SPATIAL ANALYSIS
OF
RESIDENTIAL BREAK AND ENTER

by

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B.A., Simon Fraser University, 1990
M.P.A., University of Victoria, 1995

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In the Department of Geography

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ABSTRACT

This study explores three separate, but inter-related aspects of residential break and enter. The study, located in the Capital Regional District of Victoria, British Columbia, Canada, offers a unique environment for this type of research with its thirteen municipalities, four municipal and one national police force confined geographically by sea on three sides and wilderness on the fourth.

The first part of this research identifies spatial and temporal patterns of residential break and enters at the regional level and the municipal level. The results showed that patterns existed at the municipal level, but changed at the regional level. There was evidence that some of the patterns at the municipal level persisted over time. Temporally, break and enter is predominately an afternoon occurrence. No other consistent pattern was found daily, monthly, nor seasonally over the course of the study period.

The second part of the study examines police perceptions about the location of residential break and enters high activity areas or 'hot spots'. Police perceptions were compared to actual hot spots to determine the degree of agreement. The research also explored the concordance between police perceptions of hot spot locations. The results indicated that police hot spots did not conform to actual hot spots; furthermore, there was only limited agreement amongst police on hot spot locations.

The third part of the study examined burglar's use of space. Burglars were asked a number of questions to establish their geographical knowledge of the region. Information was obtained on the location of their offences, routes taken to offence sites, method of transportation, trip start location, motivation behind the offence, and purpose of the trip. The findings indicate that offenders commit the majority of their crimes within areas they know. The subjects in the study were motivated by the need for money, mainly to purchase drugs. The majority of Offence trips were initiated with the sole purpose of committing a burglary. Most journey to crimes emanated from the offenders' residence. Travel was restricted not so much by distance, instead by their knowledge of the region or by the necessity to obtain money for drugs.

Table of Contents

Supervisory Committee ii
Abstract iii
Table of Contents iv
List of Table xii
List of Figures xviii
Acknowledgements xxiv
Dedication xxvi

Chapter 1: Introduction
1.1 Introduction 1.1
1.2 Explaining Criminality a Restricted Perspective 1.4
Biological Explanations 1.4
Psychoanalytic Explanations 1.6
Sociological Explanations 1.6
1.3 Environmental Criminology 1.11
Crime Patterns 1.12
1.4 Theoretical Approach 1.15
Routine Activity 1.16
Rational Choice Theory 1.16
Pattern Theory 1.17
1.5 Research Questions 1.18
Part I: Distribution of Residential Break and Enter 1.19
Hypotheses 1.19
Part II: Police Perceptions of Break and Enter Patterns 1.20
Hypotheses 1.20
Part III: Where Offenders Commit Their Crimes 1.21
Hypotheses 1.22
Organization of Dissertation 1.22

Chapter 2: Spatial Knowledge
2.1 Acquisition of Spatial Knowledge 2.24
2.2 Activity in Space and the Cognitive Map 2.31
Trip Planning and Travel Constraints 2.33
Distortion in Cognitive Maps 2.34
Alignment and Rotation 2.35
Distance and Direction 2.36
Hierarchical Structure 2.37
Perspective 2.39
Reference Points 2.39
Orientation 2.40
Information Processing/Retrieval 2.40
2.3 Criminal's Use of Space 2.42
2.4 Summary 2.53

Chapter 3: The Study Area: the Capital Regional District
3.1: Population, Housing, Economy and Income 3.55
Population 3.58
Economy 3.61
Income 3.62
Housing 3.64
House Prices 3.65
3.2 Policing 3.66
3.3 Geography 3.68

Chapter 4: Data and Methodological Issues
4.1 Introduction 4.70
4.2 General Issues Associated With Official Crime Data 4.70
Official Data 4.72
Official Police Reports 4.75
Police Report Deficiencies 4.76
4.3 Offender Interviews 4.77
Potential Problems with Offender Interviews Incarcerated 4.78
Non - Incarcerated 4.80
Consent of Offender 4.81
4.4 Police Interviews 4.82
4.5 Samples 4.82
Police 4.83
Offender 4.83
4.6 Maps 4.84
Difficulties with Regional Maps 4.85
4.7 Point Pattern Analysis 4.86
4.8 Summary 4.90

Chapter 5: The Format for Spatial Analysis of Crime (B and E): The CRD and Data Quality
5.1: Introduction 5.91
5.2: Address Master Index File 5.91
5.3: Crime Data – Hurdles – Holes 5.92
5.4: Police Services Division 5.93
5.5: Capital Regional Police Department Data 5.95
5.6: Data Problems 5.99
5.7: Data Solutions 5.100
5.8: Comparison CRD Data to Regional Police RMS 5.102
5.9: Geo-Coding 5.103

Chapter 6: Spatial Patterns of Break and Enter In the Core of the CRD
6.1 Introduction 6.107
6.2 General Features 6.111
6.3 Spatial Analysis 6.114
Results 6.115
6.4 Patterns in Burglary at the Micro Level Quadrat Analysis 6.117
Methodology 6.118
Results 6.121
Victoria – Esquimalt 6.123
Significant Patterns of Burglary 6.126
Results 6.128
Cluster Hunter 6.133
Results 6.135
Victoria – Esquimalt 6.135
6.4 Hot Spot Areas 6.137
Introduction 6.137
Hotspots 6.137
6.5 Summary 6.142

Chapter 7: Stability of B and E Patterns over Time 7.145
7.1 Introduction 7.145
7.2 Saanich 7.148
Saanich 7.148
7.3 Offender Home Addresses (2004) 7.151
Summary 7.155
7.4 Temporal Rhythms of Residential Burglary 7.157
Hourly Tempo of Break and Enter 7.161
Victoria Esquimalt Time of Day 7.162
Daily Rhythm of Burglary 7.167
Victoria Esquimalt Day of the Week 7.168
Average Daily Break and Enter 1999 – 2003 ..... 7.171
Monthly 7.173
Average Monthly Rhythms 1999 – 2003 ..... 7.173
Seasonal 7.176
Average Seasonal Break and Enter 7.176
Discussion and Summary 7.179

Chapter 8: Police Perceptions of Residential Break and Enter Hot Spots 8.184
8.1 Introduction 8.184
8.2 Sample 8.186
8.3 Methodology 8.188
8.4 Results 8.189
Center Point Agreement 8.189
Certainty of Choice 8.190
Area Agreement Police Hot Spots and Actual Hot Spots 8.193
Police Hot Spot Agreement 8.194
Sources of Police Crime Information 8.199
Police Response the Residential Break and Enter 8.200
8.5 Summary 8.201

Chapter 9: Offender Case Studies 9.203
9.1 Introduction 9.203
9.2 Theoretical Underpinning 9.203
Offenders' Use of Space 9.204
9.3 Methodology 9.206
Sample 9.207
9.4 Case Summaries 9.208
Subject 1 – "Randy" 9.208
Subject 2 – "Bill" 9.210
Subject 3 – "Trevor" 9.212
9.5 Case Study 9.214
Subject Four "Joe" 9.214
Spatial Knowledge 9.215
Break and Enter 9.217
Break and Enter Interviews 9.219
Break and Enter Two 9.223
Break and Enter Five 9.224
Break and Enter Seven 9.225
Break and Enter Eight 9.227
Break and Enter Nine 9.227
Break and Enter Ten 9.228
Break and Enter Thirteen 9.228
Break and Enter Fifteen 9.230
Break and Enter Sixteen 9.231
Break and Enter Seventeen 9.232
Break and Enter Nineteen 9.233
Break and Enter Twenty 9.234
Discussion 9.235
9.6 Summary 9.237

Chapter 10: Summary and Conclusions 10.243
10.1 Summary 10.243
Background 10.243
Theoretical Approach 10.245
Location of Study 10.247
Objectives 10.247
10.2 Conclusion 10.249
Data 10.249
Geographical Patterns – Variation in Space and Time 10.252
Temporal Stability 10.253
Offender Spatial Perceptions and Activity 10.256

References: Ref.263

Bibliography: Bib.281

Appendices

Appendix I: Regional Crime Rates for B and E by Municipality I.318
I.1 Annual Change I.318
I.2: Annual Percent Change I.322
I.3 Clearance Rates I.323
I.4 Incidence of Residential Break And Enter I.326
I.5 Ratio of Population I.326
I.6 Ratio of Households I.328
I.7 Prevalence of Break and Enter I.332
I.8 Concentration of Break and Enter Within the Population (Repeat Victimization) I.336
Central Saanich I.338
Sidney - North Saanich I.340
Saanich I.341
Oak Bay I.342
Victoria I.343
West Shore I.345
Sooke I.346

Appendix II: Spatial Analysis Municipal Offence Patterns by Municipality II.348
IL.1 Bandwidth Variation II.348
Sidney – North Saanich II.348
Central Saanich II.351
Saanich II.355
Oak Bay II.359
West Shore II.363
Sooke II.367
II.2 Cluster Hunter II.371
Comparison of Visualizations II.372
Sidney North Saanich II.372
Saanich II.372
Oak Bay II.374
West Shore II.376
Sooke II.380
II.3 Hotspots II.383
Sidney – North Saanich II.383
Central Saanich II.386
Saanich II.387
Victoria – Esquimalt II.389
Oak Bay II.391
West Shore II.392
Sooke II.394
II.4 Changes Over Time II.394
Sidney – North Saanich II.394
Central Saanich II.395
Saanich II.396
Oak Bay II.396
Victoria II.397
Esquimalt II.398
West Shore II.398

Appendix III: Stability and Variation of Patterns over Time III.401
III.1 Hotspots III.401
Annual Variation III.401
Sidney North Saanich III.401
Central Saanich III.403
Oak Bay III.406
Victoria Esquimalt III.409
Esquimalt III.414
West Shore III.415
Sooke III.418
Seasonal Variation III.420
West Shore III.420
Monthly Variation III.424
Saanich III.424
Victoria Esquimalt III.427
III.2 Temporal Variation III.429
Hourly Changes III.429
Central Saanich III.429
Saanich III.433
Oak Bay III.437
Daily Changes III.441
Central Saanich III.441
Saanich III.443
Oak Bay III.446
Monthly Changes III.449
Central Saanich III.449
Saanich III.453
Oak Bay III.456
Victoria/Esquimalt III.459
Seasonal Changes III.462
Central Saanich III.462
Saanich III.464
Oak Bay III.466
Victoria Esquimalt III.468

Appendix IV: Offender Case Studies IV.471
Subject One "Randy" IV.471
Spatial Knowledge IV.471
Break and Enters IV.473
Break and Enter One IV.476
Break and Enter Two IV.477
Break and Enter Three IV.478
Property Disposition IV.479
Co-Offender IV.479
Subject Two "Bill" IV.480
Spatial Knowledge IV.480
Break and Enter IV.481
Break and Enter One IV.482
Break and Enter Two IV.484
Intoxicants IV.485
Subject Three "Trevor" IV.485
Spatial Knowledge IV.485
Break and Enter IV.489
Break and Enter One IV.492
Break and Enter Two IV.493
Break and Enter Three IV.494
Break and Enter Four IV.495
Break and Enter Four and Five IV.497
Break and Enter Six IV.499
Break and Enter Seven IV.500
Break and Enter Eight IV.501
Break and Enter Nine IV.502
Break and Enter Ten IV.503
Break and Enter Eleven IV.504
Break and Enter Twelve IV.506
Break and Enter Thirteen IV.507
Break and Enter Fourteen IV.508
Break and Enter Fifteen IV.509
Break and Enter Sixteen IV.510

List of Table

Chapter 2
Table 2.1: Journey to Crime Break and Enter. 2.47
Table 2.2: Journey to Crime Sexual Assault. 2.48
Table 2.3: Journey to Crime Robbery. 2.49
Table 2.4: Journey to Crime - Assorted Crimes..... 2.50

Chapter 3
Table 3.1: Municipalities and Sub Regions. 3.58
Table 3.2: Municipal Area. 3.59
Table 3.3: Population – Source Ministry of the Solicitor General – Police Services. ... 3.60
Table 3.4: Population Density (Population per square Km). 3.61
Table 3.5: Business Location in CRD..... 3.63
Table 3.6: Household Income 2004. ..... 3.63
Table 3.7: Residential Housing Stock..... 3.64
Table 3.8: Owner/Occupied Dwellings in CRD. 3.66
Table 3.9: Police Forces and Strength. 3.68

Chapter 5
Table 5.1: Police Services Break and Enter. 5.95
Table 5.2: Police Break and Enter data obtained from jurisdictions RMS. 5.99
Table 5.3: Difference in actual number of Break and Enters between Police Services and Police RMS. 5.103
Table 5.4: Regional Geo-Code rate by year..... 5.104
Table 5.5: Geo-Code Rate by Municipality. 5.105
Table 5.6: Geo-Code rates by year and Municipality. 5.106

Chapter 6

Table 6.1Regional Break and Enter 1993-2000 Proportions. 6.108
Table 6.2: RMS data. 6.109
Table 6.3: Percent of Municipal Break and Enters. 6.110
Table 6.4: % Municipal Housing Stock - % of Break and Enter. 6.111
Table 6.5: Nearest Neighbour Index - Region. 6.115
Table 6.6: Nearest Neighbour Index – Municipal Level. 6.116
Table 6.7Municipal Clusters at 400m – Year 2004. ..... 6.123
Table 6.8: Municipal Clusters at 670m – Year 2004. ..... 6.123
Table 6.9: Significance levels for G*i scores. 6.128
Table 6.10: GAM/K (Fotheringham & Zhan, 1996; Turton & Openshaw, 2001)..... 6.134
Table 6.11: Number of Hot Spots and Percent of Municipality at Bandwidth 400..... 6.138
Table 6.12: Number of Hot Spots and Percent of Municipality at Bandwidth 670..... 6.138
Table 6.13: Number of Hot Spots and Percent of Municipality at Municipal specific Bandwidths. 6.139
Table 6.14: Number of Burglaries and Percent of total Burglaries at Bandwidth 400.6.139
Table 6.15: Number of Burglaries and Percent of total Burglaries at Bandwidth 670.6.140
Table 6.16: Number of Burglaries and Percent of total Burglaries at Municipal specific Bandwidths. 6.140
Table 6.17: Percent of Burglaries within Hot Spots at Municipal specific Bandwidths. 6.141
Table 6.18: Percent of Burglaries within Hot Spots at Bandwidth 670m..... 6.141
Table 6.19: Percent of Burglaries within Hot Spots at Bandwidth 400m..... 6.141

Chapter 7

Table 7.1: Victoria Esquimalt Hourly Distribution of B & E..... 7.163
Table 7.2: Periodic Pattern of Daily B & E in Victoria Esquimalt..... 7.165
Table 7.3: Municipal Average Periodic Patterns 1999 – 2004. ..... 7.166
Table 7.4: Victoria Esquimalt Daily Patterns of Break and Enter. 7.169
Table 7.5: Average Daily of Break and Enter 1999 – 2003..... 7.171
Table 7.6: Daily Index of Break and Enter 1999 – 2003. ..... 7.172
Table 7.7: Average Monthly Percent of B & E 1999-2003. ..... 7.173
Table 7.8: Monthly Index of B & E 1999 – 2003. ..... 7.175
Table 7.9: Combined Data Sets Average Seasonal Break and Enter 1999 – 2003..... 7.176
Table 7.10: Seasonal Index Break and Enter 1999 – 2003. ..... 7.178

Chapter 8

Table 8.1: Sampling Method..... 8.186
Table 8.2: Mean Age and Years of service..... 8.187
Table 8.3: Completed years of Education..... 8.187
Table 8.4: Sample Gender8.3 Methodology..... 8.187
Table 8.5: Centre Point - Hot Spot Agreement..... 8.190
Table 8.6: Police Perception Agreement with Hot Spots..... 8.190
Table 8.7: Confidence in Selection at Bandwidth 670m..... 8.190
Table 8.8: Confidence in Selection at Individual Jurisdictional Bandwidths..... 8.191
Table 8.9: Accuracy of certainty – Levels 1 to 3 - Regional Bandwidth 670m..... 8.191
Table 8.10: Accuracy of certainty within each rating category – HS Levels 1 to 3 - Regional Bandwidth 670m..... 8.192
Table 8.11: Accuracy of certainty across all categories – Levels 1 to 3 – Jurisdictional Bandwidth..... 8.192
Table 8.12: Accuracy of certainty within each rating category – HS Levels 1 to 3 – Jurisdictional Bandwidth..... 8.192
Table 8.13: Hot Spot Comparison..... 8.193
Table 8.14: Subject Agreement..... 8.196
Table 8.15: Number and Percent Agree..... 8.196
Table 8.16: PHS Convergence Coverage..... 8.198
Table 8.17: Area overlap in Quartiles (25% increments)..... 8.198
Table 8.18: Sources of Police Crime Information..... 8.199
Table 8.19: Response Tactics..... 8.200

Chapter 9

Table 9.1: Offender Characteristics..... 9.207
Table 9.2: Offender Trip Dynamics..... 9.209
Table 9.3: Property Characteristics..... 9.210
Table 9.4: Target Cues..... 9.213
Table 9.5: Break and Enter 2006 in Date Order..... 9.222
Table 9.6: Break and Enter Discussed..... 9.222
Table 9.7: Distance from Residence to Break and Enter..... 9.223
Table 9.8: The Average Straight Line Distance to Crime versus Actual Distance..... 9.238
Table 9.9: Aggregated Trip Dynamics..... 9.239
Table 9.10: Relationship of Offence Location to Awareness Space..... 9.240

Appendix I

Table I.1: Percent change over time. I.323
Table I.2: Clearance Rates. I.325
Table I.3: Residential Break and Enter Rate per 1,000 Population. I.327
Table I.4: Residential Break and Enter Incidence Rate per 1000 households. I.331
Table I.5: Residential Break and Enter Incidence Rate Percent change. I.332
Table I.6: Prevalence of break and enter in the Region. I.334
Table I.7: Annual Percent Change in Prevalence. I.335
Table I.8: Concentration of break and enter in the CRD. I.337
Table I.9: Annual Change in Concentration. I.337
Table I.10: Concentration of break and enter in Central Saanich. I.339
Table I.11: Concentration of break and enter in Sidney - North Saanich. I.340
Table I.12: Concentration of break and enter in Saanich. I.342
Table I.13: Concentration of break and enter in Oak Bay. I.343
Table I.14: Concentration of break and enter in Victoria. I.344
Table I.15: Concentration of break and enter in West Shore. I.346
Table I.16: Concentration of break and enter in Sooke. I.347

Appendix II

Table II.1: Number of Circles Generated by GAM. II.371
Table II.2: Sidney – North Saanich Relationship of break and enter to hot spot (HS) Area. II.385
Table II.3: Central Saanich Relationship of break and enter to hot spot (HS) Area.... II.387
Table II.4: Saanich Relationship of break and enter to hot spot (HS) Area. II.389
Table II.5: Victoria – Esquimalt Relationship of break and enter to hot spot (HS) Area. II.390
Table II.6: Oak Bay Relationship of break and enter to hot spot (HS) Area. II.392
Table II.7: West Shore Relationship of break and enter to hot spot (HS) Area. II.393
Table II.8: Sidney–North Saanich Hot Spot Size and Percent of Break and Enter Over Three Year Intervals. II.395
Table II.9: Central Saanich Hot Spot Size And Percent of Break and Enter Over Three Year Intervals. II.395
Table II.10: Saanich Hot Spot Size and Percent of Break and Enter Over Three Year Intervals II.396
Table II.11: Oak Bay Hot Spot Size and Percent of Break and Enter Over Three Year Intervals II.397
Table II.12: Victoria Hot Spot Size and Percent of Break and Enter Over Three Year Intervals II.397
Table II.13: Esquimalt Hot Spot Size and Percent of Break and Enter Over Three Year Intervals II.398
Table II.14: West Shore Hot Spot Size and Percent of Break and Enter Over Three Year Intervals II.399
Table II.15: Kruskal Wallis Results for the number of Hot Spot Cells in each level. II.399
Table II.16: Kruskal Wallis results for the number of Break and Enters in each level. II.400

Appendix III

Table III.1: Central Saanich Hourly distribution of B and E (B &E). III.429
Table III.2: Quarterly breakdown. III.431
Table III.3: Periodic Pattern of Daily B and E (B &E) in Central Saanich. III.432
Table III.4: Saanich Hourly Distribution of B and E (B &E). III.434
Table III.5: Periodic Pattern of Daily B and E (B &E) in Saanich. III.436
Table III.6: Oak Bay Hourly Distribution of B and E (B &E). III.437
Table III.7: Periodic Pattern of Daily B and E (B &E) in Oak Bay. III.439
Table III.8: Central Saanich Daily Patterns of Break and Enter. III.442
Table III.9: Saanich Daily Patterns of Break and Enter. III.444
Table III.10: Oak Bay Daily Patterns of Break and Enter. III.448
Table III.11Oak Bay Daily Patterns of Break and Enter. III.451
Table III.12: Saanich Monthly Break and Enter. III.454
Table III.13: Oak Bay Monthly Break and Enter. III.457
Table III.14: Victoria Esquimalt Monthly Break and Enter. III.460
Table III.15: Central Saanich Seasonal Break and Enter. III.463
Table III.16: Saanich Seasonal Break and Enter. III.464
Table III.17: Oak Bay Seasonal Break and Enter. III.467
Table III.18: Victoria Esquimalt Seasonal Break and Enter. III.469

Appendix IV

Table IV.1: Distance from Residence to Break and Enter. IV.475
Table IV.2: Date and Time range of Break and Enter. IV.476
Table IV.3: Distance from Residence to Break and Enter. IV.482
Table IV.4: Distance from Residence to Break and Enter. IV.482
Table IV.5: Distance from Residence to Break and Enter. IV.491
Table IV.6: Date of Break and Enter. IV.491

List of Figures

Chapter 1
Figure 1.1: Three study areas. 1.2

Chapter 2
Figure 2.1: Offender's Awareness Space 2.43
Figure 2.2: Distance from Residence to Break and Enter (From table 2.1) 2.51
Figure 2.3: Break and Enter Offence Range (From table 2.1). 2.52

Chapter 3
Figure 3.1: Capital Regional District Political Boundaries 3.55
Figure 3.2: Capital Regional District Main Highways. 3.56
Figure 3.3: Capital Regional District Road Network 3.57
Figure 3.4: Capital Regional District Land Parcels (Lots). 3.57

Chapter 5
Figure 5.1: Reporting Process – Criminal Event. 5.94
Figure 5.2: Evolution of RMS in the CRD 5.96

Chapter 6
Figure 6.1: Intra Regional Break and Enter 2004 (25m2 cell – 400m bandwidth). 6.122
Figure 6.2: Intra Regional Break and Enter 2004 (25m2 cell – 670m bandwidth) 6.122
Figure 6.3: Victoria - Esquimalt Lot Boundaries 6.124
Figure 6.4: Victoria – Esquimalt 2004 Break and Enters with the road network. 6.124
Figure 6.5: Break and Enter Victoria - Esquimalt 2004 (25m2 cell – 400m bandwidth). 6.125
Figure 6.6: Break and Enter Victoria - Esquimalt 2004 (25m2 cell – 530m bandwidth) 6.125
Figure 6.7: Break and Enter Victoria - Esquimalt 2004 (25m2 cell – 670m bandwidth). 6.126
Figure 6.8: Victoria G*i results (50m cell – 400m distance). 6.129
Figure 6.9: Victoria G*i results (50m cell - 670m distance). 6.130
Figure 6.10: G*i results for the CRD (50m cell – 400m distance). 6.131
Figure 6.11: G*i results for the CRD (50m cell – 670m distance).z 6.132
Figure 6.12: Victoria GAM Results with 400m circles. 6.135
Figure 6.13: Victoria GAM Results with 500m circles. 6.136
Figure 6.14: Victoria GAM Results with 600m circles. 6.136

Chapter 7

Figure 7.1: Break and Enter Saanich (25m2 cell – 670m bandwidth). 7.149
Figure 7.2: Victoria and Saanich: Home Locations of offenders charged with Break and Enter. 7.153
Figure 7.3: Victoria and Saanich: Home Locations of Offenders Charged with Break and Enter. 7.153
Figure 7.4: Home Locations of Offenders Charged for Break and Enter in Victoria.. 7.154
Figure 7.5: Home Locations of Offenders Charged for Break and Enter in Saanich.. 7.154
Figure 7.6: Timeline development (Gottlieb, Arenberg et al., 1994; Ratcliffe, 2000, p. 671). 7.158
Figure 7.7: Hourly Distribution of Break and Enter in Victoria/Esquimalt. 7.164
Figure 7.8: Average Hourly Distribution of Victoria/Esquimalt B & E from 1999 – 2003. ..... 7.165
Figure 7.9: Periodic Patterns of B and E in Victoria Esquimalt. 7.166
Figure 7.10: Municipal Average Periodic Patterns 1999 – 2004. ..... 7.167
Figure 7.11: Victoria Esquimalt Daily Patterns of Break and Enter. 7.168
Figure 7.12: Victoria Esquimalt Daily B & E 1999 – 2003 ..... 7.169
Figure 7.13: Victoria Esquimalt Daily Variability 2003 to 1999 – Avg.: 14.3%, SD: 1.3%. 7.170
Figure 7.14: Average Daily of Break and Enter 1999 – 2003. ..... 7.171
Figure 7.15: Average Monthly Percent of B & E 1999 – 2003. ..... 7.174
Figure 7.16: All Municipal Data Combined for B & E 1999 – 2003. ..... 7.175
Figure 7.17: Average Seasonal Proportion of Break and Enter 1999 – 2003. ..... 7.177
Figure 7.18: Combine Municipal Data Sets for Break and Enter 1999 – 2003/4. ..... 7.178

Chapter 9
Figure 9.1: Municipal Awareness. 9.215
Figure 9.2: Neighbourhood Awareness. 9.216
Figure 9.3: Subject Four Awareness Space. 9.217
Figure 9.4: Break and Enters Over Awareness Space. 9.220
Figure 9.5: Break and Enters Discussed Over Awareness Space. 9.221
Figure 9.6: Journey to Break and Enter Two. 9.224
Figure 9.7: Journey to Break and Enter Five. 9.225
Figure 9.8: Journey to Break and Enter Seven. 9.226
Figure 9.9: Journey to Break and Enter Eight 9.227
Figure 9.10: Journey to Break and Enter Ten. 9.228
Figure 9.11: Journey to Break and Enter Thirteen 9.229
Figure 9.12: Journey to Break and Enter Fifteen. 9.230
Figure 9.13: Journey to Break and Enter Sixteen. 9.231
Figure 9.14: Journey to Break and Enter Seventeen. 9.232
Figure 9.15: Journey to Break and Enter Nineteen. 9.233
Figure 9.16: Journey to Break and Enter Twenty. 9.234

Chapter 10
Figure 10.1: Common Response to Burglary with some modification: A Simplified Map of the system 10.261

Appendix I
Figure I.1: Regional Trend. I.318
Figure I.2: Core Trend. I.319
Figure I.3: West Shore Trend I.320
Figure I.4: Peninsula Trend I.321
Figure I.5: Sooke Trend. I.322

Appendix II

Figure II.1: Sidney – North Saanich lot boundaries. II.348
Figure II.2: Sidney – North Saanich 2004 Break and Enters with the road network. .II.349
Figure II.3: Break and Enter Hot Spots Sidney – North Saanich 2004 (25m2 cell – 400m bandwidth). II.349
Figure II.4: Break and Enter Hot Spots Sidney – North Saanich 2004 (25m2 cell – 570m bandwidth..... II.350
Figure II.5: Break and Enter Hot Spots Sidney – North Saanich 2004 (25m2 cell – 670m bandwidth). II.350
Figure II.6: Central Saanich Lot Boundaries. II.352
Figure II.7: Central Saanich 2004 Break and Enters with the road network. II.352
Figure II.8: Break and Enter Hot Spots Central Saanich 2004 (25m2 cell – 400m bandwidth). II.353
Figure II.9: Break and Enter Hot Spots Central Saanich 2004 (25m2 cell – 500m bandwidth). II.354
Figure II.10: Break and Enter Hot Spots Central Saanich 2004 (25m2 cell – 670m bandwidth). II.354
Figure II.11: Saanich Lot Boundaries. II.355
Figure II.12: Saanich 2004 Break and Enters with the road network. II.356
Figure II.13: Break and Enter Hot Spots Saanich 2004 (25m2 cell – 400m bandwidth). II.357
Figure II.14: Break and Enter Hot Spots Saanich 2004 (25m2 cell – 670m bandwidth). II.358
Figure II.15: Break and Enter Hot Spots Saanich 2004 (25m2 cell – 1000m bandwidth). II.358
Figure II.16: Oak Bay Lot Boundaries. II.360
Figure II.17: Oak Bay 2004 Break and Enters with the road network. II.361
Figure II.18: Break and Enter Hot Spots Oak Bay 2004 (25m2 cell – 400m bandwidth). II.361
Figure II.19: Break and Enter Hot Spots Oak Bay 2004 (25m2 cell – 670m bandwidth). II.362
Figure II.20: Break and Enter Hot Spots Oak Bay 2004 (25m2 cell – 720m bandwidth). II.362
Figure II.21: West Shore Lot Boundaries. II.363
Figure II.22: West Shore 2004 Break and Enters with the road network. II.364
Figure II.23: Break and Enter Hot Spots West Shore 2004 (25m2 cell – 400m bandwidth). II.364
Figure II.24: Break and Enter Hot Spots West Shore 2004 (25m2 cell – 600m bandwidth). II.365
Figure II.25: Break and Enter Hot Spots West Shore 2004 (25m2 cell – 670m bandwidth). II.365
Figure II.26: Break and Enter Hot Spots West Shore (disaggregated) 2004 (25m2 cell – 400m bandwidth). II.366
Figure II.27: Sooke District, Juan de Fuca, and City of Renfrew Lot Boundaries. II.367
Figure II.28: Sooke 2004 Break and Enters with the road network II.368
Figure II.29: Sooke District. II.368

Appendix III

Figure III.1: Break and Enter Sidney - North Saanich (25m2 cell – 670m bandwidth). III.402
Figure III.2: Break and Enter Central Saanich (25m2 cell – 670m bandwidth). III.404
Figure III.3: Break and Enter Oak Bay (25m2 cell – 670m bandwidth). III.407
Figure III.4: Break and Enter Victoria and Esquimalt (25m2 cell – 670m bandwidth).. ..... III.411
Figure III.5: Break and Enter West Shore (25m2 cell – 670m bandwidth). III.416
Figure III.6: Break and Enter Sooke (25m2 cell – 670m bandwidth). III.419
Figure III.7: 2004 Seasonal Variation West Shore. III.420
Figure III.8: 2003 Seasonal Variation West Shore. III.420
Figure III.9: 2002 Seasonal Variation West Shore. III.421
Figure III.10: 2001 Seasonal Variation West Shore. III.422
Figure III.11: 2000 Seasonal Variation West Shore. III.422
Figure III.12: 1999 Seasonal Variation West Shore. III.423
Figure III.13: 1998 Seasonal Variation West Shore. III.423
Figure III.14: 2003 Monthly Variations in Saanich. III.426
Figure III.15: 2003 Monthly Variations in Victoria Esquimalt. III.428
Figure III.16: Hourly distribution of break and enter in Central Saanich. III.430
Figure III.17: Average Hourly distribution of Central Saanich B and E (B & E) from 1999 - 2004. ..... III.431
Figure III.18: Periodic Patterns of B and E (B &E) in Central Saanich. III.432
Figure III.19: Hourly Distribution of Break and Enter in Saanich. III.435
Figure III.20: Average Hourly Distribution of Saanich B and E (B &E) from 1999 – 2003 ..... III.435
Figure III.21: Periodic Patterns of B and E (B &E) in Saanich. III.436
Figure III.22: Hourly Distribution of Break and Enter in Oak Bay. III.438
Figure III.23: Average Hourly Distribution of Oak Bay B and E (B &E) from 1999 – 2004 ..... III.439
Figure III.24: Periodic Patterns of B and E (B &E) in Oak Bay. III.440
Figure III.25: Central Saanich Daily Patterns of Break and Enter III.441
Figure III.26: CSPD Daily B and E (B &E) 1999 - 2004. ..... III.442
Figure III.27: CSPD Daily Variability 2003 to 1999 – Avg.: 14.3%, SD: 6.8%. III.443
Figure III.28: Saanich Daily Patterns of Break and Enter III.444
Figure III.29: SPD Daily B and E (B &E) 1999 - 2003 ..... III.445
Figure III.30: Saanich Daily Variability 2003 to 1999 – Avg.: 14.3%, SD: 1.9%. ... III.446
Figure III.31: Oak Bay Daily Patterns of Break and Enter III.447
Figure III.32: Oak Bay Daily B and E (B &E) 1999 – 2004. ..... III.448
Figure III.33: Oak Bay Daily Variability 2003 to 1999 – Avg.: 14.3%, SD: 4.5%... III.449
Figure III.34: Central Saanich Monthly Patterns of Break and Enter 1999 – 2004... III.450
Figure III.35: Central Saanich Monthly Variability 2003 to 1999 – Avg.: 14.4%, SD: 6.1%. III.452
Figure III.36: Saanich Monthly Patterns of Break and Enter 1999 - 2004. ..... III.453
Figure III.37: Saanich Monthly Variability 2003 to 1999 – Avg.: 8.3%, SD: 2.3%. III.455
Figure III.38: Oak Bay Monthly Patterns of Break and Enter 1999 – 2004. ..... III.457
Figure III.39: Oak Bay Monthly Variability 2003 to 1999 – Avg.: 8.3%, SD: 5.6%.III.458

Appendix IV

Figure IV.1: Subject One's Awareness Space. IV.472
Figure IV.2: Subject One's Break and Enters. IV.473
Figure IV.3: Journey to Break and Enter One. IV.476
Figure IV.4: Journey to Break and Enter Two. IV.478
Figure IV.5: Journey to Break and Enter Three. IV.479
Figure IV.6: Subject Two's Awareness Space. IV.481
Figure IV.7: Journey to Break and Enter One. IV.483
Figure IV.8: Journey to Break and Enter Two. IV.484
Figure IV.9: Subject Three's Municipal Awareness. IV.486
Figure IV.10: Subject Three's Neighbourhood Awareness. IV.487
Figure IV.11: Subject Three's Awareness Space. IV.488
Figure IV.12: Subject Three's Break and Enters. IV.488
Figure IV.13: Subject Three's Break and Enters Over Awareness Space. IV.489
Figure IV.14: Break and Enter One. IV.492
Figure IV.15: Break and Enter One in Relation to Other Break and Enters. IV.493
Figure IV.16: Journey to Break and Enter Two. IV.494
Figure IV.17: Journey to Break and Enter Three. IV.495
Figure IV.18: Journey to Break and Enter Four. IV.496
Figure IV.19: Journey to Break and Enter Four and Five. IV.497
Figure IV.20: Journey to Break and Enter Six. IV.499
Figure IV.21: Journey to Break and Enter Seven. IV.500
Figure IV.22: Journey to Break and Enter Eight. IV.502
Figure IV.23: Journey to Break and Enter Nine. IV.503
Figure IV.24: Journey to Break and Enter Ten. IV.504
Figure IV.25: Journey to Break and Enter Eleven. IV.505
Figure IV.26: Break and Enter in Relation to Other Break and Enters. IV.505
Figure IV.27: Journey to Break and Enter Twelve. IV.506
Figure IV.28: Journey to Break and Enter Thirteen. IV.507
Figure IV.29: Journey to Break and Enter Fourteen. IV.508
Figure IV.30: Journey to Break and Enter Fifteen. IV.509
Figure IV.31: Break and Enter Sixteen. IV.510
Figure IV.32: Break and Enter Sixteen in Relation to Other Break and Enters. IV.511

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DEDICATION

Dedicated to Daniel J. Koenig,

thanks Dan

Chapter 1: Introduction

"The person who never made a mistake never tried anything new."

Albert Einstein

1.1 Introduction

There is a growing body of research examining the spatial patterns of crimes, police perceptions about the spatial offence pattern, and a criminal's movement through space. The evidence demonstrates crime is not randomly distributed in space; instead, it forms distinct patterns. Crime patterns are a reflection of the criminal's knowledge and use of space. However, it is not clear if police are familiar with concentrations or clusters of crime in their jurisdictions.

This study focuses on the geographic nature of residential break and enter, a specific offence that is part of the general phenomenon known as criminal behaviour, where individuals or groups perpetrate certain acts, which are proscribed as criminal. In Canada, the determination of what behaviour constitutes a criminal act is a function of the Federal government. Criminal behaviour is defined in the Criminal Code of Canada[1]. Section 348 of the Criminal Code of Canada describes the offence of break and enter and its sub classifications. In this study, the terms residential burglary, B and E, break and enter and burglary are used interchangeably to mean residential break and enter.

The location of the study is the Capital Region of Victoria, British Columbia, Canada. It is a geographically contained region located on the southern tip of Vancouver

[1] R.S.C. 1985, c. C-46

Island bounded by water on three sides and forests on the remaining side. The area has a unique multi-jurisdictional environment with a population of 330,000 residing in thirteen municipalities policed by four municipal forces and one national police force. This research will focus on three areas, the spatial distribution of residential break and enters, police perceptions about the spatial distribution, and offender's use of space. They are three important sub components of the general phenomenon of criminal activity.

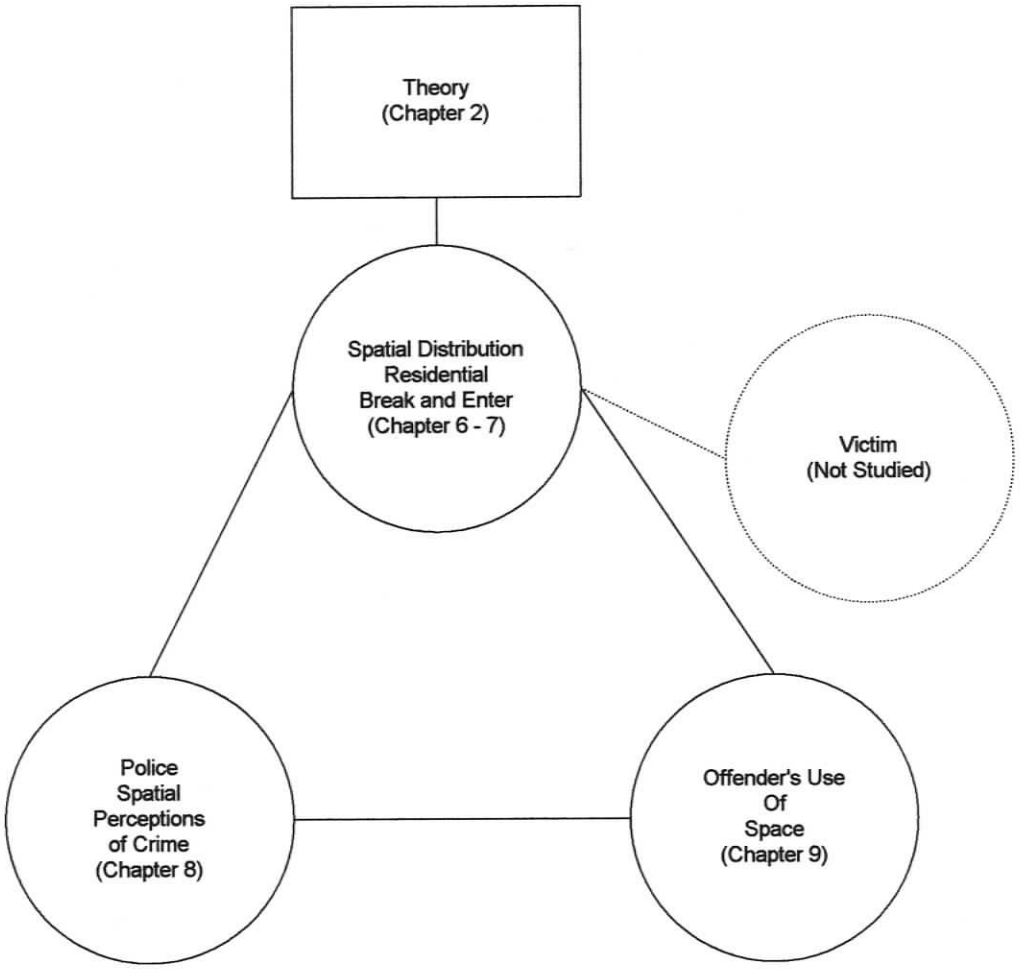

Figure 1.1: Three study areas.

This study examines residential break and enter within a municipal and a regional context, to determine if clusters are present within municipalities, if they change at the regional level, and if they persistent over time. This approach is of special interest since

residential break and enters that straddle municipal boundaries may pose a problem for police forces who work independently of the adjoining police forces.

There is limited research on police knowledge of spatial offence patterns. This research will determine where police feel high levels of crime are concentrated, the level of agreement between officers, where police obtain information about offences, and what actions are taken to address areas that are believed to have high levels of crime.

Criminals, learn about their environments through the same methods used by the ordinary person. Evidence suggests that criminals will strike out from their homes into well known areas to commit their crimes. Even though there is a substantial body of research pointing to this fact, there is a lack of direct evidence conclusively substantiating this area of study. Furthermore, there is emerging information that indicates that not all crime trips emanate from the offender's home. This study will uncover the spatial knowledge of offenders and examine how they use this knowledge in the commission of their offences.

1.2 Explaining Criminality a Restricted Perspective

During the 19th and early 20th century, social theorists were preoccupied with understanding and explaining individual or group criminality. They were interested in the individual or social characteristics that they believed influenced the development of criminal behaviour. The following discussion is a brief exploration of some of the major themes advocated to explain criminality and demonstrates how ideas have evolved to understand and hence cope with the phenomenon leading into the theoretical foundations for this study.

Biological Explanations

Lombroso, Sheldon, and Hooton (in Bartol, 1980) focused exclusively on the physiological characteristics of offenders in an effort to explain their criminal tendencies. Their work was criticized due to methodological deficiencies and the broad generalizations that followed.

Chromosomal and genetic theorists postulated criminal behaviour originated in defective genetic development or inherited criminal dispositions. In the early 1960s researches believed the Y chromosome was linked to criminal behavior. Powledge submits that "...80% of those arrested for any crime, and more than 90% of those arrested for violent crime, possess a Y chromosome." Alper (1995, p. 272) argues subsequent research found no support for this contention. The Y chromosome they found is just as prevalent in the non-offender population as it is in the criminal population. Early research on twins and adopted children hypothesized that violent behavior was linked to heredity. Recent more methodologically sound research has tended to disprove these hypotheses (Alper, 1995). Gene research has found no conclusive evidence indicating an association between a particular gene and criminal behaviour (Powledge, 1996).

Researchers have discovered relationships between environmental stress, or physiological trauma, predisposing individuals to aggressive behavior (Powledge, 1996; Roush, 1995). Environmental pollutants created biochemical imbalances. Birth trauma or head injuries to areas of the brain controlling behaviour impair judgment and control. These maladies have all been linked to violent behaviour. However, physiology explanations are limited in scope. In isolation, they do not provide a general explanation of deviant behavior; usually it must be examined in conjunction with other possible

determinants. Critics point out that it is not physiological imperfection that is at the root of crime, instead, it is poor social conditions, for example, poverty, racism, and unemployment (Roush, 1995, p. 1809).

It is evident that research has not established a clear link between biological abnormalities and crime. However, gene research is evolving exponentially. It is unclear what gene research will discover as technology evolves.

Psychoanalytic Explanations

Psychoanalytic theory seeks to explain criminal deviance through close examination of the individual's internal psyche. Individual personality consists of three components, the id, the ego and the superego. The superego acts as a control mechanism repressing inappropriate actions of the id and sustaining realistic goals for the ego (Wright & Fox, 1978, p. 183). It is during periods of conflict that the individual may act out in deviant ways. Stress or anxiety may force the individual to fixate on a particular developmental stage retarding future psychological growth, or regress to an earlier stage of development, which is less complex or stressful. When conflict arises the individual's ego uses defence mechanisms to protect the psyche. Defence mechanisms tend to distort reality at the unconscious level.

Psychoanalytic theory has been developed through clinical treatment and observation (Bartol, 1980). The theory has been criticized because of its inability to associate developmental stages to specific deviant behaviour (Wright & Fox, 1978). The concepts are fuzzy, therefore, they are difficult to operationalize and test (Bartol, 1980; Wright & Fox, 1978). Wright and Fox (1978, p. 187) argue that concepts developed

mainly for the treatment of the mentally ill should not be applied to the wide variety of behaviours deemed criminal, except in a very small number of cases.

Sociological Explanations

Sociological theorists looked at cultural, institutional, economic, and social factors, which were believed to contribute to criminality. In the early part of the 20th century, the Chicago School of Sociology developed the concept of 'social disorganization'. It was based on the premise that urbanization, migration, immigration combined with technological change led to a decline in the social fabric. A break down in mainstream institutions created an environment contributing to the formation of a nonconformist or deviant subculture. Subcultures maintained and fostered deviant behaviour within disorganized communities. Deviant traditions are transmitted to subsequent generations through interaction with peers and older offenders who glorify deviant behaviour as a mechanism to obtain wealth and influenced to those whose access through legitimate means is limited.

The concept of 'differential association' rose from the work of the Chicago School. Deviant behaviour is learned and reinforced through association with groups, and criminal subcultures (Wright & Fox, 1978), who favour and teach deviant norms and values (Sutherland, 1979). Swigert and Farrell (1979a, p. 251) note,

> "By differentially associating with those demonstrating a preponderance of deviant norms, individuals acquire the techniques, drives, motives, attitudes, and rationalizations conducive to nonconformity. Depending upon the frequency, duration, and the priority of these associations in an individual's life cycle, along with intensity of associational ties, the person will develop varying levels of commitment to deviant careers."

