possess a graded profile. There is a marked knick represented by the falls at Hell's Gate (mile 16), almost certainly due to downcutting following the capture of the Black River by the Gaspereau. The knick is at an elevation of 250 feet, consonant with the highest elevation of the dry valley of Deep Hollow, through which the Black River formerly ran. The less obvious knick above Hollow Bridge power station is possibly due to a narrow transverse band of more resistant greywacke.

Hydro-Electricity Generation

The headwaters of the Gaspereau and Black rivers collect on the granite peneplain of the Atlantic Upland, where opportunities for damming and water diversion are numerous. Between 1930 and 1952 the Avon River Power Company diverted most of these headwaters to flow into the Black River, and fully exploited the increased volume for hydro-electric power generation. The Black River was preferred since (1) the headwaters of both the Gaspereau and West Branch Avon can be diverted to the upstream portion of the Black over low water divides, but the reverse is not possible; and (2) in its lower reaches, the Black flows transversely over slates and schists which are almost vertically bedded, providing good sites for reservoir dams.

Of the five stations in the Gaspereau-Black River scheme, Methal's Brook and Lumsden are conventional, in that they are sited immediately below their respective dams, and use the head of water directly. But the three other stations derive additional head by being situated further downstream, with the dammed water travelling via a canal or pipes (penstocks), and being raised back to the reservoir level by a standpipe above the turbines.

Power Station (upstream first)	**Year Commissioned**	**Net Head** (feet)	**Generating Capacity** (Kw)
Methal’s Brook	1949	45	3,400
Hollow Bridge	1940	150	5,300
Lumsden	1941	70	3,100
Hell's Gate	1949	185	6,930
White Rock	1952	30	3,200

Compilation

Longitudinal profiles were constructed by conventional methods (see Dickenson, 1979, 209—213) from 1:25,000 and 1:50,000 topographic maps (contour interval of 50 feet), with additional information from Land Registration and Information Services Resource Series orthophotomaps at 1:10,000 (contour interval of 5 m). Cross-sectional profiles were constructed entirely from 1:10,000 orthophotomaps. Fieldwork was conducted to ascertain details of drainage diversions and electrical power generation along the upper Gaspereau and Black River. Additional information on power generation was provided by D. Flemming, Corporate Relations Department, Nova Scotia Power Corporation.

Transverse or cross-sectional profiles were constructed at right angles to the general course of the Gaspereau, at approximately equal intervals upstream. They are shown aligned one behind the other, centred on the river. The vertical exaggeration was chosen to highlight slight changes in relief in the lower reaches of the river.

The longitudinal profiles were constructed starting at the Highway 101 bridge, and working upstream. The horizontal scale represents kilometre distance from the bridge along the course of the river (including all meanders) , or along the centre of lakes. The large vertical exaggeration was necessary since the gradient of the rivers is slight, as are differences in lake levels in the upper reaches of the Black River.

References

Profile Construction:
G. C. Dickenson, *Maps and Air Photographs, 2nd ed.* (London: Edward Arnold, 1979).

Hydro-Electricity Generation:
A. Brady, *Nova Scotia Royal Commission on Provincial Development and Rehabilitation, Report on Electric Power* (Halifax: King's Printer, 1944).

Stream Profiles and gradients:
M. Morisawa, *Streams: Their Dynamics and Morphology* (New York, N.Y.: McGraw-Hill, 1968), chs.7-8.
K.J. Gregory and D.E. Walling, *Drainage Basin Form and Process* (London: Edward Arnold, 1973).

Plate 3

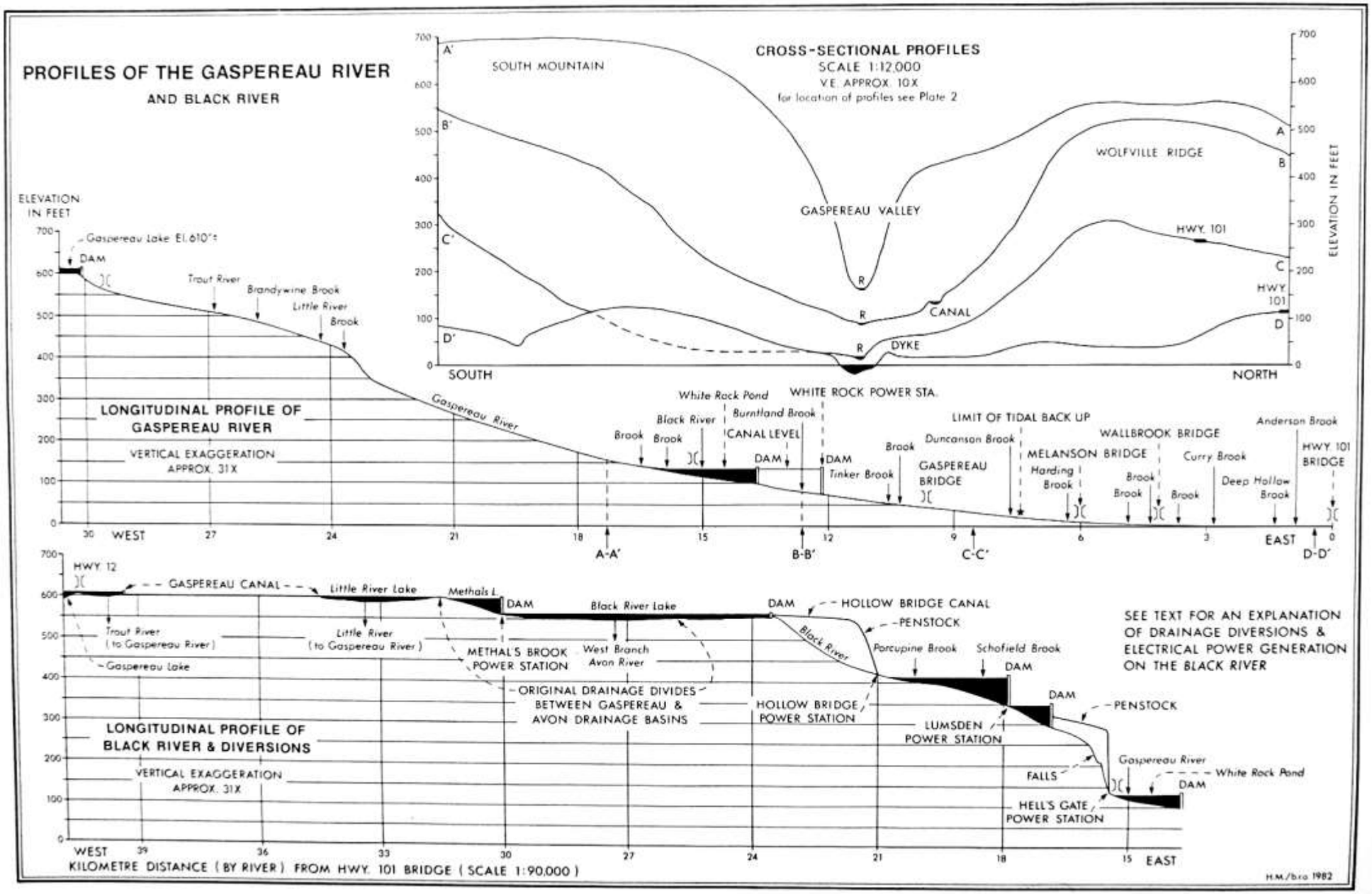

PROFILES OF THE GASPEREAU RIVER
AND BLACK RIVER
CROSS-SECTIONAL PROFILES
SCALE 1:12,000
V.E. APPROX. 10X
for location of profiles see Plate 2
SOUTH MOUNTAIN
WOLFVILLE RIDGE
GASPEREAU VALLEY
HWY. 101
CANAL
DYKE
SOUTH
NORTH
ELEVATION IN FEET
LONGITUDINAL PROFILE OF GASPEREAU RIVER
VERTICAL EXAGGERATION APPROX. 31X
Gaspereau Lake El. 610'±
DAM
Trout River
Brandywine Brook
Little River
Brook
Gaspereau River
White Rock Pond
WHITE ROCK POWER STA.
Black River
Burntland Brook
CANAL LEVEL
Tinker Brook
GASPEREAU BRIDGE
LIMIT OF TIDAL BACK UP
Duncanson Brook
MELANSON BRIDGE
Harding Brook
WALLBROOK BRIDGE
Curry Brook
Deep Hollow Brook
Anderson Brook
HWY. 101 BRIDGE
WEST
EAST
A-A'
B-B'
C-C'
D-D'
LONGITUDINAL PROFILE OF BLACK RIVER & DIVERSIONS
VERTICAL EXAGGERATION APPROX. 31X
HWY. 12
GASPEREAU CANAL
Little River Lake
Methals L.
Black River Lake
HOLLOW BRIDGE CANAL
PENSTOCK
Trout River (to Gaspereau River)
Little River (to Gaspereau River)
Gaspereau Lake
METHAL'S BROOK POWER STATION
West Branch Avon River
ORIGINAL DRAINAGE DIVIDES BETWEEN GASPEREAU & AVON DRAINAGE BASINS
Porcupine Brook
Schofield Brook
HOLLOW BRIDGE POWER STATION
LUMSDEN POWER STATION
FALLS
HELL'S GATE POWER STATION
Gaspereau River
White Rock Pond
KILOMETRE DISTANCE (BY RIVER) FROM HWY. 101 BRIDGE (SCALE 1:90,000)
SEE TEXT FOR AN EXPLANATION OF DRAINAGE DIVERSIONS & ELECTRICAL POWER GENERATION ON THE BLACK RIVER
H.M./b.r.o 1982

PLATE 4: MORPHOLOGY AND GEOMORPHOLOGY

by Peter J. Ricketts

The formation and development of the Gaspereau Valley presents a fascinating microcosm of the geomorphological history of the southern mainland of Nova Scotia. In essence, it is a structurally controlled valley, occupying a deep synclinal fold in the Halifax Formation and the White Rock sandstones which resulted from the Acadian orogeny during the mid-Devonian period.

The Ancestral Upland Drainage Pattern

While the Gaspereau Valley is a major feature of the present landscape of Kings County, it is a relatively recent addition to the regional drainage pattern. Early in the Cretaceous period, a planation surface appears to have been formed, across which a series of rivers flowed northwards. Faulting and warping during the late Triassic / early Jurassic periods had caused the recently formed sandstones (Wolfville and Blomidon Formations)and basalts (North Mountain Basalt) to dip into a regional geosyncline. This series of events initiated the Fundian drainage system together with the formation of the Cornwallis River. As the Cornwallis cut back through the weak Triassic sandstones, tributaries draining the South Mountain joinedthe valley along its entire length.

At this time, the Gaspereau Valley (and hence the Wolfville Ridge) had not been formed, and by the mid-Cretaceous, after about 100 million years of erosion, the uplands of Nova Scotia (including the South Mountain) seem to have been levelled into a planation surface. Possible remnants of this surface can be identified on the present uplands (Plate 4A), and the existence of cols on the Wolfville Ridge and the location of deeply incised streams on the South Mountain (see Plate 4A) suggest that possibly six rivers flowed across the present location of the Gaspereau to join the Cornwallis river to the north.

Formation of the Gaspereau Valley and River Capture

It is difficult to establish exactly when the Gaspereau Valley began to form, but development of the river most probably began following the mid-Tertiary, when uplifting and tilting of the Cretaceous planation surface initiated the present drainage pattern and its accompanying topography.

The Gaspereau began as a tributary of the present Avon river, cutting back into the relatively soft Horton Series. This series of sands, silts and shales underlies the northeastern end of the valley (see Plate 1B) occupying the trough of the Halifax Formation syncline, which dips beneaththe overlying sediments. Once formed, the Gaspereau cut back into the existing planation surface at right angles to the ancestral drainage system, capturing, one by one, the northward flowing streams (see Plate 4B). With each stream capture, the discharge of the Gaspereau was increased accordingly, thus enhancing the widening and deepening of the valley. Once captured, the ancestral streams became tributaries of the Gaspereau, and as that river continued to cut down into the valley floor they began to incise into the underlying slates in order to maintain equilibrium with their new, and ever lowering base-level (see Plate 4A).

Today, the southern tributaries of the Gaspereau are deeply incised into the South Mountain, with the major streams occupying small gorges (see Plate 4B). Across the summit of the newly created Wolfville Ridge, the lower valleys of these streams, now cut offfrom their discharge, remain as depressions, or wind gaps, within the upland surface. These wind gaps now lie between 30 and 60 metres above the present base-level of their former streams. Only Deep Hollow, the most westward of the depressions, is occupied by a small misfit stream, and, therefore, is technically a water gap.