The functionalist approach in sociology believed the social structure inadvertently created a system that produces deviance. The structural strain of the system induces individuals to commit deviant acts. Functionalists did not view deviance as destructive; instead deviance challenged the existing social structures manufacturing positive change within the system. Functionalism explored social strain and the differential opportunities which existed in society. Subcultures whose legitimate access to societal goals was frustrated by inequitable access turned to deviant behaviour to meet their needs. Functional theory has garnered little support. Deutschmann's (1998, p. 279) review points out that functionalism should not be developed as an independent theory, but take a more integrated approach incorporating similar theories, for example, social learning theory or control theory.

Labelling Theory (Swigert & Farrell, 1979b) for example, asserts that once an individual is sanctioned for some form of deviant behaviour, a process of stigmatization commences. Further contact and sanction reinforces stigmatization leading to hostilities towards the system and its conformists. The individual rejects the dominant social control system and adopts or is forced into a deviant lifestyle.

Control theory emphasises a commitment to societal norms, whereby individuals form an attachment to the family, inculcating traditional norms, encouraging involvement in non criminal conventional activities, and a belief or bonding with society's principal values (Deutschmann, 1998, p. 337-339). A general theory of crime evolved from early control theory to explain criminal behaviour. Gottfredson and Hirschi (1993, p. 49) contend that low self-control is the primary characteristic, which predisposes an individual to commit crime. "Low self control is established in early childhood in

families which parents do not closely monitor the child's behaviour, do not recognize deviant behaviour when it occurs, and do not punish such behaviour" (Gottfredson, in: Grasmick, Tittle et al., 1993, p. 7). It would appear that low self-control results from an absence of competent parenting.

Low self-control is characterized by traits such as impulsivity, a lack of diligence, risk seeking physical activity, a self centered attitude and minimal tolerance (Grasmick, Tittle et al., 1993). Hirschi and Gottfredson (1993) argue that these traits are only by-products of self-control; they are not essential elements required for the commission of a crime.

Crime is a function of low self-control and opportunity combined with situational factors. A person with low self-control, given the opportunity and the right circumstances will commit a crime. Note that, Hirschi and Gottfredson (1993, p. 50) contend that low self-control is not dependent on opportunities since the theory is centered on the offender not the situational or structural influences.

Grasmick et al. (1993) have criticized Hirschi and Gottfredson (1990) general theory of crime on several grounds. First, little attention is paid to the opportunity variable. Grasmick et al. (1993) found that opportunity to commit crime can be a stronger indicator of crime than the combination of opportunity and low self-control. Second, the ability of a family to impart self-control is influenced by structural variables, for example, residential area, income, or stability. Structural variables are only given brief mention in control theory. Furthermore, once low self-control is established these and other potential influences have no further effect on the individual's criminality, yet variations in informal social control impact or influence an individual's criminality

through one's life course (Piquero, Brame et al., 2002; Sampson & Laub, 1993). LeBlanc et al. (1988), suggest social control consists of internal and external control. Internal control embodies adherence to norms; external control is developed through punishment and supervision. There is clearly a need for additional variables in the explanation of criminal behaviour, for example, motivation, or future relationships. Finally, Control Theory mentions situational circumstances that may counteract self-control but Hirschi and Gottfredson (in: Grasmick, Tittle et al., 1993) fail to elaborate on these circumstances.

While these theories attempted to rationalize the nature of criminal behaviour they still failed to realize the complex nature of crime and criminality (Brantingham & Brantingham, 1993b). Theorists who took a discipline specific approach in studying and explaining crime and criminal behaviour neglected or failed to recognize contributions and advances in areas of study outside of their discipline (Brantingham & Brantingham, 1981b; Brantingham & Brantingham, 1993b; Clarke & Cornish, 1985). Clarke and Cornish (1985, p. 148) argue, "Whether framed in terms of social or psychological factors, these theories have traditionally been concerned to explain the criminal dispositions of particular individuals or groups." Brantingham and Brantingham (1981b, p. 18-19) argue that,

> "Sociologists…saw crime a special case more of the general problem of social deviance - behaviour differing from the commonplace and frequently observed patterns within a society. Crime could be viewed as a special, extreme example of deviant behaviour...Psychologists (saw) criminality as illustrative of some general psychological process. Criminal behaviour, for instance, might be one form of abnormal personality development…or criminal behaviour might illustrate the problems caused by faulty social conditioning…or by effective conditioning to the wrong social rule."

Brantingham and Brantingham (1993b, p. 260) point out "...many different socio-economic situations and psychological conditions can result in particular persons engaging in...(criminal acts)." Theory steeped in a single disciplinary approach concentrating on the individual or group in explaining the cause of criminality leaves many unanswered questions.

Theorists concentrated their examination on criminal motivation (Felson & Clarke, 1998a) neglecting the broader issues surrounding crime (Brantingham & Brantingham, 1981b). Many theories were deterministic, in other words, criminality was outside the control of the individual. "The primary weakness...is a tendency to equate criminality with crime when criminality is but one of the elements contributing to a criminal event" (Brantingham & Brantingham, 1993b, p. 260). Brantingham and Brantingham (1993b) argue that, theories have been far too limited, focusing primarily on conceptually constrained origins of the desire or willingness to commit crimes rather than on the complex patterns in crimes. Exploration into crime cannot restrict enquiry to one aspect of crime, that is criminality, nor can it focus on a single disciplinary approach when investigating crime. Instead it involves a multi-disciplinary examination into the characteristics of criminal events.

1.3 Environmental Criminology

Environmental criminology developed over the later part of the 20th century, particularly during the early 1970s. The Brantinghams (1981b, p. 18) assert that three major shifts developed separating environmental criminology from the mainstream research of the 19th and early 20th century. There was a "...shift from a disciplinary to a

criminological relationship, from concern with offender motives to concern with criminal events, and from the sociological to the geographic imagination."

Earlier research examined criminality from a unique disciplinary perspective, seeking to develop theories of offender motivation. Environmental criminology, realizing the etiological complexity of criminal events, freed itself from the single disciplinary, simple causal approach, sought in explaining criminal motivation. It went further by taking a multidisciplinary approach - examining sociological, economical and psychological characteristics of criminal events within a geographical perspective.

Environmental criminology explores how individuals and groups interact with the built and natural environments to influence or prevent crime. Specifically, attention focused on situational characteristics of places with high criminal activity (Braga, Weisburd et al., 1999). It approaches crime as discrete events, examining how offenders and victims (or targets) come together under varying conditions and circumstances, at different times, in different places, which may or may not lead to a criminal event. Conversely, knowledge about the relationship between crime and place should lead to more effective crime reduction strategies (Taylor, 1997, p. 1). By investigating crime patterns within an environmental context Criminologists seek to explain how criminal events take place in an effort to develop methods to reduce or even prevent future occurrences.

Crime Patterns

Viewing crime from the city level one is astonished at what appears to be an arbitrary dispersion of crime throughout the region. With this indiscriminate or what

appears to be a random distribution of crime, how could one ever anticipate the time or the location of criminal events?

Due to the dispersion of populations and places at the city regional level the distribution of crime appears to form a haphazard distribution of offences throughout space. Yet, it is hypothesized that crime is not randomly or haphazardly distributed within the city region, instead differential circumstances increase or restrict the likelihood crime will occur within any specific area at any particular time (Brantingham & Brantingham, 1999; Carter & Hill, 1980). Rossmo points out "As chaotic as crime may appear to be, there is often rationality influencing the geography of its occurrence and some semblance of structure underlying its spatial distribution" (1995, p. 142). "At any given time, the risk of crime is concentrated among few people and places" (Spelman, 1995, p. 382). In fact, there are areas that generate substantially more crime than others within a region (Brantingham & Brantingham, 1993a; Sherman, Gartin et al., 1989). Yet, within those areas, enclaves or neighbourhoods may remain virtually crime free (Sherman, Gartin et al., 1989).

It is evident that crime patterns vary at different levels of resolution or aggregation of information. At the macro level analysis, patterns may or may not appear at a city or regional level. High-level aggregation of people and space may mask important variation (Herbert, 1982; Spelman, 1995). What may appear as a random dispersion of crime at the macro level of analysis may in fact have identifiable crime patterns revealing a confluence of criminal events at the meso level of city subunits. The reverse is also true, for example, exploring the jurisdictionally independent burglary data sets of two adjacent municipalities at the meso level may show no discernable crime

patterns along their boundaries. However, when the data are aggregated, a clear pattern exists at the macro level straddling the common boundary between the two municipalities. Uncovering a pattern could lead to a joint jurisdictional examination of what is causing the problem. At the meso level of analysis, an enumeration area or neighbourhood may appear to generate a significant level of criminal activity. However, when we view the pattern at a lower level of resolution, at the micro level, we see that this activity may result from a single drug house located within the area. Micro level analysis may provide insight into to crime generation at particular sites within neighbourhoods. Taking action against the drug house may resolve or at minimum reduce the amount of criminal activity in the area.

The opportunity structure for crime varies over time and space (Carter & Hill, 1980; Felson, 1998b; Sherman, Gartin et al., 1989). "Each element in the criminal event has some historical trajectory shaped by the past experience and future intention, by the routine activities and rhythms of life, and by the constraints of the environment" (Brantingham & Brantingham, 1993b, p. 259). The routine activities of offenders and victims collide at a location in time suitable for the commission of a criminal event. However, for a crime to occur there must be a motivated offender ready to attack in the absence of a potential guardian. All of this occurs within an environmental backcloth (Brantingham & Brantingham, 1993a; Felson & Clarke, 1998a; Rengert, 1981; Sherman, Gartin et al., 1989).

There are numerous examples of the variation in criminal opportunities by geographic location and time of day. It is clear…"what is suitable for one crime site or crime situation is not necessarily suitable for another" (Brantingham & Brantingham,

1993b, p. 272). Thefts from autos provide an example of the variability in offence patterns. In the downtown core they tend to occur during the day when workers and shoppers leave their vehicles unattended in parking lots (Felson, 1998b; Ratcliffe, 2002). In residential areas they tend to occur late at night when owners sleep while cars are parked in exposed and insecure areas such as driveways, on the street, or in underground parking lots (Felson, 1998b; Ratcliffe, 2002). Assaults increase in the downtown areas at night during the weekend in or near bars and nightclubs (Nelson, Bromley et al., 2001). Commercial burglaries generally occur in areas zoned for commercial activity during the night when the premises are closed and vacant. Residential burglaries occur predominantly in daytime hours when there is a high likelihood residences are vacant.

It is hypothesized that crime occurs in areas within the offender's routine activity space. It is assumed that the offender learns about space in a similar manner to the average non-criminal person. The majority of knowledge is obtained through passive or routine travel. Offenders acquire spatial information about areas as they travel their habitual paths to work, school, malls, or other social settings. Offenders do not see everything in their daily travel so they are cognizant of a small proportion of their surrounding's. This subset of knowledge becomes their 'awareness space'. As a result, not all areas are known equally to the offender.

Within the offender's awareness space is the 'activity space' in which they will seek out potential targets (Brantingham & Brantingham, 1993a; Rengert & Wasilchick, 1985). This space tends to cluster around the trip termination points (his/her activity nodes) and the paths used to get to them (Brantingham & Brantingham, 1993a). The offender is comfortable, they fit in, and they are inconspicuous. In terms of burglary it is

in this area, the offender will search for targets, houses that appear profitable, safe and offer the greatest chances of success (Cromwell, Olson et al., 1991; Davidson, 1980; Pettiway, 1982; Rengert & Wasilchick, 1985; Reppetto, 1974).

1.4 Theoretical Approach

It is important that research flows from a theoretical base, especially theory with prior evidentiary support (Hempel, 1966). Since it acts as a general explanation of how phenomena occur in nature. Binder et al. (1983, p. 3-4) assert, "...the purpose of theory is to summarize and organize knowledge. (It) consists of a set of assumptions; concepts regarding events, situations, individuals, and groups; and propositions that describe the interrelationships among the various assumptions and concepts." Theory provides a foundation an understanding of situations or events enabling future research. Harre argues (1976, p. 163), "...one of the great powers of theories in science is to be the basis of the design of experiments." He goes on to say "what we cannot do is describe the world in the absence of any prior understanding of it, and in the absence of any theory" (Harre, 1976). Theory assists in the development of testable propositions to refute, support or increase our current knowledge about a phenomenon under study.

Three recent theories have developed within the field of Environmental Criminology that help to explain how individuals interact in time and space creating opportunities for crime.

Routine Activity

Routine activity theory establishes that the routine activities of both the offenders and their victims influence the time and location of criminal events. If the offender is

motivated to commit a crime and there is a likely victim present, concurrent with the absence of capable guardians, the likelihood of a criminal event increases (Clarke & Felson, 1993; Felson & Clarke, 1998a). If, on the other hand, a criminal opportunity exists, but the offender lacks motivation, knowledge of the area, or a potential guardian is present, then in all likelihood the offender will not exploit the opportunity.

Rational Choice Theory

Rational choice theory focuses on the decision-making process of the offender. It assumes criminal behaviour is purposive in nature and is designed to reap some kind of benefit (Clarke & Cornish, 1985). The offender is goal oriented, albeit goals tend to be short sighted, hoping to accomplish some gain whether instrumental or affective with a minimum of effort. Offenders are generally constrained by the time and effort they can put into the decision-making process. The offender weighs out only a limited number of benefits and risks in his decision process since the quality of information is usually inadequate and/or inferior. However, since the risk of apprehension is usually low the benefits generally outweigh the risks.

Pattern Theory

Pattern theory recognizes crime is a complicated process of circumstances and situations. Nevertheless, given this complexity, clear patterns of criminal activity exist when observed at different levels of analyses. Brantingham and Brantingham (1993b, p. 264) use the term *pattern* "...to describe the recognizable inter-connection of objects, processes, or ideas." Patterns are evident across groups, among individuals, throughout regions, municipalities, and neighbourhoods.

There must be a confluence of various elements appearing concurrently to facilitate a criminal event. Brantingham and Brantingham (1993b, p. 266) point out,

> The likelihood of a criminal event transpiring depends on the backcloth, the site, the situation, the individual's criminal readiness, routine activity patterns and the distribution of targets. None of these elements can, independently, be expected to explain criminal events. They must be considered co-jointly with special emphasis on how they shape choices.

For a crime to occur there must be a willing individual who is motivated to offend and is ready to take advantage of an existing opportunity to accomplish a spontaneous or predefined goal. Triggers exist which activate the individual's readiness to offend. Triggers "(are) shaped... (by the)...surrounding environment, past experience and crime template" of the offender (Brantingham & Brantingham, 1993b, p.273). Offenders assess areas to search and targets to attack based on a sequence of cues, a cue template, which identifies suitable areas for exploitation.

Offender movements develop through their general routine activities. "Routine activities place people in situations, both physically and temporally, where crime triggering events are more or less likely to occur" (Brantingham & Brantingham, 1993b, p. 269). Routine activities formulate the awareness space of offenders and potential victims. Offenders develop activity spaces within their general awareness space. It is in this activity space that they will commit their crimes. It is clear that this activity space is limited in scope and does not cover all areas within a region; instead, it forms patterns of localized activity.

All this transpires within an environmental backcloth. At minimum, this backcloth consists of the social, legal, cultural, economic, and physical, in which the criminal act takes place (Brantingham & Brantingham, 1993a, 1993b). The backcloth is

interconnected and constantly shifting (Brantingham & Brantingham, 1993a, 1993b). Change amongst the elements is constant but vary in tempo, moving at irregular rates (Brantingham & Brantingham, 1993a, 1993b).

1.5 Research Questions

The purpose of this research is to build on the current body of research in Environmental Criminology by focussing on the spatial distribution of break and enter, police perceptions of break and enter patterns and offender's use of space in committing break and enter.

Part I: Distribution of Residential Break and Enter

The study will examine the spatial distribution of residential burglary within the context of Victoria's Capital Regional District (CRD). It will answer both general and specific questions about the characteristics of burglary patterns and when they occur. The general research questions are:

1. What is the pattern of burglary in greater Victoria? Is it random, clustered, or uniform in distribution?
2. Where do patterns or clusters exist within the region?
    a. What differences exist between inter-municipal analysis and intra-municipal analysis?
    b. Do they persist over time or are they transient?
    c. What changes have occurred over the period of study?
3. What are the temporal differences in patterns?
    a. What are the temporal patterns? Do they vary by day, week, month, or year?

Hypotheses

1. Residential burglaries will form concentrated patterns within the Victoria Capital Region.
    a. The null Hypothesis is that residential burglaries will not form concentrated patterns within the Victoria Capital Region.

2. Residential burglary concentrations at the municipal level of analysis will vary from concentrations at the regional level of analysis.
    a. The null hypothesis is that residential burglary concentrations at the municipal level of analysis will not vary from concentrations at the regional level of analysis.

3. Residential burglary will form distinct temporal patterns.
    a. To the contrary, the null hypothesis argues residential burglary will not form distinct temporal patterns.

Part II: Police Perceptions of Break and Enter Patterns

This part of the study will examine the burglary perceptions of police officers working within the context of the Capital Regional District. This research will build on the previous work conducted by Bichler and Gains (2005), Ham-Rowbottom, et al. (1999), Ratcliffe and McCullagh (2001), Rengert (1993), and Rowbottom (1999). The purpose of this component will be to determine where police think patterns of high activity burglary exist. Burglary patterns constructed by police officers will be compared with the patterns established in Part I. The general research questions are:

1. Do patterns identified by police match computer generated patterns?
2. Where do Police obtain their information about crime patterns?

Hypotheses

1. Police will have good knowledge of burglary patterns within the municipal

jurisdictions they police when examining burglaries strictly from an intra municipal perspective.

   a. The null hypothesis is that police will not have good knowledge of burglary patterns within the municipal jurisdictions they police when examining burglaries strictly from an intra municipal perspective.

2. Police will agree on the areas where burglary patterns form.
   a. The null hypothesis states there will be limited agreement between police on the location of break and enter patterns.

Part III: Where Offenders Commit Their Crimes

This portion of the study will focus primarily on the residential burglar's knowledge, understanding, and use of space for criminal activity within the context of the Capital Regional District on Vancouver Island. The research questions are:

1. What areas do individual burglars know within the Capital Regional District? How did the burglar acquire this knowledge?
2. In what areas does the burglar offend? Why did the burglar choose these areas to offend in? Does the offender choose all areas equally or is some other choice process operating? Did the offence area fall within the offender's awareness space?
3. What routes do offenders take to their offence locations? Do offenders use the paths of minimal effort to their offence sites? Are these paths the most efficient paths to the offence sites?
4. What method of transportation did the offender use while offending or in general?
5. What was the starting point? Was it the offender's home, a friend's residence, or some other location?

6. What motivated the offence? Was it for money, revenge, or some other provocation? (Triggering event)
7. Was the trip objective to commit a crime? If not, what was the original purpose of the trip?
8. Was there a co-offender present? Who made the decision to offend?
9. How do offenders use spatial opportunities as spatial knowledge increases?

Hypotheses

1. Offenders operating alone will commit their crime within an area known to them, where they conduct his/her routine activities.
    a. Alternatively, the null hypothesis is that offenders operating alone will not commit their crime within an area known to them, where they conduct their routine activities.

2. They will set out to commit their crimes from a known location, within the offence area, from which they have made their decision to offend.
    a. The null hypothesis states they will not set out to commit their crime from a known location, within the offence area, from which they have made their decision to offend.

3. They will travel as short a distance as possible (perceived by the offender), to locate a target.
    a. In contrast, the null hypothesis stipulates they will not travel as short a distance as possible (perceived by the offender), to locate a target.

4. The originating goal behind the travel plan will influence the area in which the offender will seek out targets. For example, the offender's original trip plan was to visit a friend. They take known routes towards their friend's place. While traveling the offender is presented with an opportunity to offend. If the offender has high motivation to commit a crime and a suitable guardian is absent, they will exploit the opportunity.
    a. The null hypothesis states the originating goal behind the travel plan will not

influence the area in which the offender will seek out targets.

Organization of Dissertation

The remainder of the thesis is organized as follows, Chapter 2 reviews the literature on human spatial knowledge and how offender's use space. Chapter 3 describes the study area, the Capital Regional District (CRD). Chapter 4 looks at potential data and methodological issues arising in this type of study. Chapter 5 examines the data used in this study, the difficulties encountered, and the methods used to overcome the obstacles. Chapter 6 explores the spatial patterns of residential break and enters in the CRD. Chapter 7 examines the stability of break and patterns over time. Chapters 8 identifies and compares police perceptions about break and enter hot spots, police sources of break and enter information and actions taken by police to address the problem of break and enter. Chapter 9 reports the results from four offender case studies. Chapter 10 summarizes the study, concluding with answers to the questions posed at the outset of this study.

Chapter 2: Spatial Knowledge

The physical environment, such as the city, is an important variable that influences human behavior. Individuals construct cognitive maps or spatial representations of the city through their daily or routine activities. An individual's activity space consisting of home, workplace, social activities, commuting, or other significant locations, is instrumental in developing their mental image of the city – the personal 'cognitive map'. This chapter reviews and discusses how people develop spatial knowledge and how criminals operate in space.

Cognitive maps have universal characteristics; therefore, individual patterns of behavior contain identifiable similarities. It is likely that individuals who commit crime construct their mental images of the city in the same manner as the general population. Based on observed generalities of spatial behaviour the way an offender interacts with the environment and makes spatial choices is somewhat predictable.

People generally and hence offenders develop templates based on cues emitted from the environment (Gifford, 1987). Templates are used to define suitable targets, based on an infinite set of characteristics interacting continuously within an environmental backcloth (Brantingham & Brantingham, 1993a). Some of these characteristics include: neighborhood wealth, street network, target location and surveillance, situational characteristics, and offender comfort level.

To comprehend how offenders act in space it is important to understand how an individual acquires, develops, and uses spatial knowledge to facilitate movement within the environment.

2.1 Acquisition of Spatial Knowledge

An individual's spatial ability develops during the early stages of childhood, from birth through adolescence and declines in the later years of life (Downs & Stea, 1977; Gifford, 1987; Golledge & Stimson, 1997; Ungar, 2000). Spatial knowledge progresses through phases or steps as the child matures (Golledge & Stimson, 1997; Hart & Moore, 1973; Mcdonald & Pellegrino, 1993; Ungar, 2000). Coordination and internalization of actions in space develops spatial knowledge. (Golledge & Stimson, 1997, p. 161; Hart & Moore, 1973, p.261).

Studying and understanding spatial knowledge is a difficult task. One cannot directly observe our internal functioning or our organization of spatial thought. Instead we can only make inferences based on observed behaviour that is the outcome or response to a spatial task. Downs and Stea (1977, p. 190) point out that we do not know if the behavioral outcome of experimentation "...is not an unwanted artifact of the techniques and methods used to generate the behaviour? This is a difficult problem to resolve with adults, but its difficulty is compounded in the case of young children."

One of the most extensive theories of cognitive development is one constructed by Piaget and his associates (Hart & Moore, 1973). This theory does not explicitly address the development of spatial abilities, but identifies stages in the child's growth where an understanding of space commences and matures (Downs & Stea, 1977). Piaget proposed four stages of development over a period from birth to 12 years of age. In the sensorimotor stage the child progresses from basic reflex activity (Golledge & Stimson, 1997; Hart & Moore, 1973), to the ability to represent its environment (Golledge & Stimson, 1997; Ungar, 2000). The child imitates interactions with others thus

internalizing images of repeated transactions. Through constant interaction with its environment the child is able to follow familiar routes (Ungar, 2000). As the child interacts with objects they become tangible, no longer are they transitory elements, which cease to exist when they are not in direct contact with the child. They can "…move freely and confidently through a limited spatial terrain-for example, they can take shortcut over routes, return to a point of origin, and detour around an object in order to get to another place" (Hart & Moore, 1973, p. 262). The child may be able to represent its environment, but it is unable to mentally manipulate or think about it (Ungar, 2000). The child is capable of solving sensory – motor problems (Golledge & Stimson, 1997), but it does so from an egocentric perspective (Ungar, 2000).

Stage two is the preoperational phase, which includes ages 2 to 7. The child progresses "from the sensory–motor representation to pre-logical thought for solutions to problems" (Golledge & Stimson, 1997, p. 160). The child is able to think beyond the immediate environment (Ungar, 2000). It has the ability to symbolize external objects and places (Ungar, 2000) and mentally manipulate them (Hart & Moore, 1973). Ungar (2000, p. 1) notes "reasoning is intuitive rather than logical, and knowledge is relatively unstructured." The child's "…representation of space is essentially static and not immediately coordinated into a reversible structure…(instead), the child can only return to a point of origin in thought by tracing a cyclical rather than symmetrical or truly reversible route (Hart & Moore, 1973, p. 263). Spatial thinking is still confined to an egocentric perspective.

At the ages of 7 to 11, the child enters the concrete operations phase of development. Spatial thought is no longer dominated by images, it is abstracted and now

logically coordinated from multiple viewpoints (Hart & Moore, 1973). The child begins to think in abstract ways, albeit partial abstraction, and now has a limited ability to manipulate representations of the world (Ungar, 2000). With the "…formation of reversible operations, the child not longer fuses or confuses his own viewpoint with that of others; they are able to differentiate and coordinate different points of view independent of him/herself, such that the elements and relations are compassable, associative, and reversible" (Hart & Moore, 1973, p. 262). The child proceeds from pre-logical to a logical reasoning. "The child is able to imagine multiple perspectives of a situation, realizes that a sequence of actions can be cancelled out by the reverse sequence, and that the same goal can be achieved by a number of different means" (Ungar, 2000, p. 1).

In the fourth and final stage the child enters the formal operational state. This phase develops from 11 to 15 years and beyond. "The individual appears capable of scientific thinking, can solve complex verbal problems, and all the cognitive structures mature" (Golledge, 1999, p.161). "The adolescent is able to achieve a higher order of reflective abstraction – objects of thought are replaced by pure hypothetical-deductive propositions – and classifications are generalized to arrive at second and higher order classifications" (Hart & Moore, 1973, p. 261). The child is fully capable of abstract and logical thinking.

As the child proceeds through the stages of cognitive development spatial abilities begin to evolve. It is in the preoperational stage that the child develops an understanding of topological relationships within its environment. These are purely qualitative relationships, for example, "proximity and separation open and closed (Hart & Moore,

1973, p. 264), Quantitative aspects of relative distance and direction are still not understood by the child (Ungar, 2000), (Golledge & Stimson, 1997). If the child's environment remains relatively stable, they are able to recall environmental cues from her memory of previous travel, which enable navigation through his/her environment.

Projective relations develop as the child moves through stage two into successive stages. Projection relates to the ability of the individual to imagine the environment from different perspectives. A child in stage two development views his/her environment from a strictly egocentric perspective. They are unable to imagine his/her environment from any other point of view. By the end of stage three, children are able to differentiate environments from diverse viewpoints independent of their own point of view. "The child is able to de-center from one pint of view, to differentiate between her/his own and other points of view, and to integrate this differentiation into a coordination or equilibration of perspectives" (Hart & Moore, 1973, p. 267).

Near the end of stage three and into stage four the child fully develops projective and metric abilities. Hart and Moore (1973, p. 268) suggest, "…the beginning of general projective and Euclidian coordination develops co-temporally with formation of concrete operations…(but it is) not until the development of formal operations (IV: 11 or 12) is the concept of a coordinated reference system attained which takes into account the additional projective and Euclidian relations of proportional reduction to scale, accuracy of distance, and metric coordinates." It is at the completion of stage IV that the child has developed a coordinated perspective and a general frame of reference enabling him/her to navigate successfully through the environment (Ungar, 2000).

Piaget's formulation of spatial knowledge relies on experiments using small-scale versus large-scale environments (Downs & Stea, 1977). Other methodological difficulties influencing experimental results, included misunderstanding of task demands and the child's affective state (Ungar, 2000). There is evidence that the stages of development are not as fixed as Piaget conceived. Research has demonstrated that children have the spatial abilities at much earlier ages than originally predicted by Piaget (Downs & Stea, 1973).

Siegel and White (1975) propose three stages in the development of spatial knowledge, they are landmark knowledge, route knowledge and survey knowledge. These stages closely parallel Piaget's theories of spatial development (Ungar, 2000). "Landmarks are unique patterns of perceptual events at a specific location, they are predominantly visual for human adults, they are the strategic foci to and from which one travels, and they are used as proximate or intermediate course-maintaining devices" (Siegel & White, 1975, p. 23). They correspond to our awareness understanding and meaning of places and spatial objects (Mcdonald & Pellegrino, 1993). Landmarks are points, which enable individuals to travel to and from different locations. They do not contain spatial information, but act as organizing agents of spatial knowledge (Montello, 1998).

Golledge (1997) suggests that at a rudimentary level a simple system of primary nodes (landmarks) anchors one's understanding of their spatial environment. The home, work and shopping relationship create a primary starting point for the development, over time, of more complex networks of spatial knowledge. The development of an

individual's knowledge stems from these primary points radiating out from these locations increasing (if one chooses) their spatial awareness of the environment.

Routes create the links connecting the starting point of a journey to its termination point. Landmarks provide reference points or a sequence of reference points that connect the route to its termini. "One can conceive, then, of the environment consisting of potential landmarks connected by potential routes. One can picture a spatial representation as landmarks (visual "pegs") connected by routes (sensorimotor "lines"), to some extent guided by sequence learning" (Siegel & White, 1975, p. 24). At this stage individuals are capable of simple wayfinding tasks from a start point to an end point. As one becomes more experienced with their immediate environment, their subjective knowledge coincides more accurately with the objective, or real environment, there is an increase in the accuracy of directional and distance judgments. With increased knowledge, the route becomes more detailed, a hierarchy of dominate features (landmarks, route segments), as well as less prominent cues within the environment, aid in the navigational process.

Survey or configurational knowledge connects landmarks and routes creating the spatial relationships between them in 'gestalt like' knowledge of the environment. "It is a map-like, or at least configurational, representation of metric spatial relationships between non-linearly-aligned sets of environmental features such as routes and landmarks (and broader elements such as districts), organized within a common frame of reference (Montello, 1998, p. 145). McDonald et al. (1993, p. 56), point out that "it consists of well-learned response patterns which exist in a functionally compact or "compiled" form that may be relatively inaccessible to conscious processes…it makes little demand on

attention resources, and may be utilized very quickly and efficiently." Hirtle et al. (1993, p. 172) assert configurational knowledge is more holistic and is said to incorporate Euclidean, as opposed to purely topological, relationships." "Once routes with termini become interrelated into a network-like assembly, the gaps are gradually filled in" (Siegel & White, 1975, p. 30). Survey knowledge creates a network of spatial relationships and environmental understanding, which is important for successful wayfinding and navigation through the environment.

Past research has conceived of each developmental stage as distinct and successive, one following the other. However, it would appear that a strict dichotomy does not necessarily exist. Hirtle et al. (1993) point out recent findings suggest survey knowledge develops earlier than was previously considered. Survey knowledge may initially develop along with or prior to the emergence of route knowledge. Recent research by Montello (1998) suggests quantitative abilities may also start at earlier stages in the developmental cycle. Hirtle and Hudson (1991) note when an individual learns a new area, configurational knowledge may precede route knowledge depending on the method used to learn the new environment. Furthermore, configurational and route knowledge may be obtained jointly when learning multiple routes in the same area.

Development evolves not only through direct sensory interaction with the environment, but also from experiencing other forms of information. Early imitation of others actions builds a schema of spatial images, which the child internalizes and replicates (Golledge & Stimson, 1997; Hart & Moore, 1973). While moving about, the child acts on objects in the environment, internalizing mental representations,

constructing spatial knowledge of the environment (Golledge & Stimson, 1997; Hart & Moore, 1973; Ungar, 2000).

Learning takes place through primary learning or direct experience with the environment. Secondary learning occurs through other forms of media, for example, maps, or pictures (Lloyd, Cammack et al., 1995; Mcdonald & Pellegrino, 1993). Individuals learn about the environment through language, for example, verbal descriptions or through emotional transactions with others or places (Golledge & Stimson, 1997; Mcdonald & Pellegrino, 1993). Attribute information is acquired through multi-sensory exposure to the environment, as Siegel and White (1975, p.26) point out "that (it is) not the result of any one modality of sensations." All senses are used to internalize information about the spatial environment and the attributes associated with it, which builds our knowledge base.

2.2 Activity in Space and the Cognitive Map

Downs and Stea (1973, p. 8) have defined Cognitive mapping as a "process composed of a series of psychological transformations by which an individual acquires, codes, stores, recalls, and decodes information about the relative locations and attributes of phenomena in her/his everyday spatial environment." "Above all, cognitive mapping refers to a process of doing; it is an activity that we engage in rather than an object that we have. It is the…way we come to grips with and comprehend the world around us" (Downs & Stea, 1973, p. 6). Kitchin (1994, p. 3) suggests cognitive maps…"contain information concerning, spatial relations and environmental attributive data which reside within a space-time context allowing the possessor to operate within an environment and to process environmental and geographical data."

Cognitive maps are not maps in the sense of true cartographic representations of the environment (Hirtle & Jonides, 1985; Mcdonald & Pellegrino, 1993; Siegel & White, 1975), nor are they simply picture like images (McNamara, 1992), instead, they are more like multi modal sensory representations of the environment. Lloyd et al.'s (1995) research supports the notion that cognitive maps form mental models that incorporate both images and verbal descriptions of the environment. Mcdonald and Pellegrino (1993, p. 60) argue…"cognitive maps acquired through direct experience with the environment are 'multimedia' representations, incorporating detailed perspective views, along with additional components such as sound, smells, tactual and affective sensations, and, eventually, also incorporating a schematic map-like representation which has been abstracted from the numerous perspective views." Siegel and White (1975) suggest that spatial representations stored in an individual's memory tend to be fragmented, distorted, accessing several separate but inter-related clusters within the environment, incorporating not only visual but also tactile and olfactory inputs (Siegel & White, 1975, p. 21). "They are complex, highly selective, abstract and generalized structures which are incomplete, distorted, schematized, and augmented" (Downs & Stea, 1973).

"The primary function of the spatial representation or cognitive map is to facilitate location and movement within the larger physical environment and to prevent getting lost" (Siegel & White, 1975, p. 22). The representations held within the cognitive map act as organizing principles of our transactions with the environment. Lynch (1960, p.126) argues, "…It serves as a general frame of reference within which individual(s) can act, or to which (they) can attach (their) knowledge." It is a means of organizing knowledge, physical, emotional, social and cultural, to direct action in space.

Trip Planning and Travel Constraints

Trip planning is affected by the number of locations, the attributes associated with travel to the location and the location itself (McNamara, 1992). Thill et al. (1997, p.109) point out "destinations, whether on simple, one-stop trips or on multi-stop trips, are found to be confined to a certain neighborhood around the home or work trip base." Furthermore, individuals will consider only a small number of alternatives in trip planning (Golledge, Briggs et al., 1969). A geographic dependence also exists between destinations chained on the same multi-stop trip. Constraints are brought about by time, physical attributes of the environment institutional and social attributes and personal characteristics. Priority of activities is another factor that will influence trip-planning decisions. Subjects make sequential spatial choices based on their evaluation of the available information pertinent to their travel objectives. Attribute assessment forces individuals to make tradeoffs between the desired objectives. As information accumulates it increases demands on information processing which affects travel decision-making.

In multi-trip choices, individuals attempt to minimize the overall trip distance (Saisa & Garling, 1987), thus reducing travel inefficiency (Golledge, Briggs et al., 1969). Travel distances are estimated between locations and ordered to reflect the shortest trip distances (Garling, 1999, p.87). Individuals will use different, but a limited number of methods in making decisions on multi-trip destination choices (Hirtle & Garling, 1992; Saisa & Garling, 1987). Depending on the route layout some methods are superior to others. When the number of destinations is low, subjects are somewhat competent in reducing overall distance in route determination.

As the number of destinations increase it creates a burden on information processing, subjects will begin clustering destinations and make destination choices based on the location of clusters. Subjects will first minimize distance between clusters of locations, followed by distance estimations within clusters. Subjects tend to make poor decisions on distance minimization as destination choices increase (Hirtle & Garling, 1992).

Time factors into the trip planning process, having a direct effect on distance minimization. It is not necessarily travel time, which is commonly associated with travel distance, but instead it is the constraints imposed by time, for example, store closing hours, wait times, or pre determined appointments. Garling (1999) submits, subjects will trade off distance minimization when store hours prohibit trip distance minimization or when subjects are confronted with longer waiting periods at one location over another. Wait time is particularly influential in destination planning, it is considered very early in the trip planning process. If wait time is high at certain destinations less important destination may be abandoned for more important trips.

Distortion in Cognitive Maps

Cognitive maps are subjective representations of the environment that do not form a complete schema of the objective world. Instead, they provide a functional working model of an individual's environment for the purposes of navigating through it. As a result, cognitive representations contain several systematic errors or patterns of distortion (Mcdonald & Pellegrino, 1993; Tversky, 1992). Moreover, it is clear that a number of these errors are not consistent across learning modalities. In many cases, those gathered through primary learning contain different types of distortions than those acquired from

secondary learning. Mcdonald and Pellegrino (1993) argue that many distortions are a reflection of the manner in which the spatial representation is encoded (Lloyd, Cammack et al., 1995). Yet, some errors are similar under varying learning conditions.

Alignment and Rotation

Subjective spatial representations suffer from both rotation and alignment errors. They are a "…consequence of the perceptual and conceptual processing done on the visual world as we experience and comprehend it. We isolate figures from a background, and then organize them by relating their locations and orientations to a frame of reference" (Tversky, 1992, p.137). Mcdonald and Pellegrino (1993, p.69) indicate, "Rotation errors are similar to alignment errors in the sense that in the former, whole configurations are rotated into alignment with a reference system, whereas in the latter, individual components of a configuration are translated or displaced so as to be aligned relative to another remembered object or group of objects." Subjects will adjust or rotate objective environments aligning them with their cognitive frame of reference. Tversky (1992) has found rotation effects in global and local environments. Individuals will rotate objective environments into a north/south, east/west alignment. She (Tversky, p. 136) argues, "the idea was that figures are remembered with respect to a frame of reference, and that, when the orientation of the frame of reference and the natural orientation of the figure conflict, the figure's orientation will be remembered as closest to that of the frame of reference."

Alignment errors result when an object is misaligned to conform to a known or set of known objects. Tversky (1992, p. 136) explains, "…two figures that are perceived as grouped together but are misaligned, that is, offset in one spatial dimension, are

remembered as more aligned than they really are." Lynch (1960) found evidence of misaligned landmarks in his study of three metropolitan cities. Lloyd (1989) found that rotation and alignment errors differed depending on the mode of learning. Errors tended to be smaller for representation obtained through secondary learning. Sholl (1987) found that the amount of information or the familiarity with a location improve alignment.

Distance and Direction

Distance judgements are strongly influenced by the cognitive representation of the environment (Golledge, Briggs et al., 1969). Freundschuh (1998) points out the distinction between perceptual distance and cognitive distance. Perceptual distance judgements are assessed from small-scale environments where the subject has a complete view of the area in question, while cognitive distances are estimates of large-scale environments, which are not viewable from a single vantage point.

Garling (1999) argues that the relationship between cognitive distance and objective distance is non-linear (Golledge, Briggs et al., 1969). Distance judgements are asymmetrical, in other words, the distance in one direction is not judged the same as distance in the opposite direction (Garling, 1999). Golledge (1969) found that distances towards the central business district (CBD) were over estimated, while distances in the opposite directions were under estimated.

Familiarity with an environment increases the accuracy of distance judgements with in the environment (Golledge, Briggs et al., 1969). "Moreover, familiarity of landmarks along urban routes influences distance judgements" (Mcdonald & Pellegrino, 1993, p. 69), (Montello, 1991b). Turns distort distance estimates; "…the more turns in a route increases errors in judgements, while fewer turns reduces error" (Mcdonald &

Pellegrino, 1993, p. 69; Montello, 1991b; Tversky, 1992). The "…number of nodes (in a route, or)…the amount of information remembered (about a route) influence distance judgements' (Tversky, 1992, p. 134).

Segmentation of routes distorts distance judgements. Individuals divide routes into segments; routes crossing segments increase errors in distance estimates (Mcdonald & Pellegrino, 1993, p. 70). McDonald and Pellegrino (1993, p. 70) found that these findings have been "…replicated for representations acquired through secondary learning."

Time is sometimes used as a surrogate measure for distance estimation. Freundschuh (1998) discovered that individuals use time estimates in determining distance as the geographic scale increases. The subjects used distance as a measure in small-scale environments because time is not as meaningful at this level of activity, whereas time becomes more important when travel exceeded one hour. As the geographic scale increased, subjects used travel time as a substitute measure for distance. Interestingly, Freundschuh (1998) found subjects judgements of time and distance were over estimated in small-scale environments and underestimated as the geographic scale increase.

Hierarchical Structure

There is strong evidence which supports the notion that hierarchical structures are encoded into spatial representations (Hirtle & Jonides, 1985; McNamara, 1992; Tversky, 1992). Garling (1999, p.91) suggests that "a hierarchical organization may be conceived of as a simplifying storage heuristic." Spatial information is assembled into clusters of areas or regions, at both a global and a local level. When judgements are made about

distance or direction to a particular place or location, individuals check higher order references within categories or clusters of spatial information to make decisions on locations within or between reference frames. A form of priming occurs where judgements about locations are aided by reference to other locations within the clusters (Hirtle & Garling, 1992; Hirtle, Heidorn et al., 1993; McNamara, 1992). Natural boundaries and barriers influence judgements made about the spatial representation. McNamara and Hardy (1989) point out that individuals will create clusters of spatial information, within the environment under study, in the absence of natural boundaries. Hirtle and Jonides (1985) suggest hierarchical structures are imbued in spatial representations learned through primary interaction, or direct experience with the environment and from exposure to secondary learning techniques, such as maps.

Information memorized in a hierarchical manner introduces errors when individual estimates distance or directions (McNamara, 1992), (Garling, 1999; Hirtle, Heidorn et al., 1993; Mcdonald & Pellegrino, 1993; McNamara, 1992; Tversky, 1992). Directions are miscalculated when subjects make estimates based on the overall direction of the cluster (Tversky, 1992). Subjects misjudge distance when they calculate distances within or between clusters (McNamara, 1992). McNamara (1992, p.141) suggests "…psychological distance between remembered objects is smaller when the objects are in the same subjective region of the space than when they are in different subjective regions of the space." Times to make directional judgements are faster when estimating inter-cluster directions than equidistance intra-cluster directions (Hirtle & Jonides, 1985). Barriers affect estimates of distance and direction where distances across barriers are

overestimated in comparison to equal distances that do not cross barriers (Hirtle & Jonides, 1985).

Individuals tend to distort the configuration of local street networks. Tversky (1981) found that turns are translated towards right angles more than they truly are. Streets are considered parallel when they are not.

Perspective

The individual's perspective, real or imagined, from which they make decisions on distance and direction, influence their estimations (Tversky, 1992). Distances are overestimated for locations that are closer rather than farther away. Fotheringham and Pitts (1995) observed "…areas in close proximity appear to be stored mentally as more complex entities than do distant areas, presumably because of the greater amounts of information available on nearby areas." Locations closer to the subject have richer fields of information affecting the accuracy of the estimation.

Reference Points

Landmarks are a fundamental aspect in the development of an individual's spatial reference system. They act as a basic initiation point for direction and distance information, yet landmarks introduce distortion into spatial judgements. Tversky (Tversky, 1992) points out, when distances are estimated from a known landmark to a relatively unknown object or the reverse from relatively unknown object to a known landmark, distance judgements from the landmark to the object are underestimated whereas the reverse is not true. Hirtle and Jonides (Hirtle & Jonides, 1985) report that object proximity to a landmark or reference point influence distance estimates. When

objects are grouped around a landmark, those objects within close proximity to the reference point tend to be overestimated. Although, landmarks act as important reference points in our spatial knowledge, they do influence the accuracy of distance judgements.

Orientation

Montello (1991b) found that oblique versus orthogonal streets tends to disorientate individuals affecting their ability to make judgements about directions. Furthermore, streets constructed at oblique angles to the main street network distort individual impressions of cardinal directions. However, increased knowledge of an area reduces the imprecision.

Learning an environment through direct interaction versus from a map affects an individual orientation. McNamara (1992, p. 147) argues, "…memories of maps are encoded in a viewer-centered representation, with a canonical upright. In contrast, naturally acquired memories…are encoded in a scene-centered representation, with no canonical orientation."

Information Processing/Retrieval

Distortion may be the by-product of an efficient method of representation or a flawed system of information retrieval. McDonald and Pellegrino (1993) assert that a hierarchical structured representation, although flawed, allows for expedient and efficient retrieval of spatial information. However, an alternative explanation suggests that the retrieval system itself is the cause of distortion of information not the spatial representation (Hirtle, Heidorn et al., 1993; Mcdonald & Pellegrino, 1993; Tversky,

1992). There is no clear evidence that one or the other or both are the cause of distortion in our perceptions of space. Tversky (1992, p.137) suggests,

> As we navigate an environment, or make inferences from memory of one, we draw on information from many different sources, from particular episodes in the environment and schematic knowledge of the environment, from verbal descriptions and visual experience, from information specific to the environment, and from general information about that kind of environment. When all that information is put together, it does not necessarily form a coherent picture, something that could be drawn on paper or modeled in three dimensions. On the contrary, the different bits and pieces may very well conflict with each other, something that would not be evident without an attempt to put them together.

Even though our cognitive maps or the means of accessing and interpreting the information from our cognitive maps introduce error in our spatial judgements, it is clear that they provide a valuable function enabling us to navigate through the environment.

Spatial abilities develop through childhood to adolescence. At different cognitive stages children learn to memorize simple routes within a limited environment. Stages do not strict division, instead they have fuzzy boundaries. At adolescence the young adult forms a general frame of reference enabling wayfinding. They have the ability to imagine the environment from different orientations and make reasonably accurate decisions about distance and direction.