With the development of the Gaspereau river capture occurred from northeast to southwest. Therefore, the Black River was the last to be captured and so, following the Tertiary uplift, it had time to develop a significant valley within the planation surface before capture diverted its flow into the Gaspereau. The Black River provides one of the most classic examples of river capture in Nova Scotia, and its water gap (Deep Hollow) maintains all the characteristics of a river valley. Its meandering course indicates the nature of the ancestral streams as they meandered across the

upland surface, and were then incised following the mid-Tertiary uplift. Since capture, the confluence of the Gaspereau and Black Rivers at White Rock has cut down some 45 metres below the elevation of the valley bottom in Deep Hollow. A waterfall represents the knickpoint in the long profile of Black River as it attempts to adjust to its new base-level (see Plates 3 and 4B).

Glacial and Fluvio-Glacial Modifications

The Gaspereau Valley was affected by the advance and retreat of ice sheets throughout the Pleistocene, but it is the influence of the final, localised advance that has most relevance to the present topography. At the end of the ice age, the valley was occupied either by a small valley glacier or, more likely, the remnant of a larger ice sheet, which originated on the South Mountain and extended out across the surrounding lowlands.

As the glacier melted within the confines of the valley, supra-glacial streams formed at the ice/ valley-side contacts, and deposited layers of sand and gravel along their beds. These deposits now form kame terraces, which arereadily identifiable along the south side of the valley (Plate 4B). They consist of stratified sands and gravels with considerable cross-bedding. Incorporated within the kame deposits are larger boulders that were probably part of the englacial load. Often, these sands and gravels have been wrongly identified as beach deposits, but they are undoubtedly fluvio-glacial. A similar terrace feature exists on the north side of the valley, but overlying ablation till obscures the sediments (see Plate 4B). However, it is mostlikely that this too is a kame terrace.

Across from Duncanson Brook, the wind gap (marked A on Plate 4B) shows evidence of fluvio-glacial modification. On the north slope of the WolfviIle Ridge (beyond the edge of the map) a deep valley has been formed occupied bya misfit stream originating from a small pond. This valley has been formed within the wind gap since the capture of Duncanson Brook, and is too large to have been formed by the stream that now occupies it. Either meltwater from the glacier spilled through the gap, or, more likely, an ice-dammed lake may have been formed within the Gaspereau Valley and the wind gap acted as an overspill channel outlet. The existence of such a lake might explain the width of the valley floor and the irregular pattern of the tributaries at this point (Plate 4B).

Holocene Fluvial Characteristics

Following the ice age, the Gaspereau would have resumed its incision, slicing into the glacial deposits on the valley floor.However, as theHolocene period progressed, rising sea levels inundated the Fundian drainage system right up to the lower Gaspereau. Consequently, the Gaspereau is nolonger a tributary of the Avon, and the river has had to adjust to a rising base level. As the river moved into an aggrading condition, it began to deposit its own alluvial sediments and lateral migration of the channel took over from vertical incision. Meander scars provide evidence of channel migration across the flood plain (see Plate 4B). The present river continues to meander and there are some highly active undercut banks andpoint bar formations along the channel (see Plate 4B).

In addition to a rising base level, the development of a high tidal regimecauses tidal insurgence almost up to the bridge at Gaspereau village. Thishas made the river very susceptible to flooding at high tide, and has caused the formation of an enormous channel, with banks in excess of 12 metres high at low tide.

Throughout the entire length of the lower valley, river terraces define the extent of the flood plain on both sides of the river. In places, tributarystreams enter the valley floor on the kame terrace deposits, turn north-eastward and run parallel to the main river for a while (rather like yazoo streams). Eventually, these streams descend across the kame and river terraces and join the Gaspereau itself. This occurs particularly in that part of the valley that may have been the location of the ice-dammed lake, as noted above.

Human-Made Changes

The present geomorphology of the Gaspereau Valley has been modified significantly by human action (see Plate 4B). A number of gravel pits have been dug into the kame deposits along the

south side of the valley, and a quarry has been cut into the slates at the head of Deep Hollow. However, although unsightly and environmentally damaging, the gravel pits have not affected the geomorphology of the valley as much as changes that have been made to the river itself.

Along its tidal reach, dykes were built along the channel by the Acadians, and part of the flood plain has been drained for agriculture. Some of thesedykes have fallen into disrepair or have been undercut by the river, and flooding of parts of the drained flood plain now occurs. More important still has been the damming of the upper reaches of the Gaspereau and Black Rivers for hydro—electric power generation. Lakes have been formed at White Rock and on the upper Black River (off the map area) and the artificial channelling of flow has reduced and regulated thedischarge of the Gaspereau throughout the map area. No doubt, these modifications will reduce the pace of development of both the Black River and the Gaspereau River as they continue to adjust to present base-level conditions.

Compilation

Both plates 4A and 4B were initially compiled by the author from black and white, vertical air photographs of the Gaspereau Valley. The photos were from the 1973 air photo survey, flown by Capital Air Surveys for the Land Registration and Information Service, Surveys and Mapping Division, Summerside, Prince Edward Island.

Following the initial compilation from stereo pairs of photos, ground-truth surveys were undertaken by undergraduate students enrolled in the author' s Geomorphology course, taught at Saint Mary's University during the academic sessions 1980-81 and 1981-82. These involved a series of transect surveys across the valley, and existing stream cuts and gravel pits were used to identify sedimentary structures.

The maps, particularly Plate 4B, were re-drawn by the author incorporating information from the ground surveys, and the final plates were produced. The author is grateful to all the students who took part in the ground-truth surveys, but particular mention is deserved for Darlene Andries, Julie Hutchings, Sherry Wittman, Susan Kober, and Merry-Jill Milne .

References

Cann, D.B., J.I. MacDougall, and J.D. Hilchey. *Soil Survey of Kings County, Nova Scotia: Report No . 15, Nova Scotia Soil Survey* (Truro: Canada Department of Agriculture and Nova Scotia Department of Agriculture and Marketing, 1966), 97 pp.

Churchill, F.C. "Probable change in the drainage of the Black and Gaspereau Rivers, Kings County, Nova Scotia," *Proceedings and Transactions of the Nova Scotian Institute of Science, 15*, 1920-21, pp. 141-144.

Churchill, F.C. "Effects of glaciation in the vicinity of Wolfville, Nova Scotia," *Proceedings and Transactions of the Nova Scotian Institute of Science, 15*, 1921-22, pp. 161-163.

Crosby, D.G. *Wolfville Map Area, Nova Scotia*, Geological Survey of Canada, Memoir 325, 1962, 67 pp. plus map.

Goldthwait, J.W. *Physiography of Nova Scotia* (Ottawa: Canada Geological Survey, Memoir No. 140, 1924) 179 pp.

Haycock, E. "The geological history of the Gaspereau Valley, Nova Scotia," *Proceedings and Transactions of the Nova Scotian Institute of Science, 10*, 1898-1902 (Session 1900-01) pp. 361-375.

Keppie, D.I. *1:500,000 Geological Map of the Province of Nova Scotia and 1:1,000,000 Structural Map of Nova Scotia* (Department of Mines and Energy, Nova Scotia, 1979).

Roland, A.E. *Geological Background and Physiography of Nova Scotia*, Nova Scotian Institute of Science, Halifax, Nova Scotia, 1982, 311 pp.

Plate 4

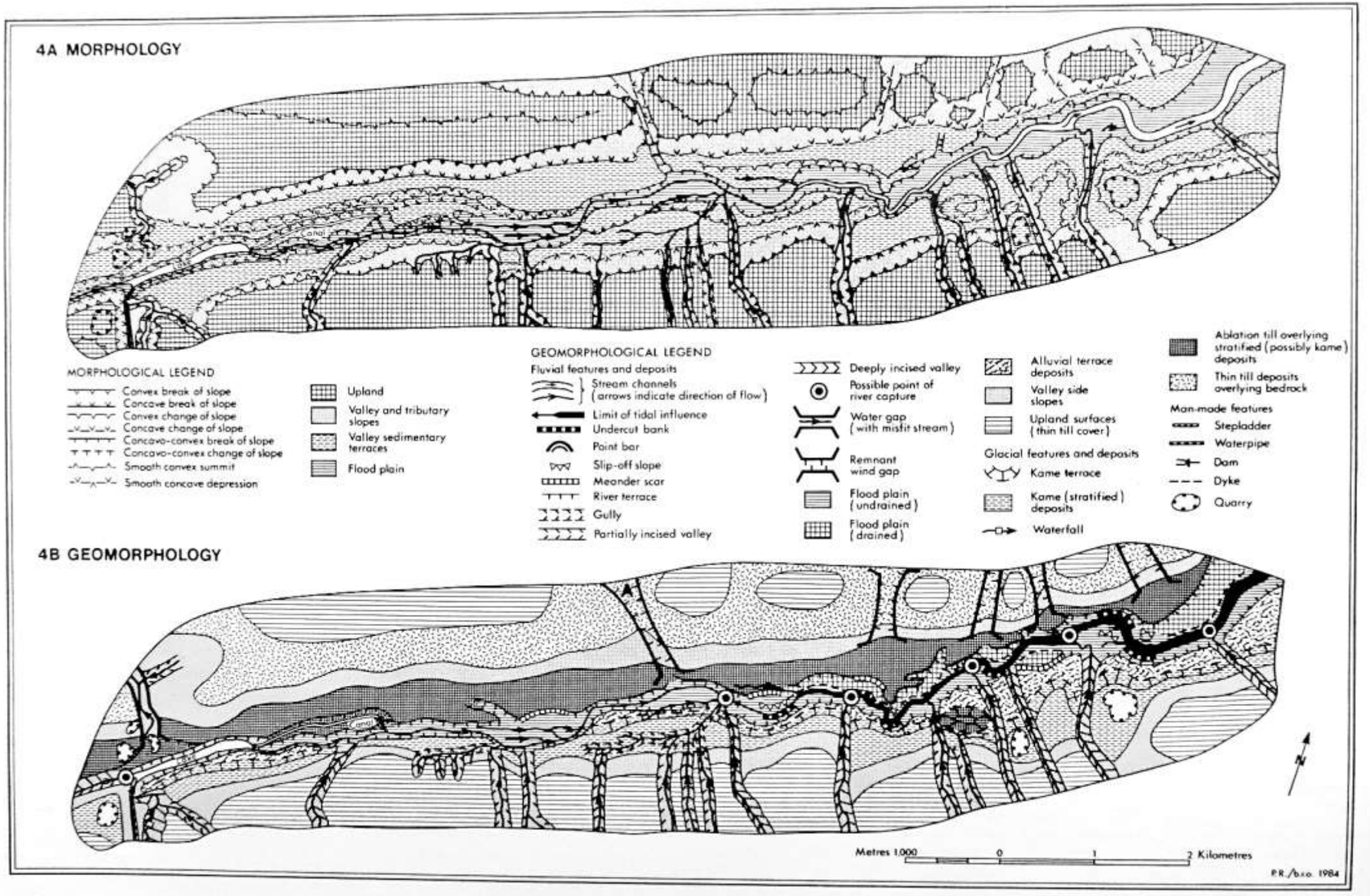

4A MORPHOLOGY
MORPHOLOGICAL LEGEND
Convex break of slope
Concave break of slope
Convex change of slope
Concave change of slope
Concavo-convex break of slope
Concavo-convex change of slope
Smooth convex summit
Smooth concave depression
Upland
Valley and tributary slopes
Valley sedimentary terraces
Flood plain
GEOMORPHOLOGICAL LEGEND
Fluvial features and deposits
Stream channels (arrows indicate direction of flow)
Limit of tidal influence
Undercut bank
Point bar
Slip-off slope
Meander scar
River terrace
Gully
Partially incised valley
Deeply incised valley
Possible point of river capture
Water gap (with misfit stream)
Remnant wind gap
Flood plain (undrained)
Flood plain (drained)
Alluvial terrace deposits
Valley side slopes
Upland surfaces (thin till cover)
Glacial features and deposits
Kame terrace
Kame (stratified) deposits
Waterfall
Ablation till overlying stratified (possibly kame) deposits
Thin till deposits overlying bedrock
Man-made features
Stepladder
Waterpipe
Dam
Dyke
Quarry
4B GEOMORPHOLOGY
Metres 1,000 0 1 2 Kilometres
P.R./b.r.o. 1984

PLATE 5: SOILS

Soil Characteristics

The upper map shows three major properties of the soils, each of which can have an important effect on the land's capability for agriculture.**Texture** is determined by the size of the soil particles, and their proportional mix. Three major particle size categories are recognized: clay (particle diameters less than .002 ml) , silt (between . 002 and .05 mm), and sand (.05 to 2 mm). The texture class diagram shows the particle size mixes associated with each. Sandier soils tend to be infertile due to rapid loss of nutrients through leaching, while clay soils retain too much moisture and are difficult to plough.

The **drainage** categories shown on the map are those used by Cann and MacDougall (1966). In Kings County, most of the well-drained soils are loams on the plateau areas. These podsols have well-developed horizons, with a concentration of leached and eluviated materials in the B-horizon. Wherever drainage is restricted by the parent material or topography, water remains in the soil for much of the year, and leaching and podsolization are unimportant. Poorly drained soils therefore have less distinct horizons, duller colours, and are prominently mottled. They are called Gleysols. Imperfectly drained soils have distinct horizons but with some mottling, and are termed Gleyed Podsols.

Stoniness by itself can be sufficient to make an otherwise suitable soil unworkable. A stoniness index of O or 1 means that there is no hindrance to cultivation, 2 indicates enough stone to interfere with cultivation unless removed, and 3 indicates enough stone to be a serious handicap to cultivation. Soils scoring 4 (not present on this map) would be too stony for cultivation.

In addition to texture, drainage, and stoniness, soils can vary in colour (which frequently indicates the mineral content of the parent material, and also the organic content of the soil), fertility, acidity, depth to bedrock, and the type of topography on which they are found. Soils with a similar mix of these characteristics have been classified by Cann and MacDougall into Soil Series, and are described below according to their typical location.

Soils of the Ridge and South Mountain

Within the study area, the most predominant soil series occur on the plateau and valley sides above the zone of maximum slope. The three most important, in terms of area, are the Wolfville, Morristown and Hantsport series, all of which are loams.

Wolfville Series: these soils occur over most of the Ridge between 50 feet and 300 feet. They are brown to dark brown loams (A horizon) developed over reddish-brown loams (B horizon). The soils are deep, having developed from a dark reddish-brown sandy clay loam till. They are moderately well drained, moderately fertile (with liming), and either stone-free or slightly stony. (Capability class 2).

Morristown Series: these occur over 200 feet on the South Mountain, and also on the higher part of the Wolfville Ridge. They are derived from a shaly loam till, often shallow, which itself is derived from slate bedrock (the Halifax formation).They are well drained, low in fertility, and acidic. In the vicinity of White Rock Mills, they are moderately to very stony. (Capability class generally 3, although 7 where very stony).

Hantsport Series: these occur near Avonport above 100 feet on the South Mountain, on the snout of the Wolfville Ridge (between 50 and 100 feet), and on the ridgetop north of Melanson. They are dark greyish-brown loams over yellowish-brown loams, developed on till derived from the sandstones and shales of the Horton formation. Drainage is imperfect due to compact subsoil or shallowness to bedrock. The soils are acidic and low in fertility.(Capability classes 3 and 4).

Riverport Series: these sandy loams occur in a small area on the South Mountain between Burntland brook and Tinker brook. They are developed from the slates of the Halifax formation, are imperfectly drained, slightly stony, and acidic. (Capability class 4).

Mahone Series: these occur in small areas of sandy loam on the eastern part of the Wolfville Ridge. They are very poorly drained, grey, and mottled. (Capability class 5).

Soils of the Valley Sides

Torbrook Series: these brown sandy loams occur all along the flanks of the South Mountain, with particular concentrations at the mouths of Curry brook and Duncanson brook. Developed from slaty sands and gravel (deposited originally as kame terraces and deltas, they drain rapidly and are therefore droughty. Torbrook soils are stone-free or slightly stony. (Capability class 3, except class 4 where steep).

Soils of the Valley Floor

Four soil series have developed from sedimentation of waterborne particles along the floodplain of the Gaspereau. Three are derived from coarse alluvial (riverborne) sediments, while the Acadia series is from a mixture of alluvial and finer marine sediments.

Cumberland Series: these are reddish-brown sandy loams occurring upstream from Melanson. They are well drained, mainly stone free, and moderately fertile, although due to their location are subject to flooding. (Capability class 2) .

Avonport Series: these occur in small areas of loamy sand near Melanson. Being underIain by clay, they are imperfectly drained. (Capability class 3).

Millar Series: these are found in small areas of dark grey, poorly-drained sands in the vicinity of Gaspereau. (Capability class 5).

Acadia Series: all the dykelands in the Gaspereau valley have Acadia soils. They are reddish-brown clay loams, which drain well (although they require artificial drainage due to their location). They are stone free, only slightly acidic, and quite fertile. (Capability class 3).

Poorly-Developed Soils

Eroded Land (E): severely-eroded stream banks and gullied land are unsuitable for agriculture. They are mostly over 16 degrees of slope. (Capability class 7).

Salt Marsh (S.M.): these areas are periodically flooded by tides, which deposit a reddish-brown silty clay loam sediment. Sometimes the salt-resistant grasses are cut for hay. (Capability class 6).

Compilation

5A and 5B

Soil Map of Kings County, Nova Scotia, East Sheet. 1:63,360 (Ottawa: Soil Research Institute, Research Branch, Canada Department of Agriculture, 1966).

Reference

D.B. Cann, J.I. MacDougall, and J.D. Hilchey, *Soil Survey of Kings County, Nova Scotia: Report No. 15, Nova Scotia Soil Survey* (Truro: Canada Department of Agriculture and Nova Scotia Department of Agriculture and Marketing, 1966). 97 pp.

Plate 5

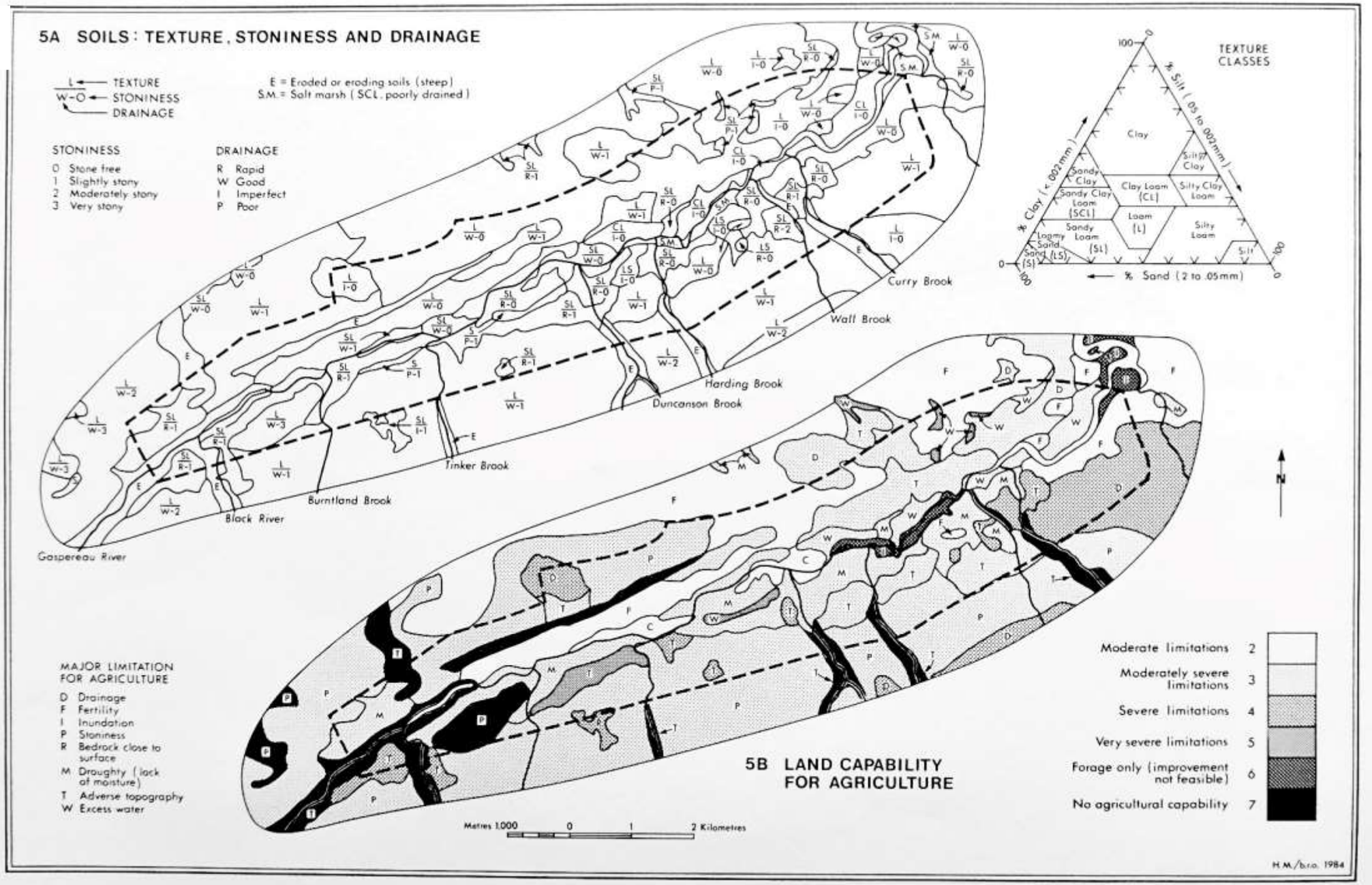

5A SOILS: TEXTURE, STONINESS AND DRAINAGE
L TEXTURE
W-0 STONINESS
DRAINAGE
E = Eroded or eroding soils (steep)
S.M. = Salt marsh (SCL, poorly drained)
STONINESS
0 Stone free
1 Slightly stony
2 Moderately stony
3 Very stony
DRAINAGE
R Rapid
W Good
I Imperfect
P Poor
TEXTURE CLASSES
% Clay (< .002mm)
% Silt (.05 to .002mm)
% Sand (2 to .05mm)
Clay
Silty Clay
Sandy Clay
Clay Loam (CL)
Silty Clay Loam
Sandy Clay Loam (SCL)
Loam (L)
Sandy Loam (SL)
Silty Loam
Loamy Sand
Sand (S)
Silt
Curry Brook
Wall Brook
Harding Brook
Duncanson Brook
Tinker Brook
Burntland Brook
Black River
Gaspereau River
MAJOR LIMITATION FOR AGRICULTURE
D Drainage
F Fertility
I Inundation
P Stoniness
R Bedrock close to surface
M Droughty (lack of moisture)
T Adverse topography
W Excess water
5B LAND CAPABILITY FOR AGRICULTURE
Moderate limitations 2
Moderately severe limitations 3
Severe limitations 4
Very severe limitations 5
Forage only (improvement not feasible) 6
No agricultural capability 7
Metres 1,000 0 1 2 Kilometres
N
H.M./b.r.o. 1984

PLATE 6: LAND HOLDINGS

The Original Survey Plan

The Acadian settlers in the Minas district were expelled in 1755 for failure to swear allegiance to the British crown. Their homes, barns, mills and churches were burned, and plans were made to replace them with New England settlers. The township of Horton, on which the Gaspereau valley lies, was created on May 21, 1759, and the first "planters" began arriving at Horton Landing in the late spring of 1760. The first effective land grants were made in May 1761 (139 grantees), and were followed by further grants in 1764 (43 grantees) and 1765 (16 grantees).

The method of land apportionment was as follows: the town of Hortonville was laid out adjacent to Horton Landing, and it was expected that most planters would dwell there, and farm small plots adjacent to the townsite, in the area shown on the survey plan as Lower Horton. No plan of survey was devised for this area, since the earliest arrivals simply took along the township surveyor and laid out a "pitch" of the allotted extent wherever they could find unappropriated land. Properties were described in writing by "metes and bounds," rather than by lines on a map.

For the area outside Lower Horton, the township "lot-layers" drew up a plan of survey, on which all lots were numbered. These were drawn by lot at the town meeting. Plate 6A shows the intended pattern of lots. The survey plan has been modified to conform to the actual position of the Gaspereau river (rather inaccurately portrayed on the original), and to the position of the east-west baselines as they were laid out on theground (from the evidence of present-day roads and property boundaries).Road allowances were left along baselines, and the plan envisaged tiers of rectangular farms running back from the roads in double-front fashion. These lots were presumably intended to be 100 acres, but due to the inaccurate mapping of the time, would have translated in fact to an average of 115 acres. Those backing onto the Gaspereau were to vary in width to compensate for their varying depth. Since the original plan representedthe course of the Gaspereau inaccurately, the intended layout would have produced many undersized lots if carried out in practice.

On the plateau of the South Mountain, and in the extreme southwest of the study area, the survey plan envisaged very regular lots intended to be 250 acres in area (one mile by 33 and 1/3 chains), but which translate on the ground as about 275 acres.