Primary nodes form the foundation of our spatial reference system. Routes or paths form linkages between nodes. Survey knowledge combines spatial relationships and environmental understanding allowing navigation through the environment.

Cognitive maps store and recall spatial relationships assisting spatial decision making and wayfinding. They are not map-like in nature, more like an inculcation of experiences through direct encounters or indirect exposure of to different media forms. They are not perfect images or representations of the environment.

2.3 Criminal's Use of Space

Burglars learn about the environment as do others, establishing their spatial knowledge through both passive and active interaction with the environment (Rengert 1985). The majority of knowledge is obtained through passive travel. Offenders acquire spatial information about areas as they travel habitual paths to common nodes, such as work, school, malls, or other social settings, creating an image of their environment.

Burglars do not see everything in their daily travel so they are cognizant of a small proportion of their surroundings. This subset of knowledge becomes their awareness space (Fig. 2.1) (Brantingham & Brantingham, 1993a; Pettiway, 1982; Rengert, 1989; Rengert & Wasilchick, 1985).

Offender's knowledge is affected by their mode of transportation. Foot travel limits the size of an individual's awareness space. Public transit facilitates learning of an individual's spatial knowledge, but predetermined transit routes influence understanding. Vehicles can broaden the offender's knowledge of areas, facilitating exploration, providing access to previously unknown areas.

Another means in which burglars acquire spatial knowledge is through active exploration (Rengert & Wasilchick, 1985). The burglar purposely enters unfamiliar regions evaluating the utility of areas. Through intentional exploration, the offender increases his/her awareness space. Offenders learn about new environment through interaction with acquaintances. Burglars are directed into unexplored areas, through tips from friends or information from fences about good targets.

Within the offender's awareness space is the activity space in which they will seek out potential targets (Brantingham & Brantingham, 1993a; Rengert & Wasilchick, 1985). This space tends to cluster around the trip termination points (their activity nodes) and the paths used to get to them (Brantingham & Brantingham, 1993a). In this area offenders are comfortable, they fit in, and they are inconspicuous.

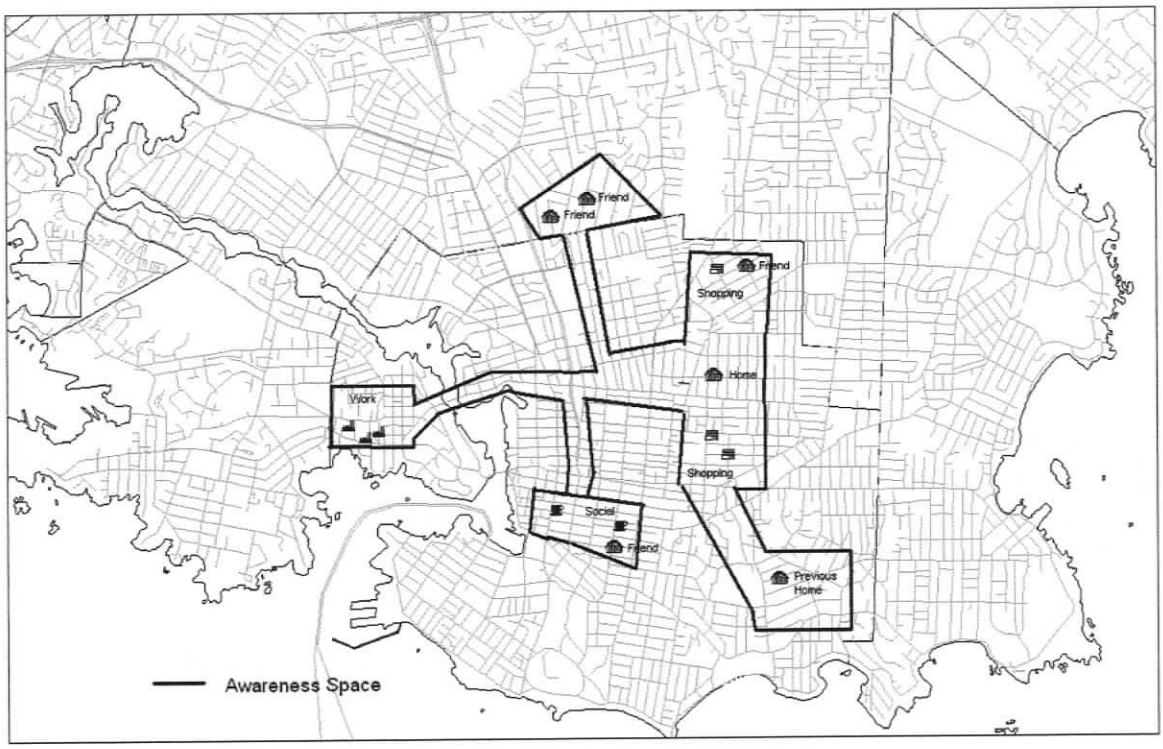

Figure 2.1: Offender's Awareness Space

In this area, the offender will search for targets to burgle, houses that appear profitable, safe and offer the greatest chances of success (Brantingham & Brantingham, 1993a; Cromwell, Olson et al., 1991; Davidson, 1980; Pettiway, 1982; Rengert & Wasilchick, 1985; Reppetto, 1974).

Most journey to crime trips emanate from the burglar's home (Reppetto 1974; Davidson 1980) and are committed within a short distance from their home (Brantingham & Brantingham, 1999). The searches are biased in the direction of offender's habitual

paths (Brantingham & Brantingham, 1999; Rengert & Wasilchick, 1985). Criminals living in the same area will generally travel in the same direction to crime local (Costanzo, Halperin et al., 1986). When burglars embark on a journey to commit a crime they will conduct his/her search within the immediate area of familiar paths and trip termination points (Wright 1994). Offenders with greater spatial knowledge of an area will broaden their search from the main roads and activity nodes. Those with limited knowledge will confine their search to a short distance from known paths and nodes.

A burglar's search behaviour is constrained by distance; they operate under a distance decay function (Bailey & Gatrell, 1995; Brantingham & Brantingham, 1993b; Davidson, 1980; Pettiway, 1982; Phillips, 1980; Reppetto, 1974). As the distance increases from the offender's anchor point (the location the offender strikes out from to commit her/his crime) the number of burglaries decrease. However, the friction of distance is not universal, it has to be understood within the individual's context (Eldridge & Jones III, 1991). Offenders do not treat all space equally; they operate within a limited spatial context because they do not have complete knowledge of their surroundings. Therefore, distance decay has a directional component (Fotheringham & Pitts, 1995); the offender functions in a warped space constrained by his/her directional knowledge.

Offenders try to minimize costs in time, money and energy by offending close to home (Clarke & Felson, 1993). Furthermore, the offender commits crimes in familiar areas since risk of apprehension increases with longer journeys into unknown territory (Phillips 1980; Brantingham 1993; Van Koppen 1997). It is clear that familiarity and effort minimization work together to restrict the offender's spatial behaviour.

Several researchers have attempted to approximate how far burglars travel to crime sites (Table 2.1). Pettiway (1982), in his study of ghetto burglars, found that subjects committed 55% of their burglaries within one mile of their home. Reppetto (1974) found that younger black burglars traveled predominately by foot, committing offences within one hour of their home, operating mainly in their own neighbourhood. On the other hand whites tend to travel farther from home. Drug users operate around and in their own neighbourhood. Older offenders were more mobile and traveled up to 24 hours from home. LeBeau (1987) discovered that on average burglars travel between 1.62 and 1.72 miles to their crime sites. Davidson (1980) found that burglars, in Christchurch New Zealand, offended within three kilometers of their home.

There is evidence that some offenders will travel great distances to commit their offences. This tends to distort distances by increasing the average distance to crime figures. However, Costello and Wiles (2001), have shown that crime decision making points, those locations where the offender makes his/her decision to commit their crime, are not always located at their home. Instead, the decision to offend may have been made at a friend's house or at a vacation spot. Since the journey to crime start point is not the home distances to crime may be exaggerated, or underestimated.

An area that has received little attention is the influence of co offender on offender decision making. When an individual commits a crime with a co-offender it begs the question which individual's activity space is being used to commit the offence. Felson (2003) suggests that co-offenders meet at some point in time and space where their activity spaces convergence. Hochstetler (2001) found the process of group decision making differs from that found in individual settings. Certain characters within

the relationship play a more dominate role in the decision making process. Therefore, in cases of co-offending it is possible that there is a convergence of activity spaces, thus enlarging the potential field in which crime targets are sought. However, it is likely that limitations are imposed on the search area by the dominate character in the relationship.

BREAK AND ENTER					
Source	Crime	Location	Crime Trip Distance	Comments	Method
Carter and Hill (1980)	Burglary		Within the offenders activity space		
Cromwell et al (1991)	Burglary	Texas	Within the offenders activity space		
Hearnden and Magill (2004)	Burglary	UK	Close to home - knowledgeable area	Considerations: need for drug money, walking w/ large goods, advantage of knowing area	
Rand (1986)	Burglary	Philadelphia	42% lived in same census tract	juvenile offenders	
Davidson (1984)	Burglary	Hull, England	60 % same type area offender resides	localized offenders	
Letkemann (1973)	Burglary			Within offender awareness' space - along daily activity paths	
Gabour and Gottheil (1984)	Burglary	Ottawa	65% within .35 mi,	excluded those offenders who did not live in Ottawa, who were N/K or those who had no fixed address (NFA)	
Evans (2001)	Burglary	England	49% 0.8 km	72% within same social status - mostly low status	
Baker and Donnelly (1986)	Burglary	Dayton Ohio	50% within 1 mi.	majority commit burglary within their neighbourhoods - neighbourhoods approx. 1 square mi.	
Baldwin and Bottoms (1976)	Breaking and Entering	Sheffield, England	54% less than 1 mi., 75% within 2 mi.	from offenders nearest activity node	
Davidson (1980)	Burglary	Christchurch New Zealand	54% within 1 mi. - most often within 3 km.	within normal activity space	
Kocsis, Cooksey, Irwin, and Allen (2002)	Burglary	Australia, Armidale, Coffs Harbour, Glen Innes and	1.8 km, 1.1 km, .81km and .87 km	mean distances	
Ratcliffe (2004)	Burglary	Canberra, Australia	Mean 5.1 Kms (3.1 mi) - Median 2.9 Kms - 1/3 < 1.5 km	70% of B and Es occur in 25 of 120 suburbs - 27% commit B and E in home suburb	Crow flies
Pettiway (1982)	Burglary	Milwaukee	55% within 1 mi. of residence	General movement of offenders is to offend within the zone they reside	
Phillips (1980	Burglary	Lexington-Ayette, Kentucky	1.05 mi		
Rhodes and Conly (1981)	Burglary	Washington, D.C.	47% less than 1 mi., 1.62 mean, 1.20 median,	wheel distance	
Wiles and Costello (2000 & 2001)	Burglary	Sheffield, England	average1.6 mi	concentrated in areas of current offender residence	
Reppetto (1976	Burglary	Boston	93% within 1.5 mi		
White (1932)	Burglary	Indianapolis	1.76 mi		
Maguire and Bennett (1982)	Burglary	England	Majority within 2 mi. of home	majority set out from home or from a car or public house with the intention of burgling a house - known offenders - exception - ambitious thieves travel greater distances	
Walsh (1980)	Burglary	Exerter, England	Most lived distance up to 2 mi., some travel 30 to 40 mi to work	57% new neighbourhood well. 1/3 new nothing about neighbourhood. Standardized housing, limited hiding places help burglars unfamiliar with area	
Waller and Okihiro	Burglary	Toronto	50% within .5 mi		
Rengert and Wasilchick (1985)	Burglary	Delaware Co.	52% within 5 mi.	Within offender awareness' space - directional distortion towards work and recreation sites - close to home	

Table 2.1: Journey to Crime Break and Enter.

SEXUAL ASSAULT					
Source	Crime	Location	Crime Trip Distance	Comments	Method
Alston (1994)	Rape	British Columbia	56% within 1.5 km, 75% within 3 km		
Gabour and Gottheil (1984)	rape and indecent assault	Ottawa	71% within 1.43 mi	excluded those offenders who did not live in Ottawa, N/K or NFA	
LeBeau (1987)	Serial rape	San Diego	1.77 mi	geometric mean, Manhattan geometry	
LeBeau (1992)	Serial rape	San Diego	25.88km, 1.89km, .52km, 3.33km	4 case studies of Serial Rape - 25.88km to offence region but .69km between offences, within offence region	
LeBeau (1987)	Serial rape	San Diego	1.77 mi	geometric mean, Manhattan geometry	
LeBeau (1987)	non serial rape	San Diego	3.5 mi	Manhattan geometry	
Canter and Larkin (1993)	Serial rape	London, SE England	less than 1.5 mi	87% marauder - 13% commuter	
Mowbray	Sexual Assault	Edmonton	average 3.26 km		
Rand (1986)	rape	Philadelphia	53 % within home census tract	juvenile offenders	
Rhodes and Conly (1981)	rape	Washington, D.C.	1.15 mi, median .73 mi. and 62% within 1 mi.	wheel distance	
Warren et al (1998)	Serial rape	U.S.	average 3.14 mi	local serial rapists (group traveled less than 23 mi to site)	

Table 2.2: Journey to Crime Sexual Assault.

ROBBERY					
Source	Crime	Location	Crime Trip Distance	Comments	Method
van Koppen and Jansen (1998)	Commercial Robbery	Netherlands	median 3.5 km, 60% within 6 km		
White (1932)	Robbery	Indianapolis	2.14mi		
Rand (1986)	Robbery	Philadelphia	32 % within home census tract	juvenile offenders	
Rhodes and Conly (1981)	Robbery	Washington, D.C.	2.1 mi., median 1.62 mi., and 37% within 1 mi.	wheel distance	
van Koppen and Jansen (1998)	Commercial Robbery	Netherlands	median 3.5 km, 60% within 6 km		
Gabour and Gottheil (1984)	armed robbery	Ottawa	80% within 1.22 mi	excluded those offenders who did not live in Ottawa, N/K or NFA	
Gabour and Gottheil (1984)	unarmed robbery	Ottawa	55% within .62 mi	excluded those offenders who did not live in Ottawa, N/K or NFA	
Block et al (2002)	Personal Robbery	Baltimore	1.63 km - median Manhattan Metric	No prior relationship	
Capone and Nicoles (1976)	Robbery	Miami	33% within 1 mi., 50% within 2mi, 66% within 3 mi		
Capone and Nicoles (1976)	armed robbery	Miami	26% within 1 mi., 45% within 2 mi., and 59% within 3 mi.		Nonparametric measure of spatial Autocorrelation. Test statistic Z-statistic with Skewness parameter, Persons type III approximation and Monte Carl significance level.
Capone and Nicoles (1976)	unarmed robbery	Miami	36% with 1 mi., 60% within 2 mi., and 75% within 3 mi.		

Table 2.3: Journey to Crime Robbery.

Source	Crime	Location	Crime Trip Distance	Comments	Method
Costanzo, Halperin and Gale (1986)	Robbery, Assault, Rape, B and E (Buis. And Res.)	Minneapolis		directionality of crime travel. Offenders living in same area travel same directions to crime	
Turner (1969)	Violent crime and Vandalism	Philadelphia	75% within 1 mi., 87% within 2 mi.	juvenile offenders	
Gabour and Gottheil (1984)	assault	Ottawa	90% within 1.33 mi	excluded those offenders who did not live in Ottawa, N/K or NFA	
Gabour and Gottheil (1984)	auto theft	Ottawa	70% within 1.24 mi	excluded those offenders who did not live in Ottawa, N/K or NFA	
Pyle(1980)	Property Crime	Cleveland	48% within home census tract, mean 2.48 mi		
Fritzon (2001)	Fire setting	England	mean 2.06 km		

Table 2.4: Journey to Crime - Assorted Crimes.

In general, offenders will not commit offenses in or around their own home for fear of being recognized, (Van Koppen 1997), unless a good opportunity presents itself (Rengert & Wasilchick, 1985). It is not clear exactly how far, on average, offenders will travel from their home before they begin their search. The area around the offender's home in which they refrains from offending is similar to a buffer zone. Phillips (1980) in his research found that juveniles tend to reduce their criminal activity within 1000 feet of their home.

Alternatively, for some crimes buffers do not exist, for example, domestic violence predominately occurs in the home. In cases of drug dependencies, offenders who are under the influence may get careless and offend near their residence. In an apartment building, the floor the offender lives on may represent her/his buffer, for example, crimes are committed on other apartment floors excluding the floor the offender lives on. It is clear there is variation in buffers depending on the type of crime and the type of offender.

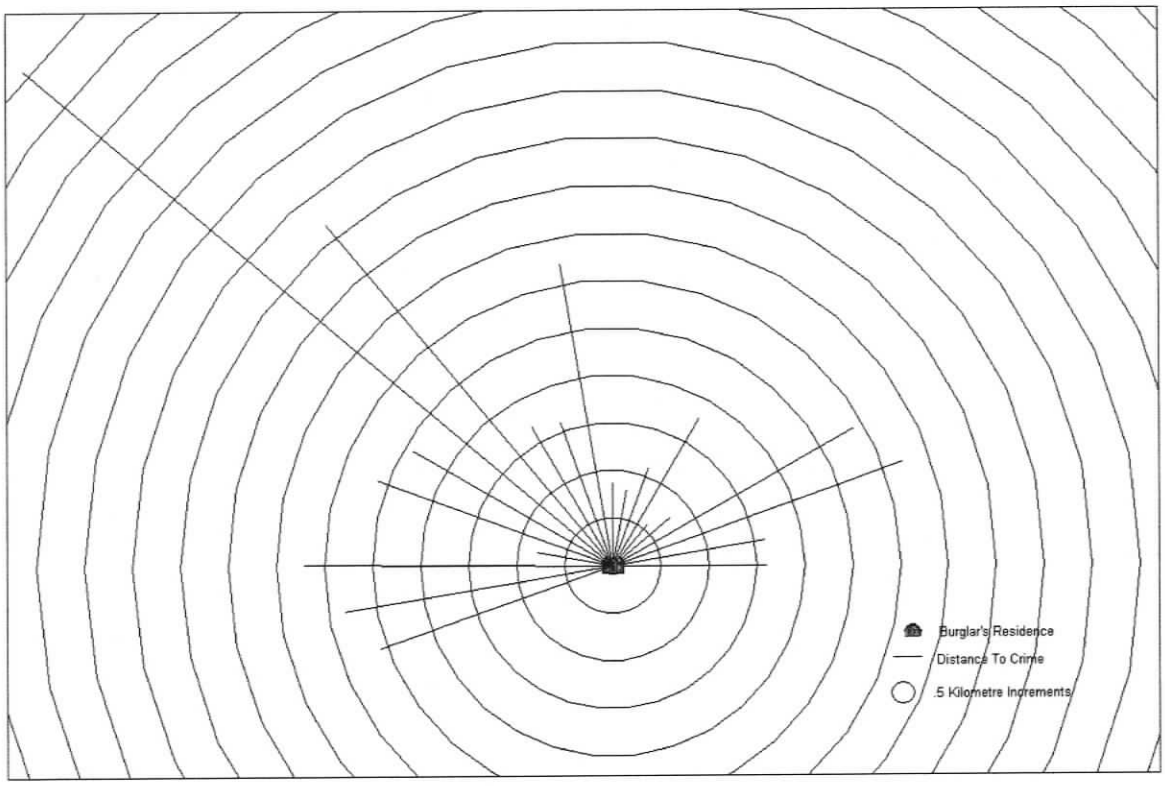

Figure 2.2: Distance from Residence to Break and Enter (From table 2.1)

Offenders are influenced by the edges bordering areas (Brantingham & Brantingham, 1993a). Edges are both real and symbolic. Examples of real edges include parks, rivers, major roads or strip malls bordering neighbourhoods (Brantingham & Brantingham, 1993a). Symbolic edges are those perceived boundaries that separate classes, cultures, or races (Rengert & Wasilchick, 1985). Neighbourhoods bordering strip malls tend to have a higher incidence of burglary. Pettiway (1982) found that cultural or racial edges restrict movement of black burglars into white neighbourhoods and white burglars into black neighbourhoods. However, both groups targeted the racially mixed buffer area dividing between these edges. This supports Brantingham and Brantingham's (1993a) contention that crime is higher along edges bordering neighbourhoods. Strangers are more readily accepted within these areas. Criminals move about freely, they do not stand out, so they feel comfortable along these edges.

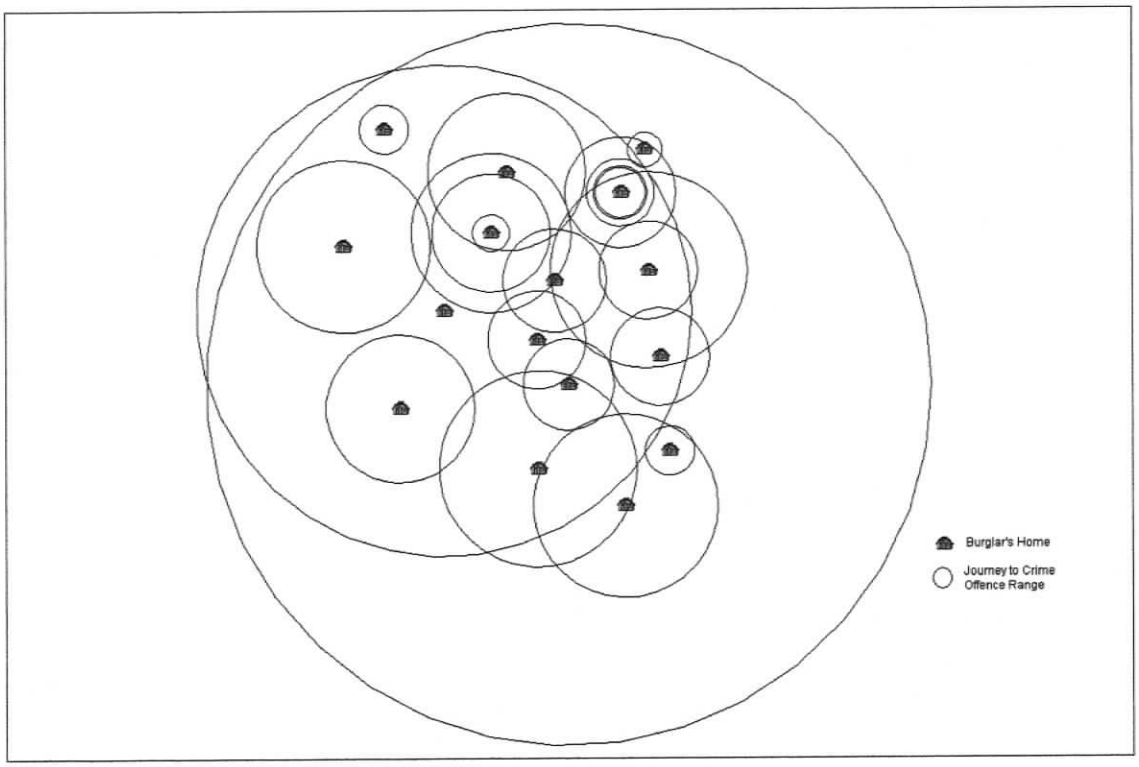

Figure 2.3: Break and Enter Offence Range (From table 2.1).

Edges act as a conduit for uninhibited travel, but in some cases they also act as a barrier to entry. Rengert and Wasilchick (1985) found that a highway separating two distinct social classes acted as a barrier. One side of the highway contained a more affluent population. Residents from these areas did not cross the highway to interact with each other. Offenders felt out of place so they refrained from entering this area when searching for targets.

Burglars' spatial knowledge evolves with interaction, whether direct or indirect, with the environment. Space is learned through exposure to nodes, landmarks and paths creating an image of their spatial surroundings. In all likelihood, methods of spatial learning are the same for the general public as they are for those who commit crimes.

Burglars use areas they are familiar with to seek out targets, areas where they will not draw attention, or get lost. Crime trips tend to start from the home. There is a reluctance to offend near home; therefore, a buffer is established around the offender's residence. They use a template of cues, which help identify ideal offence areas and targets while, reducing risk, minimizing costs in time, money and energy and enhancing profit. In general Burglar's travel short distances to their crime sites in an attempt to minimize overall effort in committing their crimes.

2.4 Summary

Environment learning develops through our childhood into adolescence. It occurs through an interaction of the human senses with the environment. The abilities learned in the developmental stages are used through life to understand and learn new environments. The cognitive map, which is not map like in nature, assists one in acquiring, storing and recalling attributes in space. Due to the complexities in the cognitive map, it does not provide a complete schema of an individual's knowledge. It contains systematic errors, which influence one's spatial judgments and decision-making. However, it is a functional representation of the environment used for wayfinding.

In all likelihood, offenders learn about the environment in the same manner as non-offenders. They, as with any individual, are limited in their spatial knowledge. It is within this limited space, their 'awareness space', areas in which they are comfortable, that they seek out their targets. Offenders attempt to minimize costs in time, money, energy, and reduce risk by committing their crimes close to home, but not to close to attract attention. They commit their crimes along familiar routes near trip termination points. As distance increases, the individual level of activity tends to decline.

The following chapter will examine methodological issues confronted in this study.

Chapter 3: The Study Area: the Capital Regional District

3.1: Population, Housing, Economy and Income

This research into patterns of residential break and enters consists of a case study specifically focussing on the Capital Regional District (CRD) of Victoria[1], British Columbia. It is therefore necessary to outline briefly the region's geographic setting, particularly its geography, demography, economy and housing.

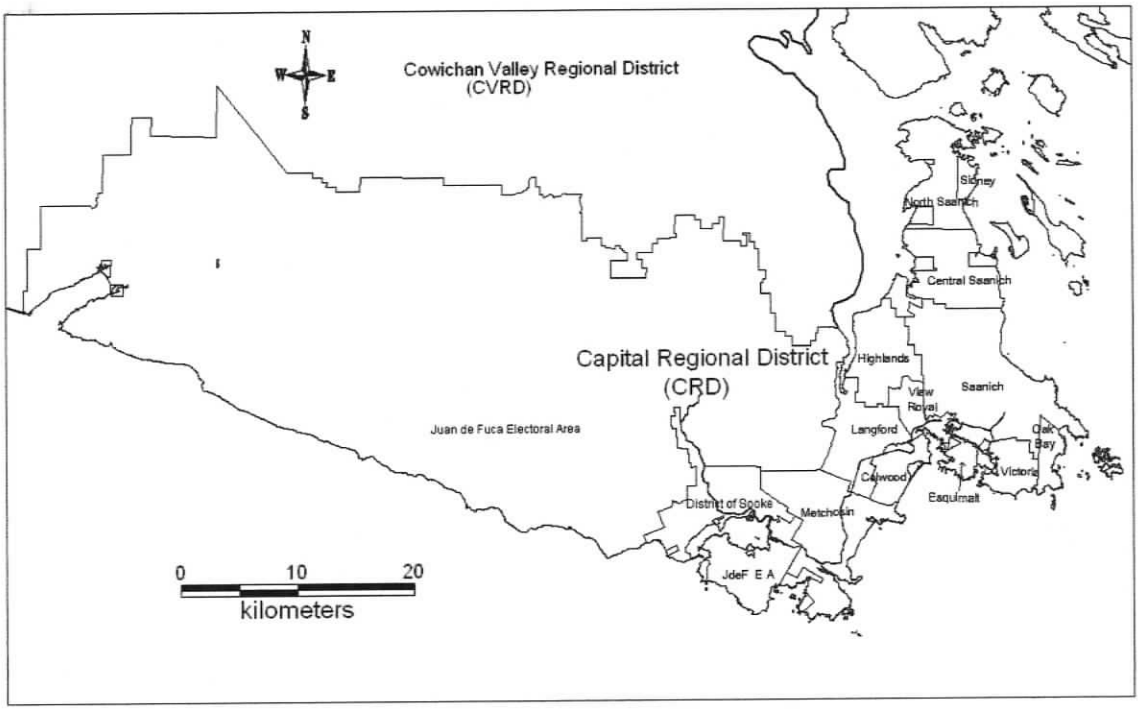

Figure 3.1: Capital Regional District Political Boundaries[2]

The CRD[3] is located on the south end of Vancouver Island in British Columbia, Canada (Figure: 3.1). There are thirteen municipalities within the region along with unorganized

[1] The Capital Regional District includes the south Island along with the Gulf Islands and the Juan de Fuca EA. For the purposes of this project the Gulf Islands and the Juan de Fuca EA will be excluded. The Gulf Islands are physically separated from the main island. The Juan de Fuca EA is mainly an unorganized territory with a small population and limited dwellings for examination.

[2] The maps in this study were provided by the Capital Regional District Information Technology Office.
[3] Information was gathered from the CRD website at http://www.crd.bc.ca/ . Data for 2001 comes from the 2000 census, 2002 to 2004 are estimates.

territories/communities and First Nations Reserves. For reporting purposes the Capital Regional District has divided the area into three sub-regions, the Core Municipalities, the Peninsula, and West Shore Communities (in the recent past they were referred to as the Western Communities).

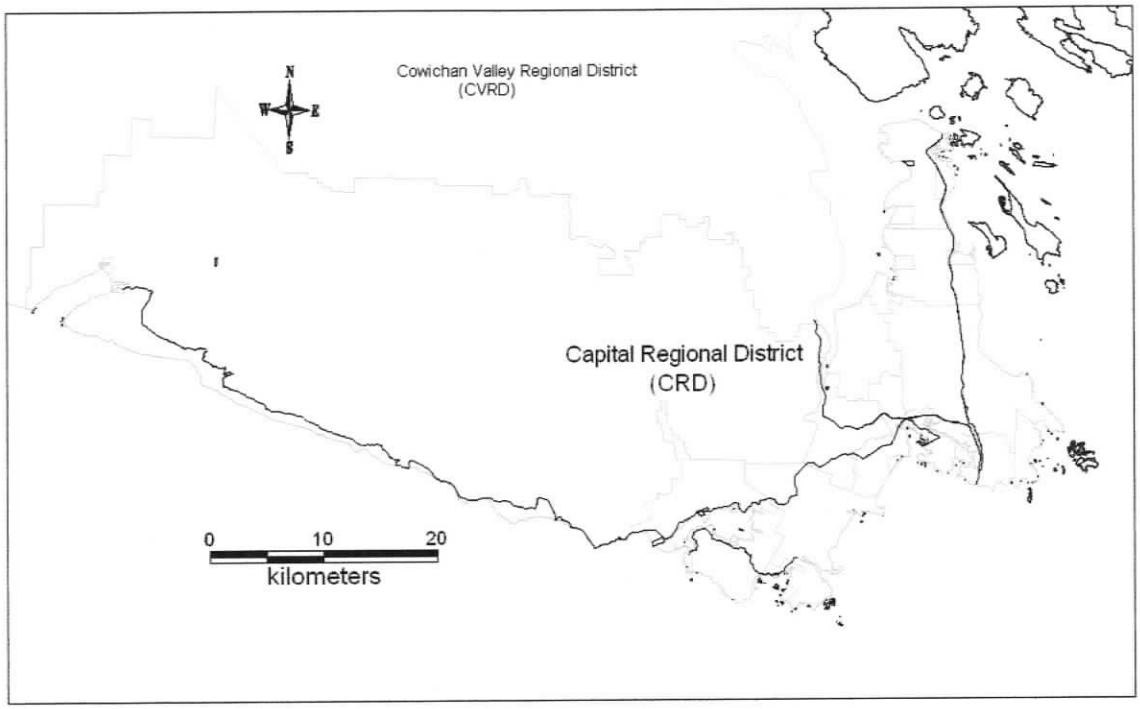

Figure 3.2: Capital Regional District Main Highways.

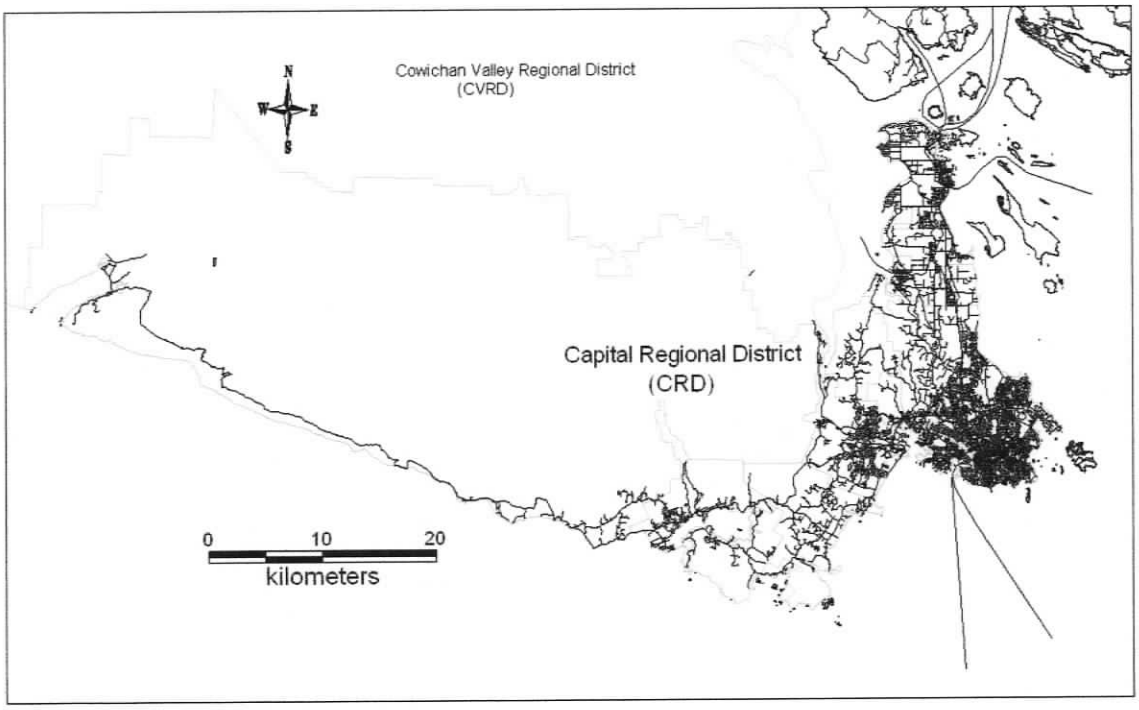

Figure 3.3: Capital Regional District Road Network.

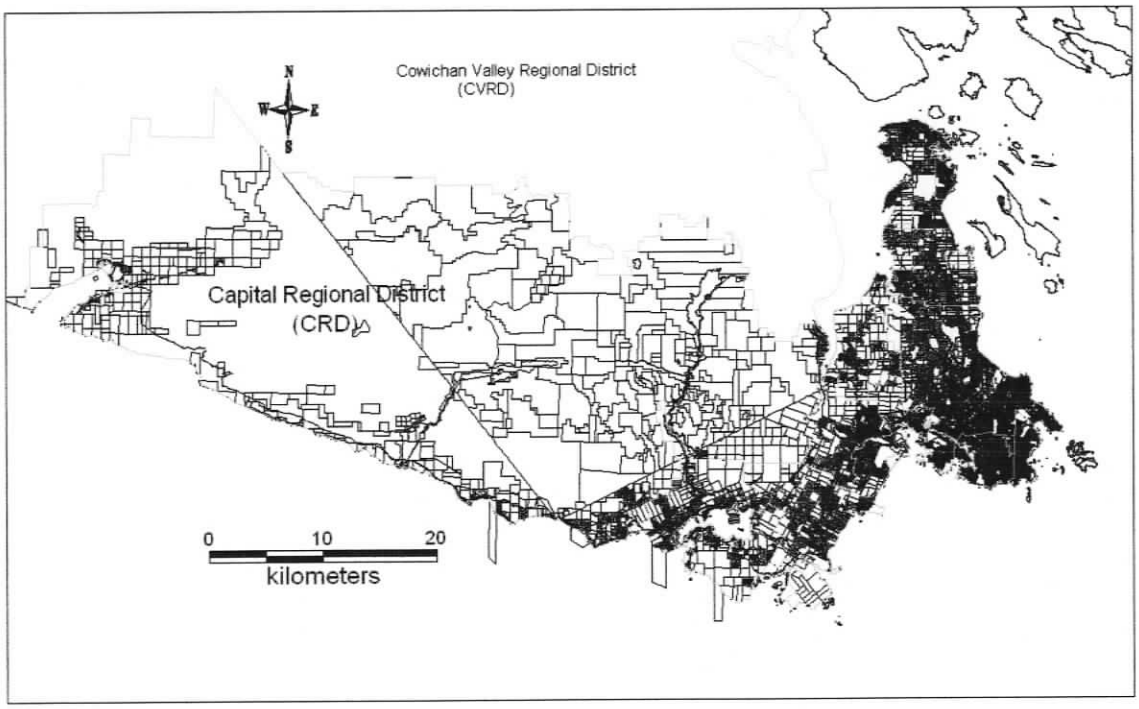

Figure 3.4: Capital Regional District Land Parcels (Lots).

Core	Peninsula	West Shore
Esquimalt Oak Bay Saanich Victoria	Central Saanich North Saanich Sidney	Colwood Highlands Juan de fuca EA Langford Metchosin Sooke View Royal

Table 3.1: Municipalities and Sub Regions.

The region covers an area of approximately 298 Sq. Miles, or 722 Sq Km. The size of municipalities vary from Sydney which is only 7.14 Sq. Km. to Saanich which is 111.83 Sq. Km. The Juan de Fuca E.A. is the largest area in the region with 253.84 Sq. Km..

Population

The region, excluding the Gulf Islands, has a population of 338,738 (Year: 2005). The Urban Core municipalities have a combined population of 224,576 (Year: 2004) or approximately 70% of the region's population. The Municipality of Saanich has the largest population 109,639 (33%) and the City of Victoria follows with 78,460 (24%).West Shore communities have a combined population of 53,228 (19%). The municipalities located on the Peninsula have a total population of 42,113 (13%). The rest of the municipalities have significantly lower population 22,000 or fewer residents. It can be seen that the overall population of the CRD has grown by 9114, or 3% over 4 years,

	Area	
Municipality	Sq Km	Sq. Miles
Core		
Esquimalt	10.05	3.88
Oak B ay	16.37	6.32
Saanich	111.83	43.18
Victoria	23.35	9.02
Sub Total	161.6	62.4
Peninsula		
Central Saanich	50.07	19.33
North Saanich	46.91	18.11
Sidney	7.14	2.76
Sub Total	104.12	40.2
West Shore		
Colwood	20.68	7.99
Highlands	39.46	15.24
Juan de Fuca E.A.	253.84	98.02
Langford	41.61	16.07
Metchosin	79.8	30.81
Sooke District	58.25	22.49
View Royal	12.60	4.87
Sub Total	506.24	195.49
TOTAL	771.96	298.09

Table 3.2: Municipal Area.[4]

with some variation between sub areas (Saanich approximately plus 2% and Oak Bay decline by 0.06%) since birth rates are declining a significant component of this change can be attributed to in-migration.

[4] Information was derived from the CRD web site http://www.crd.bc.ca/.

	POPULATION				
Municipality	2000	2001	2002	2003	2004
Victoria	76,450	77,363	77,466	77,331	77,633
Esquimalt	16718	16832	16819	16906	16943
Saanich	107,402	108,178	108,503	109,287	109,639
Oak Bay .	18,488	18,572	18,528	18,430	18,357
Core	221058	222946	223318	223957	224576
Central Saanich	15,824	16,018	16,148	16,288	16,451
North Saanich	10,838	10,890	10,956	11,057	11,103
Sidney	11,332	11,404	11,416	11,511	11,495
Sidney Provincial	3,329	2,947	2,993	3,034	3,064
Peninsula	41,323	41,259	41,513	41,890	42,113
Colwood	14,375	14,344	14,507	14,614	14,825
Langford	19,450	19,661	20,088	20,540	20,901
View Royal	7,411	7,587	7,804	7,965	8,045
West Shore Provincial	8,510	8,955	9,052	9,220	9,457
West Shore	49,746	50,547	51,451	52,339	53,228
Sooke	---	---	9,241	9,419	9,730
Sooke Provincial	12,663	13,211	4,159	4,216	4,257
Sooke	12,663	13,211	13,400	13,635	13,987
Region	324,790	327,963	329,682	331,821	333,904

Table 3.3: Population – Source Ministry of the Solicitor General – Police Services.[5]

Clearly, the population in the CRD is unevenly distributed – an important consideration when describing and analyzing spatial problems. One way of examining the population density is to calculate the ratio of population to area. Victoria has the highest ratio of population per sq. km with 3274 persons per sq. km. This is approximately double the rate of the next highest municipality, Esquimalt at 1663 persons per sq. km. Sidney has the third highest rate with 1587 persons per sq. km. The Core has almost four times the population per sq. km. than the other sub regions and three times the regional rate. In fact if Saanich is eliminated from the Core calculations, the rate rises to more than five times the regional rate. It is evident that the Regional population is highly

[5] See footnote 4 for source.

concentrated in and around the City of Victoria.

	Population Density				
Municipality	2000	2001	2002	2003	2004
Esquimalt	1663	1675	1674	1682	1686
Oak Bay	1129	1135	1132	1126	1121
Saanich	960	967	970	977	980
Victoria	3274	3313	3318	3312	3325
Core	1356	1367	1370	1373	1377
Central Saanich	316	320	323	325	329
North Saanich	231	232	234	236	237
Sidney	1587	1597	1599	1612	1610
Peninsula	365	368	370	373	375
Colwood	695	694	701	707	717
Langford	467	473	483	494	502
View Royal	588	602	619	632	638
West Shore Provincial	71	75	76	77	79
West Shore	207	211	215	218	222
Sooke			159	162	167
Region	421	425	427	430	433

Table 3.4: Population Density (Population per square Km).[6]

Economy

The economy of the CRD is dominated by employment in the service sector, associated with its role as the Provincial Capital (government offices), Tourism (hotels and restaurants) and the Military (Esquimalt DND dockyard). The heavy industry sector, ship building and forest products have moved elsewhere, although ship repair is still active along with a small high tech industrial sector.

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[6] West Shore Prov consists of two major Municipalities, Metchosin and the Highlands, as well as a number of smaller unorganized territories/communities. Sooke Prov was excluded because I did not know which territories or communities it contained. Sidney Prov was excluded since it consisted mainly of small island communities surrounding the Saanich Peninsula. The ratio developed here are estimates they are by no means exact. See footnote 4 for source of data.

Victoria is considered the business centre of the Capital Regional District. Since almost half of the regional employment activity occurs there, with 38%[7] (2001) of all the businesses found in the region. Larger businesses, especially tend to locate in Victoria, for example, 49%[5] (2001) of businesses with 11 or more employees are found in the city. Seventy-five percent of all business activity in the region occurs within the Core municipalities (Table 3.5). Smaller centres of business activity occur in Sooke, Sidney and Central Saanich (Keating X Rd).

Income

In 2004 the CRD workforce totalled 168,400 with an unemployment rate of 5.4%. Approximately 50% of the workforce within the region is employed in the service industry. Average household income varies between municipalities with a high of $81,989 in N. Saanich to a low of $42,323 in Victoria (Table 4.6).

While average incomes are higher than the National average, it is estimated that 15.4% of the population living in the CRD lives in poverty (1996 census). Poverty is a growing concern within the region, because the number of individuals and families living below the poverty income level has been increasing steadily through the 1990s. The groups affected by poverty have also changed. In the past, poverty was generally associated with the over 65 age group, but recently this has been changing to younger age groups and single women. According to the 1996 census the highest rates of poverty were found in the City of Victoria, Esquimalt, and View Royal. There were no current rates available for the region or individual municipalities.

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[7] Size (&) Location of Business Establishments Capital Region, 2001, http://www.crd.bc.ca/

Location and Number of Business by Number of Employees								
Municipality	1 to 5	6 to 10	11 to 25	26 to 50	51 to 100	101 to 250	251 to 500	500+
Esquimalt	472	99	54	15	7	2	0	2
Oak Bay	249	77	25	14	2	3	2	0
Saanich	3438	1016	325	110	52	19	6	1
Vitoria	3680	1527	703	252	105	56	15	7
Core	7,839	2,719	1,107	391	166	80	23	10
Central Saanich	446	191	84	30	11	2	0	0
North Saanich	194	70	30	17	5	2	1	0
Sidney	372	137	64	24	9	4	0	0
Peninsula	1,012	398	178	71	25	8	1	0
Colwood	338	92	32	13	5	3	1	0
Highlands	32	7	4	2	0	0	0	0
Juan de fuca EA	56	13	1	1	0	0	0	0
Langford	644	179	77	26	9	4	1	0
Metchosin	168	44	8	3	1	1	0	0
Sooke	198	70	16	11	4	0	0	0
View Royal	165	55	16	10	4	2	0	0
West Shore	1,601	460	154	66	23	10	2	0
Total	10,452	3,577	1,439	528	214	98	26	10

Table 3.5: Business Location in CRD.

Municiaplities	Household Income	
Core	Average	Median
Esquimalt	46,490	40,101
Oak Bay	75,004	58,905
Saanich	61,876	52,099
Victoria	42,323	34,334
AREA	56,423	46,100
Peninsula		
Central Saanich	69,461	61,486
North Saanich	81,989	71,711
Sidney	50,934	44,013
AREA	67,461	61,486
West Shore		
Colwood	62,341	59,987
Highlands	78,061	72,637
Langford	54,911	51,173
Metchosin	63,773	57,044
Sooke District	50,329	44,921
View Royal	50,233	46,471
Average	59,941	54,109

Table 3.6: Household Income 2004.

Housing

In the year 2004 it was estimated that there were 152,203 dwellings within the region (Table 3.7). The Core municipalities contained 107,517 or 71% of all residences in the region. The Municipalities of Saanich and Victoria have the largest proportion of the residential housing stock, 45,818 (30%) units and 44,838 (29%) units respectively. Twelve percent of regional residences were located on the Peninsula, while the West Shore had 13%.

Municipal Residential Stock	2001		2002		2003		2004	
Esquimalt	7847	6%	8215	6%	8263	5%	8327	5%
Oak Bay	8084	6%	8407	6%	8414	6%	8534	6%
Saanich	42905	30%	44862	30%	45452	30%	45818	30%
Victoria	42359	30%	44269	30%	44434	30%	44838	29%
Sub Total	101195	71%	105753	71%	106563	71%	107517	71%
Central Saanich	6047	4%	6351	4%	6406	4%	6433	4%
North Saanich	4279	3%	4492	3%	4533	3%	4571	3%
Sidney	5278	4%	5507	4%	5581	4%	5809	4%
First Nations Reserves	932	1%	968	1%	968	1%	968	1%
Sub Total	16536	12%	17318	12%	17488	12%	17781	12%
Colwood	4966	3%	5184	3%	5295	4%	5425	4%
Highlands	620	0%	657	0%	670	0%	691	0%
Langford	7215	5%	7642	5%	7839	5%	8071	5%
Metchosin	1744	1%	1827	1%	1852	1%	1864	1%
View Royal	3166	2%	3346	2%	3409	2%	3485	2%
Sub Total	17711	12%	18656	13%	19065	13%	19536	13%
Sooke District	3640	3%	3842	3%	3885	3%	4021	3%
Juan De Fuca E.A.	1967	1%	2086	1%	2127	1%	2165	1%
First Nations Reserves	1102	1%	1183	1%	1183	1%	1183	1%
Sub Total	6709	5%	7111	5%	7195	5%	7369	5%
Total	142151	100%	148838	100%	150311	100%	152203	100%

Table 3.7: Residential Housing Stock.[8]

[8] Housing counts for 2002 to 2004 are estimates based on the 2001 census.
On Dec. 6, 1999 the District of Sooke was incorporated consisting of a portion of the former Sooke E.A. The remainder of the Sooke E.A., plus the Langford E.A., were combined into the new Juan de Fuca E.A.

Source: Information was obtained from the CRD website www.crd.bc.ca

All of the municipalities, with the exception of Esquimalt 51% and Victoria 42%, had a rate of 70% or more owner occupied residences. Victoria was the only municipality with higher rate renter occupied (58%) than owner occupied (42%) residences. The CRD tends to follow the normal pattern of dwelling ownership in urban areas. There is a smaller percent of owner-occupied dwellings in the core area, with a greater percentage in the suburbs.

House Prices

During the period under review, there has been a steady increase in the number of housing starts in the CRD. This follows a significant increase in the cost of housing, where the median price of a single family residence reached $433,000.00 in December 2006[9]. Unfortunately, the percent of cheap housing has remained static or even declined, so that homelessness and overcrowding in cheap rental units is increasing. This problem is exacerbated by the low availability of cheap housing, with apartment vacancies at 0.5% in October of 2005.

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[9] Victoria Real Estate Board Multiple Listing Service ®

Owner and Renter Occupied Dwellings 2004					
Municipality	Total Dwellings	Owner Occupied	Percent	Renter Occupied	Percent
Esquimalt	7210	3671	51%	3539	49%
Oak Bay	7494	5152	69%	2342	31%
Saanich	40038	29978	75%	10060	25%
Victoria	39639	16796	42%	22843	58%
Core	94381	55597	59%	38784	41%
Central Saanich	5587	4600	82%	987	18%
North Saanich	4175	3250	78%	925	22%
Sidney	5020	3865	77%	1155	23%
Peninsula	14782	11715	79%	3067	21%
Colwood	4440	3547	80%	893	20%
Highlands	665	562	85%	103	15%
Juan de fuca EA	1826	1253	69%	573	31%
Langford	7249	5569	77%	1680	23%
Metchosin	1478	1287	87%	191	13%
Sooke District	4085	2872	70%	1213	30%
View Royal	2949	2266	77%	683	23%
West Shore	22692	17356	76%	5336	24%
Total	131855	84668	64%	47187	36%

Table 3.8: Owner/Occupied Dwellings in CRD.[10]

3.2 Policing

The region is policed by a combination of Municipal Police Forces and the Royal Canadian Mounted Police (RCMP) (Table: 3.9). The RCMP is Canada's national police force. They provide contract policing to those provinces and its municipalities who are unable to support or do not wish to create an independent police force. Three of the four Core municipalities have independent municipal police departments, consisting of Saanich, Victoria, and Oak Bay. In January of 2003 the Municipality of Esquimalt contracted with the City of Victoria municipal police department to provide police services to their municipality. The West Shore municipalities consisting of Colwood,

[10] Note: Total Dwellings in Residential Stock and Owner/Rental tables do not agree for 2004. Source: Information was obtained from the CRD website www.crd.bc.ca

Highlands, Langford, Metchosin, Sooke District, and View Royal contract with the RCMP to provide police services. The municipalities located on the Peninsula consist of both municipal and RCMP departments. Central Saanich has an independent municipal police force, while North Saanich and Sydney both contract with the RCMP to provide police services. The unincorporated regions in the CRD are policed by the RCMP Provincial Force, Sooke Provincial in the Western Communities and Sidney Provincial on the Peninsula. The Provincial forces are responsible for unorganized territories and First Nations Reservations.

There is combined total of 482 police officers[11] in the CRD. The region is dominated by Municipal police officers, which make up the bulk of the officers 395 (82%) in the region. The Core municipalities consist of the vast majority of police resources with 374 (78%) of the municipal officers. The City of Victoria has almost half of the police in the region 211 (44%), while the Municipality of Saanich has approximately a 1/3 of the police officers 141 (29%). The RCMP[12] strength consists of 87 officers (18%), 62 (13%) located in the Western Communities and 25 (5%) located on the Peninsula. One interesting observation, Victoria the centre of the urban core, has almost double the ratio of officers to population than any other municipality in the CRD (Table 4.9). This is indicative of cities containing the bulk of employment, entertainment and the associated problems.

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[11] Ministry of the Solicitor General – Police Services Division – for the year 2004 – this number may vary slightly from actual police department figures.

[12] It is believed that this number does not include RCMP officers assigned to various duties at Sub Division office located in Victoria.

Police Force (2004)	Type	# of Officers	% of Region	Ratio Off/1000 Pop
Core				
Victoria & Esquimalt	Municipal	211	44%	2.23
Saanich	Municipal	144	30%	1.31
Oak Bay	Municipal	22	5%	1.20
Sub Total		374	78%	1.67
Peninsula				
Central Saanich	Municipal	21	4%	1.28
Sydney	RCMP	14	3%	0.81
Sydney Prov	RCMP	3	1%	1.22
N. Saanich	RCMP	9	2%	0.98
Sub Total		46	10%	1.09
West Shore				
Colwood	RCMP	15	3%	1.01
Langford	RCMP	24	5%	1.15
View Royal	RCMP	8	2%	0.99
Sooke District & Sooke Prov.	RCMP	14	3%	1.00
Sub Total		62	13%	0.92
Total		482	100%	1.44

Table 3.9: Police Forces and Strength.[13]

3.3 Geography

Geographically the CRD provides a unique environment for studying certain types of categories of crime patterns. In most geographical studies of social phenomena the study area is usually contained within a larger region. Crime is studied within census tracts, enumeration areas, or police beats. In reality it is unlikely the point pattern of crime occurrences will end suddenly at the edge of the study area. Instead, there will be interactions and/or interdependencies with points outside of the study boundaries. Under this situation point pattern analysis requires corrections for edge effects. The CRD is enclosed by natural boundaries on all sides; therefore, the study area encompasses the region. This situation offers the unique opportunity to explore burglary patterns on an

[13] Source: Police and Crime 1995 – 2004, Ministry of Public Safety and Solicitor General, Police Services, B.C. Sidney Provincial ratio is a rough estimate. West Shore Provincial was not calculated due to the difficulty in determining its composition.

intra-municipal basis where municipal boundaries may distort burglary patterns, and at an inter-municipal level where patterns will not be affected by artificial boundaries.

Chapter 4: Data and Methodological Issues

1. The basic mission for which the police exist is to prevent crime and disorder.

9. The test of police efficiency is the absence of crime and disorder, not the visible evidence of police action in dealing with it.

Sir Robert Peel

4.1 Introduction

This study links three important components of burglary – the incident, the police and the offender through their geographical relevance. Clearly, there is another important component, namely the victims. However, it is beyond the scope of this study to consider the victims other than where the B and E occurs. First, it necessary to discuss briefly the general problems associated with crime statistics. This data is a form of secondary information, over which the author has no control over the quality, format, and reliability. Secondly, a brief exploration is essential to identify issues concerning primary data obtained from offender and police interviews. Third, plotting and analyzing spatial data is one of geography's significant contributions to understanding the phenomenon. A brief discussion of the spatial representation of data and point pattern analysis will situate the geographical procedures used in this analysis.

4.2 General Issues Associated With Official Crime Data

Burglary is one of the most prevalent Criminal Code offences. In past studies it has accounted for as much as 15% (Chard, 1995) of all Canadian criminal offences and 25% of all property crime. In England burglary contributes up to 16% of all reported crime (Coupe & Griffiths, 1996).

Even though burglary accounts for such a large number of criminal code offences, it is clear that a significant percentage of burglaries are not reported to the Police. It is

estimated that between 30% and 50% of break and enters do not come to the attention of police (Chard, 1995; Evans, 1995; Hough & Lewis, 1989; Maguire & Bennet, 1982; Shover, 1991). Victims did not report their break-ins for a number of reasons, they considered them trivial; there was no loss; they felt the police would be unable to do anything due to a lack of evidence; finally, some victims felt the police would not be interested (Chard, 1995; Evans, 1995; Hough & Lewis, 1989; Maguire & Bennet, 1982; Shover, 1991; Waller & Okihiro, 1978).

Non-recording of actual break-ins has been identified as a recurring problem. A victim reports a burglary to the police, but it is not officially recorded. Of those true burglaries that are reported some are incorrectly classified (Scarr, Pinsky et al., 1973), or in very rare cases, some are not recorded at all (Evans, 1995; Maguire & Bennet, 1982).

There is no doubt that there is a discrepancy between officially recorded crime data and the true amount of crime. Under reporting and non-recording brings into question the usefulness of official data. However, Hough and Lewis (1989) discovered that there were similar crime reporting patterns between official crime reports and reports made in the British Crime Surveys from 1981 to 1983. They also found that increases in burglary between 1972 and 1983 reflected an increase in reporting to and recording by the police (Hough & Lewis, 1989). Steffensmeirer and Harer (1999) argue that the true U.S. crime rate lies somewhere between the Uniform Crime Report (UCR) and the National Crime Victimization Survey (NCVS). Evans (1995) reports burglary is one of the more reported crimes. In cases were loss is sustained, reporting can reach as high as 97%. Simmons (2002, p. 30) recent findings indicate reporting for domestic burglary is as high as 70% and reaches 90% where there is property loss. Herbert (1982, p. 7) argues,

"Official statistics can be used to portray incidence of known offences and offenders and also to provide a preliminary stage from which more detailed investigation, less dependent on official data can proceed." Fowler (in Reppetto, 1974, p. 8) notes:

> It is not necessary to know about every act that occurs. Official information would still be adequate for most crimes to show the relative variation in crime rate in different city areas, providing that the offenses and the offenders in these areas have roughly the same chance of coming to official notice and action. There is increasing evidence…that this assumption is probably true, especially for the more serious offenses….

In summary, burglary is one of the most reported offences, having a general reporting rate of 50 to 70 percent, increasing to 97% when loss is sustained. Furthermore, those offences reported and recorded tend to be the most serious burglaries. It is evident that official crime data, even with its deficiencies, provides useful and valuable information, assisting the researcher in understanding the offence.

Official Data

Low success rates are common in official burglary data. Police investigative methods have routinely met with poor results. Police clearance rates, total cases where a suspect has been identified and either charged or cleared by other means (no charge), vary between eight to thirty percent of reported burglaries (Burrows, 1986; Chard, 1995; Coupe & Griffiths, 1996; Maguire & Bennet, 1982; Shover, 1991; Simmons, 2002; Stockdale & Gresham, 1995). Simmons (2002, p. 71) points out that detection rates increased over the later half of the nineties, but have declined since then. This means that a suspect is never identified in 70 percent to 92 percent of all burglaries.

When a suspect is charged it is seldom known how many break-ins they have actually committed. In many cases offenders are reluctant to identify other locations they have burglarized. They are concerned that further confessions may lead to more charges.

When immunity is offered offenders may still refrain from identifying all of their target locations. They are reluctant because other crimes may have been committed in conjunction with the break-in, for example, theft of the victim's auto. A co-offender who they do not want identified may have accompanied them. The offender may have committed some form of behaviour that even they feel is anti-social, for example, defecating on the floor of the victim's house.

Miethe and McCorkle (1998) suggests that due to the low reporting rate for burglary and the small proportion of offences that result in arrest, burglar characteristics, based on official data, may not be representative of the total offender population. Officially recorded offenders represent the failures, the unsuccessful criminals. Furthermore, officially recognized offenders may result from police practices for example, selecting families, individuals and areas for special attention or using discretionary prosecution policies (Farrington, 1979). Targeting may tend to distort the characteristics of the pool of arrested offenders from those of the total offending population. Discretionary prosecution practices will influence who is charged and who is diverted through alternative process.

However, Walsh (1986) and Scarr (1973) argue that if a burglar is successful they will continue to offend until they are caught. Reppetto (1974) learned, from burglars in the Boston area, that most offenders would re offend once released. Generally, burglary has one of the highest recidivism rates (Miethe & McCorkle, 1998; Reppetto, 1974).

Wright et al. (1994) conducted an ethnographic study of burglary in St. Louis, Missouri. Their snowball sample consisted of 105 non-incarcerated burglars, ninety-two percent (92%) of these subjects had prior arrests and fifty-eight percent (58%) of these arrests were for burglary.

Chronic Offenders make up a small proportion of the offending population; however, they commit a disproportionate number of offences. Farrington (1979) found 17.4 percent of the convicted youth in his sample accounted for 49.1 percent of the total number of convictions. These results are consistent with Wolfgang, Figlio, and Sellin's findings, where six percent of a cohort of 9,945 males born in 1945 accounted for 52 percent of arrests recorded by the group (Blumstein, Farrington et al., 1985; Farrington, 1979).

Given this information, it is likely that Walsh (1986) is correct in suggesting that offenders committing the majority of burglaries will eventually be caught simply because of their propensity to offend. Yet, many offences will result in a successful outcome and many 'offence series' end without apprehension. After a short break, consuming the plunder of a successful series, now succumbing to the desire to satisfy a new need they may start into another series, only to be caught through some mistake or error in judgment. Therefore, it is conceivable that official data provide reliable details about offenders who have been successful in their endeavors. As a result, information on the patterns associated to the majority of known offenders is very useful.

Early criminal behaviour of repeat offenders is most likely indicative of many individuals who are one time, or sporadic offenders, who infrequently attract the attention of the criminal justice system. Knowledge from known offenders builds on our

understanding of offending patterns, providing information on historical criminal activity to present offending behaviour.

Official data also provides information on the majority of the offending population who commit few offences prior to apprehension. These individuals increase our knowledge about early individual offending patterns. At minimum, official data acts as a starting point from which to build upon.

Official Police Reports

It is expected that official police burglary reports will yield information on a significant percentage of reported burglaries committed in the region. Reported residential burglary file information is obtainable from the record management systems (RMS) of the Victoria/Esquimalt, Saanich, and Oak Bay Police Departments. These municipalities are the core municipalities of the Capital Regional District (CRD)

The record management systems supply summary information, including, the case numbers, location of the offence, persons involved (witnesses, victims, suspects, and charged persons), date and time range, and a brief description of the event.

Paper files can be located using the case number obtained through the RMS. The hard copy files tend to provide more detail. They may include more information on entry, exit, items stolen, any oddities or peculiarities of the offence, as well as other characteristics associated with the 'modus operandi'. If there are written statements from victims, witnesses, or suspects, they will be located in the file.

If the case has been cleared by arrest or by other means, it is expected that the report will contain the accused address, personal information (age, race, and

employment), criminal record, as well as cross references to other burglaries they may have confessed to.

Burglary case files are retained for seven (7) years. At the expiration of this period the RMS is purged and the paper files are destroyed.

Police Report Deficiencies

The quality of information placed in police reports varies with the amount of time available to conduct the investigation. There is a lack of content consistency; some reports will be very detailed, while others will have only the minimum amount of information required. As a result, characteristics unique to the break-in may be missed. Time/date range and addresses may be incorrectly or inconsistently entered. Reports may be incomplete, for example, the victim may be required to supply a complete list of stolen property, but this list is never submitted. Interviews with neighbours or other potential witnesses may have been overlooked, thus losing potential information on possible suspects. Personal information on arrested persons may be incorrect, because the offender lies about the facts, the investigator fails to collect it, or they record it incorrectly. Finally, cross-references to other pertinent files may not be recorded making it difficult to find associated offences.

With the growth of more sophisticated file management systems there has been a migration from paper files to purely digital files. This process has been slow within the Capital Regional District (CRD) police community. Recently, it is becoming more of a reality for two of the CRD Police departments. Because of this drive to a predominately paperless system information that is not compatible with a digital format may be lost, for example, follow-up information (which is recorded on paper) may be misplaced and not

entered into a paperless file. This appears to be short-term problem; steps are being taken to remedy this situation.

Prior to 2004, CRD Police Departments used three different, essentially incompatible record management systems. Two of the core departments could supply data in a digital format. The other department's RMS had only limited search capabilities and lacked access to data needed for more robust analytical purposes. By 2005, an integrated regional record management system went into operation alleviating many of the difficulties associated to the previous incompatible RMS environment.

4.3 Offender Interviews

Official crime data will not provide specific information on the exact time and date of the offence, all the offence locations and the spatial characteristics of the offender. To compensate for these deficiencies ideally interviews would need to be conducted with known Burglars. It is expected that Offender interviews will provide information on the temporal and the spatial dynamics of their crime. As a preliminary start in this direction an effort will be made to uncover a sample of offender's spatial knowledge, how long they have lived in the region, where in the region they lived, and how long has they lived at each location within the region. This information will be used to determine the offender's awareness space, his associated activity space and activity nodes (work, school, or social places). Burglars will be questioned on why particular target areas were chosen, what routes were taken to the targets, and what modes of travel were used. An effort will be made to try and identify any directional biases that influence the offender's trip decision making. Determining the distance from the offender's home to crime site will help in establishing whether buffer areas exist, and what effect distance has on

criminal offending patterns. This information is necessary to determine the offender's temporal and spatial range of criminal activity.

Potential Problems with Offender Interviews Incarcerated

Researchers have drawn their samples from either incarcerated or non-incarcerated offenders. Burglar populations are readily available through local correctional institutions. With the permission of prison officials and the consent of offenders, a small sample can be obtained (Nee & Taylor, 1988; Rengert & Wasilchick, 1985; Wright & Logie, 1988). However, many researchers are skeptical of the information provided by incarcerated offenders. They are concerned that incarcerated offenders may not be an accurate representation of the offender population. Instead, these individuals characterize the failures or unsuccessful portion of the population (Cromwell, Olson et al., 1991; Wright, Decker et al., 1994). It is quite probable, however, this is not the case and that most offenders are captured and officially recorded at one point in their criminal careers.

There is a widely held belief that incarcerated offenders do not act naturally within a prison environment. For example, they perceive themselves as professionals accomplished in their field. When events are related to interviewers, offenders portray their acts as performed in a cool, calm and deliberate manner. Yet, Wright et al. (1994) found that non-incarcerated subjects committed their crimes in a hurried haphazard manner under intense emotional pressure.

Memory effects and hence recall can influence the quality of information obtained from incarcerated offenders. Many incarcerated offenders have been removed from

society for some time. They may have forgotten some or all of the details of their last offences. They may telescope some offences from farther back into the study period. They may be confused about the details commingling facts from several burglaries into one. Finally, incarcerated offenders may distort the truth anticipating specialized treatment (Cromwell, Olson et al., 1991; Walsh, 1980; Wright, Decker et al., 1994).

The difficulty lies in ascertaining the accuracy of offender reports. Wright et al. argue that researchers have limited options in determining the veracity of incarcerated offenders. Some of these impediments can be resolved by cross checking offender accounts with official records, or as a last resort discussing the matter with victims (Brantingham & Brantingham, 1984; Wright, Decker et al., 1994). Walsh (1980) argues using a set of structured questions can assist in overcoming doubts about the offender's honesty. But there is information that cannot be verified through official records or victim interviews, for example, the degree of planning that went into the event, spatial and situational characteristics considered; and the emotional state at the time of the event.

There are obstacles associated with incarcerated burglar populations, but with careful cross checking and interviewing some of these problems are controllable. Wright et al. (1994) believe that interviews with incarcerated offenders have made a positive contribution to the body of knowledge surrounding burglary. Furthermore, they have found that there are many response similarities between incarcerated and non-incarcerated offenders.

Nee and Taylor (2000), in their work with prison based offenders, found little difference with results obtained in similar studies with non incarcerated offenders. In some situations non incarcerated samples were not reflective of the potential offender

population. Recent non incarcerated offender studies used similar techniques (visual cues) to those used with the prison populations; therefore, they did not observe actual offender behaviour in the open environment. Nee and Taylor (2000) believe that prison populations offer a rich source of information in understanding burglary.

Non - Incarcerated

It is more difficult to recruit non-incarcerated offenders. Samples are usually created with the help of Criminal Justice personnel (Cromwell, Olson et al., 1991), street-workers (Wright, Decker et al., 1994) or active burglars (Cromwell, Olson et al., 1991; Wright, Decker et al., 1994). Wright and Decker (1994) preferred not to use Criminal Justice personnel. They felt that offenders might suspect that a "sting" was in the works. Unsuccessful offenders might be over-represented in their sample. They thought successful burglars might not want to associate with officially recognized offenders who were failures. Yet, Cromwell, et al. (1991) recruited using both justice personnel and offenders, it appears that these concerns were not considered obstacles in the development of their sample.

Researchers dealing with non-incarcerated individuals still have difficulties with the veracity of their subject's responses. Offenders may distort the truth in an attempt to please the interviewer (Binder & Geis, 1983; Stern, 1979). Offenders may attempt to deceive the interviewer to avoid detection for other offences, to gain respect or to be mischievous (Brantingham & Brantingham, 1984; Brantingham P.L. & Brantingham P.J., 1984). However, Wright et al. (1994) found that non-incarcerated offenders who volunteer to participate in a project would be less inclined to be dishonest. Furthermore, they (Wright, Decker et al., 1994), submit that in a field setting some of these difficulties

can be overcome with the assistance of official records, good interview techniques and direct observation.

Consent of Offender

Acquiring the consent of the offenders may be difficult. Bennett and Wright (1984) conducted a study using a sample consisting of English burglars. They obtained their sample with the assistance of Probation and Corrections staff. They are not completely sure how many offenders declined the offer to participate. They feel there was less than a 10% refusal rate amongst incarcerated offenders. They do not know how many probationers refused. Shaw (1996) compiled a sample of Canadian burglars with the help of Prison Officials. There is no information on the number of individuals who declined to participate. Macdonald (1986) obtained his sample of incarcerated Canadian burglars with the assistance of prison staff. He found the initial response rate was low, as a result, several attempts were made to gather a sample. As the study progressed more offenders approached the researchers asking to participate.

Wright and Decker (1994) obtained their non-incarcerated sample of U.S. burglars using a Street Worker to make the initial contacts. They later acquired the assistance of a reformed criminal to aid them in their search. A fee was offered as an incentive to gain the offender's consent. Later in the study, offenders were used to help recruit other participants. Cromwell, et al. (1991) used Criminal Justice Officials to assist in obtaining a sample of non-incarcerated American burglars. They later used offenders to recruit other subjects. Offenders were offered a fee for participating in the study and recruiting new subjects.

Initially, there was reluctance on the part of both incarcerated and non-incarcerated offenders to participate; however, as the studies progressed suitable samples were obtained. It appears offenders were willing to participate once they realized they could trust the researchers.

4.4 Police Interviews

The interviews with police pose similar and unique problems. The majority of police officers work shifts. Shifts patterns are not fixed, instead, they vary over time. Police have other responsibilities that they have limited or no control over, for example, court appearances and extended shifts. This could create problems trying to set up and conduct interviews.

Asking police to identify their perceptions of crime locations could be viewed as a threat to their knowledge. Police may be reluctant to participate because they may feel their credibility is at stake. However, this does not pose a significant threat in this research. It is believed that the level of interest will outweigh any fear of criticism.

4.5 Samples

Taking a Sample from the population offers several benefits, it reduces costs, cuts down on resources, expedites data collection, and in some cases allows for more comprehensive data collection (Clark & Hosking, 1986; Taylor, 1977). In the end cost and time dictate the need and size of a sample (Clark & Hosking, 1986; McGrew Jr. & Monroe, 1993).

It is important to determine an appropriate sample size. Clark and Hosking (1986) argue samples can be determined by past practices in similar surveys, for example 3 percent is an acceptable sample size for studying demographic characteristics of urban

populations (McGrew Jr. & Monroe, 1993). Statistical tests require minimum sample sizes to obtain useful results. A sample size of 30 is considered the minimum number of participants for a sample (Clark & Hosking, 1986; McGrew Jr. & Monroe, 1993). Finally, another technique to determine an appropriate sample size incorporates confidence interval structures (Clark & Hosking, 1986; McGrew Jr. & Monroe, 1993).

Police

Given the time constraints, costs, and manpower limitations for this project a sample of operational police officers will be used. Taking a 3 percent sample or a sample based on confidence interval structures leads to samples below the minimum of 30 participants.

In their study of burglary cue perceptions, Ham-Rowbottom et al. (1999) used a sample of 41 police officers. Twenty-four police recruits were chosen by Rengert and Pelfrey Jr. (1997) to determine perceptions of dangerous places in Philadelphia. Ratcliffe (2001) used a sample of 65 police officers in his study of police awareness of hotspots. A sample of 40 participants, drawn from a total population of 279 officers who actively investigate burglaries, will be used in this study. It is consistent with similar research involving police, and it is manageable taking into consideration the resource limitations in this study.

Offender

A number of studies have used a variety of both incarcerated and un-incarcerated offender sample sizes. Wright et al. (1994) obtained a sample of 34 un-incarcerated offenders in their research. Rengert and Wasilchick (1985) interviewed 35 incarcerated

offenders in their study. Cromwell et al. (1991) collected 30 burglars for his work. This study will attempt to gather a sample of 30 burglars.

4.6 Maps

Maps of the Greater Victoria region form an integral part of this research. Cadastral maps of the region are important because they contain the street networks, zoning, and parcels, lot locations and addresses (Aronoff, 1995). The maps enable geo-referencing of offence sites. The display of Lot locations allow for the visual representation and analysis of the target site in relationship to other houses and road networks. Zoning will identify the land use categories for areas under study.

Planimetric maps contain the political boundaries of the city and adjoining municipalities (Aronoff, 1995). Offenders do not constrain their activities within artificial boundaries, for this reason it is important to be able to analyze offences across jurisdictions. Topological maps will provide spatial relationships of areas, complex road networks and elevations. Road networks contain impedances, for example, speed limits, directional travel, stoppages, anchor points and barriers (Aronoff, 1995; DeMers, 1997). The character of the environment has an enormous impact on the Offender's spatial behaviour. Topological maps will facilitate spatial analysis of the offender's activities in the environment.

Maps will be used to geo-reference offence sites and offender activity nodes. They will reveal the location of the target in relation to other residences. They will identify the complexity of the street network. Real edges can be visually determined. Distance calculations can be obtained using the street networks.

The Capital Regional District[1] (CRD) in cooperation with the local municipalities has created cadastral maps for the region. Most municipalities have maps consisting of the line work and lot locations with accompanying attribute tables. Attribute tables contain addresses and other pertinent information.

Difficulties with Regional Maps

One difficulty that must be resolved is how the data for the topological maps are obtained. Some municipalities have conducted extensive surveys to obtain the information. Others have digitized maps from existing maps of unknown quality.

Another problem arises with edge matching when the different municipal boundaries are joined. Error resulting from the measuring techniques and digitizing process has created discrepancies when the maps are joined at the boundaries.

There is a lack of standards to define the attribute data. Amenities in one municipality may be defined and visualized differently from another municipality. A joint municipal and CRD panel worked on these and other issues surrounding this project. The outcome of the panel discussions is unknown.

Another problem lies in the geo-referencing or geo-coding of point data. Currently, the CRD has a comprehensive address file. There is still some discrepancy between a limited number of addresses and their physical location; in other words, the addresses are not necessarily located on or within a reasonable distance of their polygon. In some cases the address may not be included in the geo-referenced address file. In

[1] Regional Districts are a regional form of government midway between the province and local municipalities. They consist of elected representatives from local municipalities. They coordinate matters or issues that affect regional municipalities. They are also responsible for unorganized territories within the region, for example, the Juan de Fuca EA.

conjunction with police address data this will complicate the geo-coding of offence and offender addresses. Ratcliffe (2004) argues that at least 85% of the address data must be correctly geo-referenced to be considered complete; anything less may lead to incorrect conclusions derived from the data analyses.

4.7 Point Pattern Analysis

Several issues arise when analyzing spatial social phenomena. Five main concerns will be examined here, the Geographical Scale, Natural Ordering or Indexing, Edge or Boundary Effects, the Modifiable Areal Unit Problem (MAUP) and geocoding data.

One of the purposes of this research is to determine if unique spatial patterns of burglary exist and locate were they are. One of the problems in spatial analysis is the geographical scale. A pattern, which exists at one geographical scale, may simply represent random variation at another scale (Bailey & Gatrell, 1995; Barber, 1988). Bailey and Gatrell (1995, p. 36) suggest that determining scale depends on the phenomenon under study, the objective of the analysis, the scale the data were collected at, and the judgment and experience of the analyst. There is no absolute way to determine an appropriate scale for analysis. However, Fotheringham (1989) points out that one method of overcoming scale effects is to examine the basic entities, for example individually burglarized residences. Data are not investigated using different scales or levels of aggregation; instead analysis stems from the basic unit under study.

This research recognizes and will be sensitive to the shifts in scale during the analysis. Point pattern analysis is conducted in a manner which will identify unique or significant patterns. The method used to identify clusters of events will point out those that are significantly different from the general distribution of events.

A second problem with spatial data is its lack of ordering or indexing in space. There is no simple indexing system, in other words, there is no 'before or after'. The phenomenon under study is often irregularly distributed over a number of sites or areal units throughout the study region. Spatial dependence or correlation extends in several directions over the area under study. Bailey and Gatrell (1995) suggest one method for overcoming the indexing problem is to create a grid or lattice network overlaid on the study area. The grid provides reasonable natural ordering and identical neighbourhood structure (Bailey & Gatrell, 1995, p.36).

Much of the statistical theory is based on the assumption that observations are independent. Tobler (in Miller, 1999, p.382) calls attention to the fact that "…all things in space are related but things close in space are more related." Spatial dependence weakens the statistical assumption of independence, thus affecting the results of many spatial statistical data analysis (McGrew Jr. & Monroe, 1993; Miller, 1999).

The analysis of burglary point patterns will incorporate a grid system in which offences will be counted. Significant or unique patterns are identified based on their spatial association.

Boundary problems influence the phenomenon under study. Typically, similar areas or neighbourhoods surround a study area. Analysis rarely extends to the whole region, but examines areas within the region. When analysis is conducted on areas within a region of similar areas the possibility exists of excluding observations around the edges (McGrew Jr. & Monroe, 1993). Miller points out edge effects tend to "… ignore the interdependencies and interactions that occur among locations within and outside the bounded region" (1999, p. 379). To overcome this problem a researcher must compensate

for the influence of edge effects. One method incorporates the use of a guard area (Bailey & Gatrell, 1995). However, the more irregular the boundary under study is, the more difficult it is to arrive at a satisfactory solution.

One of the main purposes of this research is to examine how jurisdictional boundaries affect burglary point patterns. For this reason edge correction techniques will not be used. Instead, data will be analyzed within the jurisdictional context and then compared with results once jurisdictional boundaries are removed.

The Modifiable Areal Unit Problem (MAUP) occurs when data are collected and analyzed from arbitrarily determined areas or modified zones. Social data are commonly collected from household measures aggregated up to arbitrarily determined areas. Moreover, with the development of spatial analytical tools there is greater ease in manipulating geographic units for study. Barber argues that "...different aerial definitions can have a substantial impact on the values of most...statistics" (1988, p.117). Studies that used alternative subdivisions or regionalization scheme create the potential for different outcomes depending on which forms are used (McGrew Jr. & Monroe, 1993). For example, results obtained from data aggregated at the enumeration areas cannot be compared to results obtained from data aggregated at the level of the municipal entity because their spatial arrangements differ. Results obtained from the analyses are conditional on the reporting zones (Bailey & Gatrell, 1995). Furthermore, they run the risk of being artifacts of the spatial recording system (Miller, 1999). One method of overcoming this deficiency is to design less arbitrary zones. Another method is to analyze the data using the basic entity under study (Fotheringham, 1989). Finally, visualization offers an alternative to traditional statistical methods for representing spatial data.

Fotheringham (1989) points out the 'Geographical Analysis Machine (GAM)' provides a visual representation of data at different spatial scales in contrast to performing specific spatial analysis at a single scale.

This research will examine break and enter from its basic entity, the event location. It is recognized that MAUP will be present when examining patterns within municipal or jurisdictional context and then comparing them to patterns generated at the regional level. However, one of the functions of this research is to explore what type of pattern changes occur when break and enter is examined at the two distinct levels.

Geo-referencing point data produces unique problems. Ratcliffe (2004) points out that geo-referenced point data suffers from locational inaccuracy and incomplete data coding. To overcome the first problem it is recommended that there is careful use of the offset settings within GIS (geographical information system) software to reduce the distance between user geo-referenced location and actual building location (Ratcliffe, 2004). Normally the block is split into odd/even addresses in upper, mid and lower block address ranges. Data is geo-referenced within the applicable range. Errors arise if ranges are too broad or non-existent addresses are geo-referenced into a corresponding address range.

Incorrect or inconsistent data entry leads to address inaccuracies. As a result, not all offence locations will be geo-referenced and thus locations will be excluded from the analysis. Ratcliffe (2004) has explored this problem and determined that a minimum hit rate of 85% should be obtained to preserve the integrity of the data for analytical purposes. It is clear that the researcher should make every effort to correct inaccurate

locations to enable complete geo-referencing, however, time and effort must be weighed against the level of accuracy that may or may not be attained.

4.8 Summary

This study relies on both official statistics on crime and original data collected by the author. Despite the shortcomings associated with these sources of information an extensive body of existing research supports the argument that analysis of this data should be fruitful in providing explanations of spatial variation in criminal activity. The following chapter will examine the issues discovered with the data used in this study. It will describe the measures taken to overcome the difficulties encountered.

Chapter 5: The Format for Spatial Analysis of Crime (B and E): The CRD and Data Quality

5.1: Introduction

The Capital Region District (CRD), Information Technology section, provided the map layers used in this study. The map layers included a cadastral map of the region, road network, municipal boundaries and the local area polygons (neighbourhoods). The cadastral map contains the property polygon addresses for the region. The maps are in shapefile format projected in universal transverse Mercator (UTM) grid mapping system NAD 83 - Zone 10.

The cadastral map of the region contains the merged maps from each municipality and the unorganized territories found within the CRD. The currency of the maps differs, based on the municipality they were obtained from and when they were last updated. The CRD merged map is the most recent collation of regional maps available; however, it is clear that it does not contain all the properties in the region up to the end of 2004. The maps do not contain residential information for the Department of National Defense (DND), or First Nations reserves. The accuracy of the maps varies between municipalities. However, for the purposes of this research the CRD map is suitable, because the alternative is to access maps from individual municipalities. The time and effort to achieve such a task would prove unmanageable.

5.2: Address Master Index File

The CRD did not have a geographically referenced address file for the property polygons; therefore, a file had to be created to enable geo-coding of the break and enter

addresses. Centre points were derived from the property polygon reference points creating a geographically referenced master address index. MapInfo desktop mapping application was then used to convert the CRD maps (shape file format) to tab files (MapInfo file format). The break and enters were then geo-coded against the master address index file.

5.3: Crime Data – Hurdles – Holes

The Criminal Code of Canada is divided into three broad categories, crimes against the person or violent crime, crimes against property and other crimes. Within each general category there exist sub classifications which differentiate between the type of act and the severity of the act. Violent crime has numerous categories which contain sub classifications, for example: Murder is classified into 1st, 2nd and 3rd degree. Assault is differentiated by degree of injury and whether weapons were used. Property crime essentially involves depriving someone of property they are entitled to possess. There are a number of methods described to relieve an individual of their property for example, theft or fraud. Theft is distinguished by the various methods used to commit the act and the value of the items taken, for example, shoplifting. Break and enter has four classifications, residential, business, other and cottages. However, if during the course of a break and enter an assault occurs, the assault is classified as the primary offence and is forwarded to Statistics Canada, while the break and enter is classified as a secondary offence and is not sent to Statistics Canada. When Statistics Canada publishes its crime report, the assault is documented, but the break and enter is not. This complex system of classification sometimes leads to difficulty interpreting the act and error in classifying the event. Even experienced crime coders have difficulty in defining a set of circumstances

as a specific crime. However, for the most part the type of event and its classification is straightforward.

From a research perspective, it is important to understand the subtlety of offence classification. For example, researchers have studied property crime as a single classification, failing to acknowledge the differences that exist in the types of criminal activity, the spatial/temporal characteristics and the type of individual who commits a specific type of offence. An individual who commits frauds probably will not commit a break and enter. Residential break and enter has a different offence pattern to Commercial break and enter. They occur at different times and locations. Domestic homicide has different characteristics from homicides occurring outside of a bar. Failure to understand the distinctions may lead to erroneous research results.

5.4: Police Services Division

The Ministry of the Solicitor General, Police Services Division collects crime data for the Province of British Columbia. The data are aggregated to the municipal level. local police agencies review and correct crime data guaranteeing their accuracy prior to submitting it to Police Services. The data are restricted to crime counts and clearance rate for each municipality.

Police Services Division provided Excel spreadsheets with municipal residential break and enters, clearance rates, police strengths and municipal populations for period of 1998 to 2004. The break and enter data were used as a base to compare with data obtained from the police RMS.

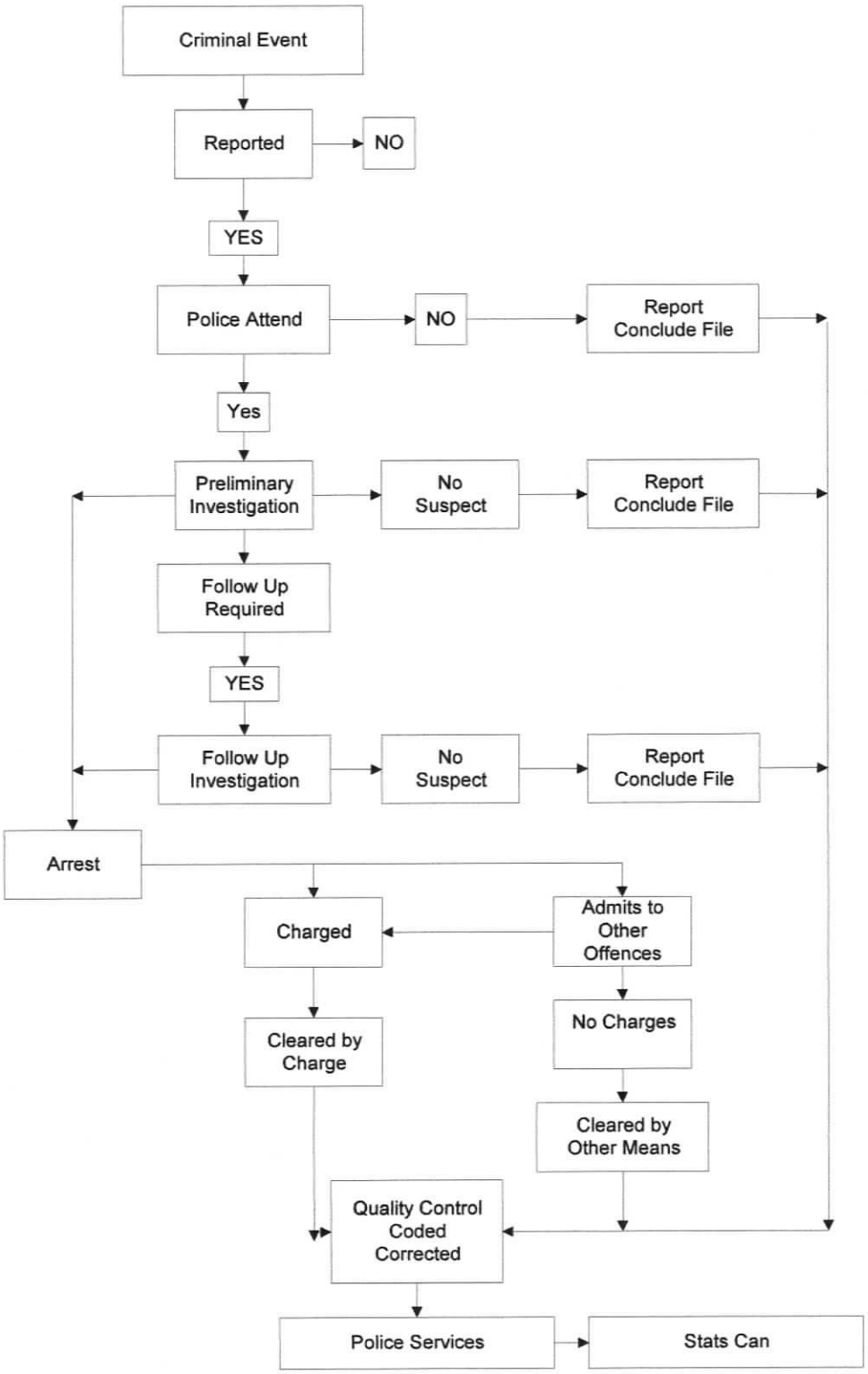

Figure 5.1: Reporting Process – Criminal Event.[1]

[1] This is a simple outline of the reporting/recording process of a criminal event assembled by the author.

Police Services Residential Break and Enter								
Municipality	1998	1999	2000	2001	2002	2003	2004	Total
Victoria	885	820	831	611	514	653	1,033	5347
Esquimalt	125	127	117	115	113	0	0	597
Saanich	448	464	443	334	333	275	397	2694
Oak Bay	76	76	74	64	33	56	54	433
Core Total	1534	1487	1465	1124	993	984	1484	9071
Central Saanich	29	33	22	18	18	20	27	167
North Saanich	13	35	13	5	18	14	29	127
Sidney	17	50	25	14	18	7	14	145
Sidney Provincial	24	12	10	8	10	9	12	85
Peninsula Total	83	130	70	45	64	50	82	524
Colwood	56	50	49	58	56	47	40	356
Langford	103	111	93	96	127	95	95	720
View Royal	55	57	39	35	31	22	32	271
West Shore Provincial	54	41	33	57	34	33	49	301
West Shore Total	268	259	214	246	248	197	216	1648
Sooke	0	0	0	0	64	40	41	145
Sooke Provincial	132	80	70	71	46	25	23	447
Sooke Total	132	80	70	71	110	65	64	592
Region Total	2017	1956	1819	1486	1415	1296	1846	11835

Table 5.1: Police Services Break and Enter.[2].

5.5: Capital Regional Police Department Data

A formal request was made to regional police departments for residential break and enters data. All parties granted permission to access to their data.

[2] Ministry of the Solicitor General – Police Services Branch.