Land Division in Practice

To what extent was the survey plan actually implemented? Clearly the baselines were surveyed, as a comparison of 6A and 6B reveals. But each lotwas apparently surveyed as it was taken up, and the surveyors had to makeadjustments in the field for the inaccurate scale of the survey plan, the unexpected position of the river, and for errors in the baselines themselves (the alignment changes along the South Mountain baseline were both in error). Most properties were laid out to approximate 100 acres, and most property lines followed the general alignment of the survey plan; beyond that, there was little resemblance between plan and practice. A road came into being where it was required, along the valley floor, so that land on the slope of the South Mountain was often inaccessible (though a road was built on a small portion of the baseline).

On the Wolfville Ridge, both baselines were surveyed, and today's roads run where they were intended to be. The property lines, however, were seldom adhered to. In particular, only a few properties fronting the ridge road run down to the river; geographical reality was recognized along the steepest section of the ridge (west of Gaspereau village) so that separate valley-bottom farms came into being, served by their own road.

Present-Day Property Boundaries

Map 6B shows property lines existing in the mid-1970s, the latest date for which information is available. The typical farm property is 30 to 40 ha, but generally only those properties with at least 25 ha (60 acres) of cleared and improved land constitute viable commercial farms. Much land is held in large holdings of 50 ha or more (tinted). Though some of these (e.g., H. Fuller, and the

South Mountain portion of A. Stirling) are woodland, others (e.g., King, Stewart, and Stevens) are almost entirely improved land. Some large holdings which clearly could be highly productive farms are only poorly utilized, or have been abandoned altogether (e.g., Miner).

Two processes are at work to change the cadastral pattern. The first is sudivision of road frontage into small home lots, frequently sold to exurbanites. These lots, generally ranging from 0.1 to 1.0 ha, are most noticeable along the Wolfville Ridge, and between the Ridge and Gaspereau village. A few abandoned farm properties are presently being subdivided into larger home lots (e.g. J. Skivington, and the Basil Smith property -- BS on the map).

The second process is farm enlargement, whereby successful farmers seek to expand their landbase to make full use of expensive capital equipment. In the Gaspereau valley, most land acquired is adjacent to the main parcel (e.g., M. Stevens, W. Biggs), but some is fragmented (e.g., Sterling, King, and the extreme case of C. Kennie, CK).Since the mid-1970s, several smaller farmers have been bought out by their richer neighbours, and some farms have combined into corporate entities. Also, farm enlargement through leasing is increasingly popular, so that a majority of the improved land is now worked by a few highly capitalized operations.

Compilation

6A The Original Survey Plan: The original land grants for Kings County are noted on sheet 44 of the Crown Land Survey (available from the Department of Lands and Forests) as being described in "Lib 1, Folio 172, Book 2, page 3, and in "Book 3, page 31" to "Book 4, page 28." These grant books list grantees by initial, with the amount of land granted. The plan of survey for Horton township (Plan A-19-8) is available in the Land Registry Office of the Department of Lands and Forests. It is not very accurate with respect to coastline or rivers, nor does it contain locational data such as latitude or longitude. It contains all lot numbers, and one could laboriously re-construct the pattern of land grants by reference to the grant books. However, as mentioned overleaf, the plan was only poorly translated into reality.

6B Present-Day Property Boundaries: While the Land Registration and Information Service (LRIS) is accurately mapping property boundaries in larger urban areas, for most of the Maritimes there remains no publicly-accessible information on property boundaries. However, the Assessment Office of the Municipality of Kings County has mapped properties within its region. This mapping is not complete, and relates to the "mid-1970s," but is at a large scale (approx. 1:16,000) and gives the names of property owners. Three sheets relating to the Gaspereau valley were kindly supplied to the author by the Assessment office in Kentville.

References

Original Survey:

Eaton, A.W.H. (1910), *The History of Kings County* (Salem, Press Co. Facsimile edition: Mika Press, Belleville, Ont. 1972), pp. 60-86.

Ferguson, M. and M. McLellan (1968), *A History and Geography of Kings County* (Windsor, N.S.: Lancelot Press), pp. 85-90.

Martell, J.S. (1933), *Pre-Loyalist Settlements around Minas Basin, 1755-1783*. Unpublished M.A. thesis, Dalhousie University, Halifax, pp. 69-172.

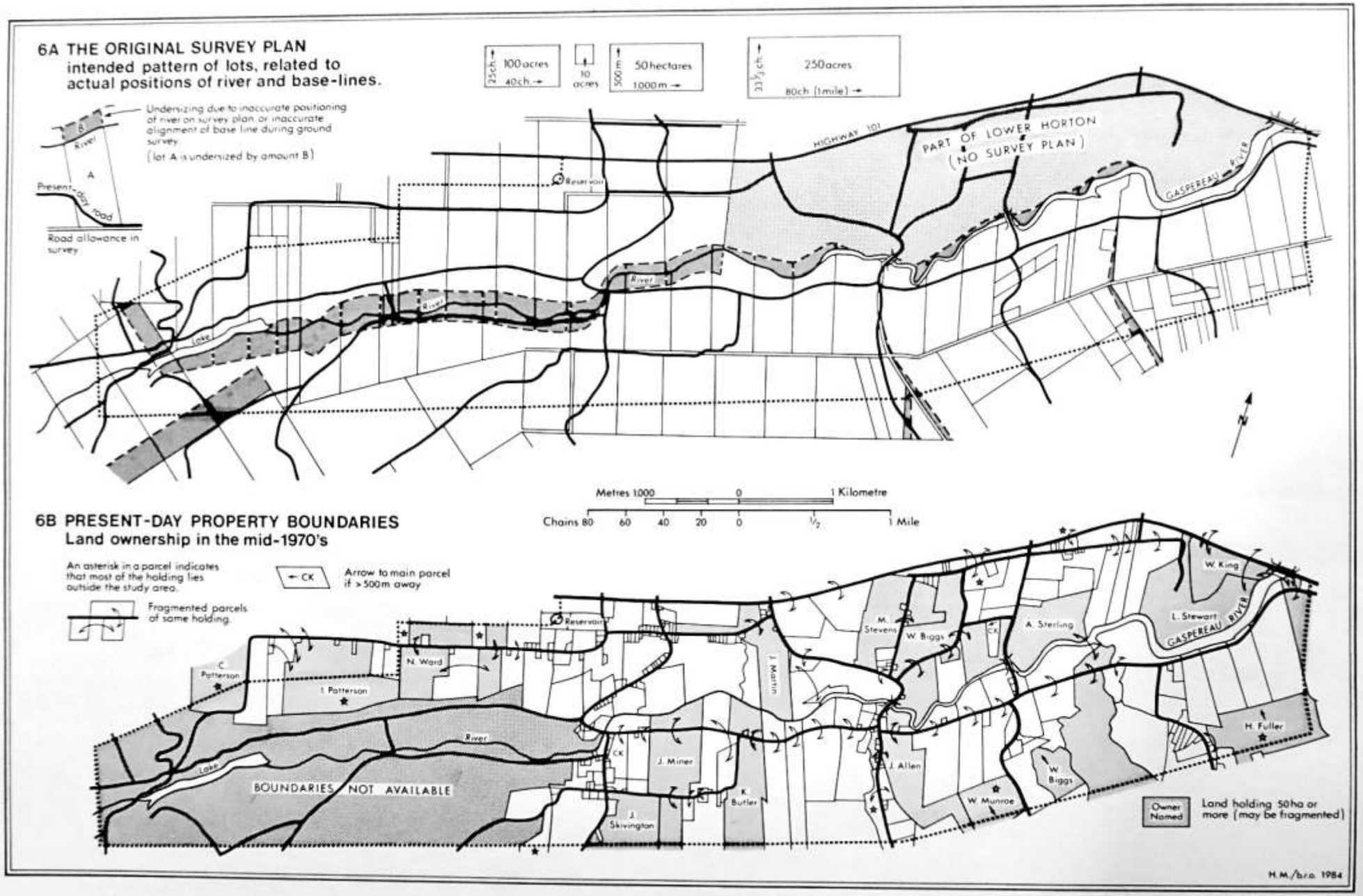
Size, Enlargement, and Management of Farms:

Hart, J.F. (1975), *The Look of the Land* (Englewood Cliffs, N.J.: Prentice-Hall), chs. 5 and 6.

Exurban Development:

Russwurm, L. (1976), "Country Residential Development and the Regional City Form in Canada," *Ontario Geography, 10*, pp. 79-96.

Plate 6


6A THE ORIGINAL SURVEY PLAN
intended pattern of lots, related to
actual positions of river and base-lines.
25ch. 100 acres 40ch.
10 acres
500m 50 hectares 1000m
33⅓ch. 250 acres 80ch. (1 mile)
Undersizing due to inaccurate positioning of river on survey plan, or inaccurate alignment of base line during ground survey.
(lot A is undersized by amount B)
River
B
A
Present-day road
Road allowance in survey
HIGHWAY 101
PART OF LOWER HORTON
(NO SURVEY PLAN)
GASPEREAU RIVER
Reservoir
River
River
Lake
N
Metres 1000 0 1 Kilometre
Chains 80 60 40 20 0 ½ 1 Mile
6B PRESENT-DAY PROPERTY BOUNDARIES
Land ownership in the mid-1970's
An asterisk in a parcel indicates that most of the holding lies outside the study area.
Fragmented parcels of same holding.
← CK
Arrow to main parcel if > 500m away
Reservoir
C. Patterson
I. Patterson
N. Ward
J. Martin
M. Stevens
W. Biggs
A. Sterling
W. King
L. Stewart
GASPEREAU RIVER
H. Fuller
River
Lake
BOUNDARIES NOT AVAILABLE
CK
J. Miner
K. Butler
J. Skivington
J. Allen
W. Munroe
W. Biggs
Owner Named
Land holding 50ha or more (may be fragmented)
H.M./b.r.o. 1984

PLATES 7 TO 10: DETAILED LAND USE MAPS

Notes on Land Use

The maps on plates 7 to 10 inclusive record general categories of land use as of September 1982. Certain components of the land use pattern are very stable (e.g., orchards), while others, particularly crops, vary in location from year to year. However, the "snapshots" provided by the maps are useful, in that the general pattern is fairly constant, and indicates the nature of farming and settlement in different parts of the valley.

Farmland (i.e., crops, horticulture, and all grass) comprises almost exactly half of the study area (see the table). About 70 per cent of farmland is grass, and the majority of this is improved. Orchards cover a fifth of the farmland and crops cover only a tenth. Mature woods occur on 30 per cent of the study area, mostly on the South Mountain, while scrub woodland covers five per cent of the land.

PERCENT OF AREA

Land Use Type	East (Plate 7)	Centre (8)	West (9)	White Rock (10)	Whole Study Area
Farmland					
All	55	63	41	13	51
Crops	9	5	2	2	5
Horticulture	9	15	8	0	10
Improved Grass	29	31	20	5	26
Unimproved Grass	9	13	11	6	10
Scrub Woodland	6	4	4	14	5
Mature Woodland	25	18	46	54	30
Settlement-Related	5	10	6	11	7
Water and Marsh	7	3	2	3	4
Roads and Tracks	3	3	3	3	3

The eastern section of the valley (plate 7) has a much larger proportion of farmland in crops, and slightly more in improved grass, than the study area as a whole. Unimproved grass and orchards are relatively less important. Most farmland lies north of the river, on the gentler slopes of the Wolfville Ridge. There is a large dyked area, though one large section of dyked land (downstream from Curry Brook) has been abandoned, and is now marsh. Farmland covers over 60 per cent of the central section (plate 8) , and this section has the largest proportion in orchards (nearly a quarter). Cropland is much less significant, though. The western and White Rock sections have much less land farmed, and a larger proportion of this is unimproved grass.

Crops

Cropland is most evident on gently-sloping valley sides in the east, where the land is neither too steep for ploughing, nor too flat and floodprone. Most crops are feedgrains: corn (maize) is most important, but barley and oats are present and even one field of wheat. In the east, there are several fields of beans, and also of gourds (squash and pumpkins). No root crops are present.Crops tend to occur in large blocks, clearly related to farms specializing in cattle / feedgrain operations. The location of crops will vary somewhat from year to year, as a result of rotation (generally with sown grass).

Horticulture (Orchards) The Gaspereau valley shares with the entire Kings-Annapolis region an agricultural specialization in apples. It has also shared in the lengthy decline and recent stabilization of the apple industry (see Hatchard, 1977; Colby, 1925). Evidence of decline is still apparent -- many of the smaller and more isolated orchards are nearing the end of their productive life, and some which were present on the 1962 topographic map have been cut down. Certain

farms specialize in apple production, which accounts for large blocks of orchards in certain locales (between Gaspereau and Wallbrook south of the river, and on the gentler slopes of the Wolfville Ridge).

Improved Grass

Cultivated grass occurs either as temporary grass (in rotation with crops) or as permanent grass (usually water-meadow, or on the steeper hill slopes). Much of it, particularly the sown grass, is cut for hay, while the rest is used as pasture. Cattle are also grazed on hay fields after the second cut, in the autumn. Most cattle in the valley are dairy herds, although there are a few cow-calf operations. About two thirds of all grassland in the valley is improved, with the proportion improved decreasing as one moves up the valley (77 percent on plate 7, 71 percent on plate 8, 63 percent on plate 9, and 43 percent in the White Rock section).

Unimproved Grass

These are generally areas of native grass and weeds, although they may include domesticated grass which has been neglected. About two thirds of this land is used productively, for both hay and pasture, while about one third is lying idle or abandoned (plate 11B shows the location of abandoned land). Unimproved grass occurs throughout the valley, but it is more common towards the west. Idle and abandoned grass occurs mainly on steeper slopes, or in large blocks which indicate an unworked or non-commercial farm.

Woodland

Mature forest (trees over 5 m) covers most of the South Mountain, particularly on the steeper slopes and thinner soils.It also covers the south facing slopes of the Wolfville Ridge where slopes exceed 8 degrees. The provincial Forest Inventory maps show most forest to be softwoods or mixed; hardwoods occur primarily in very steep or inaccessible areas which have never been cleared for agriculture, and which are not used for commercial forestry. The main hardwood stands are along the South Mountain brooks, particularly Curry brook, and along Deep Hollow). Scrub woodland comprises small areas of regenerating forestry land, but is mostly former farmland in an advanced stage of abandonment (see plate 11B).

Notes on Village Plans

Gaspereau. This is the largest settlement in the valley, with a 1981 population of 394. As "Gasparaux," it was the smaller of two Acadian French settlements in the valley (the total valley population at the time of the expulsion in 1755 was 30 families, or less than 200 people). The earliest New England settlers at Gaspereau village were "the family of Eliphalet Coldwell and families named Benjamin, Martin, and Pierce" (Eaton, 1910, 158).

The village grew where the main valley road crosses the river, at its intersection with the •major trans-valley road from Wolfville to Etna (now Greenfield). The major economic function was and still is farming, but there has been a shift from apple orchards (which covered the valley around Gaspereau in the late 19th and early 20th centuries) to a mix of orchards and improved grass. The village contains the valley's major church (United Baptist, as most of the churches are), an elementary school serving the entire valley, a service station, community centre, and cemeteries. There is a small metalworking shop and a Department of Transport depot. Increasingly, there is out-commuting to Wolfville and Kentville.

Melanson. More centrally located than Gaspereau, this hamlet was the larger of the two Acadian settlements in the valley. It was named after Pierre Mélanson, one of the founders of the French Minas settlements. It is sited on the main valley road where the Wolfville-Bishopville road bridges the river. The 1981 population of the hamlet and its vicinity was 328. There have always been several farms here, but the main economic functions were a sawmill (still present), and a blacksmith's forge (closed). The school was situated halfway towards Wallbrook, and is now a community centre. The settlement has recently lost one function (a small Jehovah's Witness chapel, which relocated to Wallbrook), and gained another (Reid's butcher's shop).

Wallbrook. This locality name originally referred to a few farms around a staggered intersection, just south of the bridging point of the road from Grand Pré. One of the most conspicuous farms was "St. Eulalie," the estate of Sir Robert Linton Weatherbey. At one time there was a post office (just east of the enlarged area), and a blacksmith's forge (on "Wallbrook Mountain"). Although the 1981 census gives the population of the vicinity as 125, only five houses and two churches cluster at the intersection.

White Rock. Named for the veins of quartzite in the local rock, this community of 301 people is located at a natural routeway intersection -- the valley is so narrow here that the valley floor road splits into three, two roads climbing west onto the plateaux to either side, and one going north through Deep Hollow to the Cornwallis valley. The settlement developed as a forest products centre; by the 1920s there was a pulp mill to the east (employing White Rock Pond for power) and a sawmill. Only the latter remains. It takes timber from the New Ross area, employs about 10 people, and uses a considerable amount of land for log and lumber storage, and for bark and sawdust dumps. The village also has a service station (with store), a Baptist church, and a new community hall.

Wolfville Ridge (or East Wolfville). This loose settlement of 236 people is a recent suburban extension of the town of Wolfville, whose centre lies only two kilometres to the north. The 1928 topographic map shows only six houses in the area enlarged, but the community had achieved its present size by the early 1960sThere is a Baptist church and a new grocery store.

Compilation of Land Use Maps

The land use survey was conducted by the author during early September of 1982, before most crops were harvested, thus allowing ready identification of crop type). Land use was noted on 1:10,000 base maps showing all land use and field boundaries, derived from orthophotomaps (Land Registration and Information Services Resource Series, sheets 21H/01-V1, 21H/01-S3, 21H/01-R4, and 21H/01-R3). The land use classification scheme contained five major categories and 24 sub-categories. For simplicity, these were later collapsed into the nine categories of use shown on the maps.

In addition to land use, all buildings and structures were noted on the field maps, and notes were made of unusual or interesting features, particularly in the five major settlement areas (those areas shown in the detailed plans on plate 10).

The per cent of land area in each use category was estimated by a systematic dot sampling technique (a dot planimeter).

References

On the Apple Industry:

Keith Hatchard (1977), "The Nova Scotia Apple Industry, Part 1," *Nova Scotia Historical Quarterly, 7*, 31-40.

C. C. Colby (1925), "An Analysis of the Apple Industry of the Annapolis-Cornwallis Valley," *Economic Geography,1,* 173-198 and 337-356.

On Settlement History:

A, W. H. Eaton (1910), *The History of Kings County* (Salem, Mass., Salem Press. Facsimile edition: Belleville, Ont., Mika Press, 1972).

M. G. Fergusson and M. McLellan (1967), *A History and Geography of Kings County* (Windsor, N.S., Lancelot Press).

A. Clark (1968), *Acadia: The Geography of Early Nova Scotia to 1760* (Madison: University of Wisconsin Press).

Plates 7 to 10: Index Map and Land Use Key

from a field survey conducted in September 1982

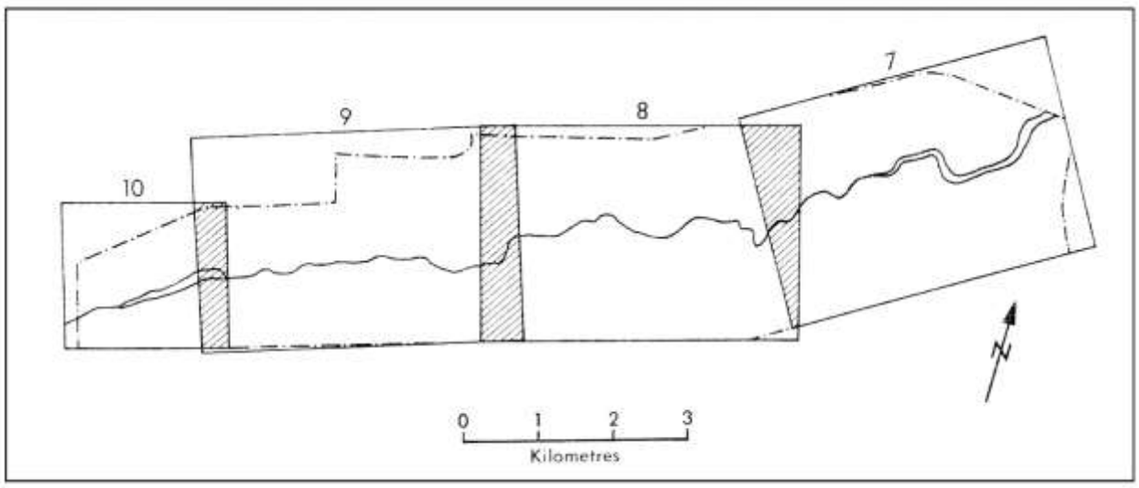
Index Map

Plate 7 Eastern section

Plate 8 Central section

Plate 9 Western section

Plate 10 White Rock section, and detailed Village Plans



Key to Land Use Symbols

CROPS	Grains, legumes, roots, leaf vegetables, gourds, and ploughed land
HORTICULTURE	Mainly orchards, with a few market gardens
IMPROVED GRASS	Cultivated grasses, with few perennial weeds and no woody shrubs
UNIMPROVED GRASS	Native grasses, with many weeds and some bushes. Includes early-stage abandoned farmland
SCRUB WOODLAND	Abandoned farmland with many bushes and young trees. Also includes cut-over woodland. Trees generally under 5 m
MATURE WOODLAND	Trees generally over 5 m
SETTLEMENT-RELATED USES	Farm operations, residences, commercial, institutional, retail, etc., and quarries
WATER	Includes Gaspereau River at high-tide extent
MARSH	Salt marsh and tidal wetlands

Plate 7

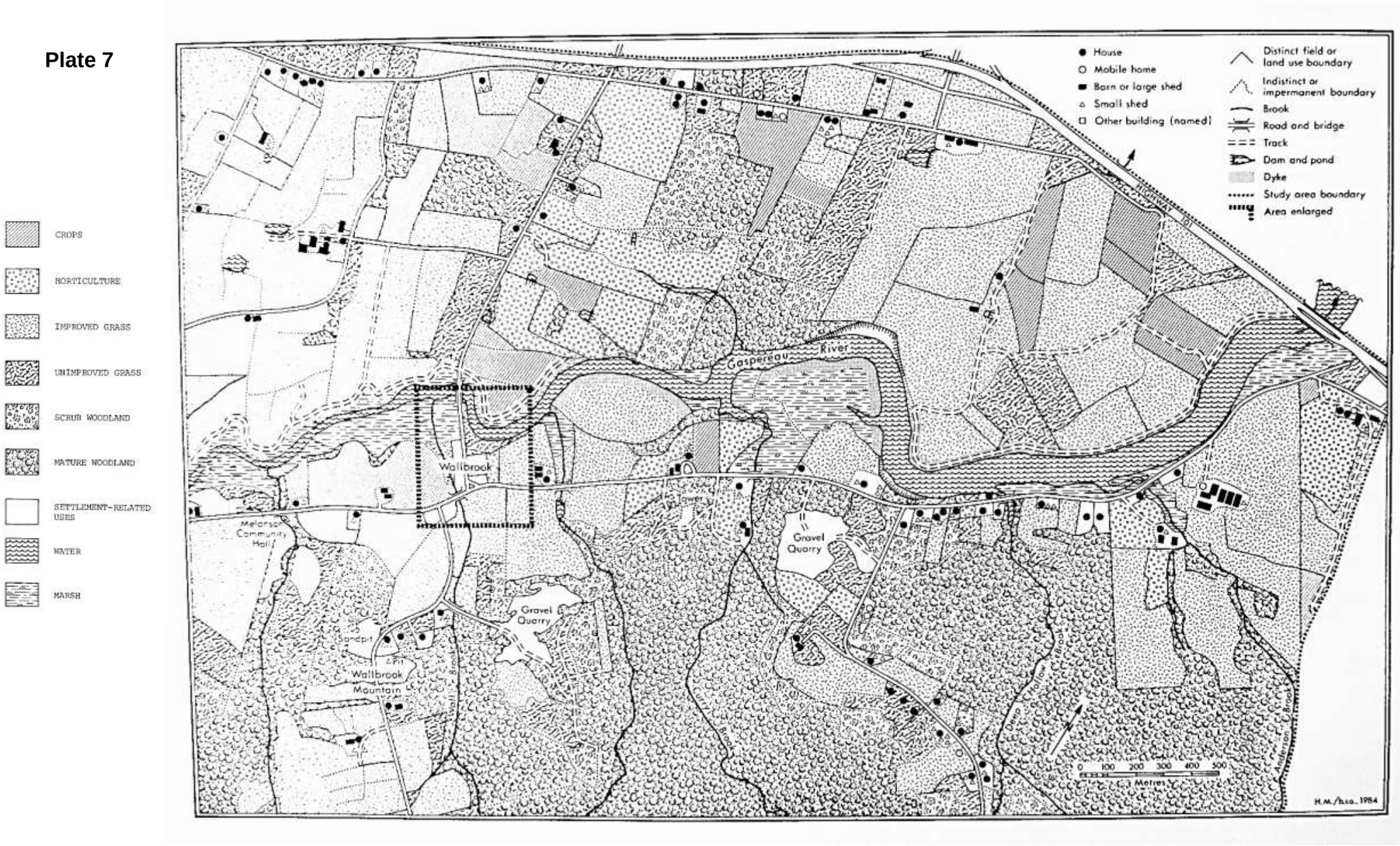

CROPS
HORTICULTURE
IMPROVED GRASS
UNIMPROVED GRASS
SCRUB WOODLAND
MATURE WOODLAND
SETTLEMENT-RELATED USES
WATER
MARSH
House
Mobile home
Barn or large shed
Small shed
Other building (named)
Distinct field or land use boundary
Indistinct or impermanent boundary
Brook
Road and bridge
Track
Dam and pond
Dyke
Study area boundary
Area enlarged
Gaspereau River
Wallbrook
Melanson Community Hall
Gravel Quarry
Gravel Quarry
Sandpit
Pit
Wallbrook Mountain
Wallbrook Brook
Lower Brook
Deep Hollow Brook
Anderson Brook
HIGHWAY 101
0 100 200 300 400 500
Metres
H.M./b.s.o. 1984