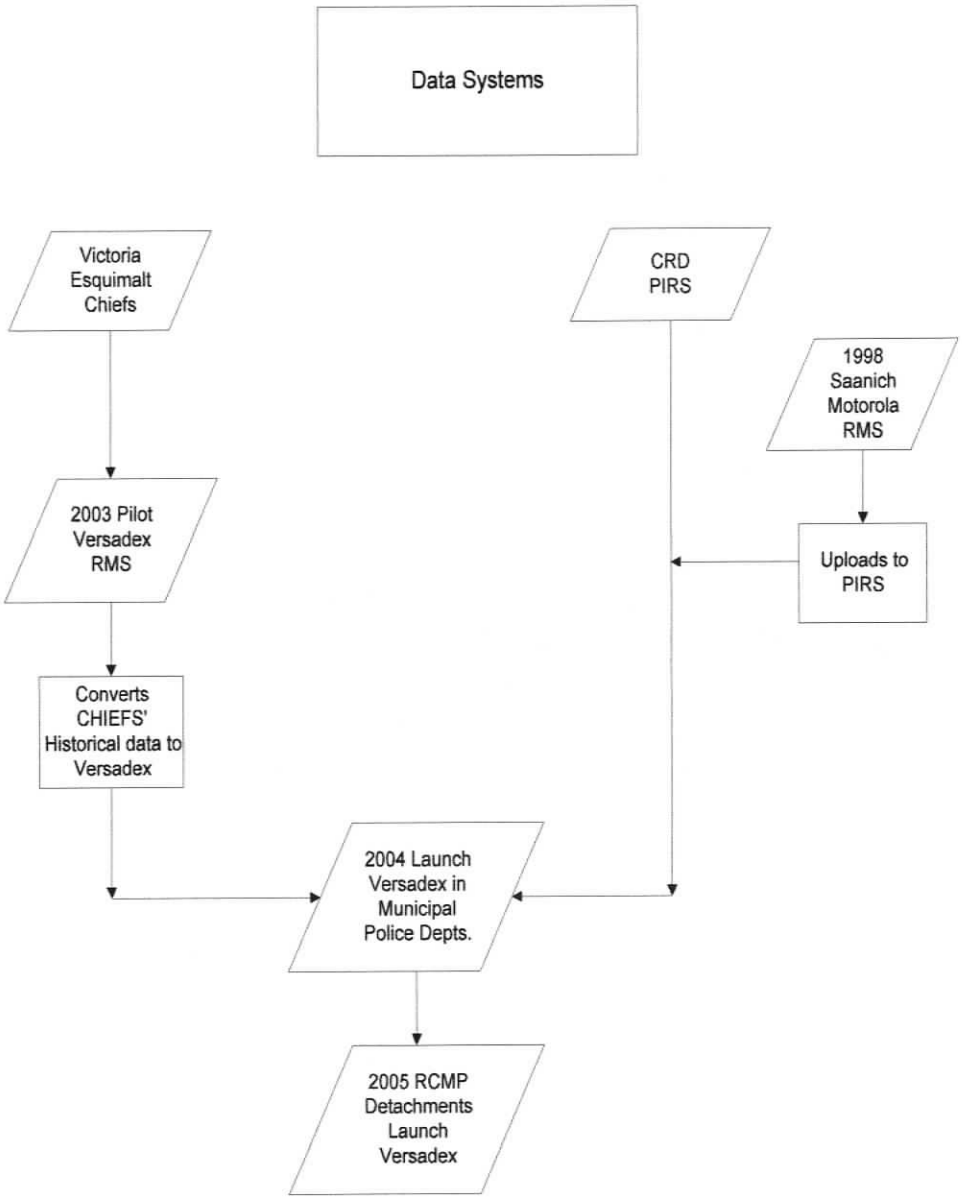

Figure 5.2: Evolution of RMS in the CRD[3]

Historically, the regional police departments were divided into three distinct record management systems (RMS), two of which were not integrated. The Victoria Police department and the Esquimalt Police department used a RMS known as CHIEFS or CRIMES. The RCMP, Oak Bay Police and the Central Saanich Police used the Police Information Retrieval System (PIRS) administered and maintained by the RCMP. The

[3] This is a simplistic overview of the recent history of RMS in the CRD constructed by the author.

Saanich Police used a RMS developed by TalkThrough Canada, later acquired by Motorola Canada. The Saanich RMS was designed to upload data into PIRS, thus enabling data access and sharing of information with PIRS agencies.

PIRS provided limited information; however, police agencies participating in PIRS could access basic crime information across jurisdictions. All departments excluding the Victoria Police and the Esquimalt Police could access information on PIRS. Victoria and Esquimalt could only view information stored on CHIEFS. All other police agencies could not view information stored in CHIEFS.

In January of 2003 the Municipality of Esquimalt contracted with the City of Victoria to provide police services for their community.

In 2004 the CRD police departments introduced new RMS software known as Versadex developed by Versaterm. The Victoria police piloted the project in 2003 ironing out all the major bugs. Oak Bay, Saanich and Central Saanich came on board in 2004 once the system was tested and fully functional. In 2005 the CRD RCMP jurisdictions introduced the software into their agencies.

When the Victoria police launched the new RMS they converted their archive records to the new format. This created a problem since Victoria and Esquimalt were previously using the same RMS (CHIEFS), but as two distinct entities. When Victoria converted its archive data it had to distinguish between case numbers common to both agencies. To accomplish this 10 was placed in front of the Victoria file number and 20 in front of the Esquimalt file number.

All the RMS used the standard crime coding system mentioned above. Only residential break and enters were requested. Data was obtained from the regional police

agencies in four different file formats, excel, Access db, FoxPro db, SPSS db and WordPerfect. The fields included, case number, report date/time, from date/time, to data/time and crime location. The Victoria – Esquimalt residential break and enter files were obtained for the period of 1998 to 2004 in excel file format from the Versadex RMS. The Saanich files for 2004 were obtained in excel format from the Versadex RMS. The historical Saanich files were obtained in two different formats, Access db format for late 1998 to 2003 from the Motorola RMS and FoxPro db format for files dating back to early 1998. The RCMP provided data in SPSS file format and Access db format from PIRS. Oak Bay and Central Saanich had no mechanism for downloading their PIRS data; therefore, each individual file was cut and pasted into Word Perfect documents and then entered into an Access db. This was an extremely time consuming and monotonous process.

POLICE RMS RESIDENTIAL BREAK AND ENTER								
Municipality	1998	1999	2000	2001	2002	2003	2004	Total
Victoria	891	896	850	660	706	647	777	5427
Esquimalt	123	125	116	112	109	0	0	585
Saanich	486	510	515	399	402	337	389	3038
Oak Bay	81	74	72	62	32	57	57	435
Core Total	1581	1605	1553	1233	1249	1041	1223	9485
Central Saanich	34	30	26	18	17	19	29	173
North Saanich	15	40	16	11	19	17	29	132
Sidney	19	57	28	15	21	7	16	144
Sidney Provincial	12	12	14	9	10	8	13	66
Peninsula Total	80	139	84	53	67	51	87	515
Colwood	62	53	55	65	67	53	46	401
Langford	115	125	105	118	141	100	107	811
View Royal	63	57	44	49	34	28	33	308
West Shore Provincial	58	52	35	78	39	37	51	350
West Shore Total	298	287	239	310	281	218	237	1870
Sooke			38	48	71	42	45	244
Sooke Provincial	113	74	35	25	43	31	20	341
Sooke Total	113	74	73	73	114	73	65	585
Region Total	2072	2105	1949	1669	1711	1383	1612	12455

Table 5.2: Police Break and Enter data obtained from jurisdictions RMS.[4]

5.6: Data Problems

There were a number of issues immediately evident with the data. The Victoria Police did not classify the break and enters into sub-categories, instead they codified them all as 'break and enter other', and therefore, it was impossible to ascertain which were residential. The Victoria files did not include any of the Esquimalt break and enters for the period 1998 to 2003, pre amalgamation. A substantial number of dates and times were missing from the data. When officers open a Versadex RMS file, there is no forced choice to/from date and time requirement. Due to time constraints, officers will often accept the default time which is the report date, thus distorting the event occurrence time.

[4] Data obtained from police departments in the CRD.

RCMP data were not broken down by jurisdiction. Date fields were not formatted in the date format, instead they were formatted in different data types. Upon further inspection of the data, it was obvious there were instances of incorrect crime coding. The Saanich files did not include early 1998 break and enters, this was the year Saanich migrated from PIRS to Talk Thru RMS.

Historically, the operational data used by police for investigative purposes was not corrected. If an error was discovered the correction was sent to police services, however, there was no mechanism in place to correct operational data. In Versadex, when an error is located the operational database is corrected simultaneously.

5.7: Data Solutions

Versadex provides a secondary coding system to distinguish between types of break and enters. It is not clear how effective this code is in distinguishing between residential and all other break and enters types, but under the circumstances this was the only option available. The code was used to generate a file of residential break and enters. A cursory review of the subsequent file indicated the records were consistent with residential break and enters.

An excel file of all Esquimalt break and enters from 1998 to the end 2002 was obtained. A summary review of all Esquimalt break and enter events was conducted to isolate and acquire a unique file consisting of residential break and enters.

Each RCMP jurisdiction is differentiated by a unique letter/number combination known as a 'collator'. Agency collators were used as a filter to separate the RCMP data into their respective jurisdictions.

Dealing with the date records proved more problematic. Date fields contained different date formats, character, numeric and date. Some files contained date records that were in a numerical sequence ordered by year, month, and day while in other records a backslash separated dates. The date sequence varied in three ways, year month day, month day year, or day month year. Files where data were taken from three different RMS had all three types of formats.

Initial attempts to convert the combined character/number data to date fields lead to the deletion of a substantial number of records in test files. To overcome this setback, data were filtered by type, i.e., by character or number, and separately converted to date fields. The results were appended to a new table. A review of the table indicated this method rectified the problem.

This did not overcome the fact that a substantial number of files had incomplete or no date/time data. The only method available to increase or correct this deficiency would require reviewing all files with missing data in the hopes of finding the time and date information in the narrative of the report.

Some jurisdictions were coding break ins to 'apartment/condominium laundry rooms and storage room lockers' as 'residential break and enter' while others coded this as 'break and enter other'. There was some confusion over coding classifications, what constituted break and enter other and break and enter residential. This finding was discussed with Police Services; they felt that burglaries to 'apartment/condominium laundry rooms and storage lockers' should be classified as a 'residential break and enter'. However, some departments disagree and continue to treat these events as a 'break and enter other'.

The Victoria Police started reviewing and correcting their data to reflect the coding change. At the time of writing the reclassification had resulted in approximately a 30% increase in the number of residential break and enters for 2004 (777 events to 1033 events). Police Services were going to discuss the matter with regional departments to try and clarify coding procedures. Classifying laundry room and storage room in this manner substantially inflates the number of residential break and enters in some jurisdictions.

The reason Saanich was missing early 1998 files was due to the transition from PIRS to the Talk Thru RMS. The PIRS files were not converted to the Talk Thru RMS. Fortunately, archived PIRS files were located and appended to the 1998 data file.

5.8: Comparison CRD Data to Regional Police RMS

The number of break and enter found on police RMS data did not agree with those found in Police Services data. Generally, the RMS data had a higher number of incidences than the Police Service data. This was to be expected given the previous discussion. For the region, the differences ranged from a low of 3% or 55 RMS events in 2004 to a high of 21% or 296 RMS events in 2002.

In 2004 Victoria recorded 1033 residential break and enters. Originally, they had recorded 777 events for the year, however, due to a reassessment of coding practices and re-coding of events the number increased to 1033. This number appears historically high, since Victoria usually has approximately double the residential break and enters that Saanich records. Police Services believes that Victoria has mistakenly undercounted residential break and enters for several years. The Victoria data for the year 2004 used in this study was obtained from the police RMS prior to the re-coding corrections, therefore, the number of events used in the data analysis was 777.

DIFFERENCE BETWEEN POLICE RMS - POLICE SERVICES							
	1998	1999	2000	2001	2002	2003	2004
Victoria	6	76	19	49	192	-6	-256
Esquimalt	-2	-2	-1	-3	-4	0	0
Saanich	38	46	72	65	69	62	-8
Oak Bay	5	-2	-2	-2	-1	1	3
	47	118	88	109	256	57	-261
Central Saanich	5	-3	4	0	-1	-1	2
North Saanich Mun	2	5	3	6	1	3	0
Sidney Mun	2	7	3	1	3	0	2
Sidney Prov[1]	-12	0	4	1	0	-1	1
Peninsula Total	-3	9	14	8	3	1	5
Colwood Mun	6	3	6	7	11	6	6
Langford Mun	12	14	12	22	14	5	12
View Royal Mun	8	0	5	14	3	6	1
West Shore Prov[2]	4	11	2	21	5	4	2
West Shore Total	30	28	25	64	33	21	21
Sooke Mun[3]					7	2	4
Sooke Prov[4]					-3	6	-3
Sooke Total	-19	-6	3	2	4	8	1
Region Total	55	149	130	183	296	87	-234

Table 5.3: Difference in actual number of Break and Enters between Police Services and Police RMS.

5.9: Geo-Coding

Geo-coding presented a major obstacle. In MapInfo, the user has two options for geo-coding addresses against a master address index, automatic or interactive. The automatic function runs the non geo-coded addresses against the master address index attaching the geo-reference to the address and moving onto the next address. In the interactive mode the user geo-references each individual address, which is extremely time consuming. It was assumed that at least 50% or more of the break and enter addresses would geo-code using the automatic function. This is typical when geo-coding addresses against a master address index of address ranges versus exact addresses. Unfortunately,

geo-coding to the exact address had a 0% hit rate, this meant that every break and enter in the region was geo-coded interactively.

Interactive geo-coding leads to user errors due to the high volume of addresses involved. The break and enter addresses were geo-coded in small numbers over a lengthy period of time to reduce user error. Even with this precaution some errors did occur. When an error was located, the UTM co-ordinates were corrected and re-entered.

Region	Break and	Geocod	Not Geo	%/Yr
1998	2065	1933	132	6%
1999	2103	1794	309	15%
2000	1949	1679	270	14%
2001	1655	1445	210	13%
2002	1710	1488	222	13%
2003	1383	1126	257	19%
2004	1610	1351	259	16%
Total	12475	10816	1659	13%

Table 5.4: Regional Geo-Code rate by year.

Ratcliffe (2004) recommends an minimum geo-code rate of 85% to assure accuracy in data analysis. In the present research most files geo-coded at 85% or better, but there were some extremes. Looking at the region, 87% of the residential break and enters were geo-coded for the six year study period. Examining individual jurisdictions presents a different picture. All of the municipal police forces had an aggregated geo-code rate above 85% for the study period. Oak Bay had the highest geo-code rate at 95%. Of the Municipal departments Central Saanich Police had several years where the geo-code rate ranged from 74% to 83%. However, due to three high years where geo-code rates exceeded 94% they managed to obtain an average geo-code rate of 87%. At the other extreme, all of the RCMP jurisdictions had total rates below 85%, Sydney – North Saanich had the lowest rate at 70%, Sooke – Renfrew 73%, and West shore had a geo-code rate of 81% for the research period.

	Vic./Esq.	Saanich	Oak Bay	C. Saanich	Sydney/N. Saanich	W. Shore	Sooke	Region
Break and Enter	5991	3036	435	173	385	1859	585	12464
Geo Coded	5291	2760	412	150	271	1503	427	10814
Not Geocoded	700	276	23	23	114	356	158	1650
Percent Not GeoCoded	12%	9%	5%	13%	30%	19%	27%	13%

Table 5.5: Geo-Code Rate by Municipality.

There are several possible explanations for this finding. It was clear that the address file was not current. As of 2002, urban development in the region expanded which meant that a number of new addresses were added to the region. The quality of maps varied from Municipality to Municipality as mentioned earlier. The RCMP is responsible for policing all of the First Nations reserves in the CRD. Since the First Nations reserves are a federal government responsibility the CRD did not have any of the street address for the First Nations reserves in the cadastral map. Police recorded the address incorrectly. Finally, interactive geo-coding is time consuming and tedious, which can lead to accidental rejection, or incorrect geo-reference of an event.

The previous literature review highlighted a number of issues with police data. The discussion above indicates that the similar problems exist in the data used in the present study. Every reasonable effort was undertaken to rectify the problems identified. In many cases, data was excluded because of insufficient information or inability to geo-code events. However, in the majority of situations large numbers of events enabled a reasonable analysis of the data.

Total Not Geo-Coded								
Year	Victoria Esquimal	Saanich	Oak Bay	Central Saanich	Sydney N. Saanich	West Shore	Sooke Renfr	Region
1998	19	33	5	1	13	44	22	137
1999	150	65	2	5	25	46	17	310
2000	131	53	2	1	25	44	21	277
2001	83	32	3	1	10	59	22	210
2002	87	38	0	4	15	44	34	222
2003	121	44	3	5	12	50	22	257
2004	109	26	8	6	21	69	20	259
	700	291	23	23	121	356	158	1672
Total Geo-Coded								
Year	Victoria Esquimal	Saanich	Oak Bay	Central Saanich	Sydney N. Saanich	West Shore	Sooke Renfr	Region
1998	995	451	76	33	33	254	91	1933
1999	871	445	72	25	84	241	57	1795
2000	835	462	70	25	40	195	52	1679
2001	689	367	59	17	22	240	51	1445
2002	727	364	32	13	35	237	80	1488
2003	526	293	54	14	20	168	51	1126
2004	666	363	49	23	37	168	45	1351
Total	5309	2745	412	150	271	1503	427	10817
Total Number of Events								
Year	Victoria Esquimal	Saanich	Oak Bay	Central Saanich	Sydney N. Saanich	West Shore	Sooke Renfr	Region
1998	1014	484	81	34	46	298	113	2070
1999	1021	510	74	30	109	287	74	2105
2000	966	515	72	26	65	239	73	1956
2001	772	399	62	18	32	299	73	1655
2002	814	402	32	17	50	281	114	1710
2003	647	337	57	19	32	218	73	1383
2004	775	389	57	29	58	237	65	1610
Total	6009	3036	435	173	392	1859	585	12489
Percent not Geo-Coded								
Year	Victoria Esquimal	Saanich	Oak Bay	Central Saanich	Sydney N. Saanich	West Shore	Sooke Renfr	Region
1998	2%	7%	6%	3%	28%	15%	19%	7%
1999	15%	13%	3%	17%	23%	16%	23%	15%
2000	14%	10%	3%	4%	38%	18%	29%	14%
2001	11%	8%	5%	6%	31%	20%	30%	13%
2002	11%	9%	0%	24%	30%	16%	30%	13%
2003	19%	13%	5%	26%	38%	23%	30%	19%
2004	14%	7%	14%	21%	36%	29%	31%	16%
	12%	10%	5%	13%	31%	19%	27%	13%

Table 5.6: Geo-Code rates by year and Municipality.

Chapter 6: Spatial Patterns of Break and Enter In the Core of the CRD[1]

"Insanity is doing the same thing the same way and expecting a different outcome"

(Army Col. Chris Short in Ricks, 2006: p. 418)

"The deterrent findings suggest that the more the time police stay in a hot spot, the less opportunity they will have to exercise police powers. This is good for the community but can be boring for the police. Rather than preventing crime by keeping hot spots cool, most police would prefer to catch criminals after crime has already occurred and the harm has been done. Prevention lacks glamour; apprehensions offer the excitement of the chase. A substantial change to a community policing philosophy could make hot spot patrols more interesting, especially if police leave their cars and talk to frequent users of the hot spots. But historically the resistance to such a change has been formidable."

(Sherman & Weisburd, 1995)

6.1 Introduction

Break and enter is a difficult and persistent problem within the CRD, but one that only affects a very small proportion of households, less than approximately 2%. Between the years 1993 and 2000, Break and enter consisted of 17% of all property offences and 10% of all Criminal Code offences in the CRD. This is lower than what has been reported in past research (Chard, 1995; Coupe & Griffiths, 1996). The majority of break and enters are to residences with an average of 61% of total break and enters over the 8 year period. This is consistent with rates uncovered by Fedorowyca (2004) for the year 2002.

[1] Details in Appendix.

Regional Break And Enter									
All Break and Enter	1993	1994	1995	1996	1997	1998	1999	2000	Average
Proportion of all Property Offences	18%	18%	19%	18%	18%	18%	16%	15%	17%
Proportion of all Criminal Code	11%	11%	11%	11%	10%	9%	9%	8%	10%
Business Break and Enter									
Proportion of all Break and Enter	27%	23%	27%	23%	26%	28%	23%	21%	25%
Proportion of all Property Offences	5%	4%	5%	4%	5%	5%	4%	3%	4%
Proportion of all Criminal Code	3%	2%	3%	2%	2%	3%	2%	2%	2%
Residential Break And Enter									
Proportion of all Break and Enter	59%	59%	59%	63%	59%	60%	61%	66%	61%
Proportion of all Property Offences	10%	11%	11%	12%	11%	11%	10%	10%	11%
Proportion of all Criminal Code	6%	6%	6%	7%	6%	6%	5%	5%	6%

Table 6.1: Regional Break and Enter 1993-2000 Proportions[2]

Hope (1995) described three inter-related concepts for measuring and comparing residential break and enter. The first is incidence, which in turn is broken into two components, prevalence and concentration. Incidence measures the number of crimes or incidence of victimization per capita. The other two measures are elements of the first, with prevalence identifying the proportion of victims found within the population at risk (Farrell, 1995b), while concentration measures the number of crimes per victim (Hope, 1995; Pease, 1998; Townsley, Homel et al., 2000). Townsley et al. (2000, p.39) refer to concentration as the" mean number of victimizations per victim", while Tseloni et al. (2004, p. 71) interpret concentration to be the "...mean repeat burglary rate." The first part of this chapter will examine the raw number of residential burglary reported to police departments within the region. The remainder of the chapter will explore the incidence, prevalence and concentration of burglary victimization throughout the region. Concentration will be examined as both mean number of victimizations per victim and mean number of repeat burglaries.

[2] Source: B.C. Ministry of the Solicitor General – Police Services. This information was not available for later dates.

Over the course of the study period (1998 – 2004) 12,455 reported residential break and enters occurred in the Capital Regional District (an average of 1780 per annum). The Core municipalities suffered the highest number of break ins with 9485 or 76%. The next highest sub region was West Shore with 1870 or 15%. The Sooke District followed with 585 or 5% with the Peninsula close behind with 515 or 4%.

Police RMS Residential Break and Enter								
Municipality	1998	1999	2000	2001	2002	2003	2004	Total
Victoria	891	896	850	660	706	647	777	5427
Esquimalt	123	125	116	112	109	0	0	585
Saanich	486	510	515	399	402	337	389	3038
Oak Bay	81	74	72	62	32	57	57	435
Core Total	1581	1605	1553	1233	1249	1041	1223	9485
Central Saanich	34	30	26	18	17	19	29	173
North Saanich	15	40	16	11	19	17	29	132
Sidney	19	57	28	15	21	7	16	144
Sidney Provincial	12	12	14	9	10	8	13	66
Peninsula Total	80	139	84	53	67	51	87	515
Colwood	62	53	55	65	67	53	46	401
Langford	115	125	105	118	141	100	107	811
View Royal	63	57	44	49	34	28	33	308
West Shore Provincial	58	52	35	78	39	37	51	350
West Shore Total	298	287	239	310	281	218	237	1870
Sooke			38	48	71	42	45	244
Sooke Provincial	113	74	35	25	43	31	20	341
Sooke Total	113	74	73	73	114	73	65	585
Region Total	2072	2105	1949	1669	1711	1383	1612	12455

Table 6.2: RMS data[3]

An inspection of the raw number of break and enters at the regional level shows the City of Victoria dominated with 5427 or 44% of the entire residential break and enters over the seven year study period. Saanich followed with 3038 or 24% of residential break ins about half the number of occurrences in Victoria. Combined these

[3] In 2003 the Municipality of Esquimalt contracted with the City of Victoria to provide police services. Information for Esquimalt in 2003 and 2004 is reflected in Victoria's data.

two municipalities had ten times more residential break and enters than the next highest municipality, Langford (811 or 7%).

Police RMS Residential Break and Enter Percent of Region Total								
Municipality	1998	1999	2000	2001	2002	2003	2004	Average
Victoria	43%	43%	44%	40%	41%	47%	48%	44%
Esquimalt	6%	6%	6%	7%	6%			6%
Saanich	23%	24%	26%	24%	23%	24%	24%	24%
Oak Bay	4%	4%	4%	4%	2%	4%	4%	3%
Core Total	76%	76%	80%	74%	73%	75%	76%	76%
Central Saanich	2%	1%	1%	1%	1%	1%	2%	1%
North Saanich	1%	2%	1%	1%	1%	1%	2%	1%
Sidney	1%	3%	1%	1%	1%	1%	1%	1%
Sidney Provincial	1%	1%	1%	1%	1%	1%	1%	1%
Peninsula Total	4%	7%	4%	3%	4%	4%	5%	4%
Colwood	3%	3%	3%	4%	4%	4%	3%	3%
Langford	6%	6%	5%	7%	8%	7%	7%	7%
View Royal	3%	3%	2%	3%	2%	2%	2%	2%
West Shore Provincial	3%	2%	2%	5%	2%	3%	3%	3%
West Shore Total	14%	14%	12%	19%	16%	16%	15%	15%
Sooke			2%	3%	4%	3%	3%	3%
Sooke Provincial	5%	4%	2%	1%	3%	2%	1%	3%
Sooke Total	5%	4%	4%	4%	7%	5%	4%	5%
Region Total	100%	100%	100%	100%	100%	100%	100%	100%

Table 6.3: Percent of Municipal Break and Enters

Minor variations existed within each municipality over the course of the study period; however, the overall regional annual patterns trended downward until 2004. It is interesting that the percentages or share of annual residential break and enters remain relatively stable for each municipality over the course of the study period. As a percentage of the total annual burglary each municipal rate varies from 4% to 7% year over year during the study period. Details of break and enter rates in the CRD are tabulated in Appendix I.

6.2 General Features

Break and enter makes up one in every ten crimes in the CRD (1993 to 2000). The majority of break and enters, sixty one percent, target residential properties. The urban Core group of municipalities suffered the majority, an average of 76% of the residential break and enters over the study period. Victoria and Saanich endured the preponderance of the burglaries in the region with an average of 44 and 24% respectively. The next closest municipality was Langford with approximately 7 and 4 times less burglaries than Victoria and Saanich.

A simple comparison of average % of housing units (residences) and incidences of break and enter over recent years shows considerable inter municipal variation.

Municipality	% Housing Stock (residences)	% of B and E
Victoria	30	44
Saanich	30	24
Oak Bay	6	3
Esquimalt	5	6
Peninsula	11	4
West Shore	13	15

Table 6.4: % Municipal Housing Stock - % of Break and Enter.

Throughout the region, less than 2% of the municipality's residences suffered from a break and enter. This is somewhat lower than reported in other research Townsely et al. (2000) 91.6% and Johnson et al. (Johnson, Bowers et al., 1997) 96.7%. The municipalities found on the peninsula have the lowest number of incidents in the region followed by Sooke and then the Western Communities. The municipal proportion of regional break and enters changes or varies very little over time, in other words, Saanich averages 24% of the regional break and enters, and there is limited variation from that average over the course of the study period. Break and enters have generally been

trending downward in the region, however, every municipality saw an increase in 2004 with the exception of Colwood and Sooke Provincial.

In terms of clearance rates, the number of offences where an individual or individuals could have been charged, the region had an average annual rate of 14%. The peninsula led the way with an average annual clearance rate of 21%. The municipality of Saanich had the highest average individual clearance rate during the study period. West Shore Provincial and the city of Victoria had the lowest annual clearance rates of 8 and 10%. Burrows (1986) has found, for a variety of reasons, police departments in the central business district to tend have lower clearance rates.

When the incidence of residential burglary is examined an interesting picture emerges. Using population, which is used as a surrogate denominator to determine incidence, the urban Core had an average of 5.9 burglaries per 1000 population. However, Sooke was slightly higher with 6 burglaries per 1000 population and West Shore was very close behind with 5 burglaries in 1000 population. Both these municipalities had much smaller proportion of burglaries than the core.

Re-examining incidence using a more accurate denominator, household stock, West Shore communities had a greater average incidence rate of 14:1000 households compared to the Core communities with 11:1000 households. West Shore had a much lower total number of break and enters over the study period 1,870 compared to the Core municipalities with 9,485, but the incidence per potential household was greater. The communities that comprise Sooke had the same rate of offending as the Core municipalities with a rate of 11:1000, yet the total number of break and enters in Sooke was only 585. The municipalities on the Peninsula had a very low rate with 4:1000

households, however, they had almost the same number of break and enters as the Sooke communities. The average rate for the CRD was 10 burglaries per 1000 households.

Individually, a number of municipalities exceeded the regional rate. View Royal and Langford led the way with 15 burglaries for every 1000 households. Victoria and Sooke had similar rates of 14:1000 and 13:1000 respectively. Colwood had an average rate of 11:1000 over the four year period under examination.

The prevalence of burglary is highest in West Shore, with the Core and Sooke following. Both Langford and Victoria had rates above 1%, 1.20% and 1.09% respectively. Colwood had a prevalence rate of 0.90%, while Saanich and Sooke had the same rate of 0.73%.

Regionally, Sooke had the highest concentration rate at 1.13. The Core and West Shore were almost identical at 1.09 and 1.08 respectively. These rates are similar to those found by Tseloni et al. (2004). Victoria, Sooke and Langford had the highest individual rates at 1.18 1.13 and 1.10 respectively. Townsely et al. (2000) believes that concentration rather than prevalence offers a better explanation for the incidence rates. This is not necessarily the case in the CRD, - Victoria and Langford both had high prevalence, concentration and incidence rates. However, View Royal, Colwood and Saanich all have similar prevalence (0.71%, 0.90% and 0.73% respectively) and concentration rates (1.06, 1.08 and 1.06 respectively), yet View Royal had a much higher incidence rate 15:1000 than Colwood 11:1000 and Saanich 9:1000.

This chapter now examines these variations in greater detail using areal statistical methods proved useful in the research literature – notably (1) Nearest Neighbour Analysis, and (2) Quadrate methods, in particular Kernel estimation techniques found in

the Hot Spot Detective™ software. The analysis will focus firstly on determining (1) cluster effects in the region and second (2) HotSpot locations at the regional level and at the municipal level. Clearly, such information can form the basis to effective preventive and proactive policing measures.

6.3 Spatial Analysis

The nearest neighbour routine is an exploratory method for determining if patterns exist within a point series. The nearest neighbour routine examines the first order distances between points within a region, calculating the distance between each point and its nearest neighbour. This routine is conducted for all points in the study area. A mean nearest neighbour distance is calculated for each point within the region. This, the observed mean distance, is compared to an expected mean distance calculated from samples of randomly generated points. The nearest neighbour index is a ratio of the two mean distances. A nearest neighbour index value *less than 1* indicates that clustering is evident. An index value *around 1* indicates a random pattern exists. A value *greater than 1* is evidence of a dispersed point pattern. A *'Z score test'* is calculated to determine if the point distribution has occurred by a random process. Levine (2004) points out that the *Z test* is not a test of complete spatial randomness. It tests for spatial randomness between first-order nearest neighbours only, excluding second-order, third-order and successive distributions. The test determines whether there is a significant difference between the mean nearest neighbour distance and the expected nearest neighbour distance. A *negative Z score* indicates that the point pattern is clustered.

Nearest Neighbour analysis produces varying results depending on how the areal extent of the point pattern is defined (Mitchell, 2005). Nearest Neighbour analysis,

enveloping the area of the point pattern may produce different results from an analysis incorporating the entire study area. Finally, failure to correct for edge effects may also influence the outcome of the analysis.

CrimStat™ (Levine, 2004) was used to generate a nearest neighbour analysis for the break and enter point data at the regional level and at the municipal level. The average nearest neighbour routine, found in ESRI's ArcMap 9™ spatial statistics toolbox, was used to examine specific cases to verify results obtained from CrimStat. In this analysis the program created a bounding rectangle enveloping the point data. Edge corrections were not used in the regional analysis. The municipal analysis was run with and without edge corrections to determine what effect the boundaries may have on the results.

Results

At the regional level residential break and enter was significantly clustered for all of the years during the study period.

Year	NN Index	Z
2004	0.28	-50.88
2003	0.31	-44.59
2002	0.25	-55.44
2001	0.28	-52.50
2000	0.25	-59.11
1999	0.26	-59.83
1998	0.24	-64.08

*All Values significant at >= .0001

Table 6.5: Nearest Neighbour Index - Region

Since the index only examines each point in relationship to its neighbour, the results are limited to small geographical spaces (Bailey & Gatrell, 1995). This does however provide a valuable clue to the spatial configuration of events within the region. Residential break

and enter does not appear to be dispersed or randomly distributed throughout the CRD, instead it seems residential break and enter forms distinct clusters within the Region.

Exploring Nearest Neighbour results for residential burglary data at the municipal level, for the year 2004, produced varying results. All but one of the municipalities had negative Z scores, which indicates patterns of offending tend to cluster within the municipalities. Oak Bay had a NN index less than one with a negative Z score, however, the Z score was not significant. In Central Saanich, which has a limited numbers of break and enters, the nearest neighbour analysis indicated that the offence pattern was random, with a NN index of 1.033 and a non-significant positive Z score of 0.3025. Similar results were obtained using the nearest neighbour routine in ArcMap 9™ spatial statistics toolbox.

NN results for 2004									
		No Edge Correction				Edge Correction			
Municipality	n	NN Index	Z Score	Significa	Pattern	NN Index	Z Score	Significance	Pattern
Victoria/Esquimalt	526	0.17	-40.88	0.00	Clustered	0.16	-41.23	0.00	Clustered
Oak B ay	49	0.94	-0.76	n.s.	Ran/Clus	0.88	-1.58	n.s.	Clustered
Saanich	363	0.55	-16.53	0.00	Clustered	0.54	-16.79	0.00	Clustered
Central Saanich	23	1.03	0.30	n.s.	Random	0.98	-0.17	n.s.	Ran/Clus
North Saanich/Sidney	37	0.77	-2.73	0.01	Clustered	0.66	-4.00	0.00	Clustered
West Shore	168	0.45	-13.53	0.00	Clustered	0.44	-13.89	0.00	Clustered
Sooke	45	0.73	-3.46	0.00	Clustered	0.63	-4.80	0.00	Clustered

Table 6.6: Nearest Neighbour Index – Municipal Level

Examining Central Saanich more closely it is apparent that the municipality has residential settlement patterns restricted to limited areas. The majority of the land in this municipality is used for farming so that residential areas constitute a small proportion of the municipality situated in well-defined constellations. Land use policy restricts the

opportunity for burglary into small areas in effect creating clustered patterns. Yet, nearest neighbour results show that the offence patterns is random rather than clustered. On the other hand, Oak Bay is a small affluent community located east of Victoria and south of Saanich. It is predominately residential in nature contained in a small geographical area. The NN analysis shows a pattern of clustering with a NN index of less than one and a negative Z score, but the NN index value is not significant.

When the nearest neighbour routine was run using an edge correction the results differed from the previous findings. The NN index for the data set declined. All Z scores were negative, including that for Central Saanich. Oak Bay and Central Saanich Z scores remained not significant. Both point patterns appear to be moving in the direction of clustered patterning, however, the high nearest neighbour index indicate that the patterns are not much different from a random process.

The nearest neighbour analysis indicates that break and enters in the Capital Regional District do not form random patterns, nor are they dispersed. At a regional level, significant clusters were noted for each year of the study period. In all but two municipalities, residential burglaries form significant clusters of activity. In Oak Bay and Central Saanich, although not significant, patterns were moving in the direction of being clustered. However, it is clear that there are limitations with NN techniques; specifically it does not provide sufficient detail for policy development.

6.4 Patterns in Burglary at the Micro Level Quadrat Analysis

Residential break and enter has been examined at the macro or regional level of aggregation and the meso or municipal level of aggregation. If burglaries are not randomly distributed then residences do not have an equal opportunity of victimization.

There is evidence, which strongly suggests that clusters of offences exist at finer resolutions throughout the CRD and within municipalities. The application of pattern theory (Brantingham & Brantingham, 1993b) to residential break and enter data asserts that clusters of activity are evident across groups, among individuals, throughout regions, municipalities, and neighbourhoods. Prior research supports the notion that crime concentrates in small areas (Sherman, Gartin et al., 1989; Sherman & Weisburd, 1995; Townsley, Homel et al., 2000; Weisburd, Lum et al., 2004). The purpose of this part of the research is to explore residential break and enter at the micro level. The examination will identify where hot spots "...concentrations or clusters of crime in space" (Brantingham & Brantingham, 1999, p. 8) are located at the regional level and within municipalities. The population at risk will be the residential dwellings within the municipalities that make up the CRD. The burglary data, are geographically referenced to the household level, in other words, each individual burglary is geographically coded to the actual address at which the event occurred. Pattern detection provides information, prompting further investigation to determine if clusters result from what we might expect given the distribution of residential properties (the opportunity structure), or whether other factors are at work.

Methodology

Quadrate methods are a simple way of summarizing point pattern data. A grid of equal size quadrate is placed over the region under study. An intensity measure is obtained for each cell. This measure provides a summary of the variation over the region. However, the spatial detail of the observed pattern is often lost (Bailey & Gatrell, 1995).

One method to resolve this problem is to count the number of units within a moving window (Ratcliffe & McCullagh, 1999b). "One defines a suitable size window which is then moved over a fine grid of locations within the region and the intensity of each grid point is estimated from the event count per unit area within the window centered on a point" (Bailey & Gatrell, 1995, p. 84). Two problems surface, first this method fails to consider the location of the event within the window, and second it is often difficult to establish an appropriate size for the window (Bailey & Gatrell, 1995).

The Kernel estimation technique addresses the concerns outlined above. First, a moving window is centered over a point; other observed points within the window are assigned weights proportionate to there distance from the original point. This method considers the location of an event in relation to the point of interest. Points closer to the centre point make a greater contribution to the intensity reading. Second, there are methods available to estimate appropriate window sizes taking into consideration the event under study.

This study used the HotSpot Detective™ to identify areas where residential burglaries tend to cluster. The program is based on work done by Ratcliffe and McCullagh (1999b). A Quartic Kernel estimation method is used to identify locations of high activity (Bailey & Gatrell, 1995, p.85; Ratcliffe & McCullagh, 1999b, p.387):

$$\hat{\lambda}_t(s) = \sum_{di \le t} {}^{3}\!/_{\pi t^2} \left(1 - {}^{d_i^2}\!/_{t^2}\right)^2 \quad (1)$$

- *s:* is the center of the search circle,
- *t:* the bandwidth or the radius of the circle centered on *s*,
- *d:* distance to each point *i* within the bandwidth from the centre (*s*) within the search circle,

- $\lambda_t(s)$: is the summation of the intensity of those values which have a smaller distance from *s* than *d*,
- $3/\pi\tau^2$: weighting factor

"The calculation of the intensity $\lambda_t(s)$ is (the) summation of the intensity of those values which have a smaller distance from *s* than *d*, where the intensity is inversely weighted, with values at the centre weighted by $3/\pi\tau^2$, dropping smoothly to a value of zero at the maximum distance τ" (Ratcliffe & McCullagh, 1999b, p.387).

It is necessary to determine the bandwidth for the kernel function and the cell size of the grid network. Previous research acted as a guide in determining an appropriate cell size for the grid network. Bowers et al. (2004) argue the grid network should be small, they suggest a cell structure of 50m x 50m or 10m x 10m, depending on the computation speed available. Mitchell (2005) proposes using the following formula to develop a grid network $I = \sqrt{2 \cdot A/n}$. This formula produced varying results for the municipalities with an average cell size of 37m^2. Ratcliff and McCullagh (1999b) used a cell structure of 25m^2. Experimenting with the data using the same bandwidth with cell sizes of 25m^2 and 50m^2 did not change the results; however, a surface with 25m^2 cell was far less coarse and visually more pleasing. Based on recommendations in Bowers et al. (2005) and Ratcliff and McCullagh (1999b) the cell size was set at 25m^2.

There is no cut and dry procedure for developing an optimal bandwidth for the kernel function. Bailey and Gatrell (1995, p. 86) suggest using the formula $\tau = .068n^{-0.2}$ to arrive at a rough estimate for the bandwidth. They point out that kernel estimation

affords experimentation with different values of τ , enabling observation of the variation at different scales. However, in areas were there are dense point distributions smaller bandwidths are desirable to prevent smoothing out too much detail(Bailey & Gatrell, 1995, p. 87). This formula produced different results based on the values entered for each municipality.

Bowers et al. (2004) used a 400m bandwidth based on their research of repeat victimization. They found that the risk of burglary is communicable up to a distance of 400m. Ratcliff and McCullagh (1999b) used a bandwidth based on a survey of police officers perceptions of crime hot spot locations. Openshaw et al. (1987) recommends using several bandwidths based on the researchers understanding of the events under study.

For the purpose of this study, three bandwidths were selected. Bowers et al.'s (2004) recommendation of 400m was adapted. A regional bandwidth of 670m was obtained from the average radius of hot spots taken from a sample of police officers, hot spot perceptions. Finally, the radius for each municipality was obtained by taking the radius of officer's hot spot perceptions within each municipality. The bandwidth of 670m was used for comparison between municipalities.

Results

It can be seen that there are many distinct clusters within each municipality of the CRD identified by the Quartic Kernel estimation technique.

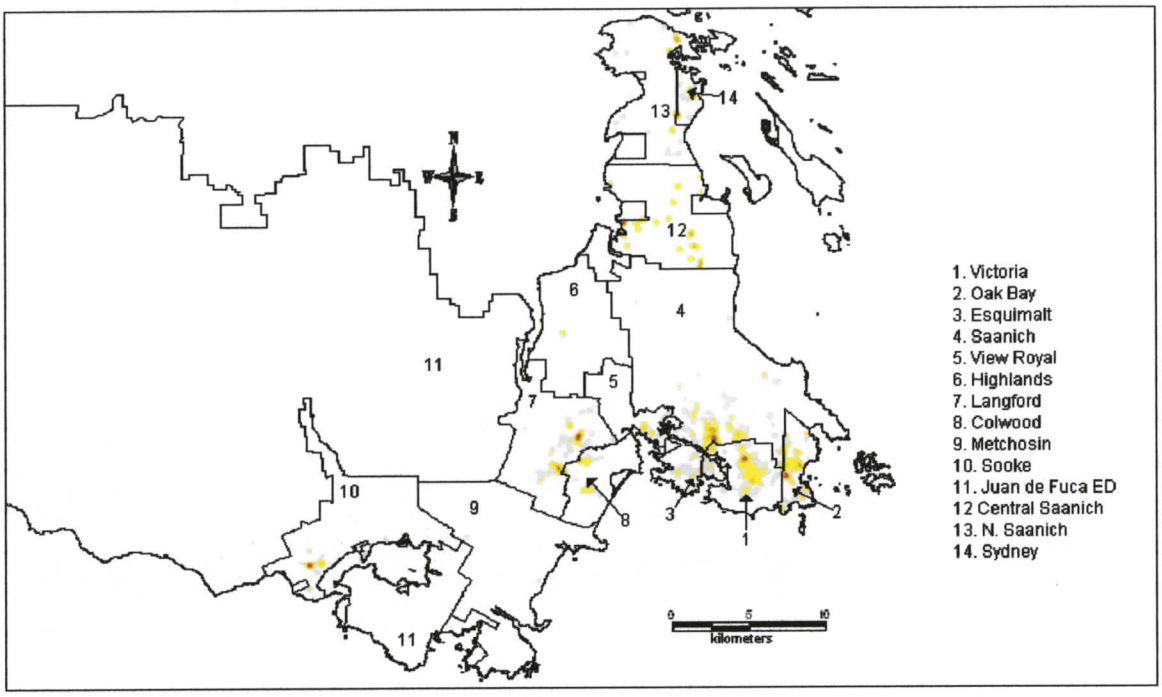

Figure 6.1: Intra Regional Break and Enter 2004 (25m2 cell – 400m bandwidth).

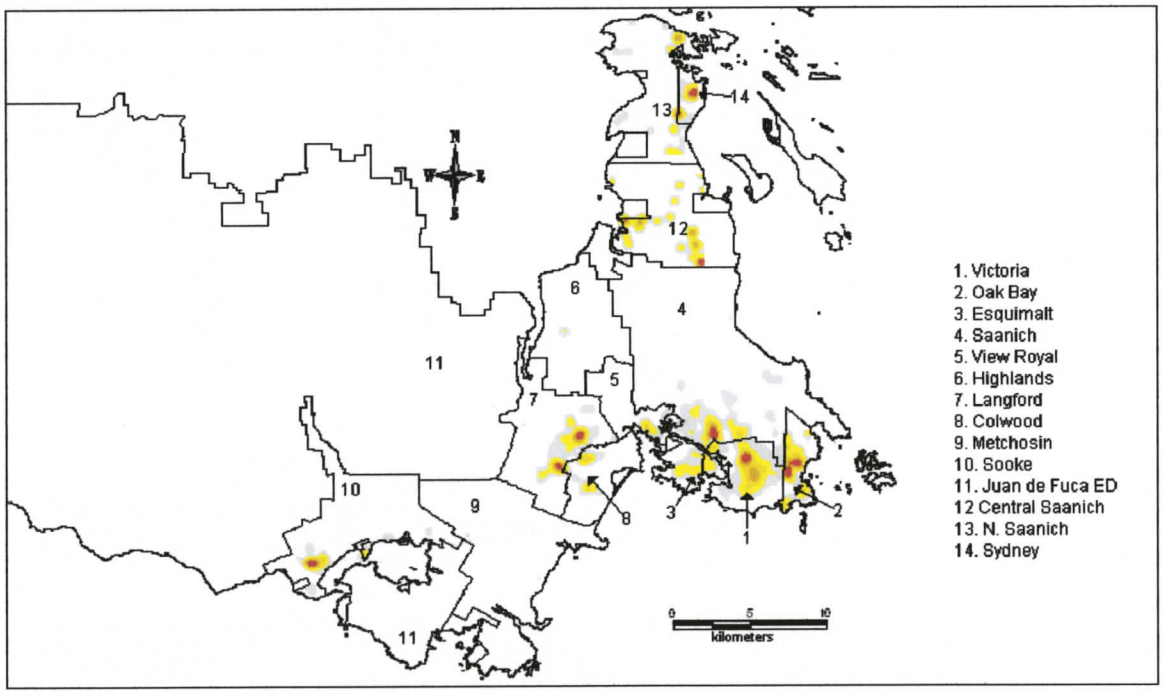

Figure 6.2: Intra Regional Break and Enter 2004 (25m2 cell – 670m bandwidth)

Number of Cluster - Figure 6.1 - in Each Municipality at a Bandwidth of 400m - Year 2004			
Municipality	High Intensity Cluster	Secondary Clusters	Larger Zones
Sidney/N. Saanich	3	3	5
Central Saanich*	2	4	18
Saanich	1	1	2
Victoria/Esquimalt	1	1	3
Oak Bay	1	2	5
West Shore	2	2	3

Table 6.7: Municipal Clusters at 400m – Year 2004 [4]
* Small n

Number of Cluster - Figure 6.2 - in Each Municipality at a Bandwidth of 670m - Year 2004			
Municipality	High Intensity Cluster	Secondary Clusters	Larger Zones
Sidney/N. Saanich	3	3	3
Central Saanich*	2	5	4
Saanich	1	1	2
Victoria/Esquimalt	1	2	2
Oak Bay	2	1	2
West Shore	2	2	5

Table 6.8: Municipal Clusters at 670m – Year 2004
* Small n

Victoria – Esquimalt

To identify bandwidth variation we will look at the City of Victoria including Esquimalt. In 2004Victoria - Esquimalt police department recorded 777 break and enters, 666 were geo-coded. Unlike the municipalities examined to this point, Victoria and Esquimalt are small in area and densely populated. The break and enter point data present the impression of a frenzied disbursement of events, yet, clear patterns emerge from the cluster analysis. At 400 metres, one hot spot is evident in the north center of Victoria.

[4] For detailed analysis see Appendix 2

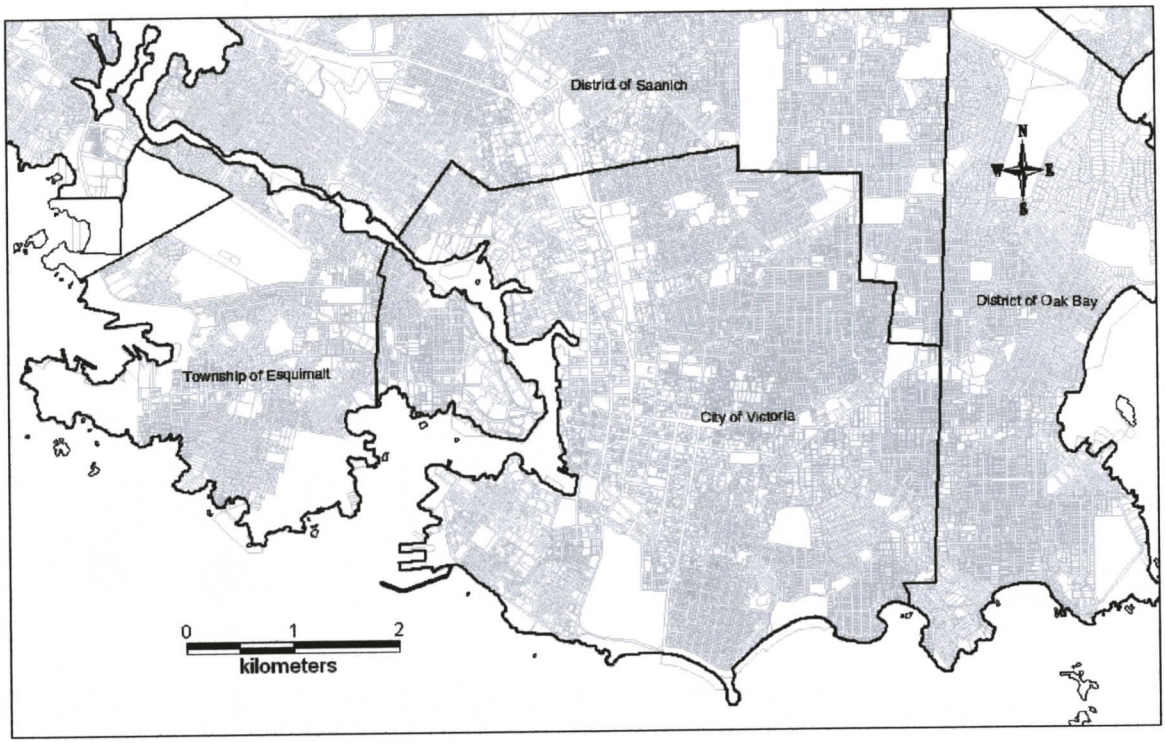

Figure 6.3: Victoria - Esquimalt Lot Boundaries.

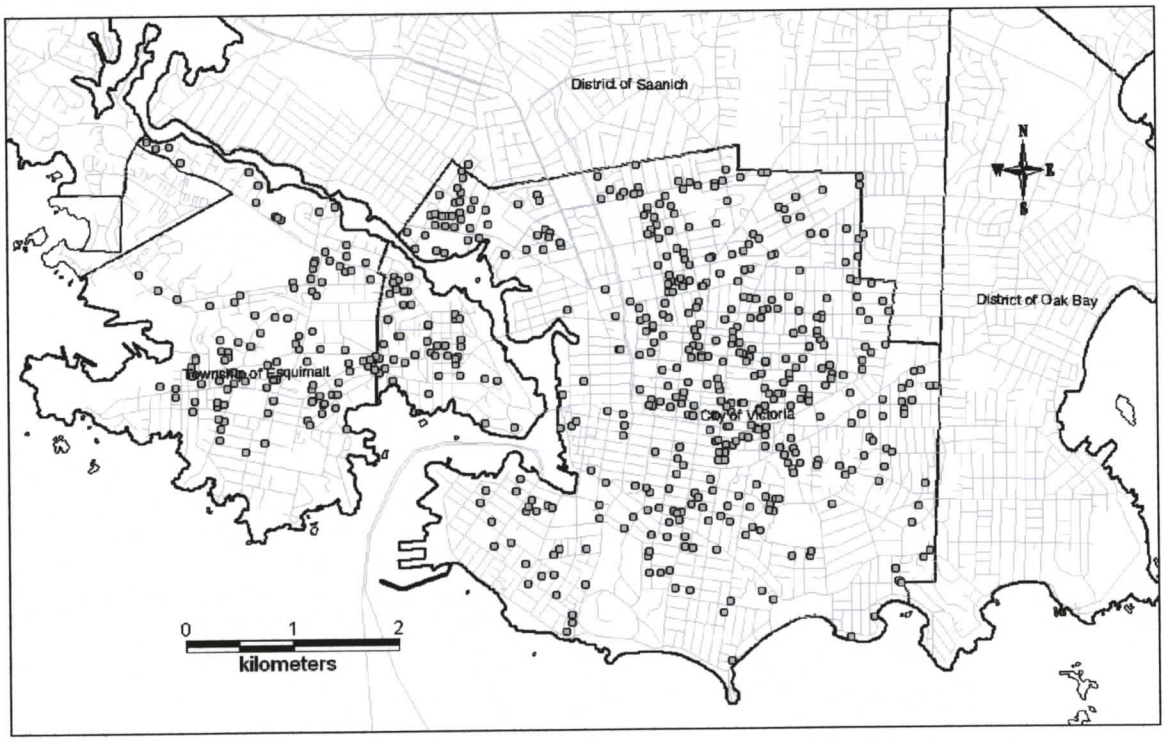

Figure 6.4: Victoria – Esquimalt 2004 Break and Enters with the road network.

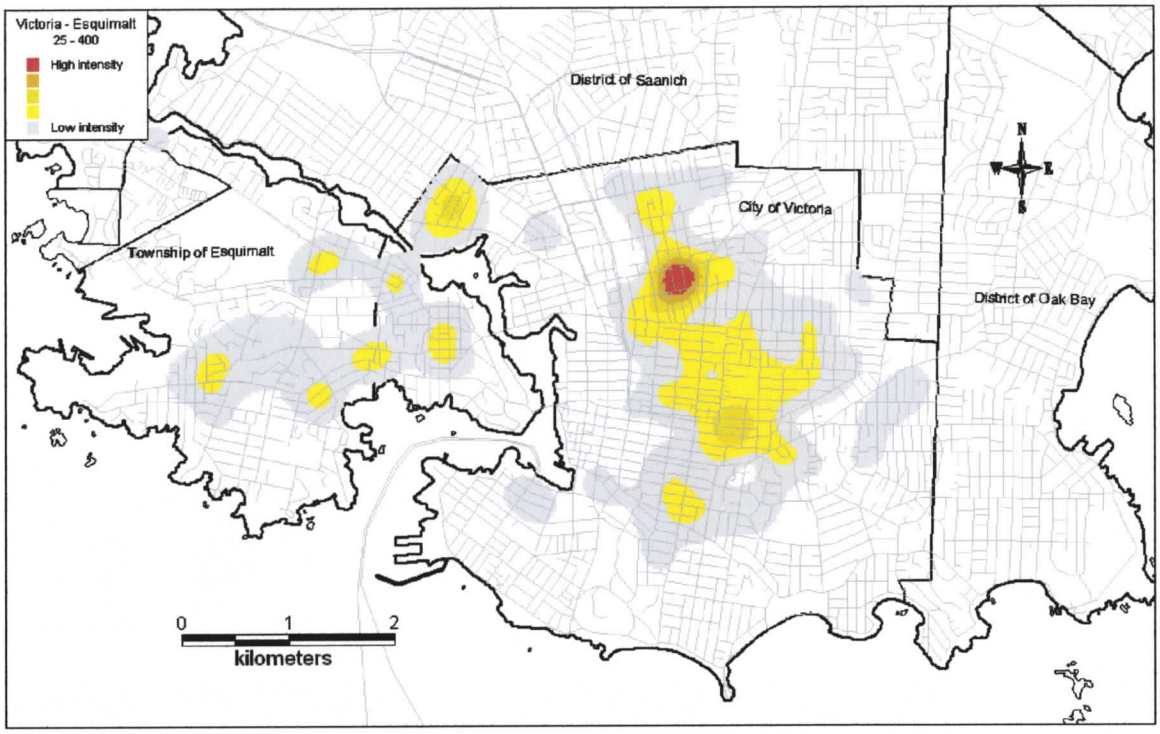

Figure 6.5: Break and Enter Victoria - Esquimalt 2004 (25m2 cell – 400m bandwidth).

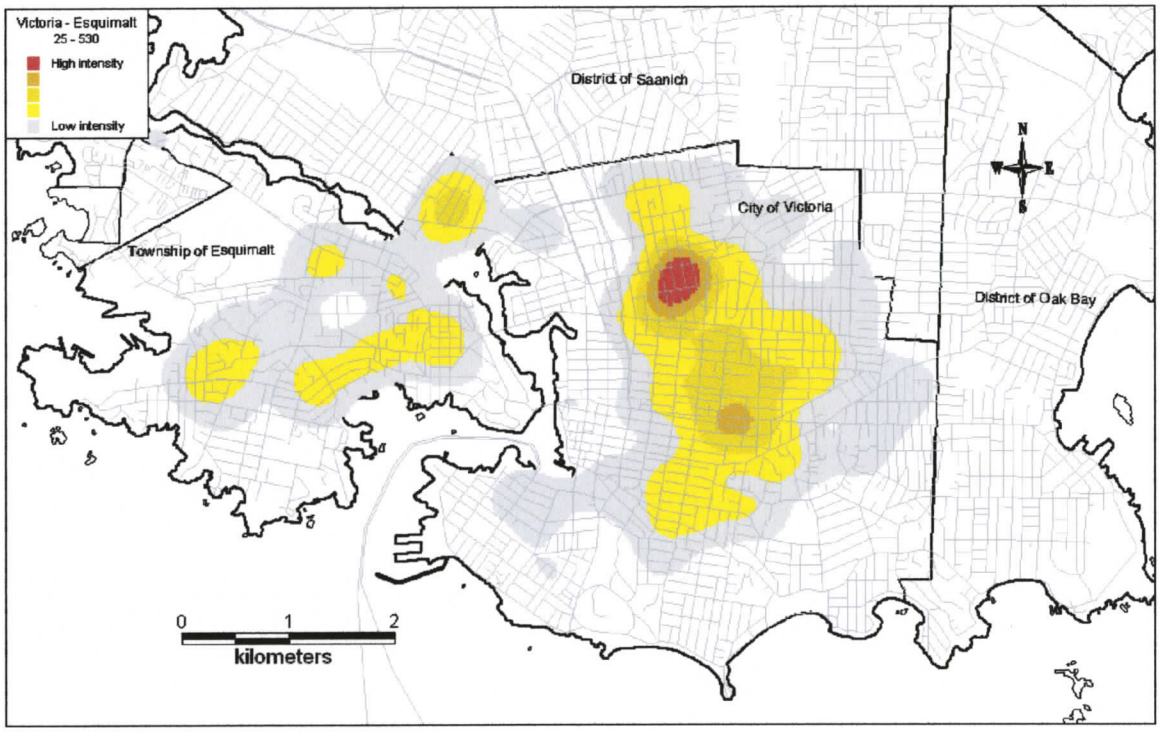

Figure 6.6: Break and Enter Victoria - Esquimalt 2004 (25m2 cell – 530m bandwidth)

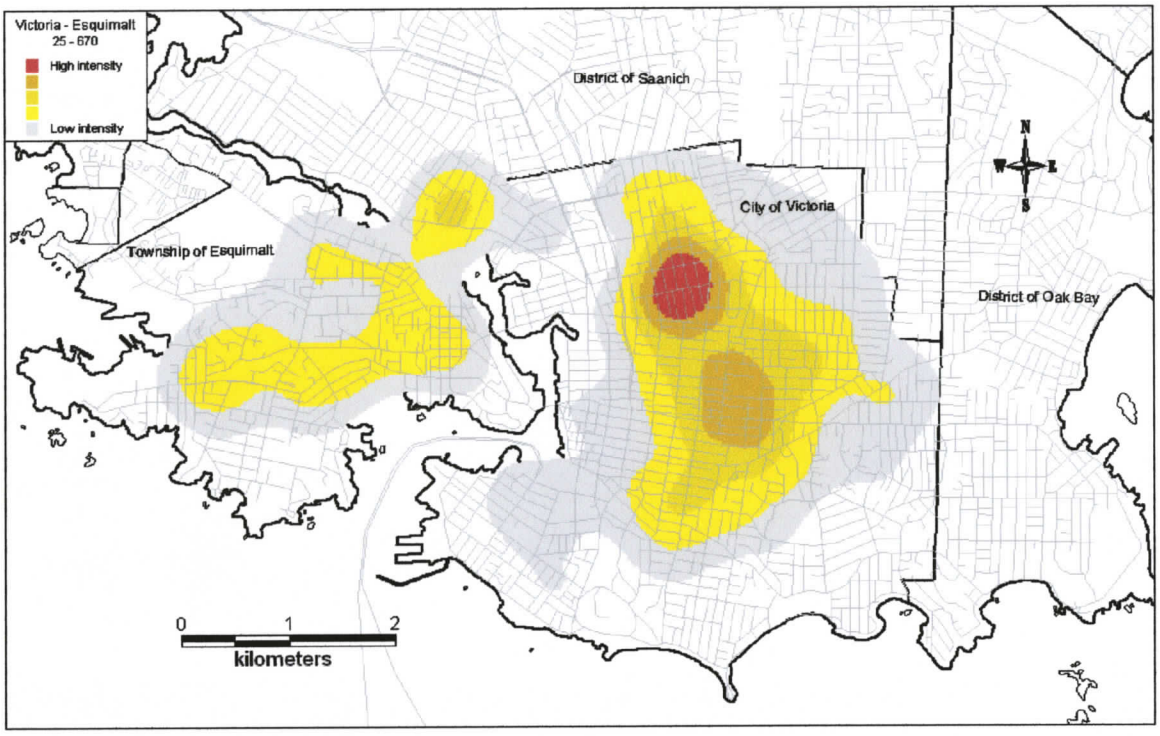

Figure 6.7: Break and Enter Victoria - Esquimalt 2004 (25m2 cell – 670m bandwidth).

Two other less intense hot spots are noticeable, one in the northeast section and the other in the south center of Victoria. A number of less significant patterns are evident in Esquimalt, Victoria West and South Victoria. At 530 metres, the radius obtained from the police sample, the one hot spot grows in size, and the area to the south centre rises in intensity. At 670 metres, the hot spot is larger as well as the pattern in the area of the south center. The pattern in the south centre never reaches the same intensity as the hot spot above it. It is evident from the analysis that residential break and enter is more prevalent in the north centre area of the city.

Significant Patterns of Burglary

Typically researchers use Statistical tests of significance to determine spatial patterns of interest (Fotheringham & Zhan, 1996; Ratcliffe & McCullagh, 1999b; Turton

& Openshaw, 2001). Ratcliffe and McCullagh (1999b) have found the G_i and G^*_i statistics are useful tools in assessing local association in spatial patterns. "The G_i and G^*_i family of statistics evaluate association by measuring additive qualities, and in doing so can compare local averages to global averages. In this manner they are ideal for defining hotspots and, more importantly, placing a spatial limit on those hotspots" (Ratcliffe & McCullagh, 1999b, p. 389).

Using these statistics inevitably leads to the problem of overlap. This exists when selected sites of *i* are within close proximity to each other, or when the distance setting around *i* is large. Getis and Ord (1996) termed this the 'correlation problem'. Ratcliffe and McCullagh point out "this overlap means that nearby values of *i* will have correlating values of *j*, and the greater the overlap, the greater the correlation between the spatial" statistics (1999b, p. 389). Variables lose their independence undermining the use of statistical significance tests" (Getis & Ord, 1996). To overcome this difficulty the resulting values are compared to the Bonferroni test tables to validate the results (Getis & Ord, 1996).

LISA (Local Indicator of Spatial Association) methods were used to examine local clustering in spatial data. The Getis G*i found in ARCMAP 9™ was used to assess whether significant clusters of break and enter are present in the CRD. The analysis was confined to locations containing at least one break and enter excluding areas where no offences occurred. A 50^2 x 50^2 m grid was laid over the point pattern. Bandwidths were set at 400 metres and 670 metres in the analysis based on police survey results. The G*i statistic requires at least 30 neighbours to avoid erroneous results. Due to the small samples and, therefore, a lack of the required neighbours, only Saanich, Victoria and the

CRD were suitable for examination. To overcome the "correlation problem" (Getis & Ord, 1996) results were compared to Bonferroni tests tables.

Results

The Saanich files did not provide any patterns of interest. The Victoria data exhibited a significant cluster of cells at both distances of 400 metres and 670 metres. Both patterns were significant at less than of equal to 0.05. The pattern identified by the G*i function coincided with the hot spots generated by the kernel density function. This pattern was replicated at the regional level of analysis. The Regional cell cluster is almost identical to results generated by the Victoria data set and the Kernel density function. The results of this analysis indicate that events are spatially concentrated in the Victoria area.

Significance	p <= 0.05	p <= 0.01
G*^{i}	3.79	4.17

Table 6.9: Significance levels for G*^{i} scores[5]

[5] Bonferroni tables were not available for the size of the data set, therefore the scores were estimated from existing tables.

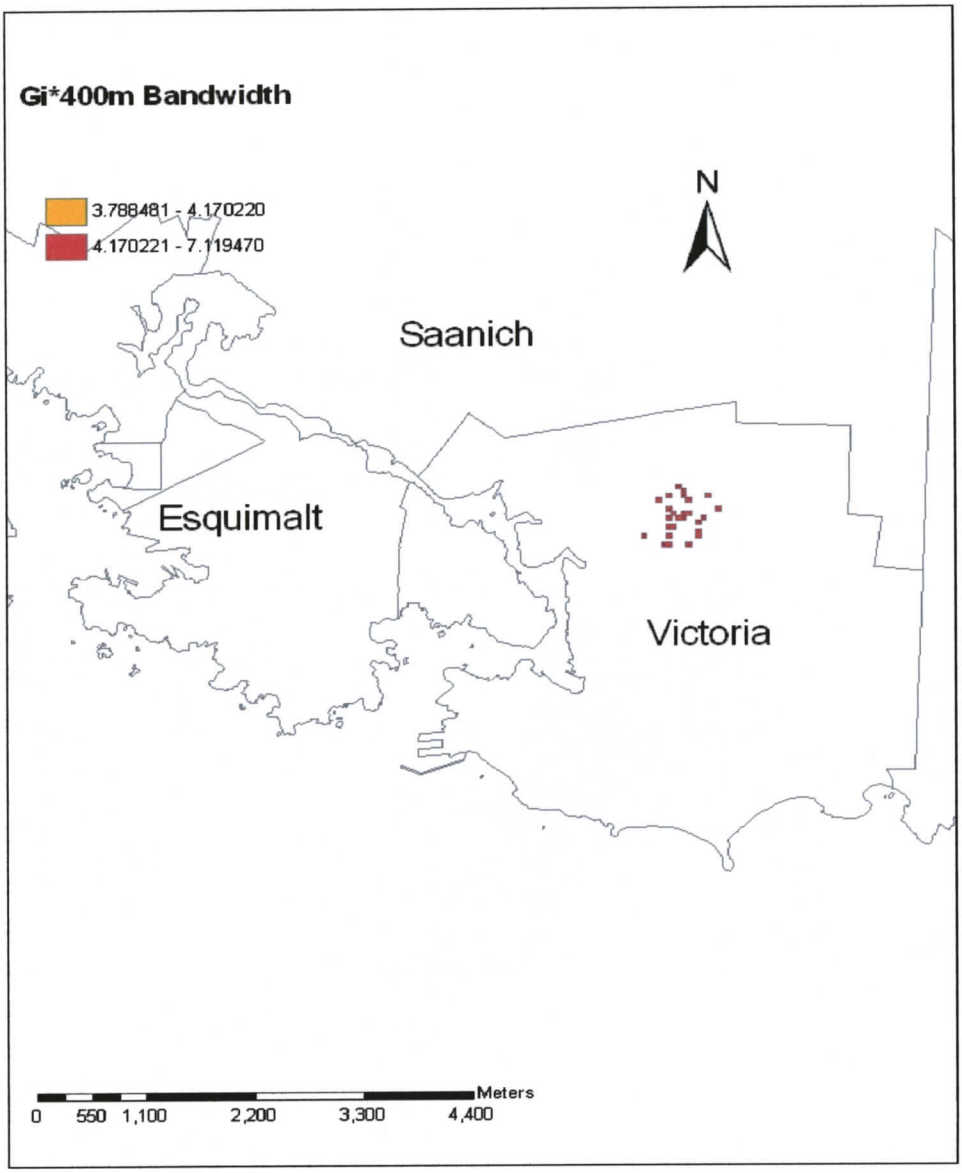

Figure 6.8: Victoria G*i results (50m cell – 400m distance).

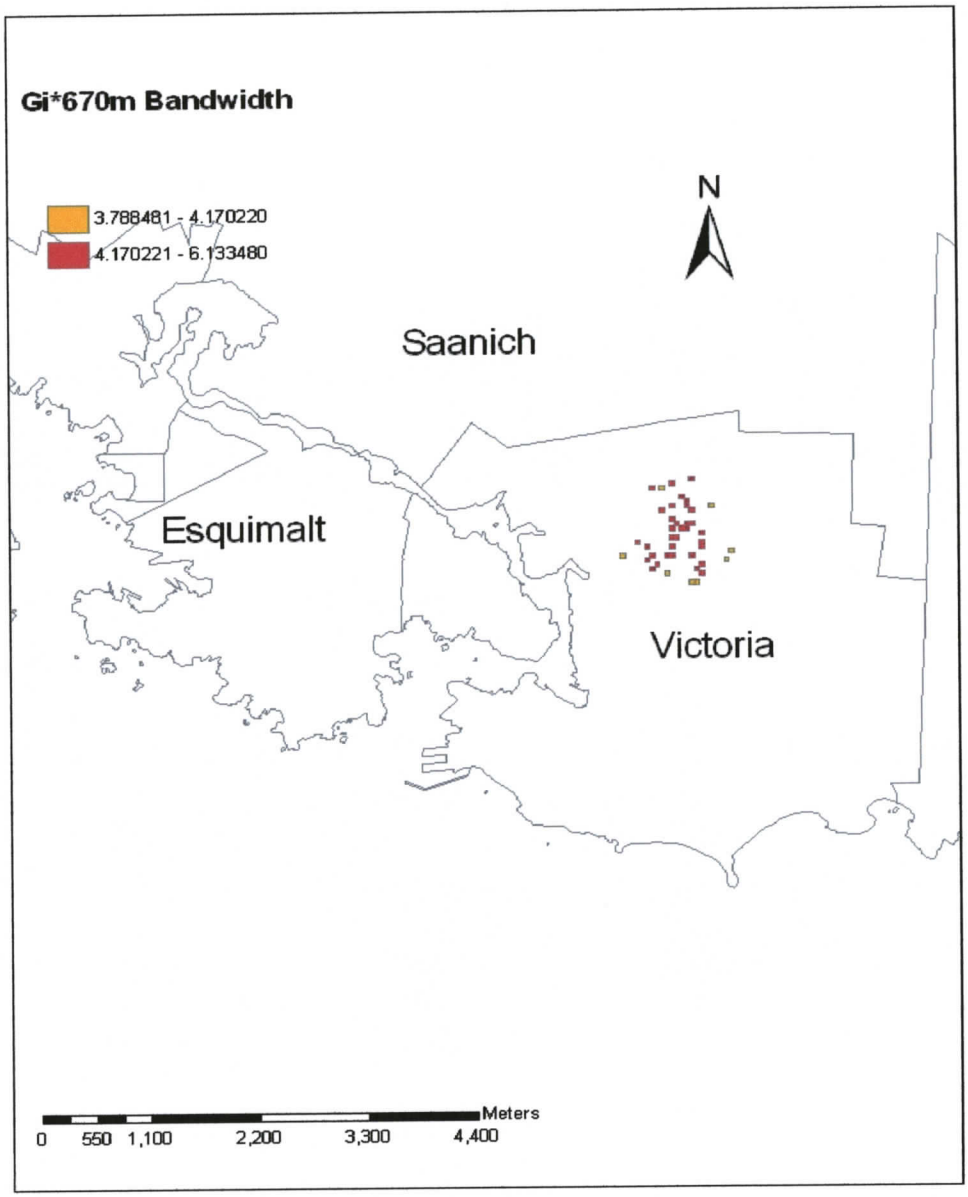

Figure 6.9: Victoria G*i results (50m cell - 670m distance).

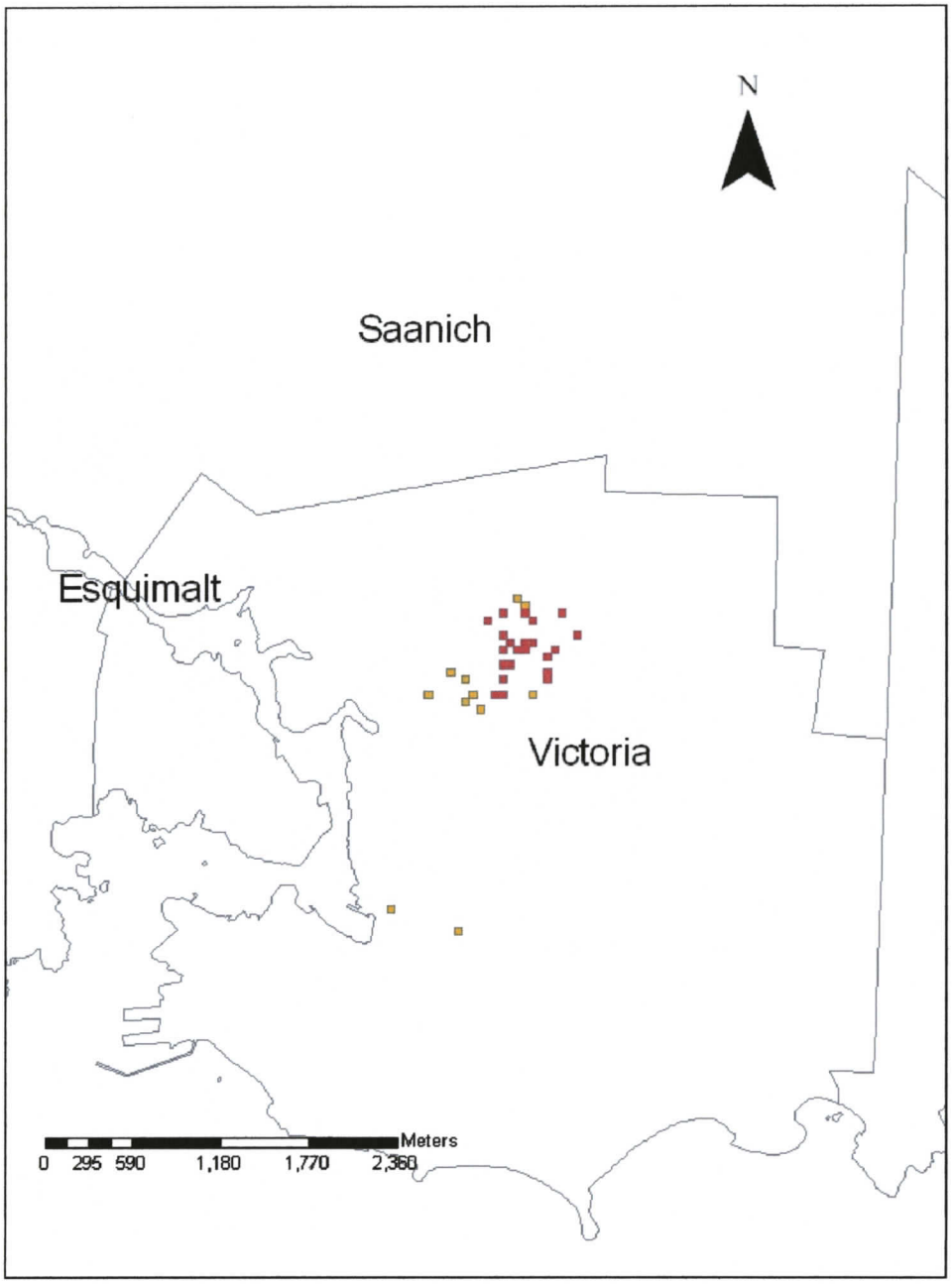

Figure 6.10: G*i results for the CRD (50m cell – 400m distance).

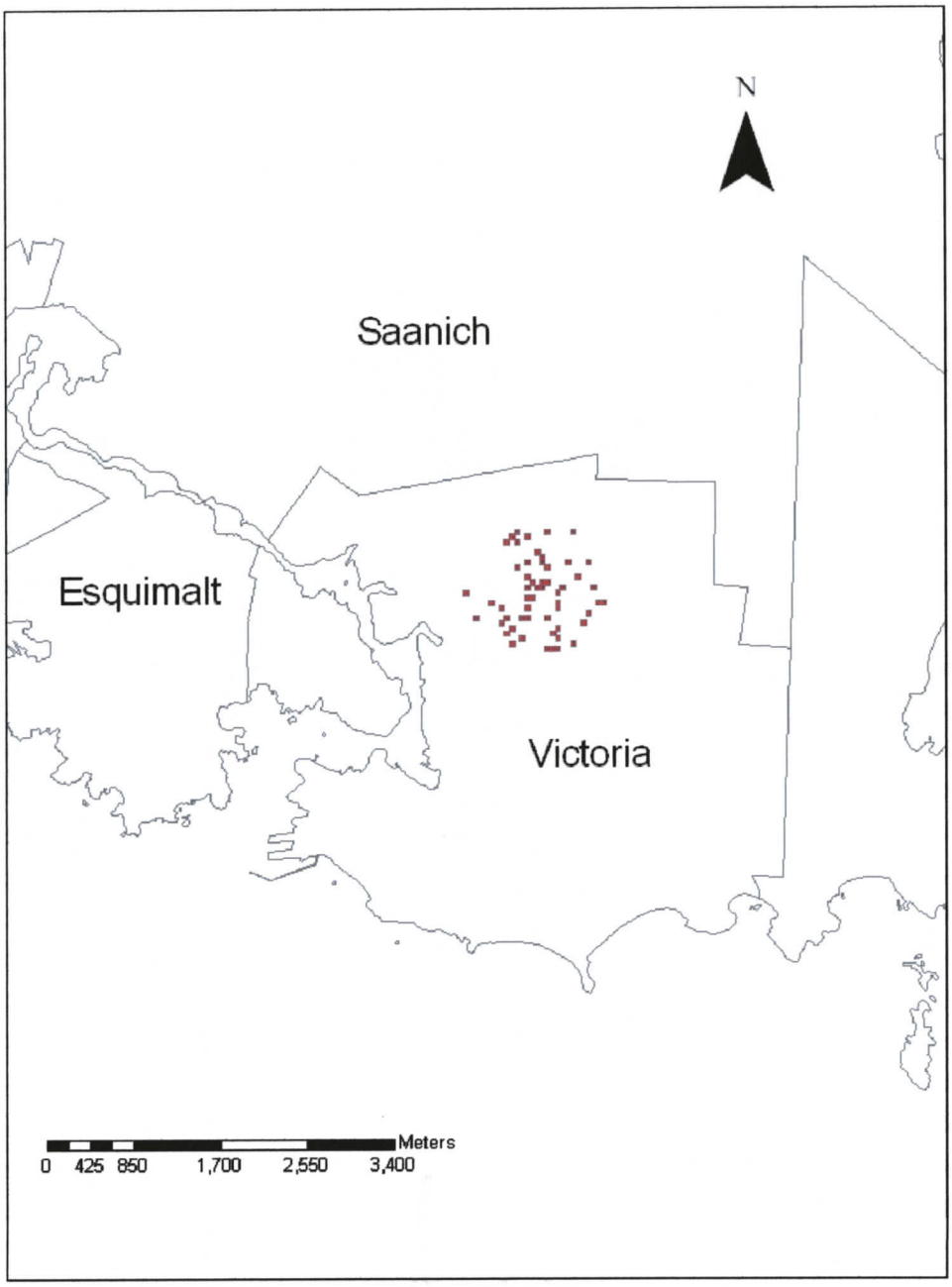

Figure 6.11: G*i results for the CRD (50m cell – 670m distance).z

Cluster Hunter

The *'Geographical Analysis Machine'*, originally developed by Openshaw et al. (1987), was employed to examine municipal residential break and enter patterns. A JAVA version, known as the Cluster Hunter[6], created for online use, was downloaded for the analysis. GAM explores point patterns to determine if clustering is present in the area under investigation. The process evaluates the observed events to assess if they exceed what might be expected within the population at risk. A Monte Carlo random process was used to obtain a test of significance for the resulting circles. The use of a significance test is not for the traditional purpose of hypothesis testing, instead it is a method used to remove unimportant circles. The minimum and maximum circle radii were set at 400m and 600m, with an increment of 100m. The significance level for circle rejection was set at 0.01. The results were visualized in the form of circles[7], meeting the specified significance level, at 400m 500m and 600m radii. The circles were layered onto the earlier results generated by the kernel density function.

The data used for the population at risk was derived from the address file used to geo-code events. This file is not a true representation of the population at risk. The address contains mixed addresses representing business and residential premises. An apartment building is a multi residential unit with one street address. A business premises in many cases consists of mixed business residential premises under one or more street address. In multi residential units, the population at risk is under-represented. In strictly business/commercial/industrial districts, residential addresses are few if non-existent, thus distorting the population at risk. However, this was the only geographical data

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[6] The application was found at http://www.ccg.leeds.ac.uk/software/gam/

[7] Circles were used instead of a continuous smooth surface to allow for comparison between the two results sets.

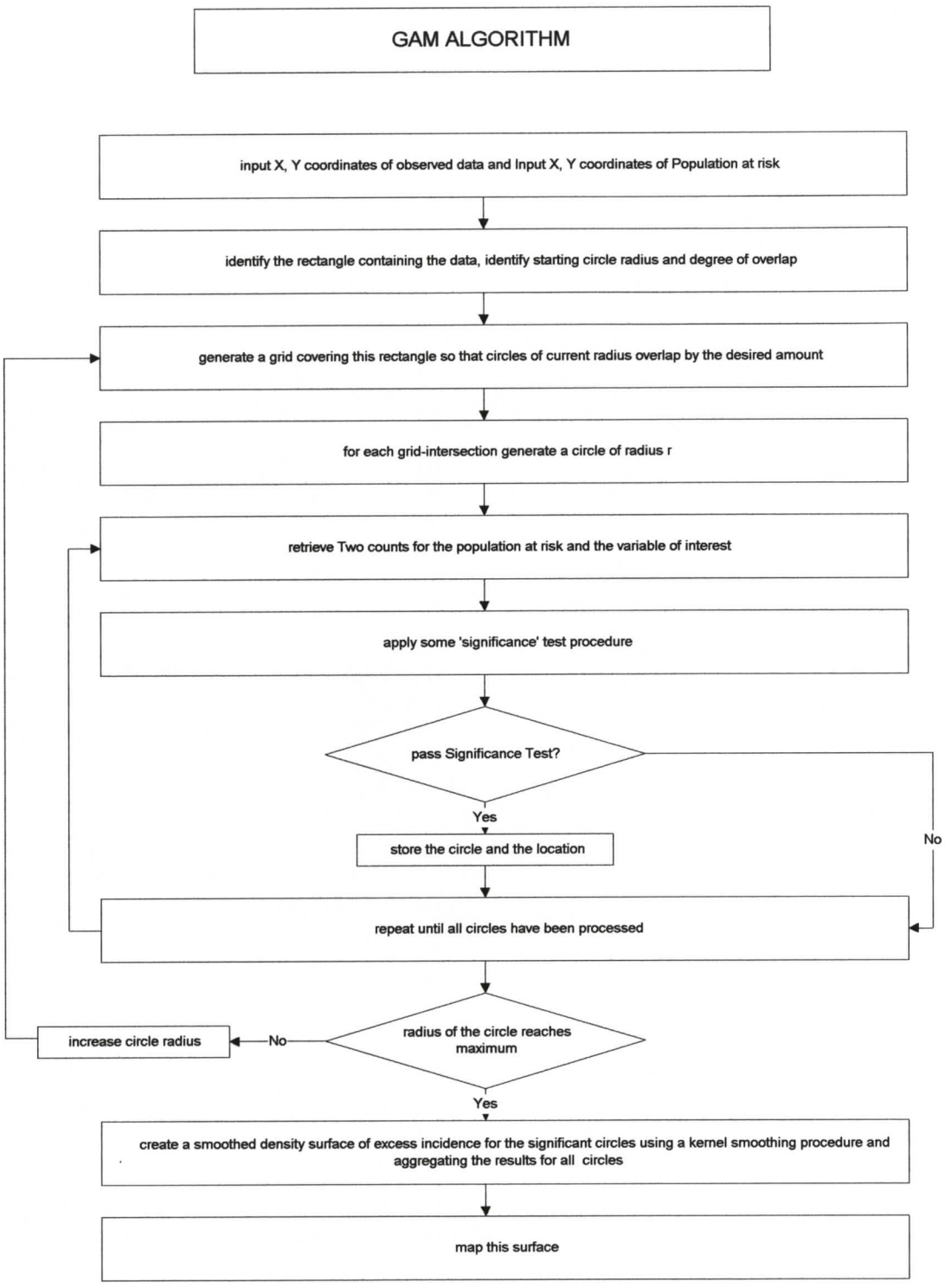


Table 6.10: GAM/K (Fotheringham & Zhan, 1996; Turton & Openshaw, 2001)

available enabling this analysis. This, in the absence to a file dedicated to residential addresses, is a reasonable alternative.

Results

Victoria – Esquimalt

The GAM circles with a 400m radius were placed over the intensity layer of $25m^2$ - 400m bandwidth (Figure 6.12). Those with a 500m radius were over laid onto the $25m^2$ – 530 bandwidth (Figure 6.13). The 600m circles were placed over the $25m^2$ – 670 bandwidth (Figure 6.14). Victoria had two general areas identified as hot spots. One is located in the centre of Victoria, the other in the Victoria West/Esquimalt area. We see the circles generally conform to the corresponding hot spot density layer. As the bandwidth increases, the circles tend to merge between the two major hot spots.

The visualization is cluttered in areas of dense populations. It is evident that as the population at risk and the number of burglaries increase so do the number of circles.

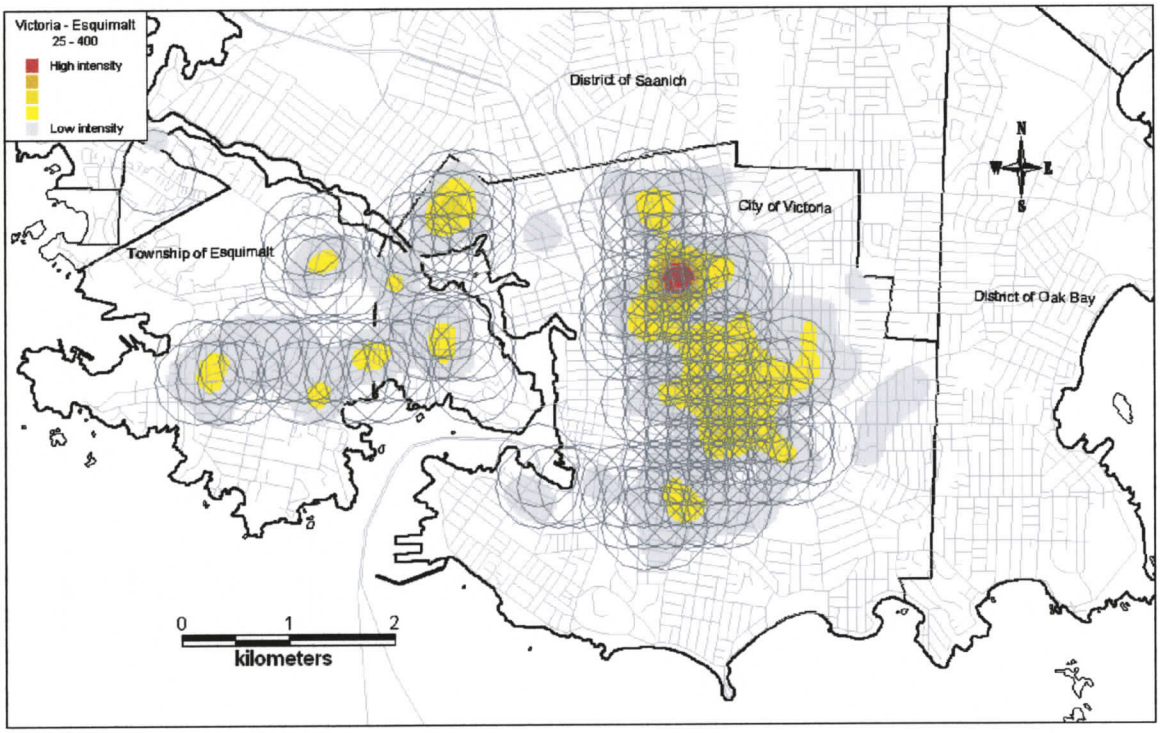


Figure 6.12: Victoria GAM Results with 400m circles.

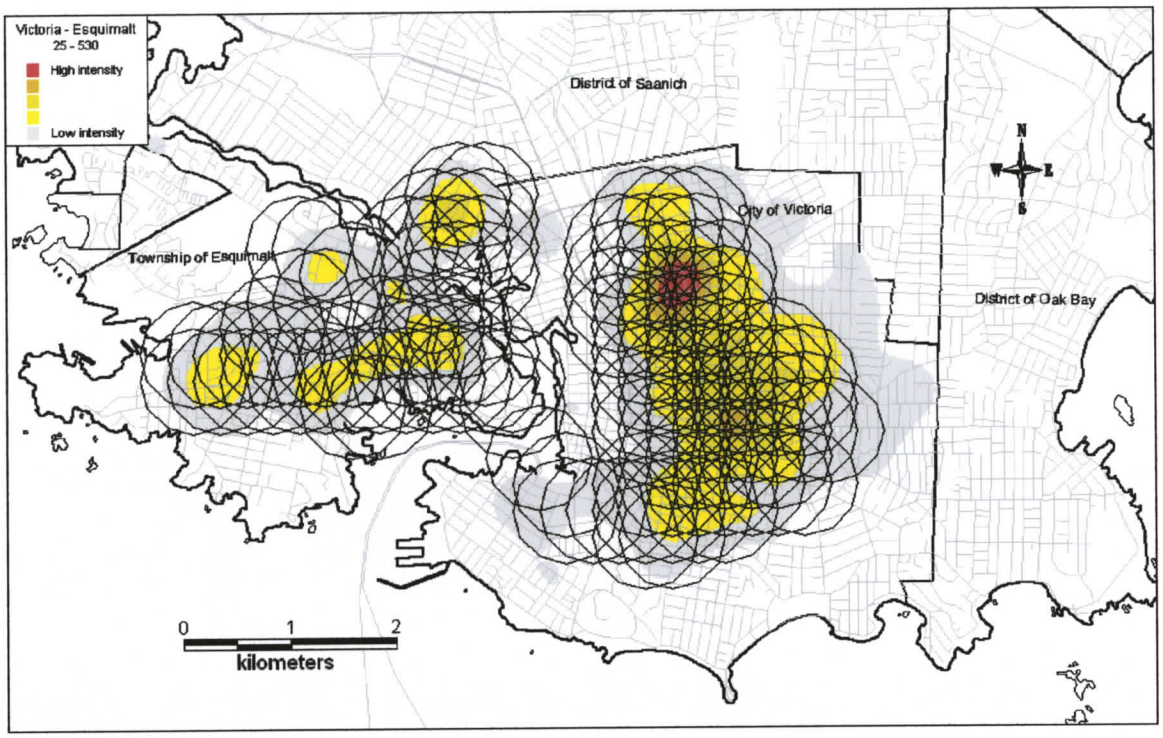


Figure 6.13: Victoria GAM Results with 500m circles.