Plate 8

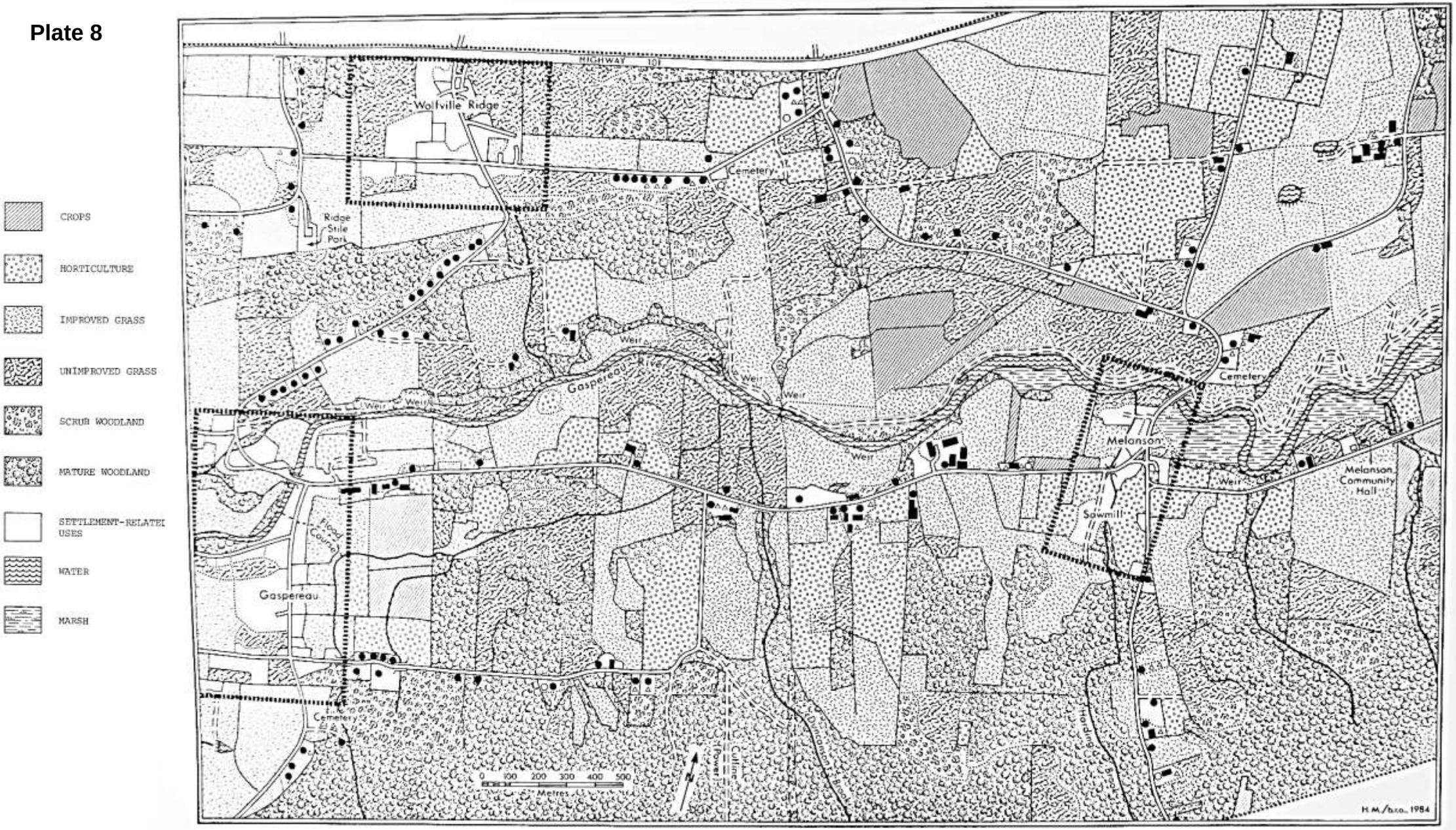

CROPS
HORTICULTURE
IMPROVED GRASS
UNIMPROVED GRASS
SCRUB WOODLAND
MATURE WOODLAND
SETTLEMENT-RELATED USES
WATER
MARSH
HIGHWAY 101
Wolfville Ridge
Cemetery
Ridge Stile Park
Weir
Gaspereau River
Melanson
Cemetery
Melanson Community Hall
Sawmill
Flood Control
Gaspereau
Cemetery
Power
Cutline
Harding Brook
0 100 200 300 400 500
Metres
H.M./B.E.D. 1984

Plate 9

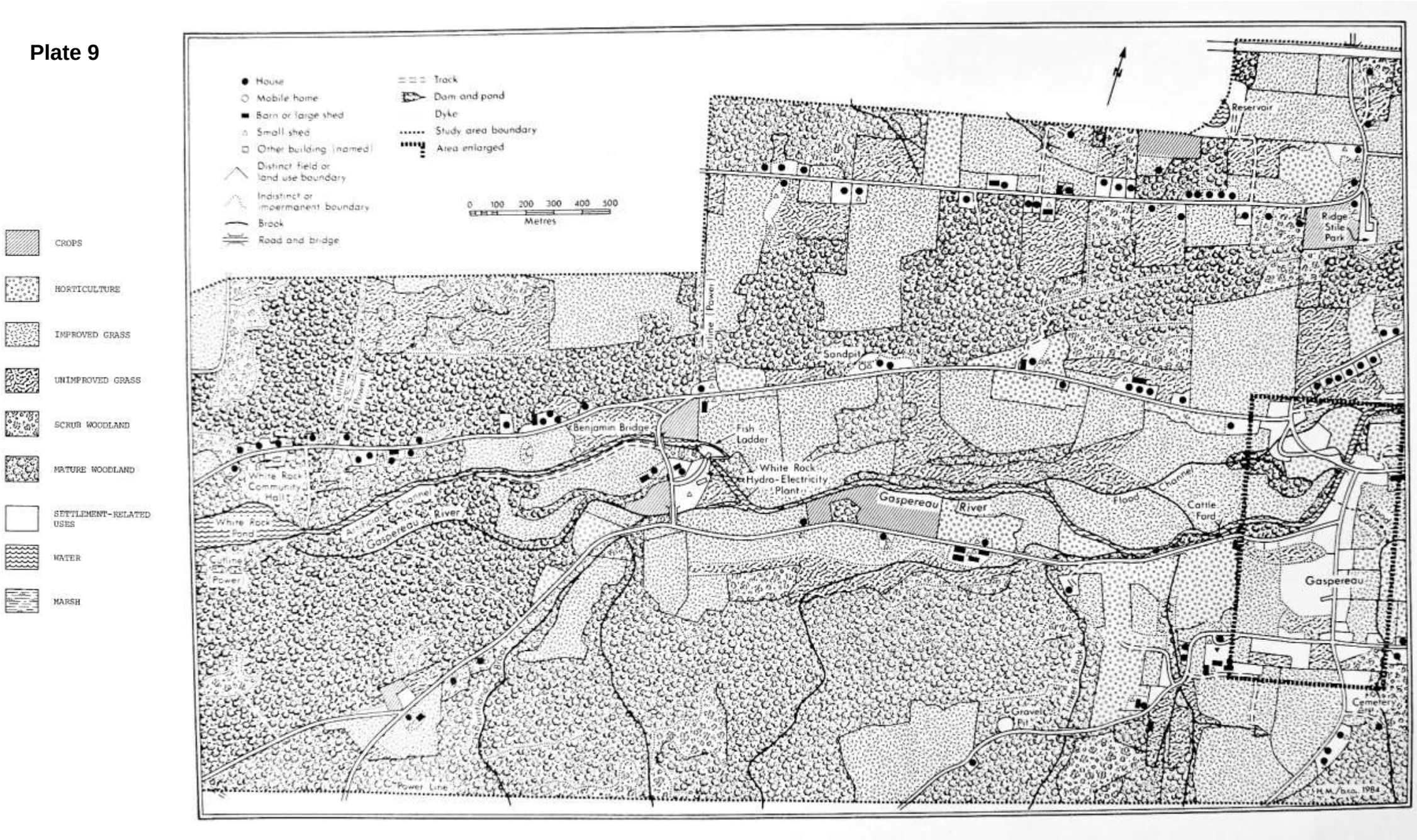

House
Mobile home
Barn or large shed
Small shed
Other building (named)
Distinct field or land use boundary
Indistinct or impermanent boundary
Brook
Road and bridge
Track
Dam and pond
Dyke
Study area boundary
Area enlarged
0 100 200 300 400 500
Metres
CROPS
HORTICULTURE
IMPROVED GRASS
UNIMPROVED GRASS
SCRUB WOODLAND
MATURE WOODLAND
SETTLEMENT-RELATED USES
WATER
MARSH
Reservoir
Ridge Stile Park
Cutline (Power)
Sandpit
Benjamin Bridge
Fish Ladder
White Rock Hydro-Electricity Plant
White Rock Community Hall
White Rock Pond
Artificial Channel
Gaspereau River
Flood Channel
Cattle Ford
Gaspereau
Flood Control
Cemetery
Gravel Pit
Tinker Brook
Power Line
H.M./bsa. 1984