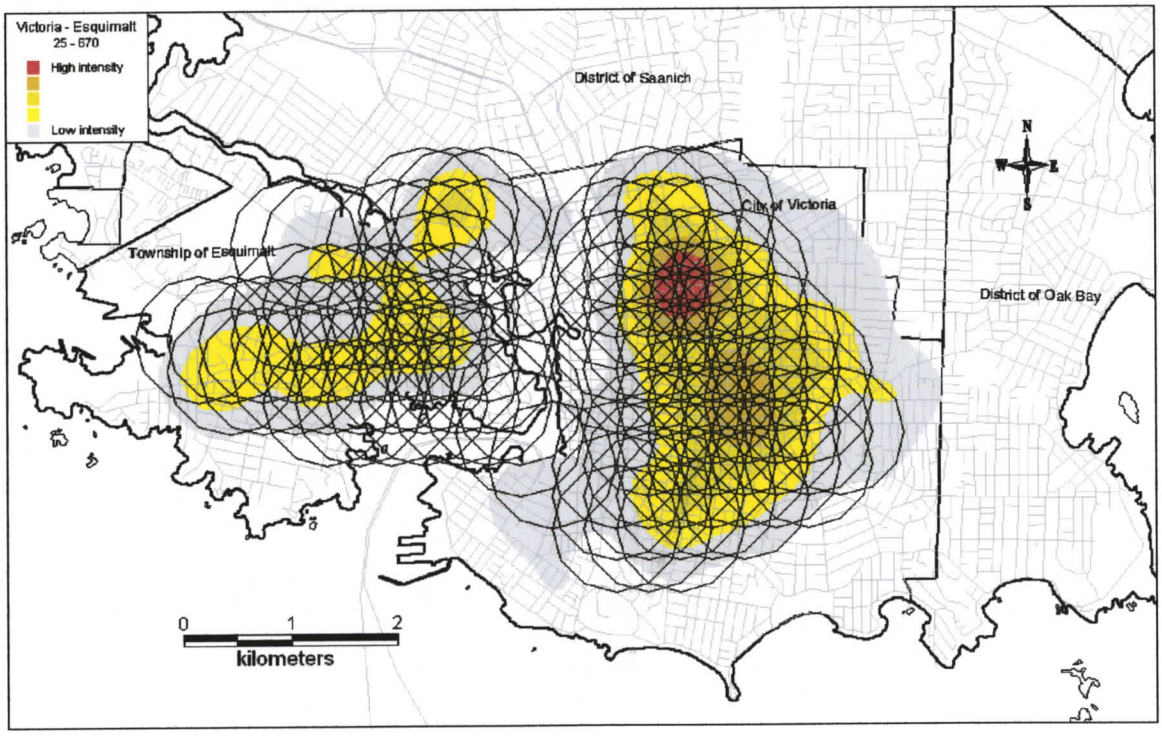


Figure 6.14: Victoria GAM Results with 600m circles.

6.4 Hot Spot Areas

Introduction

Hot spots identify areas where there are high levels of activity, but if they are too large, too scattered, or encompass a small proportion of offences they will prove ineffective from both a strategic or tactical standpoint. Rossmo (2001) and Bowers et al. (2004) argue that models have to be evaluated to demonstrate there effectiveness. Rossmo (2001) uses area searched as a mechanism to evaluate the effectiveness of offender home location techniques. Bowers et al. (2004) emphasize area covered by a hot spot, the number of hot spots identified and the events captured within a hot spot as important evaluative tools. These concepts used to evaluate the effectiveness of models are useful in the present study.

Hotspots

How well do hot spots identify high incident areas? To answer this question the relationship between hot spot area and break and enter was examined. The top three levels of intensity were used to calculate the hot spot area and the number of break and enters located within each level. The levels are cumulative, in other words, level 2 is the accumulation of area in level 1 and 2 combined. Level 3 is the addition of area in levels 1 through 3.

The number of hotspots differs as level of intensity increases. Several municipalities reached 5 hot spots at intensity level 3 but this was rare (Tables 6.11 – 6.12). There was one anomaly, Central Saanich, where every point was identified as a hot spot (Table 6.11). It is suspected that these results were influenced by the limited number of events. In fact at most bandwidths there were less than 3 hot spots. The hot spots

covered a very small proportion of the municipalities seldom exceeding 5% of the total municipal area.

Hot Spot Intensity	Municipalities					
25/400 - Level 1	Sid/NSaa	CenSaa	Saanich	Vic/Esq	Oak Bay	W/Shore
Number of Hot Spots	1	2	1	1	1	2
% of Muni	0.6%	0.1%	0.1%	0.04%	0.3%	0.04%
25/400 - Level 2						
Number of Hot Spots	3	4	1	1	2	2
% of Muni	2.4%	0.5%	0.2%	0.07%	0.6%	0.1%
25/400 - Level 3						
Number of Hot Spots	5	18	2	3	5	3
% of Muni	3.9%	1.2%	0.5%	0.20%	3.2%	0.2%

Table 6.11: Number of Hot Spots and Percent of Municipality at Bandwidth 400

Hot Spot Intensity	Municipalities					
25/670 - Level 1	Sid/NSaa	CenSaa	Saanich	Vic/Esq	Oak Bay	W/Shore
Number of Hot Spots	3	2	1	1	2	2
% of Muni	7.0%	1.6%	0.3%	2.6%	6.5%	0.2%
25/670 - Level 2						
Number of Hot Spots	3	5	1	2	1	2
% of Muni	7.0%	1.6%	0.3%	2.6%	6.5%	0.2%
25/670 - Level 3						
Number of Hot Spots	3	4	2	2	2	5
% of Muni	7.8%	3.6%	0.6%	5.4%	13.5%	0.6%

Table 6.12: Number of Hot Spots and Percent of Municipality at Bandwidth 670

Central Saanich	Intensity Levels		
25/500	level 1	level 2	level 3
Number of Hot Spots	3	4	16
% of Muni	0.3%	1.0%	2.2%
Saanich			
25/1000			
Number of Hot Spots	1	1	2
% of Muni	0.4%	0.5%	1.0%
Victoria Esquimalt			
25/530			
Number of Hot Spots	1	2	3
% of Muni	0.4%	0.8%	3.5%
Oak Bay			
25/720			
Number of Hot Spots	1	1	2
% of Muni	3.4%	7.2%	15.0%
Sidney North Saanich			
25/570			
Number of Hot Spots	3	3	5
% of Muni	3.4%	5.2%	6.8%
West Shore			
25/600			
Number of Hot Spots	2	2	5
% of Muni	0.13%	0.2%	0.5%

Table 6.13: Number of Hot Spots and Percent of Municipality at Municipal specific Bandwidths

Hot spots captured varying number of burglaries, depending on the intensity level. In tables 6.14 to 6.16 we see the number of break and enters found within in each level as a percent of total municipal break and enters. It is clear that as level of intensity increases the number of burglaries identified rises. Yet, we see above that even at the higher bandwidths a limited area of the municipality is covered by the hot spot.

Hot Spot Intensity	Municipalities					
25/400 - Level 1	Sid/NSaa	CenSaa	Saanich	Vic/Esq	Oak Bay	W/Shore
B and E In Level	3	2	5	23	3	8
% Of B AND E	8%	9%	1%	3%	6%	5%
25/400 - Level 2						
B AND E In Level	9	4	25	28	6	14
% Of B AND E	24%	17%	7%	4%	12%	8%
25/400 - Level 3						
B AND E In Level	13	23	52	51	17	32
% Of B AND E	35%	100%	14%	8%	35%	19%

Table 6.14: Number of Burglaries and Percent of total Burglaries at Bandwidth 400

Hot Spot Intensity	Municipalities					
25/670 - Level 1	Sid/NSaa	CenSaa	Saanich	Vic/Esq	Oak Bay	W/Shore
B and E In Level	7	3	17	37	4	13
% Of B AND E	19%	13%	5%	6%	8%	8%
25/670 - Level 2						
B AND E In Level	11	8	37	94	17	22
% Of B AND E	30%	35%	10%	14%	35%	13%
25/670 - Level 3						
B AND E In Level	14	12	59	190	27	40
% Of B AND E	38%	52%	16%	29%	55%	24%

Table6.15: Number of Burglaries and Percent of total Burglaries at Bandwidth 670

Central Saanich	Intensity Levels		
25/500	level 1	level 2	level 3
B and E In Level	3	8.00	23.00
% Of B AND E	13%	35%	100%
Saanich			
25/1000			
B AND E In Level	21	46	73
% Of B AND E	6%	13%	20%
Victoria Esquimalt			
25/530			
B AND E In Level	29	44	139
% Of B AND E	4%	7%	21%
Oak Bay			
25/720			
B AND E In Level	5	18	26
% Of B AND E	10%	37%	53%
Sidney North Saanich			
25/570			
B AND E In Level	8	11.00	14.00
% Of B AND E	22%	30%	38%
West Shore			
25/600			
B AND E In Level	11	20	33
% Of B AND E	7%	12%	20%

Table 6.16: Number of Burglaries and Percent of total Burglaries at Municipal specific Bandwidths

In tables 6.17 to 6.18 we see that a substantial number of municipal break and enters are captured in hotspots. In municipal specific bandwidths (table 6.17) in 77% of

the cases 10% or more of the municipal burglaries were found within the hot spots. In bandwidth 670m (table 6.18) we see again that in 77% of cases 10% or more of the break and enters are identified by the hot spot.

% BE within Hot Spot Municipal Specific	
Category	Percent In Category
less than 10%	22%
10% to 20%	33%
greater that 20%	44%

Table 6.17: Percent of Burglaries within Hot Spots at Municipal specific Bandwidths

% BE within Hot Spot at Bandwidth 670m	
Category	Percent In Category
less than 10%	22%
10% to 20%	33%
greater than 20%	44%

Table 6.18: Percent of Burglaries within Hot Spots at Bandwidth 670m

% BE within Hot Spot at Bandwidth 400m	
Category	Percent In Category
less than 10%	56%
10% to 20%	22%
greater than 20%	22%

Table 6.19: Percent of Burglaries within Hot Spots at Bandwidth 400m

In table 6.19, at 400m bandwidth, only 44% of the cases identified 10% or more of the municipal break and enters. In both the municipal specific and bandwidth 670m, in 44% of the cases more than 20% of municipal burglaries were identified. Even at the 400m bandwidth in 22% of the cases 20% or more of the municipal burglaries were highlighted.

The question arises what is a suitable bandwidth? There is evidence that residents would be willing to pay extra towards policing costs to see a 10% or more reduction in the level of criminal activity in their community (Manning, 2001). It is suggested that a bandwidth that consumes less than 15% of the municipal area and captures 10% or more

of the break and enters would be of a suitable size. The size of the area is manageable and a reduction of 10% of the crime may be feasible using proven and innovative ideas.

We have found that hot spots generally do not change in size or in the number of burglaries captured over time. This suggests that they offer opportunities for action to reduce break and enters by 10% or more. However, recent research has shown that hot spots vary in both time and space. Ratcliffe (2004) has shown that hot spots have different internal spatial and temporal patterns. Townsley and Pease (2002) have demonstrated that hot spots may already be cooling even before they were classified as hot spots. In other words, the number of incidences was already declining before the area was identified as a hot spot. If hot spots are constantly shifting in space and time they offer little promise for intervention, since patterns may change prior to the introduction of a particular action. The following chapter will explore this issue.

6.5 Summary

The purpose of this chapter was to establish whether residential burglary incidents formed identifiable patterns of concentration within the municipalities and the CRD as a whole that are consistent with pattern theory. The nearest neighbour analysis indicated that points while they were clustered within municipalities rather than random or uniform in pattern, it was limited to specific prescriptive value. The 'Hot Spot Detective' identified patterns within municipalities and the CRD. The Getis G*i found patterns in the Victoria area similar to those generated by the Hot Spot Detective. The Getis G*i did not find any significant patterns in other municipalities. When the municipal boundaries were removed, the Getis G*i results were similar to those found by the Hot Spot Detective for the region. Generally, GAM circles conformed to the Hot Spot detective

results covering all of the most intense hot spots. GAM extended the area of interest in some cases and in others missed less intense patterns generated by the Hot Spot Detective.

The spatial analysis shows that:

(1) Residential break and enter does not form random nor dispersed distributions, instead a limited number of distinct clusters form throughout the region.

(2) Clusters are not unique to any one municipality; instead, numerous locations throughout the region have concentrations of residential break and enter, further, the clusters vary in degree of intensity.

(3) Removing boundaries changes patterns, in other words, patterns at the municipal level differ from those at the regional level. There are several examples where patterns are not contained by artificial municipal boundaries, in other words, patterns do straddle municipal boundaries.

(4) There is a concentration of activity along the Langford - Colwood border in West Shore. Victoria and Esquimalt exhibit cross boundary activity. Sooke District and the adjoining Juan de Fuca EA provide another example of patterns overlapping municipal borders.

(5) Examining burglaries at the regional level provides evidence of a cross border pattern in the southwest - northwest sector of the Saanich - Victoria border.

(6) We have found that hot spots generally do not change in size or in the number of burglaries captured over time. This suggests that they offer opportunities for action to reduce break and enters by 10% or more. Hot spots identify areas that focus attention, for example, increasing citizen awareness (web page updates,

mail outs), educating residents on target hardening (crime prevention and Block Watch coordinators), and creating conventional or unconventional policing strategies to eradicate the problem. However, recent research has shown that hot spots vary in both time and space. Ratcliffe (2004) has shown that hot spots have different internal spatial and temporal patterns. Townsley and Pease (2002) have demonstrated that hot spots may already be cooling even before they were classified as hot spots. In other words, the number of incidences was already declining before the area was identified as a hot spot. If hot spots are constantly shifting in space and time they offer little promise for intervention, since patterns may change prior to the introduction of a particular action.

The following chapter will explore this issue.

Chapter 7: Stability of B and E Patterns over Time

7.1 Introduction

If patterns are unstable over time, they offer little value for strategic intervention. If they are in fact cooling before they appear hot as some research suggests, there is little tactical value. However, there is evidence that Crime patterns do persist over time in certain locations (Brantingham & Brantingham, 1984; Sherman, Gartin et al., 1989; Weisburd, Lum et al., 2004). Pease (1998a) suggests that areas with high crime rates act as good indicators of future offending patterns, if so, some clusters of intense break enter activity should endure over time. In fact, Johnson and Bowers (2004) found that burglaries, in particular, formed significant clusters of events in both time and space.

This study offers a unique look into crime clusters or hot spots. First, hotspots will be examined over a lengthy period of time, seven years, creating a longitudinal study of burglary. Rarely, has spatial analysis of crime extended beyond a few years (Weisburd, Lum et al., 2004). Failure to recognized fluctuations in hot spots over time may lead to incorrect interpretation of the results. Townsely et al. (2000) argue that "by ignoring time, hot spots become a one-off static measure of offending, with reduced analytic specificity." Second, it will explore residential burglary at the municipal level and at the regional level. Most analysis of crime clusters is conducted at the police beat level or the municipal city level.

Cluster Analyses provide evidence of high activity areas of crime or crime Hotspots. However, given the period of analysis they may not predict future activity. The time frame influences the quality of predictive validity of hotspot analysis. The lengthier the period the more likely continuous or stable hot areas will be identified. In the case of

repeat victimization, Farrell et al. (2002) found that one to three years identified an increase in the number of repeats, however, after 18 months the rate of increase started to diminish. Examining short-term crime data from one week to one month may provide limited information on current or future crime patterns. Prediction based on information established over a short time frame are no more reliable than chance (Groff & La Vinge, 2002).

Hotspots are a starting point for further investigation to uncover the reasons behind their development and continuation. They offer opportunities for police to make meaningful reductions in the both short and long term crime. Sherman and Weisburd (1995) found that increased police presence in hot spots reduced both hard and soft calls to police. Further police activity, for example, Neighbourhood Watch may affect long-term rates.

Our knowledge of space is learned through interaction with the environment. Physical attributes located throughout the environment act as aids assisting us in formulating and organizing an image of a city and its neighbourhoods (Lynch, 1960). Through internal or external contact with the environment (Lloyd, Cammack et al., 1995), an understanding of the relationship between Landmarks and the paths that connect them is established (Golledge, 1992). These spatial attributes are important in human wayfinding, because they assist us in moving from point A to B without getting lost, although they are for from perfect. Furthermore, routine interaction with an area develops an individual's awareness space creating a personal image of their environment. Offenders develop activity spaces through their daily non-offending routine, similar to non-offenders. They acquire spatial information about areas as they travel habitual paths

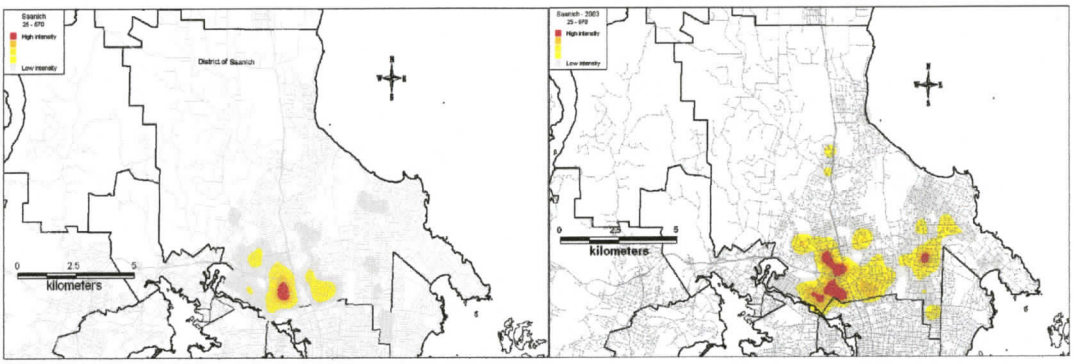
to work, school, malls, or other social settings. Burglars do not see everything in their daily travel so they are cognizant of a small proportion of their surroundings. This subset of knowledge becomes their awareness space (Pettiway, 1982; Rengert, 1989; Rengert & Wasilchick, 1985). It is in their awareness space that offenders seek out their targets (Brantingham & Brantingham, 1993b).

If persistent hot spots are located within municipalities, prominent landmarks, nodes or pathways should anchor them. Principal nodes for example, shopping malls, housing complexes or schools which attract large numbers of people may act as crime generators, (Brantingham & Brantingham, 1999). Paths connecting high activity nodes become routes for large amounts of local and transient population, traveling throughout the area for legitimate or illegitimate reasons. "Crime generators produce crime by creating particular times and places that provide appropriate concentrations of people and other targets in settings that are conducive to particular types of criminal acts" (Brantingham & Brantingham, 1999, p. 18). Nodes may also act as crime attractors, for example, drug houses, large malls, or transit exchanges. Through interaction with an area, an offender becomes aware of opportunities for different types of criminal activity. Police subjects identified these features in their jurisdictions; consequently hot spots will be examined to determine if they contain these attributes.

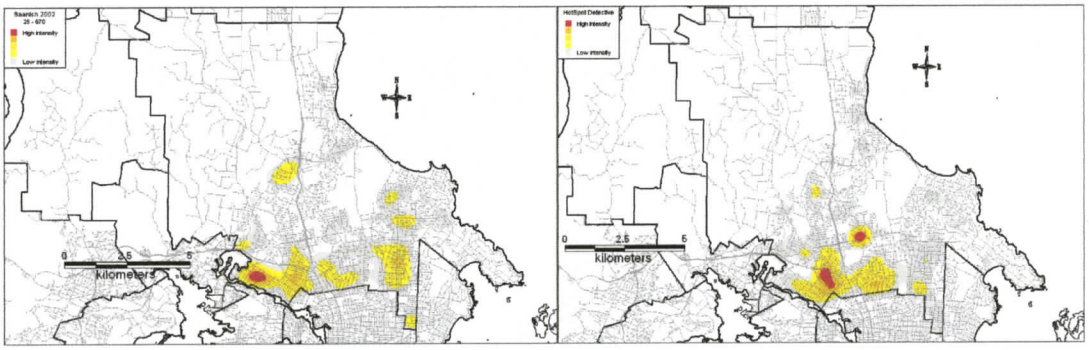
7.2 Saanich

This section will focus on Saanich as an example of stability in Hot Spots over time. The other municipalities are detailed in Appendix III.

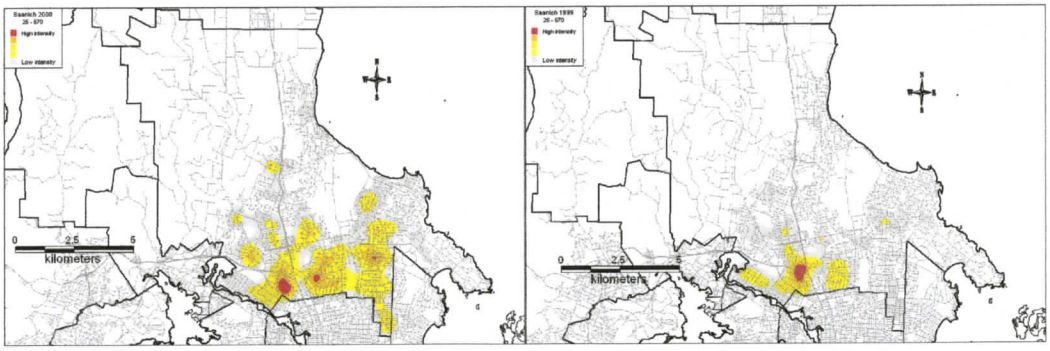
Saanich



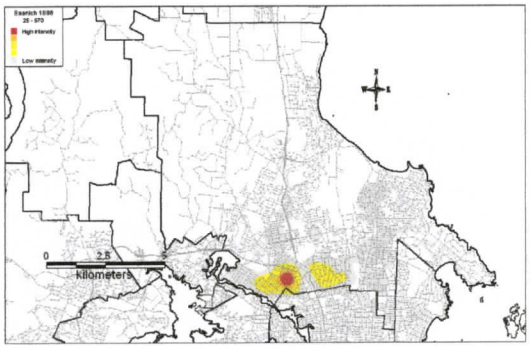
a. 2004 b. 2003



c. 2002 d. 2001



e. 2000 f. 1999



g. 1998

Figure **7.1**: Break and Enter Saanich (25m2 cell – 670m bandwidth).

Saanich had several patterns which were transitory in space over the seven year study period. There is one area west of Douglas St and south of the Trans Canada Hwy which remains stable over time. The size of the hot spot varies with time, but it is a persistent location of intense burglary activity. A less intense but temporally distinct pattern is located between Blanshard St and Maplewood Rd straddling Tattersall Dr.

It is interesting to note that the Saanich hot spot activity is predominately along its south border. This pattern is consistent over time. A large proportion of the population of

Saanich lives along the border. This border separates Saanich from the City of Victoria, which is the main business district for the region.

Both persistent hot spots are bounded by major arterial routes. Beavon (1984: p. 128), in his thesis work, concluded "...opportunities have a greater likelihood of being exploited if they are on relatively accessible street segments and frequently traveled streets." The most active hot spot occurs in the area of a major road juncture where traffic travels east into West Shore and south into the peninsula. The less active, but persistent hot spot is bounded by a major north/south arterial route Blanshard St. The two secondary routes Tattersall Dr and Maplewood Rd. access large residential populations in the north, centre and east side of Saanich.

Police officers recognized a number of nodes within or close to the primary hot spots. Nodes included the Town and Country mall, the Tillicum mall, Cloverdale/Cook/Quadra junction (strip mall), Save on Foods plaza, Perkes arena, Red Lion hotel/bar, Saanich Centre (Strip Mall), Colquitz school, MayFair mall, Future Shop mall, Salvation Army (Quadra ST), Ukrainian Cultural centre, Carey Rd 7-11, bingo hall (Tillicum Rd and Burnside Rd.), and the bottle exchange (Quadra). The primary and secondary sites are combined, because individual officers had different impressions on the significance of locations, in other words, what was a primary route to some officers may be a secondary location to others.

Police officers pointed out numerous Landmarks that interact with the main hotspots. Primary and secondary Landmarks included, Rutledge park, Playfair park, the Wang building, Gorge waterway, Municipal Hall/Police building, Swan Lake, and the McDonalds located at Saanich Rd and Oak St.

There were many routes intersecting or bordering the hot spots. The following roads and paths stood out as important, the Pat Bay Hwy # 17, Trans Canada Hwy #1, Tattersal Dr., Tillicum Rd, McKenzie Ave, the Galloping Goose trail, Burnside Rd, Cook St, Gorge Rd., Cedar Hill Rd., Cedar Hill Cross Rd., Douglas St., Saanich Rd, Blanshard St, Cloverdale Ave, and Tennyson Ave.

7.3 Offender Home Addresses (2004)

Based on prior research (Baker & Donnelly, 1986; Costello & Wiles, 2001; Davidson, 1980; Herbert, 1985; Wiles & Costello, 2000), it is likely that offenders live in, or nearby areas of intense burglary activity. Routine activities theory argues that there is a convergence of motivated offenders and suitable targets absent guardians in both time and space. Pattern theory links common nodes, paths and landmarks in conjunction with the offender's home, social activities, and work sites. The home is considered the anchor for an individual's spatial activity and perceptual space. Rational choice theory argues that offenders indulge in a limited assessment process weighing the risks and benefits of committing a particular crime. The goal is to reap some benefit with a minimum effort. If this is the case, the routine activities of offenders, leaving their homes, interacting with common nodes, traveling short distances on familiar paths would be exposed to beneficial opportunities with limited risk close to their residences. To examine this proposition, data on the home locations of individuals charged with break and enter in Victoria and Saanich was obtained for the year 2004. Common problems existed with the data, for example, the data includes only offences where the offender was charged. It does not include offences that were cleared by other means, in other words, the offender admitted to the offence, but was not charged. Other problems, which exist, include the

veracity of the offender in providing the correct home address. Memory problems - did they get the numbers wrong but the street name right? These difficulties create problems with police offender home data.

Victoria and Saanich had a combined total of 91 Offender home addresses for 2004. Fourteen of the offenders recorded no fixed address (NFA). Thirty of the remaining addresses did not geo-code so the address was modified to the nearest address. Four of the addresses were not located in the CRD.

There was a total of 77 offenders charged with 99 break and enters in municipalities of Saanich and Victoria in 2004. Male offenders made up the majority of the group 69 (90%), while there were only 8 females offenders which represented 10% of the group. Sixty-one (79%) of the offenders were charged with only one break and enter. Sixteen (21%) of the offenders committed two or more break and enters accounting for 38 (38%) of the 99 break and enters. Fourteen offenders committed 6 burglaries with two or more accomplices. In Victoria, 50 offenders committed 65 break and enters. Eleven of the offenders (22%) committed two or more of the break and enters for a total of 28 (43%) break and enters. Thirty-nine (78%) offenders were charged with only one offence. In Saanich, 28 offenders committed 34 break and enters. Ten (41%) of the break and enters were committed by 6 (21%) repeat offenders. Twenty-two (82%) offenders were charged with only one offence.

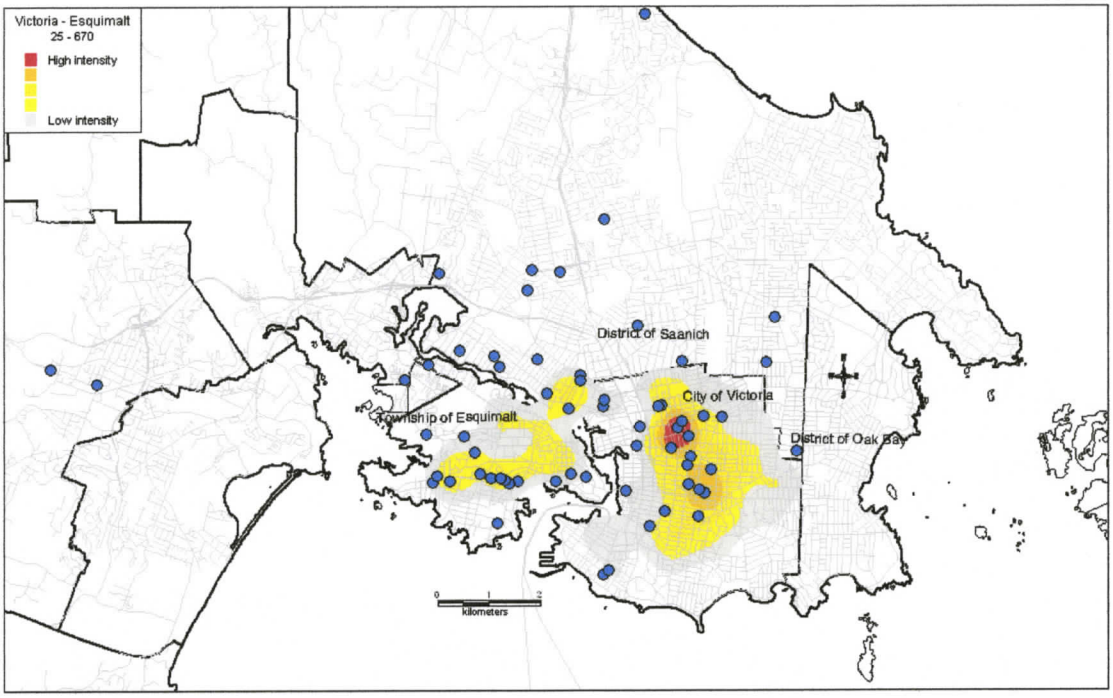


Figure 7.2: Victoria and Saanich: Home Locations of offenders charged with Break and Enter.

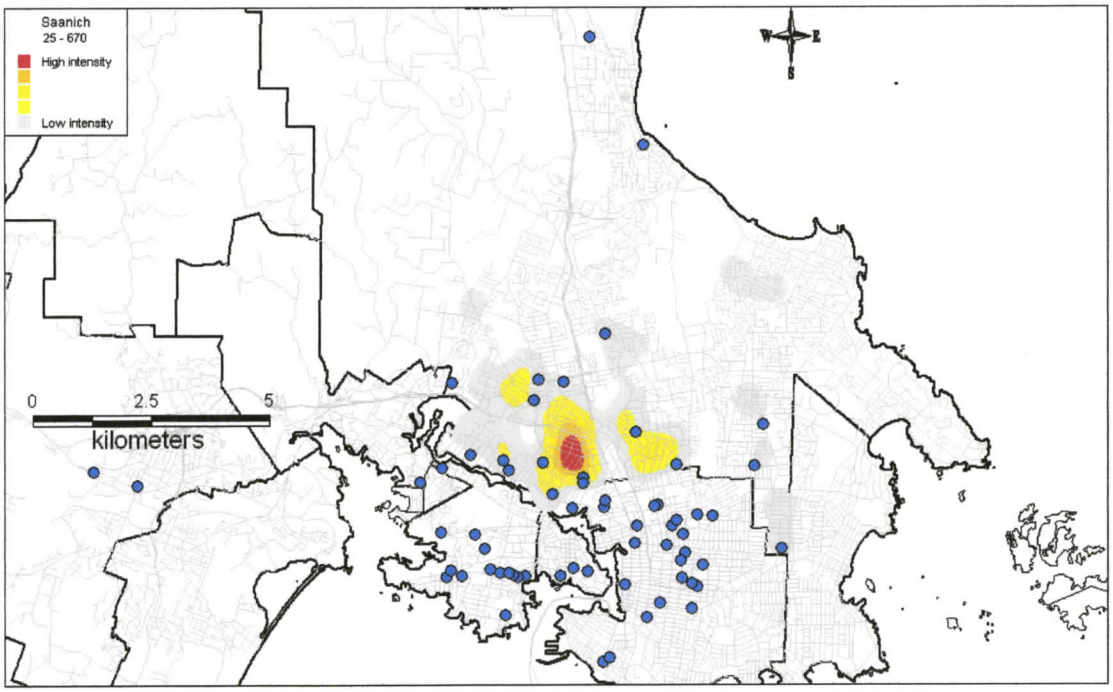


Figure 7.3: Victoria and Saanich: Home Locations of Offenders Charged with Break and Enter.

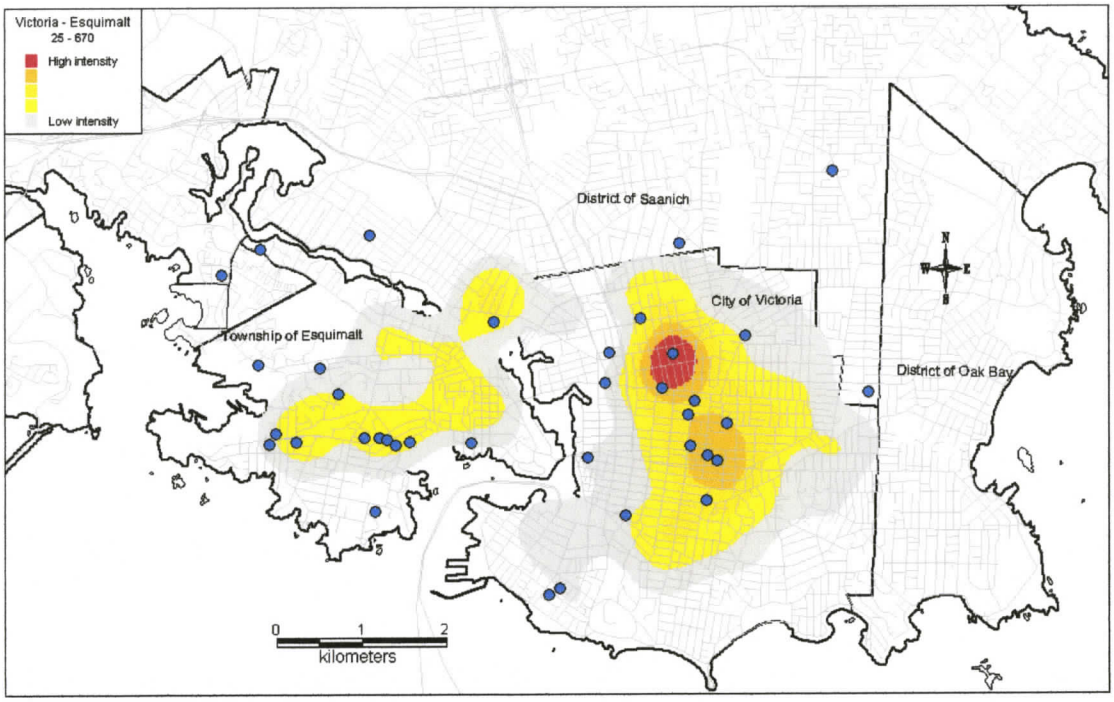


Figure 7.4: Home Locations of Offenders Charged for Break and Enter in Victoria.

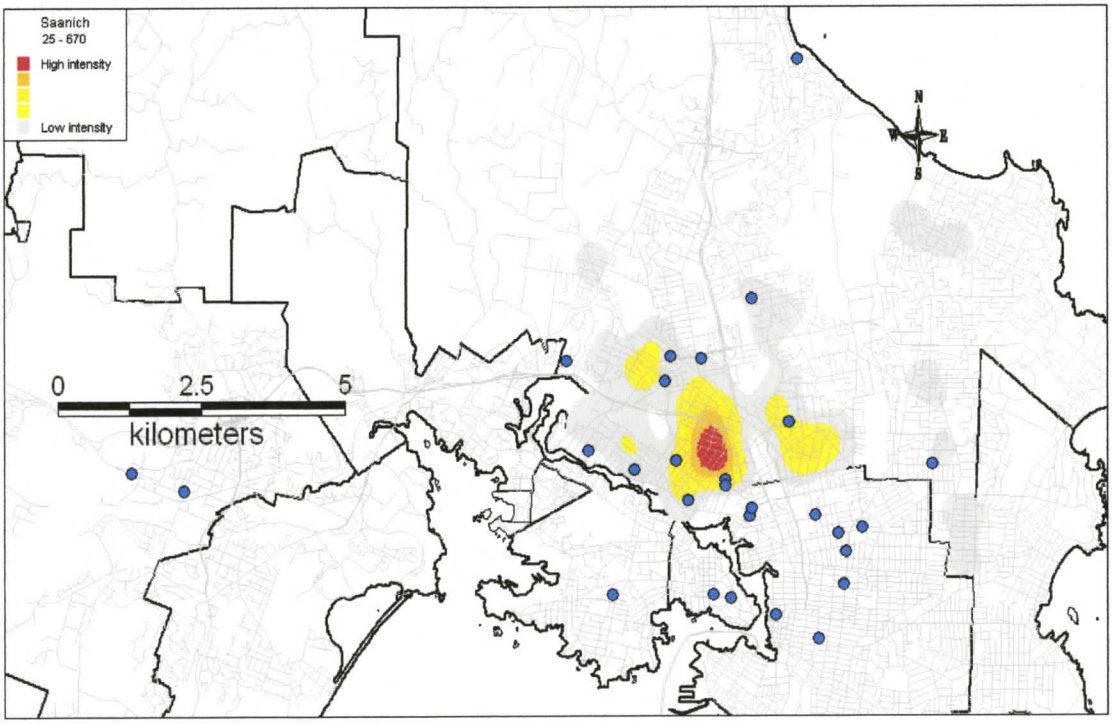


Figure 7.5: Home Locations of Offenders Charged for Break and Enter in Saanich.

The Victoria hot spots are shown in figure 7.4. Offender residences clearly follow the hot spot patterns. Offenders either live within the hot spots or reside on the hot spot borders. Surprisingly, Forty-five (90%) of the offenders had residences in or on the fringe of the hot spots. The periphery is considered the grey shaded area, which is the least intense hot spot area.

Most offenders who committed their offences in Saanich live in or near the hot spot in Saanich (Figure 7.5). In fact, 12 (43%) of the 28 burglars live within one of the hot spots levels. What is surprising is that 12 (43%) of the 28 offenders travel from Victoria to Saanich to commit their offences. There is a perception in Victoria that many of their crime problems emanate from traveling offenders coming into the city from other municipalities. This is probably true for violent offences, bar room assaults or property offences such as shoplifting. Preliminary evidence found in the current study shows some offenders do travel into Victoria to commit their burglaries, but offenders also travel into Saanich from Victoria. This demonstrates that offenders are not constrained by artificial jurisdictional borders. One final observation, most offenders traveling from Victoria into Saanich reside in or near the Victoria hot spots. It is likely, that many of these offenders also commit their burglaries in the Victoria hot spots in which they live in or near too.

Summary

We have seen evidence that hot spots of break and enter activity do form persistent patterns in specific locations over time. This occurs in each municipality throughout the region. We have witnessed many of the hot spots throughout the region are anchored by main roads, business/commercial districts and in the example of Victoria/Saanich, offender residences. These nodes, paths and landmarks as the

Brantinghams (1993b) pointed out, help form the criminal's activity spaces, developed during their routine activities. It is in their activity space that crimes are committed, that is areas where large volumes of individuals travel, by foot, bicycle or vehicle without attracting much attention, in other words, they do not stand out. These areas offer opportunity for offenders to intermingle, learn and ultimately offend.

Yet, there are nodes and landmarks throughout the region which do not seem to attract the same level of activity. However, when offender residences are added to the mix we see a concentration of homes in or near the hot spots. Hebert (1985) in his research discovered that offender residence was instrumental in defining areas with high burglary rates. It would appear that residence is an important attribute in the burglaries committed in the Saanich and Victoria municipalities. It is likely that offenders living in or near the hot spots use the nodes, paths and landmarks in the hot spot area to seek out their targets.

One area of evolving research looks to repeat victimization to generate possible alternative methods to deal with break and enter. Pease notes (1998b: p. 7) "Having identified a hot spot, what does one do when standing in it? Looking at prior victims *within* hot spots could provide one sensible route to prevention. Likewise, having identified a repeat victim, it may prove most sensible to act on the surrounding places and people, rather than on the victim. Conventional hot spot demarcation and repeat victimization are *alternative* starting points for problem definition and solution, each of which may be helped by consideration of the other perspective." A next step in regional hot spot analysis would examine what causes persistent hot spots. Is it possible to explain

why they occur and then create or modify preventative techniques to reduce or eliminate re-occurrence of the problem?

This will have to wait for future research. The next section looks at the temporal distribution of residential burglary. It asks a number of questions, for example, are there patterns in time, and are they persistent over time.

7.4 Temporal Rhythms of Residential Burglary

The geographical aspect of crime has received considerable attention with the increase of desktop GIS applications and hotspot detection methods. Time, however, has not benefited from the same degree of interest, especially the hourly periodicity of criminal events (Felson & Poulsen, 2003). To address this issue the question was posed, what kinds of patterns exist in the temporal distribution of residential break and enter in Greater Victoria?

Two main constraints exist, first the quality of temporal data varies. In all the jurisdictions numerous times, dates or both were missing. In smaller jurisdictions where there were few break and enters, there was a limited number of values available for analysis. The RCMP data had a high number of missing values, as a result, West Shore, Sooke and Sidney North/Saanich were excluded from this examination. In 2003, Victoria/Esquimalt piloted the new regional RMS. By 2004, after the successful completion of the Victoria/Esquimalt pilot, Saanich converted to the new RMS. The Victoria Esquimalt data for 2003 were missing in excess of 140 values. The 2004 time/date data for Saanich and Victoria/Esquimalt were either missing, or incorrectly entered, therefore, this year was excluded from the examination.

The second difficulty is that many crimes do not occur at a static point in time, instead they may span several hours. This is generally the case with residential break and enters; when no one is home at the time of the incident how does one determine the exact time at which the event occurred? Ratcliffe and McCullagh (1998) have developed a method termed Aoristic analysis which overcomes one of these problems. This technique applies a temporal weights method, "Aoristic analysis…calculates the probability that an event occurred within given temporal parameters, and sums the probabilities for all events that might have occurred to produce a temporal weight in a given time period" (Ratcliffe, 2002, p. 27).

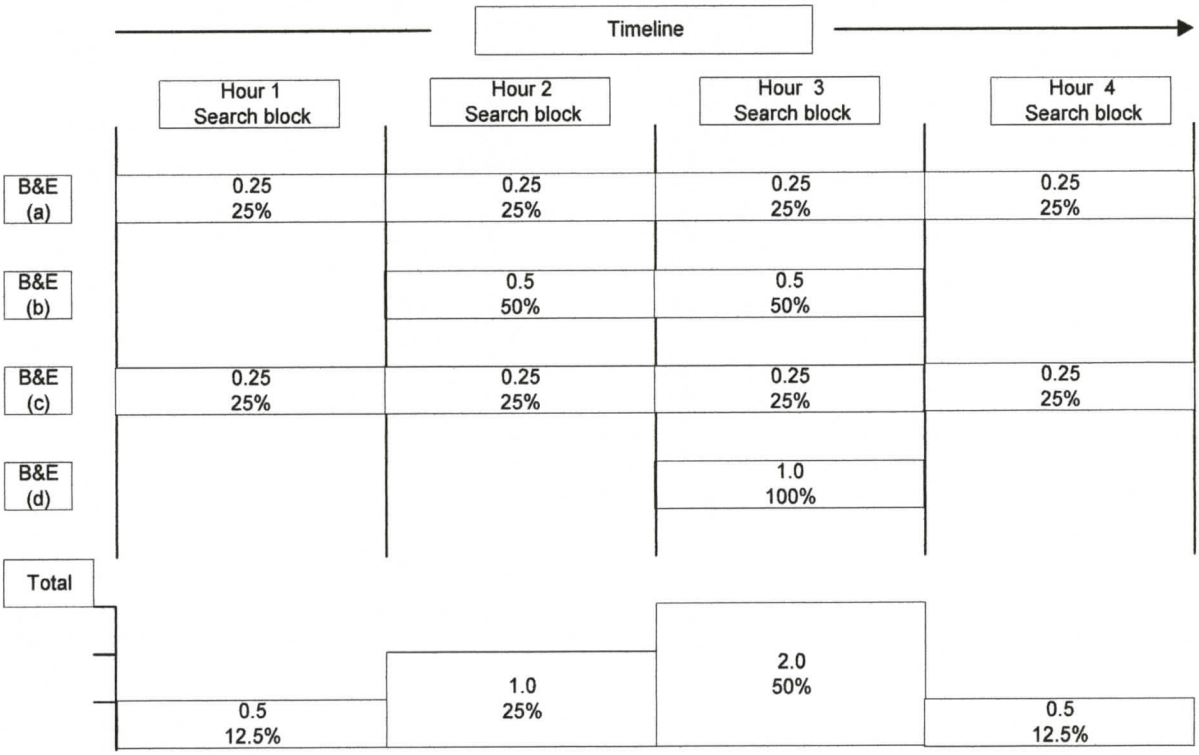


Figure 7.6: Timeline development (Gottlieb, Arenberg et al., 1994; Ratcliffe, 2000, p. 671).

Figure 7.6 presents four different events (a) to (d) occurring over a specified time frame, a four hour time period in this example. Each event has a start time and end time.

The time span can be allocated in one-hour blocks or one-day blocks depending on the data used. Each individual event is divided by the number of search blocks, or in this case hours, over which it occurs (1/search blocks) and is assigned a weight for each search block. For example, the data in figure 7.6 is arranged in hourly increments, offence (a) occurred over a 4-hour period. Therefore, it has a 0.25 weight for each one of the four hours its spans or a 25% chance of occurring in each one of the four-hours. The remaining three offences are calculated in the same manner deriving the appropriate weights. The weights for all four offences are added for each hour creating a histogram of weights for each time period (bottom of figure 7.6). This is "…not a histogram of incident frequency, but a graph of the accumulated weights for the incidents in each search period" (Ratcliffe, 2000, p. 671). For example, if search period 3 is summed there is a probability that two offences occurred in this time frame. The accumulated weights provide a reasonable probability of the number of offences that may have occurred over a specific time period.

The formula for calculating the Aoristic value is expressed

as (Ratcliffe, 2002, p. 28):

$$t_{is} = \Delta / (\beta_i - \alpha_i) \quad (4)$$

- i is a crime incident within the study region and with a start time (α_i) and end time (β_i),
- s is a temporal search parameter for the same study region with a start time α_s and an end time β_s,
- Δ represents a temporal unit (e.g., one minute, hour, or day), start times (α) are rounded down to unit Δ end times β are rounded up to unit Δ, and where (α_i, β_i intersects (α_s, β_s).

Referring back to Figure 7.6, if search period 1 through 4 was a sequence of 4 hours starting at 1000 hrs and ending at 1400 hrs and events 'a' through'd' were a series of four residential break and enters. We see *T (event* a*)* at *(hour 1)* = $1(\Delta)/[\beta_s\ (1400) - \alpha_i(1000) = 1/(1400 - 1000) = 1/4 = .25$. Two pieces of information flow from these calculations, the probability an individual event occurred within a specified search period and what chance all of the events had of occurring in each search period. Gottlieb et al. (1994) converted the weights into percentages to estimate the chance the events occurred within a specified time frame. Looking back at the previous example, event 'a' had a 25% chance of occurring in hour 1. Summing the weights or percentages for each hour, or search period, it is possible to ascertain the chance of the four break and enters occurred within each search period. Completing this process on the entire sample of four break and enters there was a weight of .5 or 12.5% (.5/4 events) chance that the four break and enters occurred in hour one, 25% in hour two, 50% in hour three and 12.5% in hour 4. The Hot Spot Detective ™ uses the aoristic method to calculate weights by hour, day, and week. The application was used in the following analysis.