Plate 10

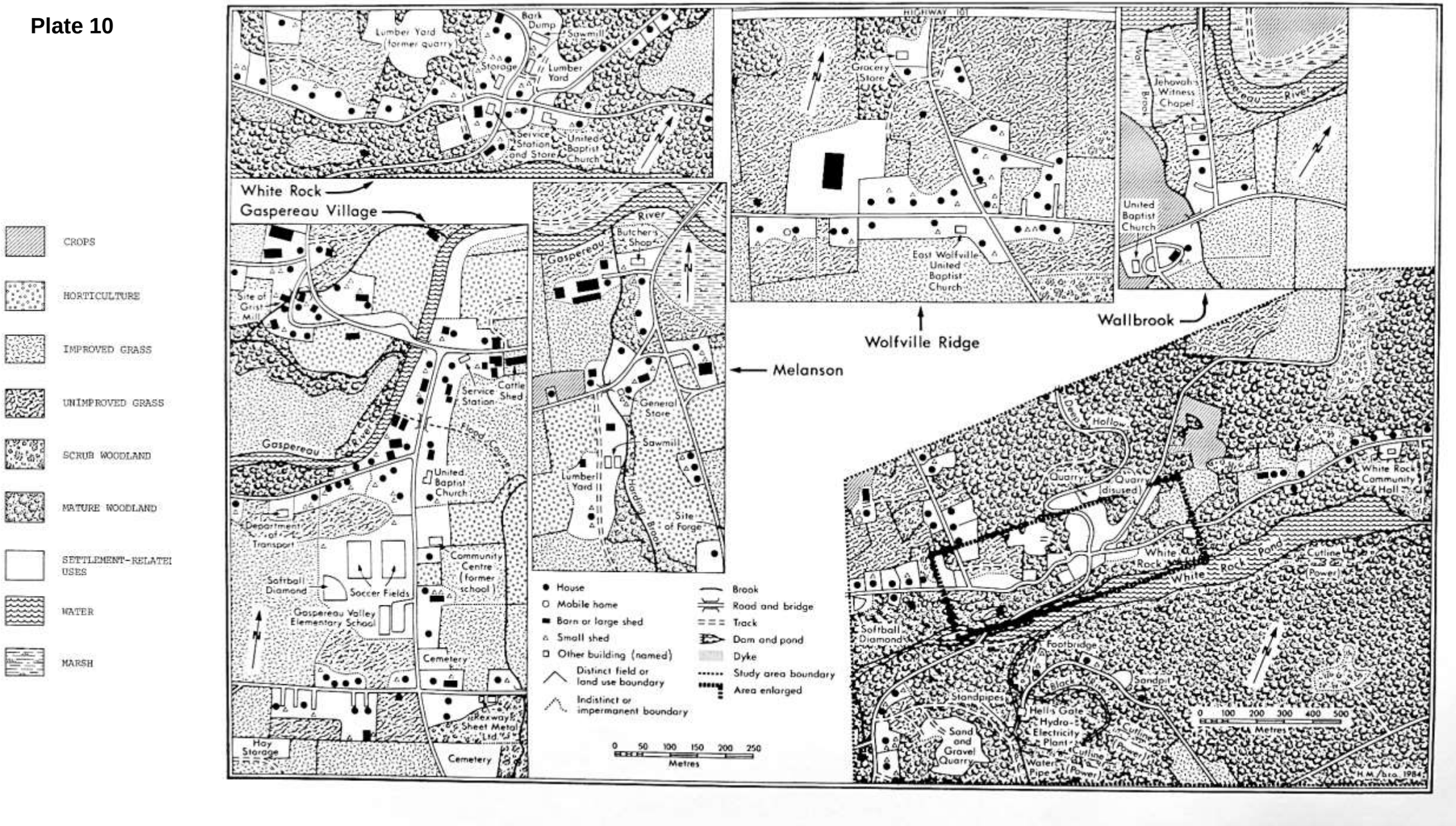

CROPS
HORTICULTURE
IMPROVED GRASS
UNIMPROVED GRASS
SCRUB WOODLAND
MATURE WOODLAND
SETTLEMENT-RELATED USES
WATER
MARSH
Lumber Yard (former quarry)
Bark Dump
Sawmill
Storage
Lumber Yard
Service Station and Store
United Baptist Church
White Rock
Gaspereau Village
Site of Grist Mill
Service Station
Cattle Shed
Gaspereau River
Flood Cover
United Baptist Church
Department of Transport
Softball Diamond
Soccer Fields
Community Centre (former school)
Gaspereau Valley Elementary School
Cemetery
Hay Storage
Rexway Sheet Metal Ltd
Cemetery
Gaspereau River
Butcher's Shop
General Store
Sawmill
Lumber Yard
Harding Brook
Site of Forge
HIGHWAY 101
Grocery Store
East Wolfville United Baptist Church
Wolfville Ridge
Melanson
Jehovah's Witness Chapel
Gaspereau River
United Baptist Church
Wallbrook
Deep Hollow
Quarry
Quarry (disused)
White Rock Community Hall
White Rock Pond
Cutline (Power)
Softball Diamond
Footbridge
Sandpit
Standpipes
Hells Gate Hydro-Electricity Plant
Sand and Gravel Quarry
Water Pipe
House
Mobile home
Barn or large shed
Small shed
Other building (named)
Distinct field or land use boundary
Indistinct or impermanent boundary
Brook
Road and bridge
Track
Dam and pond
Dyke
Study area boundary
Area enlarged
0 50 100 150 200 250
Metres
0 100 200 300 400 500
Metres
H.M./bra. 1984

PLATE 11: ECONOMIC ACTIVITY

11A: The Location of Economic Activity

The population of the Gaspereau valley study area is approximately 1,400 people, of whom 450 to 500 are employed full time. Historically, the valley area provided employment for almost all of its residents, and the main economic activity was farming. While some farmland has been abandoned (see 11B), approximately half of the land is still being used productively, and total farm output is probably higher today than at any previous time. However, that output is achieved with far less labour (and a great deal more machinery) than in the past, so that farm employment has dropped significantly. Of approximately 150 full time jobs in the valley, about half are in farming. But for every resident working in the valley, there are two who commute to work, so that only one household in six is dependent on farming.

Farming: The map depicts 21 farmsteads designated as "highly capitalized," and a further 41 which are less obviously commercial. About half of this latter group are probably worked by part-time farmers, for whom they provide an income supplement. Most farms are still family operations, but a few of the larger ones, particularly those with poultry houses or large cattle herds, employ hired hands. A good deal of farm labour, though, is supplied unpaid by farm wives and older children. Many farmers with river frontage participate in fishing the Gaspereau (i.e., Alewife) during their spring run to spawn upstream. These fish are trapped in weirs, for which licenses are required.

Sawmills: Although the valley's two sawmills employ only about 20 people, they are important to the economic life of their respective communities. The mill owned by Clifford Long and Sons at White Rock produces 1.0 to I.5 million FBM annually (FBM is a foot board measure of 12" x 12" x 1"). It also produces sawmill chips for sale. The Melanson mill of S.G. Levy and Sons produces lumber only, between 1.5 and 2.0 million FBM annually.Both mills are major operators, since most sawmills in the province produce under 100,000 FBM per year.

Hydro-Electric Power Stations: The two power plants in the study area form part of the five-station Gaspereau--Black River scheme (for details of which, see plate 3). All stations are remotely controlled, with no exclusive manpower. However, Hell's Gate has the central control room, with a staff of 12, and White Rock is the location for the maintenance shop, which employs 9 people. Both sites, therefore, are significant employment centres.

Sand and Gravel Quarries: Three sand and gravel quarries are presently being worked in the valley, employing no more than a dozen people in all. These and several disused quarries are situated on deposits of glacial outwash material (see plate 4). Several disused quarries in Deep Hollow, just north of White Rock, exploited bedrock for roadstone.

Service Employment: Most service activity is located in the village of Gaspereau. The elementary school there serves 400 children from the valley and the South Mountain area, and employs about 15 people. The service station, church, metalworking shop, and Department of Transport depot together employ about a dozen people. Service activity in all other settlements employs only 5 to 10 people.

Out-Commuting: About 300 residents (or around two thirds of the full-time labour force) commute out of the Gaspereau valley to work. Most of these travel relatively short distances to jobs in Wolfville, New Minas, Kentville, and other Kings County employment centres, but a few make the 100 km journey to Halifax and Dartmouth. Out-commuting has been an important feature of the valley's economic life at least since 1945, and the settlement of Wolfville Ridge grew up in the 1950s and 1960s solely as a dormitory community for Wolfville. Since the mid-60s, farmers have sold road frontage to commuters in several parts of the valley, leading to ribbons of exurban development.

11B Land Abandonment

The Gaspereau valley has experienced considerable land abandonment since the turn of the century, in common with other agricultural areas of the Maritimes. Maximum farm numbers, and the maximum extent of cleared land, were probably reached about 1890. After that date marginal lands were abandoned at an accelerating rate, and the pace of abandonment slowed significantly only after 1970.

Areas shown as abandoned on the map were identified in the field, and comprise unimproved grass presently undergoing abandonment, or areas of scrub woodland indicating land abandoned up to 25 years ago. Robin Crickmer (1981) has proposed a five-stage vegetation sequence on abandoned land in Nova Scotia; all of these stages are present to some degree in the Gaspereau valley. Vegetation in stage 1 (the first few years after cultivation or frequent pasturing cease) is of native grasses (e.g., poverty grass and couch grass) and annual weeds (e.g., pigweed, knapweed). Land of this type is not shown as abandoned on the map, since it can be easily returned to production. Stage 2 has a vegetation cover of perennial weeds such as fireweed, goldenrod, and Canada thistle, while stage3 sees the weeds shaded out by bushes and shrubs (alders, wire birch, and blueberry). Land which is occasionally grazed may be arrested at stage 2, but since cattle avoid eating spruce seedlings, it will become peppered with spruce trees, and eventually enter stage 4 (a young coniferous forest of pine, spruce and fir). The final stage (a mixed "climax" forest) is achieved only 50 years or more after initial abandonment.

Much of the abandoned land is on steep slopes, on which mechanized farming is extremely difficult. Very little land over 8 degrees (see plate 2B) was ever cleared, and what was has long since reverted to forest. On areas with slopes over 4 degrees the ratio of abandoned land to productive land is about 1:3. This compares with a ratio of 1:10 on slopes under 4 degrees, and a ratio of about 1:7 overall. Thus about 1/8 of farmland producing around 1960 had been abandoned by 1982).The effect of steep slopes is particularly noticeable along the Wolfville Ridge between Benjamin Bridge and Melanson, and on the steeper sections of the South Mountain.

Land furthest from the farmstead or road, and therefore least economically worked, is more subject to abandonment. Also, land which is part of a small farm is more liable to abandonment, since the farm is more likely to cease commercial production, and become a part-time or hobby unit.

Sometimes geographical location is not a factor in abandonment -- rather, personal circumstances such as ill-health or absentee ownership may trigger the process. A small proportion of abandoned land is now being brought back into production, but there is no evidence as yet of a return to forest clearance in the valley.

Compilation

11A Economic Activity:

All data are from a field survey conducted in September 1982. Productive farmland includes crops, all worked grassland, and orchards. It excludes abandoned grassland. The distinction between highly capitalized and less capitalized farmsteads was made subjectively in the field, based on the number, size, and vintage of buildings and equipment. All farmsteads had at least one barn in good repair. The distinction between major and minor non-farm employment was partly judgemental, based on the size of the operation, the number of cars in the parking lot, and information from other sources listed below. Activities with 5 or more workers are shown as major employers. Information on Nova Scotia Power Corporation employment was kindly provided by D. Flemming, Manager of the Corporate Relations Department.

11B Land Abandonment:

Abandoned land includes both abandoned grassland and scrub woodland (except for regenerating cutover areas). Areas with slopes over 4 degrees are taken from Plate 2B.

References

Economic Activity:

Nova Scotia Department of Development (1973) , *Nova Scotia Development Atlas: Secondary Manufacturing* (Halifax).

Nova Scotia Department of Lands and Forests (1983), *Forest Products Directory* (Halifax).

Nova Scotia Department of Development (1974) *Kings County Statistical Profile* (Halifax).

Nova Scotia Department of Agriculture (1983) *Directory of Agricultural Products* (Halifax).

Land Abandonment:

Robin Crickmer (1981), *The Role of Physical Factors in the Process of Farmland Abandonment in Nova Scotia, 1953-1974* (Halifax: Saint Mary's University, Atlantic Region Geographical Studies, No. 2).

Susan Kober (1981), *Farmland Abandonment in the Southwest Margaree Valley: A Response to Changing Perception,* unpublished B.A. Honours thesis, Geography Department, Saint Mary's University, Halifax.

Plate 11

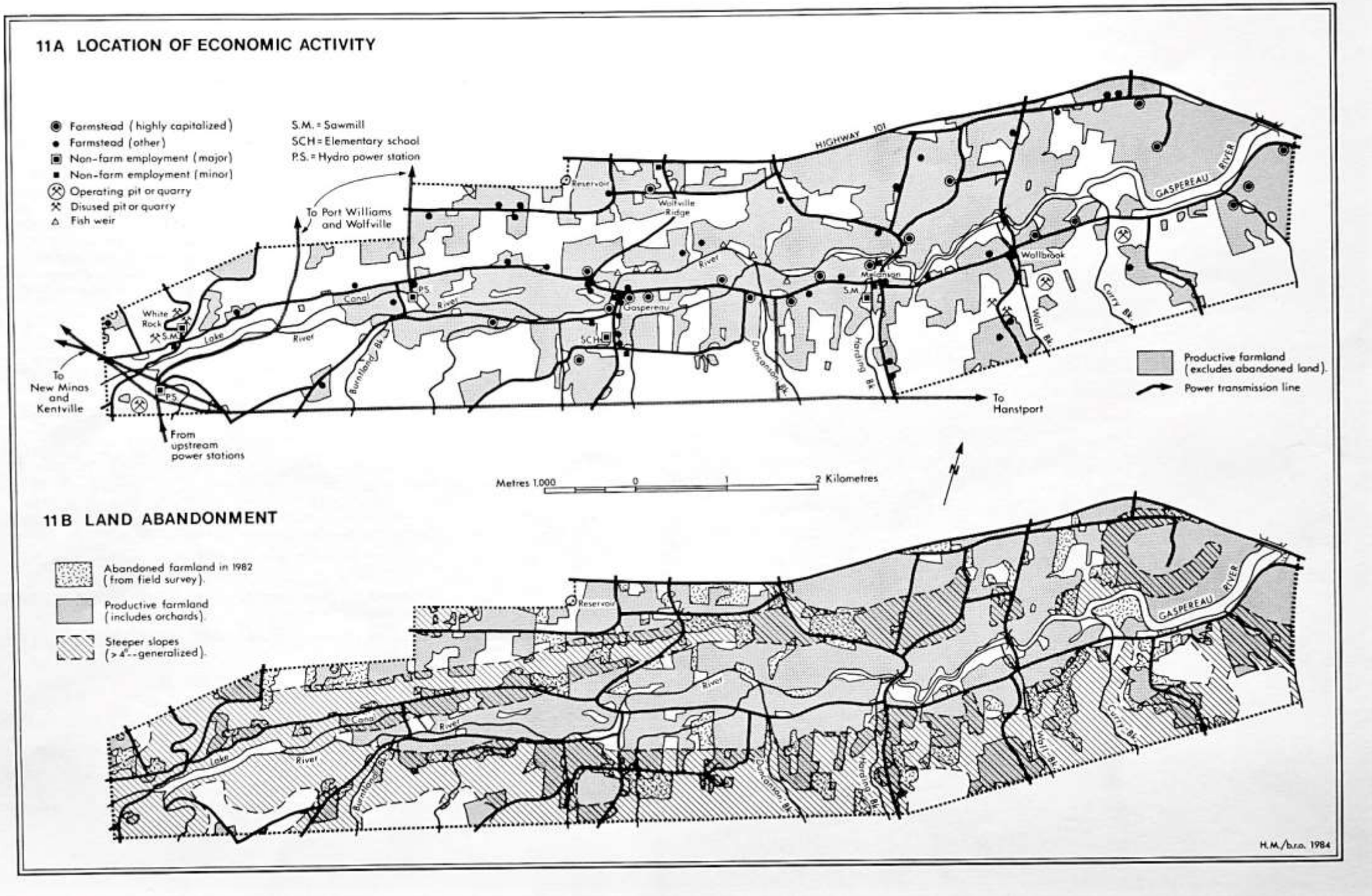

11A LOCATION OF ECONOMIC ACTIVITY
Farmstead (highly capitalized)
Farmstead (other)
Non-farm employment (major)
Non-farm employment (minor)
Operating pit or quarry
Disused pit or quarry
Fish weir
S.M. = Sawmill
SCH = Elementary school
P.S. = Hydro power station
To Port Williams and Wolfville
To New Minas and Kentville
From upstream power stations
To Hanstport
HIGHWAY 101
GASPEREAU RIVER
Reservoir
Wolfville Ridge
Wallbrook
Gaspereau
White Rock
Lake
River
Canal
Burntland Br.
Duncanson Br.
Harding Br.
Wolf Br.
Curry Br.
Productive farmland (excludes abandoned land).
Power transmission line
Metres 1,000 0 1 2 Kilometres
N
11B LAND ABANDONMENT
Abandoned farmland in 1982 (from field survey).
Productive farmland (includes orchards).
Steeper slopes (>4°--generalized).
H.M./b.r.o. 1984

PLATE 12: DISTRIBUTION AND GROWTH OF POPULATION

12A: Distribution of Dwellings

The most obvious and easily accessible data on population are from the Canada Census, but they pose serious difficulties (see notes on compilation). A more accurate indication of the distribution of population can be gained by mapping dwellings, either from maps (the 1928 situation is taken from the one inch map for that year) or from field survey (the 1982 situation was derived in this way). While the number of people per dwelling varies considerably over the study area (from one to a dozen or more), the average number was about 3.5 in 1982, and probably about 5.0 in 1928.

In 1928 there were 184 dwellings (see table). Gaspereau village was clearly the largest nucleation, followed by Melanson and White Rock. Wolfville Ridge and Wallbrook did not exist as nucleated settlements in 1928. Non-nucleated settlement was strung out along the rural roads as loose ribbons, composed almost entirely of farmsteads. The total population of the valley at this time was about 900. The 1982 situation shows considerable differences. There were 421 dwellings in this year, a 129 percent increase over 1928. Most of the increase occurred in the western section of the study area, in the form of "exurban" commuting settlement. Ribbons of new houses are clearly apparent at Wolfville Ridge, between the latter and Gaspereau, and at White Rock.

CHANGE IN NUMBER OF DWELLINGS

LOCALITY	1928		1982		% INCREASE 1928-1982
	NUMBER	% OF TOTAL	NUMBER	% OF TOTAL	
Gaspereau	47	26	81	19	+72
Melanson	28	15	36	9	+29
Wallbrook	17	9	19	5	+12
White Rock	17	9	52	12	+206
Wolfville Ridge	13	7	58	14	+346
Dispersed Settlement	62	34	175	42	+182
TOTAL	184	100	421	100	+129

The table shows dwelling counts within a one-kilometre radius from the centres of the five valley communities. Dwellings within one kilometre of both Gaspereau and Wolfville Ridge were attributed to the nearest, while dwellings further than one kilometre from a nucleation centre are regarded as "dispersed."

The greatest percentage increases were at Wolfville Ridge and White Rock, where most exurban development has occurred. Dispersed settlement has also increased rapidly due to exurban development, and therefore now constitutes a larger proportion of total housing. The village of Gaspereau, while registering a 72 percent increase in dwellings, has not kept pace with the overall rate of increase of 129 percent, and had only 19 percent of the valley's housing stock in 1982 (down from 26 percent in 1928). There has been little growth in the eastern section of the valley: both Melanson and Wallbrook grew only marginally, though some exurban development has occurred towards Avonport and Hortonville.

12B: Populations of Localities

Though census data on unincorporated places suffer from serious problems (see notes on compilation) the maps for 1961 and 1981 do allow some observations to be made. In these maps, the valley's close proximity to Wolfville is clearly apparent. Communities close to Wolfville tended to

grow more rapidly than those further away -- the best examples are Wolfville Ridge and Lower Wolfville, which are almost suburban appendages of the town. The exurban development at White Rock, which boosted its census population from 185 (1961) to 301 (1981) was probably more related to employment in New Minas (which itself grew rapidly) and Kentville (3 km west of New Minas). Communities based on agriculture tended to be very stable in population, particularly if located further from the towns;the combined population of Melanson and Wallbrook increased moderately, but Grand Pré, Hortonville, and Avonport were stagnant. Communities on the South Mountain, where land abandonment is a problem, also failed to grow in this period.

The census data suggest a total population for the study area of just under 1,000 in 1961, and just under 1,400 in 1981. While this 40 percent increase represents rapid growth by Nova Scotia standards (the province as a whole grew only 15 percent in the same period, and Kings County grew 19 percent), the additional population was almost all located in the western half of the valley, and related to exurban development. Wolfville Ridge is already a bedroom or dormitory satellite; White Rock and Gaspereau are rapidly assuming the same role.

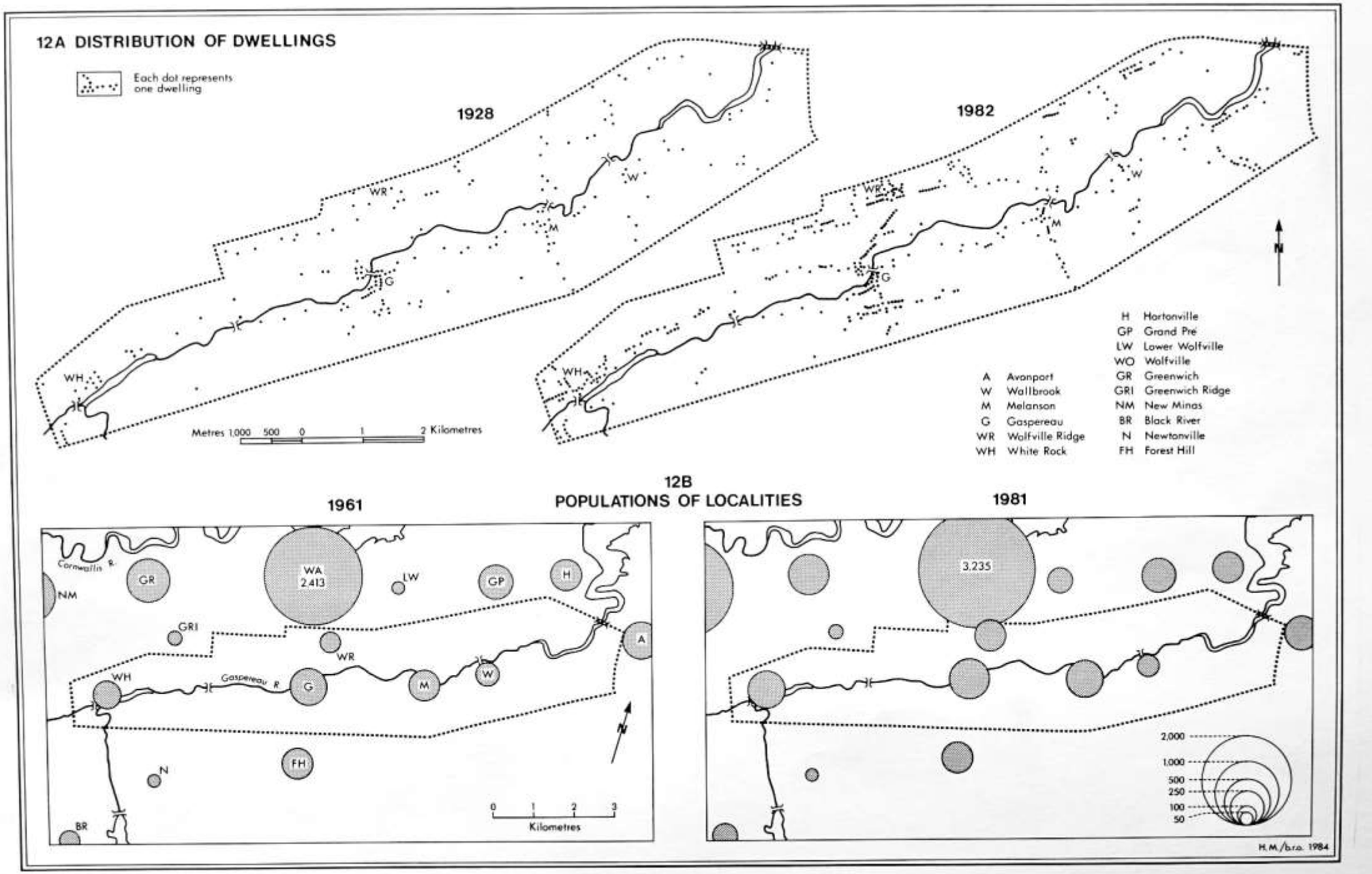
Compilation

The most detailed census data for identifiable spatial units are enumeration area (EA) populations. These are unpublished, but readily available. Maps are available showing areas assigned to each EA. Unfortunately, these areas may change substantially from census to census. For the Gaspereau study area, the 1961 and 1971 EAs differ from those for 1981. Also, the EAs are too extensive to adequately show population distribution or change within the valley: not one of the 1981 EÄs falls entirely within the study area, and of the eight EAs covering the area several extend well beyond to encompass surrounding communities.

A second census source is more useful, and is mapped in 12B. The 1961 and 1971 censuses have published statistics on the population of unincorporated places with over 50 inhabitants, while the 1981 census has such data for all unincorporated places. The definition of an unincorporated place is left to the discretion of the enumerator; as a consequence, the localities may vary in spatial extent from census to census, and the same ones may not be present in succeeding censuses. For 12B, the author computed "best estimates" of locality populations to remove discrepancies between the 1961and 1981 data (e.g., Greenwich Ridge and New Minas, which do not appear in 1981, were estimated, while the combined 1981 population for Hortonville and Grand Pré was reassigned to accord more closely with the 1961 split).

The localities are located according to the Canada Gazetteer Atlas, and the distribution of population as observed on the 1:50,000 topographic map. It is assumed that virtually the entire population has been assigned by the enumerators to a named locality, so that "Wallbrook," for example, includes Wallbrook Mountain. Certain parts of the study area would therefore fall in neighbouring localities; as many as 100 people may have been assigned in 1981 to Avonport, Hortonville, and Grand Pré.

Plate 12


12A DISTRIBUTION OF DWELLINGS
Each dot represents one dwelling
1928
1982
WR
W
M
G
WH
Metres 1,000 500 0 1 2 Kilometres
N
A Avonport
W Wallbrook
M Melanson
G Gaspereau
WR Wolfville Ridge
WH White Rock
H Hortonville
GP Grand Pré
LW Lower Wolfville
WO Wolfville
GR Greenwich
GRI Greenwich Ridge
NM New Minas
BR Black River
N Newtonville
FH Forest Hill
12B
POPULATIONS OF LOCALITIES
1961
1981
Cornwallis R.
GR
NM
WA 2,413
LW
GP
H
GRI
A
WR
WH
Gaspereau R
G
M
W
FH
N
BR
0 1 2 3 Kilometres
3,235
2,000
1,000
500
250
100
50
H.M./b.r.o. 1984