Residential burglaries generally occur during periods when occupants are least likely to be home, mainly during the daytime hours (Cromwell, Olson et al., 1991; Reppetto, 1974; Scarr, Pinsky et al., 1973; Waller & Okihiro, 1978), peaking in the afternoon (Maguire & Bennet, 1982). Shover (1991: p. 83) found that 50 percent of burglaries occur between 0600 and 1800 hours, 23 percent between 1800 and 2400 hours and 16 percent between 2400 and 0600 hours. Younger offenders will commit burglaries during the night when residents may be home. Nighttime thrill seekers represent a minority of the burglar population. Break and enter occurs mainly on week days when

residents are not at home (Miethe & McCorkle, 1998) Maguire and Bennet (1982) discovered that Sundays recorded the lowest number of burglaries during the week, although, Waller and Okihiro (1978) found marginal increases in break and enter during the weekend. Seasonally, residential burglary exhibits only a limited amount of variation (Chard, 1995; Scarr, Pinsky et al., 1973; Waller & Okihiro, 1978).

Hourly Tempo of Break and Enter

Cohen and Felson (1979) and Felson and Poulsen (2003) offer three organizing characteristics of time, tempo, rhythms and timing. Tempo describes "…the number of events per unit of time, which includes measures like "…the annual crime rates." The rhythm of time represents "…the periodicity of time patterns," for example cyclical variations in crime patterns. Timing considers the interaction between interdependent activities of both offender and the target. The following discussion will examine the tempo and rhythm of break and enter in the jurisdictions with municipal police departments.

The weights have been rounded and referred to as the number of break and enters. It must be remembered that the weights do not represent the actual number of break and enters which occurred in a specified period, only the probability that the number of events occurred. The hourly weights generated in the HOTSPOT Detective™ were also converted into percentages. Each percentage represents the probability that a proportion of the daily break and enter occurred within the corresponding hour. It is not an exact figure, but it does indicate that there is a high likelihood that the each hour contributed the respective proportion of break and enters to the daily total. Victoria/Esquimalt is used

as an example in the following discussion, details on the other municipalities analyzed are found in appendix III.

Victoria Esquimalt Time of Day

Victoria/Esquimalt had the greatest number of events suitable for analysis. In 2003 the two municipalities amalgamated their police services. At the same time they initiated a pilot project to test the new Versadex RMS. It is suspected the merging of the two departments coupled with the migration to a new RMS reduced the volume of events in 2003 usable in the analysis. In 2004 there was a lack of occurrence times available, therefore, 2004 was not used in this study. A total of 3951 events, occurring over five years, were employed in the temporal analysis.

Victoria Esquimalt is consistent with other jurisdictions, break and enter occurs predominately in the day time hours (Fig. 7.7). The activity rises in the mid morning hours, peaks in the early afternoon and starts a gradual decline to the end of the day. Some years exhibit higher evening/nighttime volume than others, but clearly the number of burglaries decrease toward the end of the day. To test for similarity in data distribution, a chi square test

VIC ESQ PERCENT OF HOURLY B & E												
Hour	2004	2003		2002		2001		2000		1999		Avg.
0000-0059		21	4%	26	3%	25	3%	24	3%	41	4%	4%
0100-0159		17	3%	25	3%	21	3%	20	2%	25	2%	3%
0200-0259		19	4%	24	3%	18	2%	20	2%	26	3%	3%
0300-0359		16	3%	25	3%	17	2%	15	2%	28	3%	3%
0400-0459		17	3%	19	2%	18	2%	15	2%	26	3%	3%
0500-0559		16	3%	20	3%	16	2%	14	1%	22	2%	2%
0600-0659		15	3%	19	2%	18	2%	15	2%	18	2%	2%
0700-0759		20	4%	24	3%	16	2%	23	2%	20	2%	3%
0800-0859		24	5%	32	4%	24	3%	34	4%	38	4%	4%
0900-0959		24	5%	38	5%	29	4%	44	5%	36	4%	4%
1000-1059		25	5%	40	5%	33	4%	48	5%	46	5%	5%
1100-1159		26	5%	44	6%	42	6%	49	5%	57	6%	6%
1200-1259		22	4%	44	6%	33	4%	60	6%	62	6%	5%
1300-1359		27	6%	40	5%	43	6%	67	7%	65	7%	6%
1400-1459		32	6%	47	6%	51	7%	69	7%	77	8%	7%
1500-1559		25	5%	38	5%	43	6%	63	7%	71	7%	6%
1600-1659		22	4%	50	6%	47	6%	72	8%	59	6%	6%
1700-1759		19	4%	42	5%	49	7%	53	6%	50	5%	5%
1800-1859		19	4%	35	4%	29	4%	49	5%	41	4%	4%
1900-1959		20	4%	36	5%	38	5%	37	4%	47	5%	4%
2000-2059		22	4%	32	4%	44	6%	42	4%	47	5%	5%
2100-2159		17	4%	27	3%	34	5%	42	4%	37	4%	4%
2200-2259		16	3%	27	3%	30	4%	34	4%	29	3%	3%
2300-2359		14	3%	27	3%	28	4%	29	3%	26	3%	3%
Total		495	100%	779	100%	748	100%	937	100%	992	100%	100%

Table 7.1: Victoria Esquimalt Hourly Distribution of B & E

was employed for each year. The results indicate that the distribution of events in 2003 did not significantly vary from a uniform distribution. However, the hourly distribution of events varied significantly from 2002 to 1999, with $p < 0.05$ in each year.

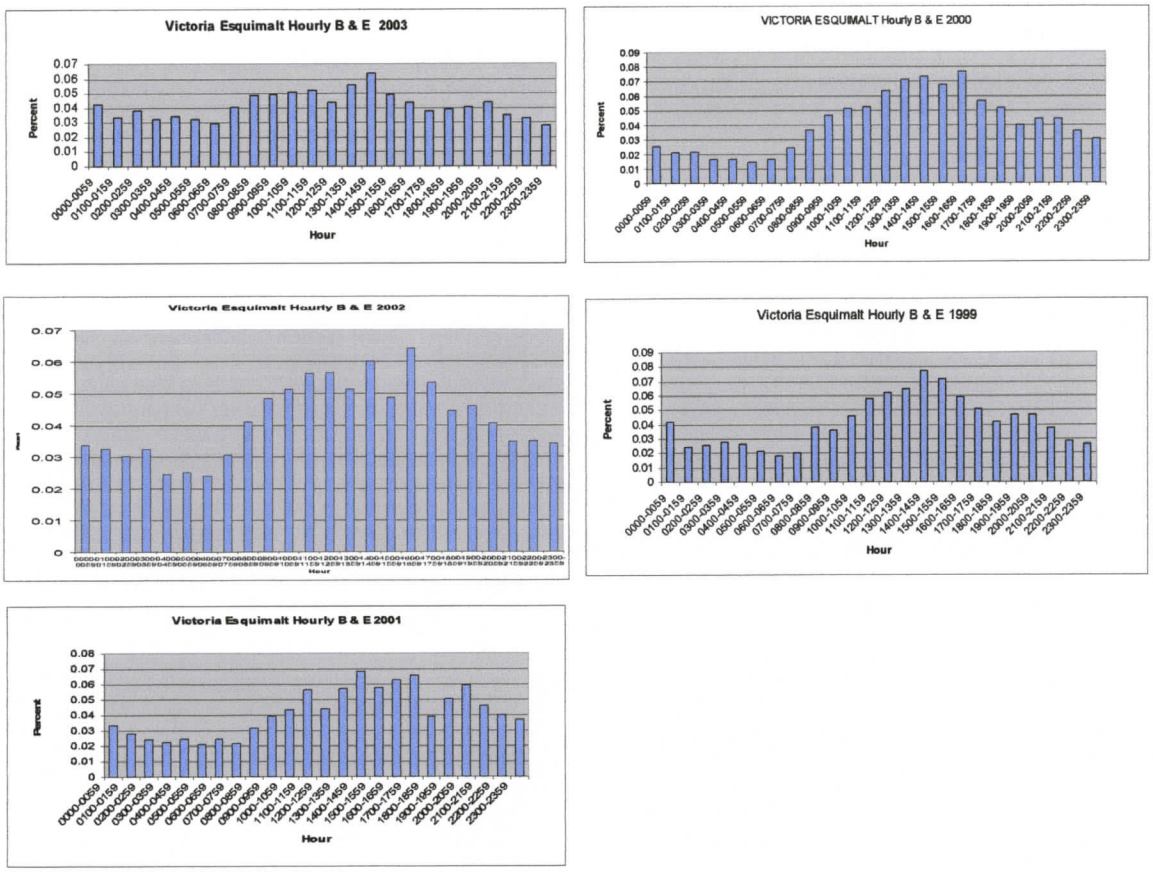


Figure 7.7: Hourly Distribution of Break and Enter in Victoria/Esquimalt.

When the data is aggregated the day time pattern is very evident (Figure 7.8). Unlike the other municipalities the descent of break and enter does not curtail at the end of the day, instead it is lengthier, continuing into the early morning hours.

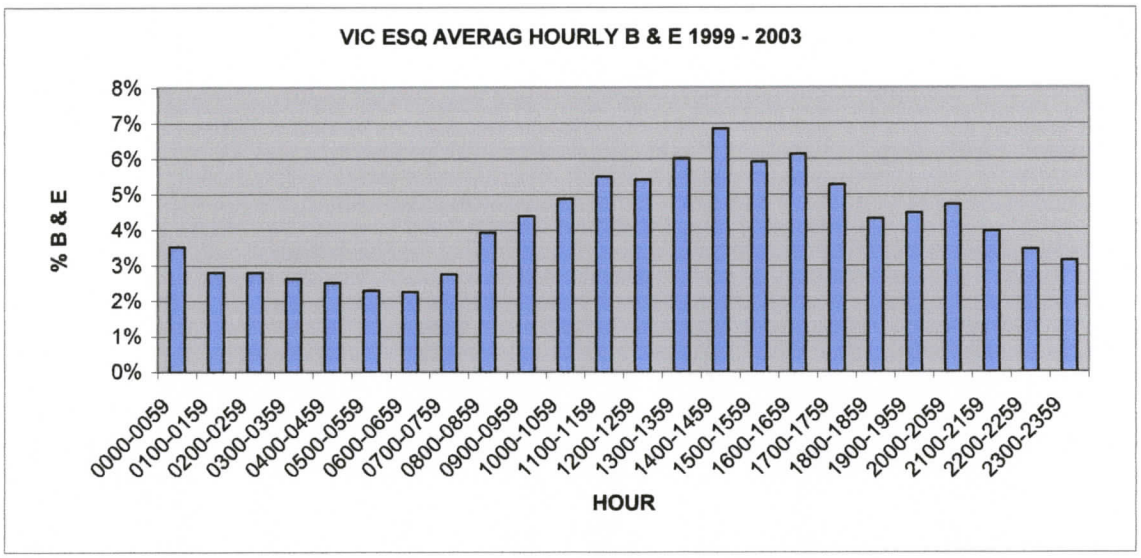


Figure 7.8: Average Hourly Distribution of Victoria/Esquimalt B & E from 1999 – 2003.

Table 7.2 shows about 30% or more of the burglaries occurred in the afternoon hours. Morning and evening burglaries tend to remain constant in the mid 20% range. Prior to 2002, early morning break and enters remained below 20%. This patterned changed in 2002 when break and enters rose to 27% and remained above 20% in 2003. In 1999 and 2000 morning and afternoon break and enters combined exceeded 60% of the daily distribution.

VICTORIA ESQUIMALT PERIODIC DAILY PATTERNS OF B & E							
	2004	2003	2002	2001	2000	1999	
Period	%	%	%	%	%	%	Avg.
0600-1159		27%	23%	22%	23%	22%	23%
1200-1759		29%	33%	36%	41%	39%	36%
1800-2359		22%	17%	27%	25%	23%	23%
2400-0559		21%	27%	15%	12%	17%	18%
Total	0%	100%	100%	100%	100%	100%	

Table 7.2: Periodic Pattern of Daily B & E in Victoria Esquimalt

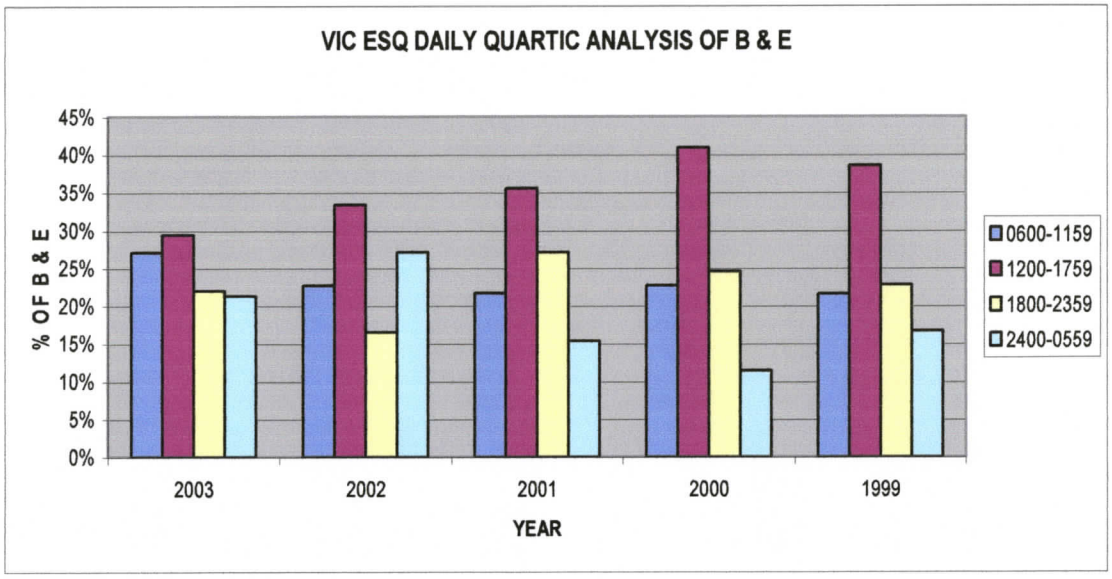


Figure 7.9: Periodic Patterns of B and E in Victoria Esquimalt.

However, this pattern changed in 2001 when break ins dropped below 60% and has leveled out in the mid 50% range. Afternoon break and enters have been declining since 2001 while early morning burglaries have increased since 2000.

AVERAGE QUARTIC ANALYSIS B and E 1999 - 2003				
Period	CSPD	SPD	OBPD	VIC ESQ
0600-1159	25%	25%	21%	23%
1200-1759	38%	38%	36%	36%
1800-2359	17%	22%	18%	23%
2400-0559	19%	15%	25%	18%

Table 7.3: Municipal Average Periodic Patterns 1999 – 2004[1]

Aggregating the five years of data for each municipality, the least variation in break and enter occurs in the afternoon. The greatest variation is evident in the early morning hours, mainly due to the high incidence rate recorded in Oak Bay. The morning period tends to have a higher percentage of incidences than evening or early morning. As

[1] Central Saanich and Oak Bay 2004 data excluded for comparison purposes.

we saw in the annual patterns, the morning/afternoon period had between 54% and 60% of the recorded break and enters.

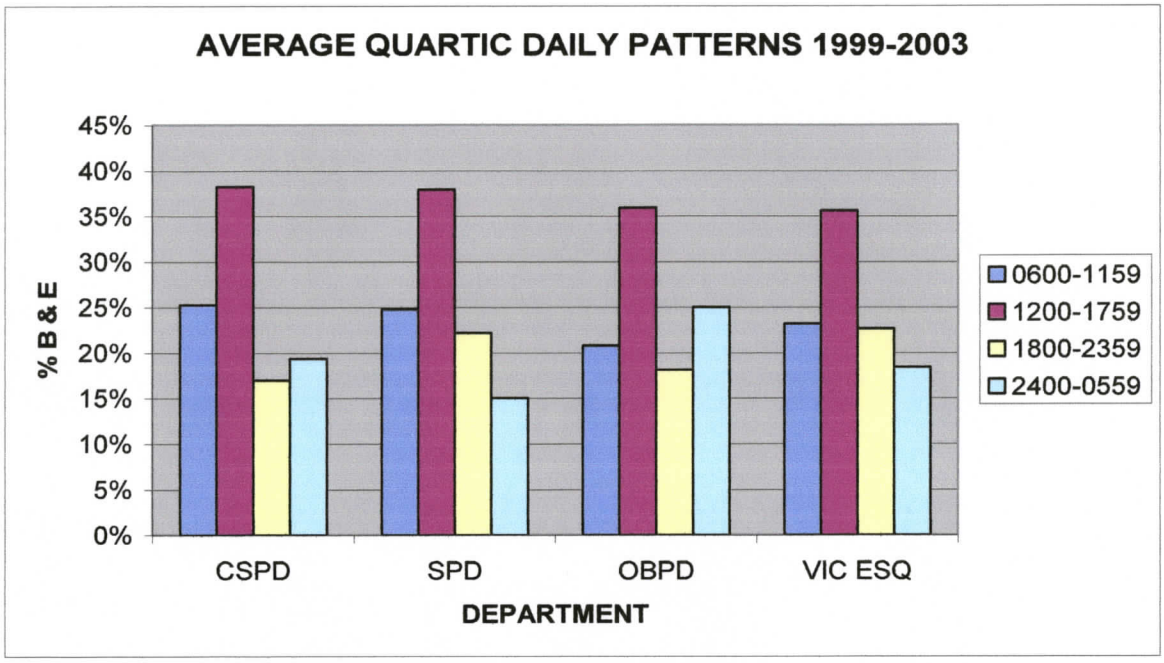


Figure 7.10: Municipal Average Periodic Patterns 1999 – 2004.

Daily Rhythm of Burglary

The previous analysis has shown that residential burglary is a daytime event, concentrating in the morning and afternoon. The next step is to examine the pattern of offending at a lower level of resolution at the meso level of analysis. Each municipality was examined individually to determine how the rhythm of burglary varies between the days of the week. Are there consistent patterns of offending visible at this level of analysis?

Victoria Esquimalt Day of the Week

There is limited variation in the number of break and enters per day of the week (Figure 7.11). Break and enter occurred predominately in the early part of the week from Monday to Wednesday. However, unlike Oak Bay the amount never exceeded 45% of the weekly total. Victoria Esquimalt would see a rise in activity over two days with a moderating affect occurring through out the rest of the week.

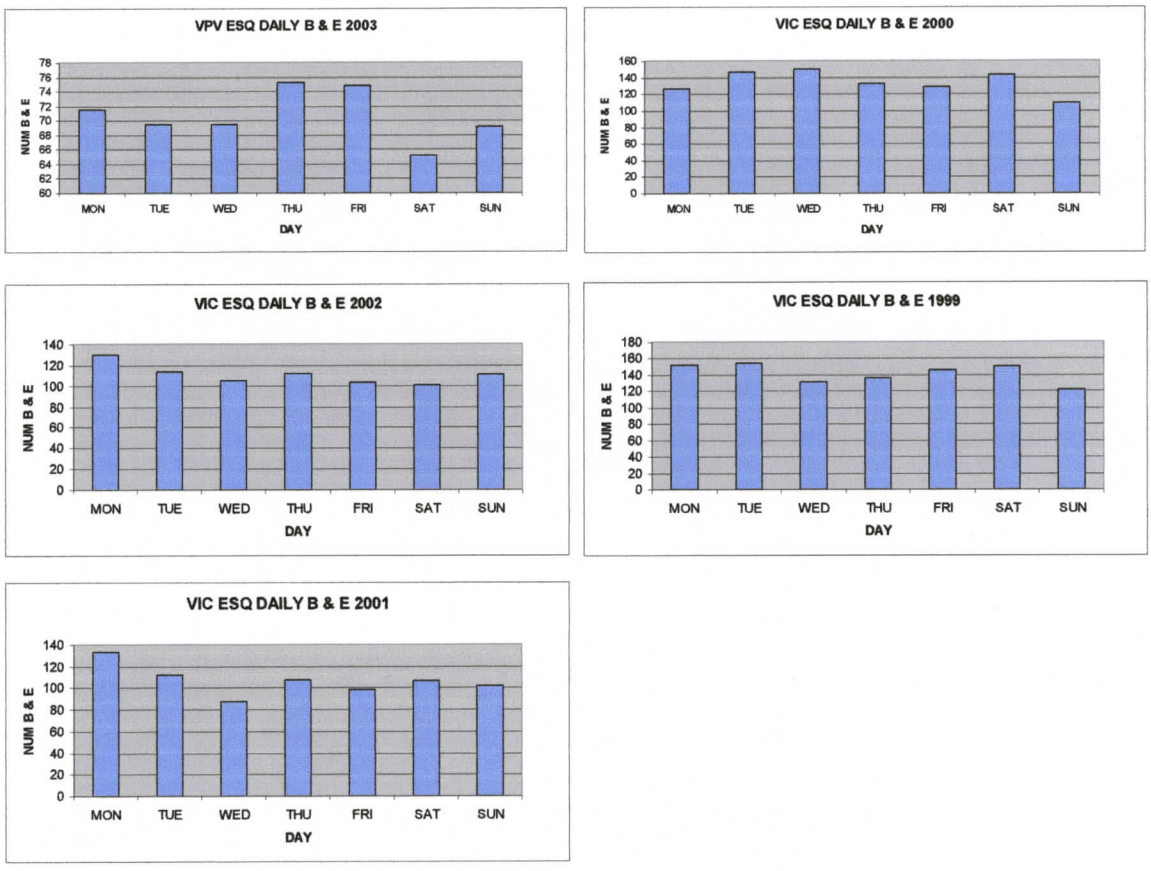


Figure 7.11: Victoria Esquimalt Daily Patterns of Break and Enter.

VICTORIA ESQUIMALT DAILY BREAK AND ENTER													
Day	2004		2003		2002		2001		2000		1999		AVG
Monday			71	14%	130	17%	133	18%	126	13%	152	15%	16%
Tuesday			70	14%	114	15%	112	15%	147	16%	154	16%	15%
Wednesday			69	14%	106	14%	87	12%	150	16%	132	13%	14%
Thursday			75	15%	112	14%	108	14%	132	14%	136	14%	14%
Friday			75	15%	104	13%	98	13%	128	14%	145	15%	14%
Saturday			65	13%	101	13%	107	14%	144	15%	151	15%	14%
Sunday			69	14%	111	14%	102	14%	109	12%	121	12%	13%
Total	0	0%	495	100%	779	100%	748	100%	937	100%	992	100%	100%

Table 7.4: Victoria Esquimalt Daily Patterns of Break and Enter

When the five years of data is aggregated Monday and Tuesday had the highest percentage of break and enters, 16% and 15% respectively (Table 7.4). However, there is only a 1% to 2% difference between Monday and Tuesday and the remaining days of the week. Sunday had the lowest percentage of break and enters 13%. In figure 7.12, we see Monday and Tuesday have the highest activity, however, there is little fluctuation

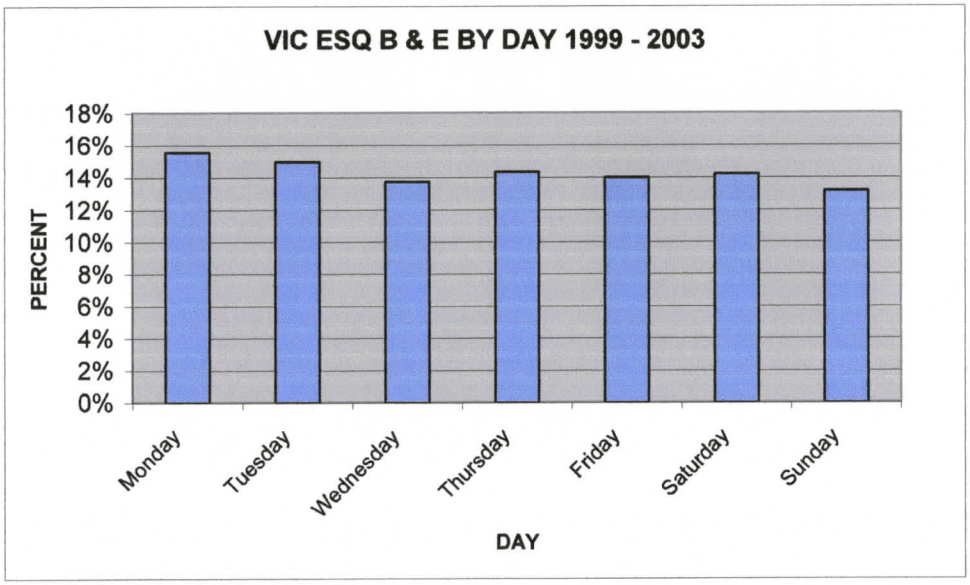


Figure 7.12: Victoria Esquimalt Daily B & E 1999 – 2003.

only 3% between the high point on Monday 16% and the low point on Sunday 13%. Unlike prior research break and enters appear to be distributed somewhat equitably through out the week.

Victoria/Esquimalt has the lowest variability in the data. The average was 14.3% and the standard deviation was 1.3% (Figure 7.13). It had the lowest number of days exceeding one standard deviation around the mean. Over time, the daily pattern of residential burglary does not vary much, differing by a mere 2.6%. The burglaries are distributed uniformly over the week, using a Chi square test $p <= 0.05$. The Kruskal-Wallis test results showed that break and enter did not vary significantly by day of the week over the study period, H=2.908836 at 6 *df*, $p > 0.05$.

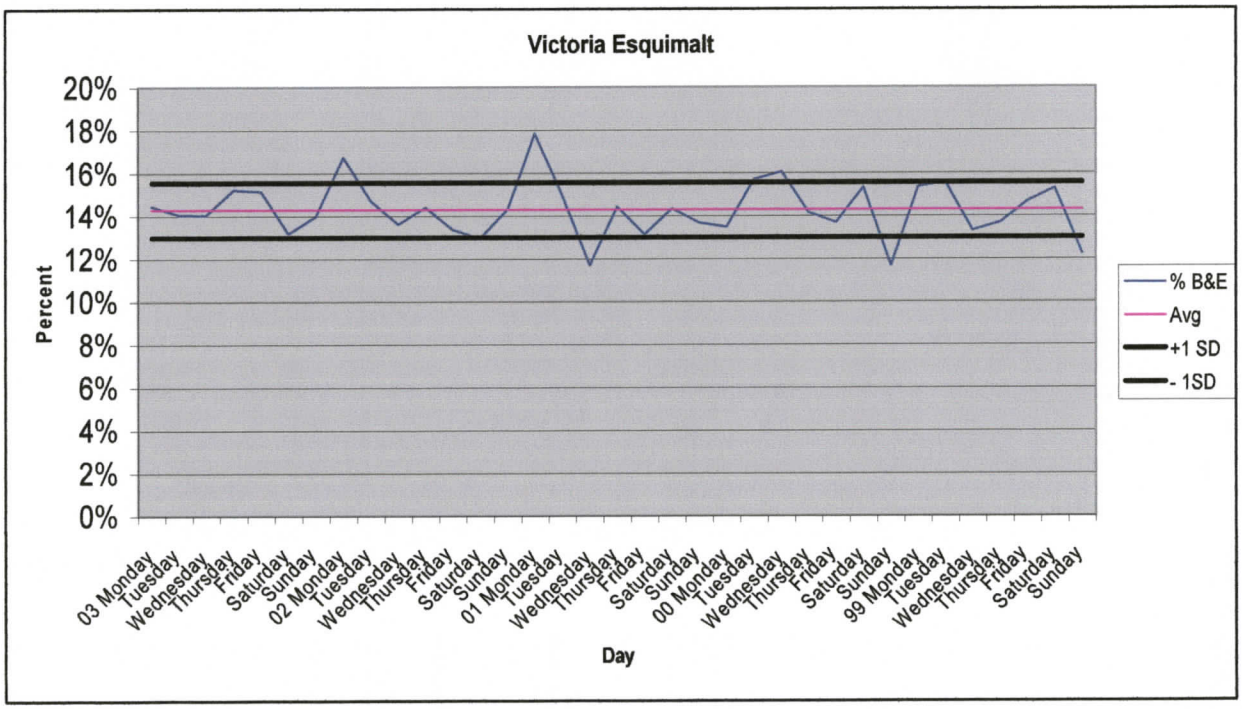


Figure 7.13: Victoria Esquimalt Daily Variability 2003 to 1999 – Avg.: 14.3%, SD: 1.3%.

Average Daily Break and Enter 1999 – 2003

As we have seen there is not a great deal of variability in the volume of events and the day of the week. There is some variation between the municipalities in which days of the week are most prominent. In Central Saanich Tuesday, Thursday and Friday are the busiest days.

AVERAGE DAILY BREAK AND ENTER 1999 - 2003				
Day	CSPD	SPD	OBPD	VIC ESQ
Monday	15%	15%	14%	16%
Tuesday	17%	15%	14%	15%
Wednesday	12%	15%	12%	14%
Thursday	16%	14%	15%	14%
Friday	17%	16%	19%	14%
Saturday	11%	13%	14%	14%
Sunday	11%	13%	11%	13%

Table 7.5: Average Daily of Break and Enter 1999 – 2003

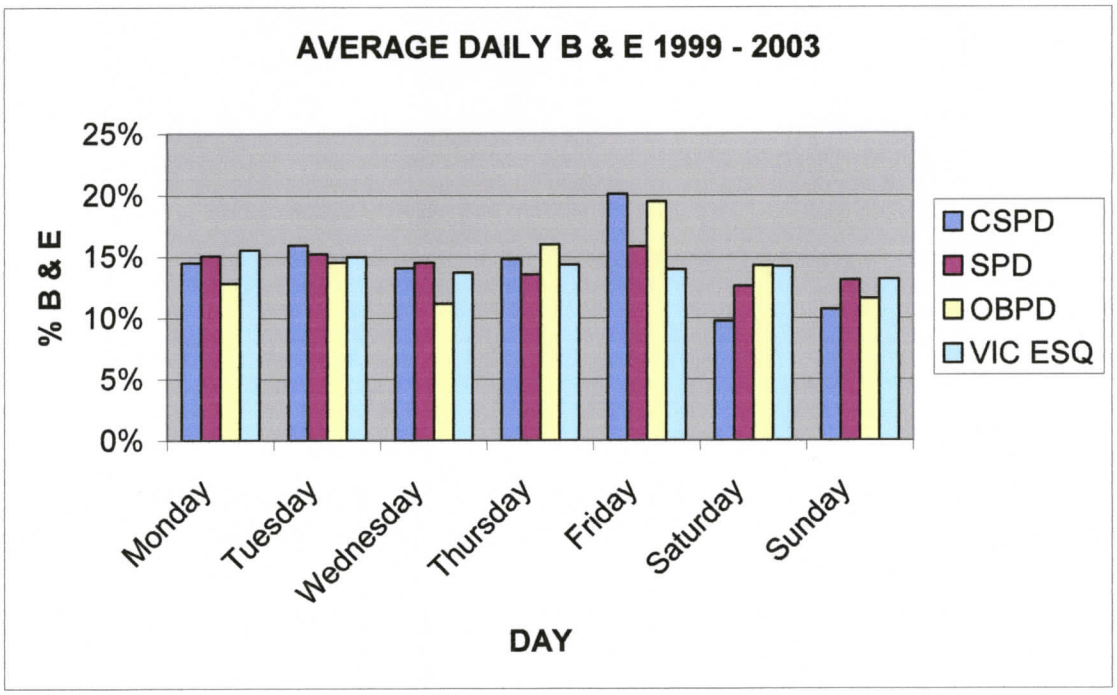


Figure 7.14: Average Daily of Break and Enter 1999 – 2003.

In Saanich Monday through Wednesday, and Friday are the busiest days of the week. In Oak Bay, Thursday and Friday contribute the highest volume of activity. In Victoria, Monday and Tuesday are the busy days of the week.

Another method useful in examining the data is to establish a daily index (Gottlieb, Arenberg et al., 1994). This enables comparison between the days of the week to establish which days exceed what may be considered the normal level of daily activity. This is done by determining the mean for each day over the six year period. The grand mean is calculated by summing the daily means and dividing by seven. The grand mean is considered the normal level of daily activity. The daily means are divided by the grand mean creating an index of daily activity. Index figures lower than one signifies lower than normal of activity. A figure higher than one represents higher than normal activity.

DAILY INDEX OF BREAK AND ENTER 1999 - 2003				
Day	CSPD	SPD	OBPD	VIC ESQ
Monday	0.975	1.06	0.91	1.09
Tuesday	1.162	1.08	1.00	1.06
Wednesday	0.977	1.01	0.76	0.97
Thursday	1.028	0.96	1.19	1.00
Friday	1.366	1.10	1.35	0.98
Saturday	0.714	0.88	0.99	1.01
Sunday	0.778	0.91	0.80	0.91

Table 7.6: Daily Index of Break and Enter 1999 – 2003

When the index is examined there is only a slight difference between what was found by examining the daily averages. In Saanich and Oak Bay there were no differences. In Victoria Saturday showed above normal activity. Sunday had the lowest level of activity with the exception of Saanich; however, the level of activity on Sunday was still below normal. The weekend displayed below normal levels of activity with the exception of Victoria. This is consistent with prior research which found most burglaries occur during weekdays, with Sundays recording the lowest number of break and enters.

Monthly

Average Monthly Rhythms 1999 – 2003

The data for the four municipalities was averaged over the five year period. Table 7.7 points to January, April, June and July as months of high activity in Central Saanich. The highest percentage months in Saanich were January and October. Four months in Oak Bay appeared to have high incidences of break and enter. Over the months occurrences in Victoria appeared to be more evenly distributed with October having the highest percentages.

AVERAGE MONTHLY PERCENT OF B & E 1999 - 2003				
Month	CSPD	SPD	OBPD	VIC ESQ
Jan	11%	11%	5%	9%
Feb	9%	8%	11%	8%
Mar	8%	8%	6%	7%
Apr	9%	8%	8%	8%
May	8%	8%	10%	7%
Jun	13%	7%	10%	9%
Jul	12%	8%	9%	9%
Aug	9%	8%	8%	8%
Sep	7%	9%	8%	9%
Oct	7%	10%	12%	10%
Nov	3%	9%	6%	9%
Dec	5%	6%	9%	8%
Total	100%	100%	100%	100%

Table 7.7: Average Monthly Percent of B & E 1999-2003

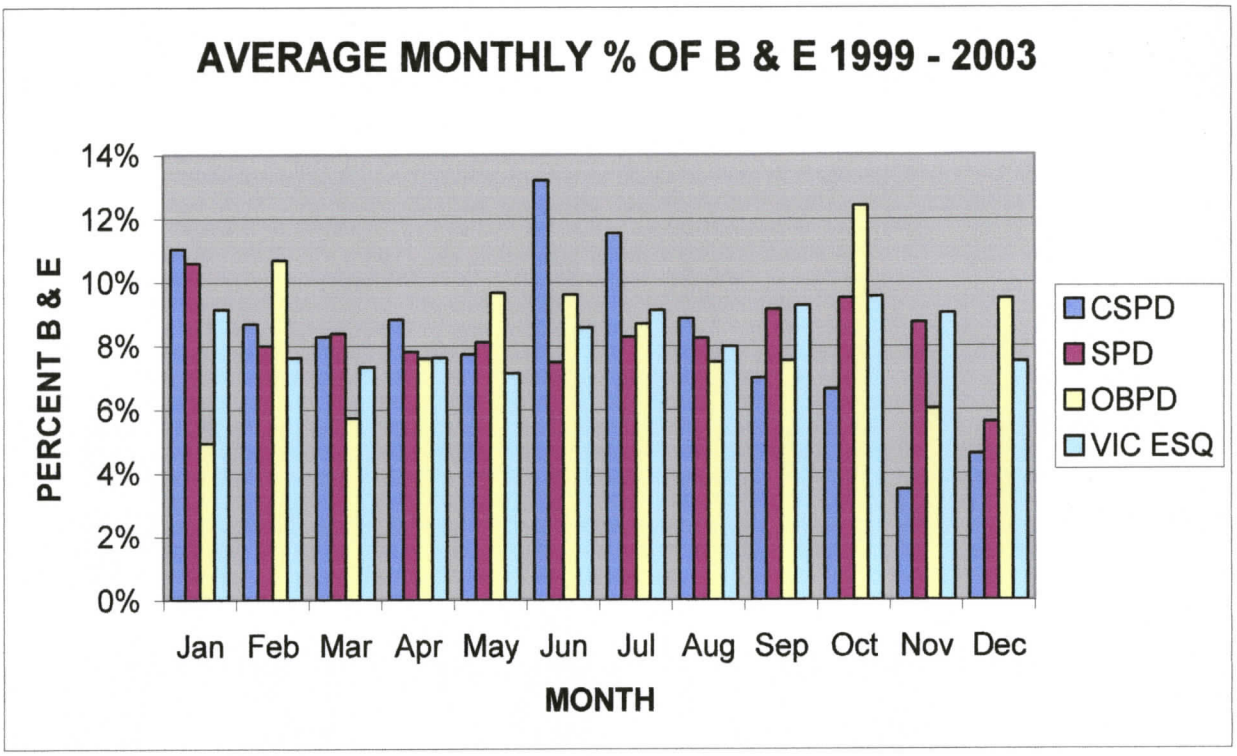


Figure 7.15: Average Monthly Percent of B & E 1999 – 2003.

If we were to draw a line following the curvature of the bars in figure 7.15 we could see activity highs in January, declining through the February, March and April, rising through May, June and July, dropping through August, rising again through September and October, followed by a down turn from November through December. Figure 7.16 displays this rhythm by combining and averaging the data from all the municipalities over the study period. January begins the year at a high point, followed by a lull through May, rising to July, declining through August only to ascend to October before declining through to December. This pattern is evident when the data for all the municipalities is combined in figure 7.16.

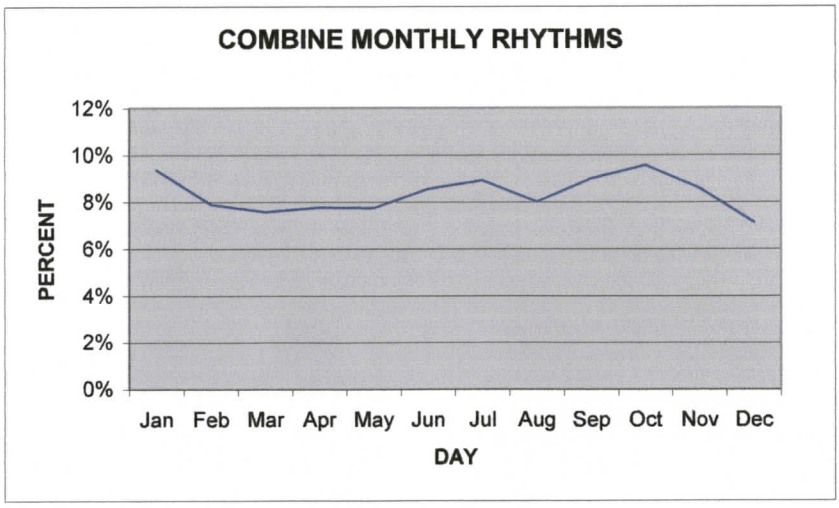


Figure 7.16: All Municipal Data Combined for B & E 1999 – 2003.

MONTHLY INDEX OF B & E 1999 - 2003				
Month	CSPD	SPD	OBPD	VIC ESQ
Jan	**1.10**	**1.25**	0.78	**1.08**
Feb	**1.10**	0.97	**1.19**	0.91
Mar	**1.50**	0.97	0.63	0.88
Apr	0.80	0.93	0.93	0.93
May	0.90	1.00	1.00	0.88
Jun	**1.60**	0.93	**1.23**	**1.05**
Jul	**1.60**	1.00	**1.19**	**1.08**
Aug	**1.20**	0.98	**1.23**	0.92
Sep	0.70	**1.10**	0.82	**1.10**
Oct	0.70	**1.16**	**1.26**	**1.14**
Nov	0.40	**1.02**	0.67	**1.08**
Dec	0.40	0.68	**1.08**	0.94

Table 7.8: Monthly Index of B & E 1999 – 2003

The index of monthly activity provides a picture of the months with above normal activity. Central Saanich activity occurred in the winter and summer. The activity in Saanich was concentrated in January and September through November. Oak Bay was more dispersed with February in the winter, June, July, August in the summer and October, December in the fall all having above normal activity. The index for Victoria Esquimalt indicates above normal activity in January, June, July, and September through November. No one month exhibited above average activity across all municipalities.

There were months that had a high index in three out of the four municipalities. In table 7.8 the highlighted months January, June, July, and October had above average activity in three out of four months.

Seasonal

Average Seasonal Break and Enter

In table 7.9 the data for each municipality was averaged over the study period. In Central Saanich spring and summer are the dominate seasons. In Saanich summer and fall have the highest levels of activity, however, there is limited variation between the seasons. In Oak Bay the summer and fall months have the highest level of activity. In Victoria/Esquimalt summer and fall have elevated levels of seasonal activity.

It is interesting to note, both Victoria/Esquimalt and Saanich have similar patterns of activity. Events rise through the year peaking in the fall. In Oak Bay and Central Saanich events rise through the winter - spring months reaching an apex in the summer. Activity then declines through the fall months. The difference is the activity in Central Saanich declines sharply in the fall to an annual low, whereas, the occurrences in Oak Bay decline but not below the winter and spring months. Figure 7.17 presents the average

AVERAGE SEASONAL % OF B & E 1999 - 2003				
Season	CSPD	SPD	OBPD	VIC ESQ
Winter	25%	24%	21%	22%
Spring	28%	24%	23%	23%
Summer	30%	25%	26%	25%
Fall	17%	27%	30%	29%
Total	100%	100%	100%	100%

Table 7.9: Combined Data Sets Average Seasonal Break and Enter 1999 – 2003

seasonal values for the each municipality over the study period. It is clear seasonal activity varies between municipalities across the seasons.

The seasonal index (Table 7.10) provides information on the seasons with above average occurrences. The information from table 7.9 is confirmed by the seasonal index for each municipality. Central Saanich has above average activity in the spring and summer, while Oak Bay exhibits occurrences above normal during the summer and the fall. Saanich and Victoria/Esquimalt have only one season with above normal activity, the fall. No one season exhibited consistently high activity across each municipality. Fall was the most active season among the jurisdictions, exhibiting above average activity in three out of the four municipalities, Victoria/Esquimalt, Oak Bay and Saanich. Except in Central Saanich Winter revealed the lowest level of activity in the municipalities.

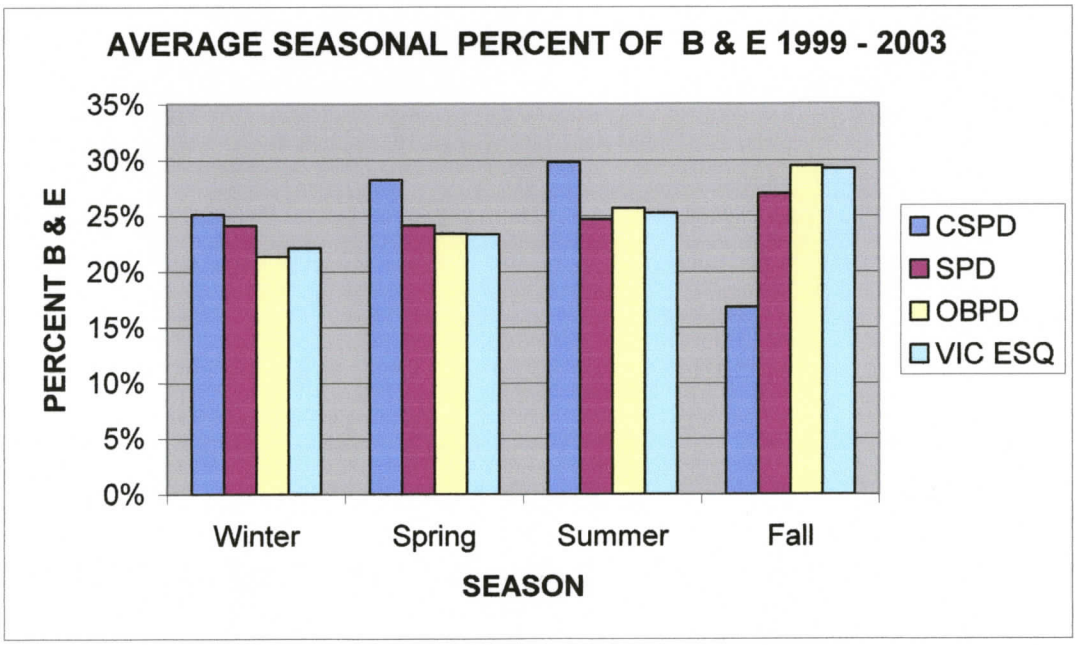


Figure 7.17: Average Seasonal Proportion of Break and Enter 1999 – 2003.

SEASONAL INDEX B & E 1999 - 2003				
Season	CSPD	SPD	OBPD	VIC ESQ
Winter	0.99	0.95	0.82	0.89
Spring	1.16	0.98	0.94	0.93
Summer	1.29	0.99	1.10	1.00
Fall	0.56	1.08	1.14	1.18

Table 7.10: Seasonal Index Break and Enter 1999 – 2003

Figure 7.18 presents the combined seasonal data for the four municipalities. A pattern emerges almost identical to the one revealed in the data sets for Victoria/Esquimalt and Saanich. This is caused by the shear weight of events in the two areas. Over the five year period Victoria Esquimalt had 43% more break and enters than the next highest municipality, Saanich and ten times more events that either Oak Bay or Central Saanich.

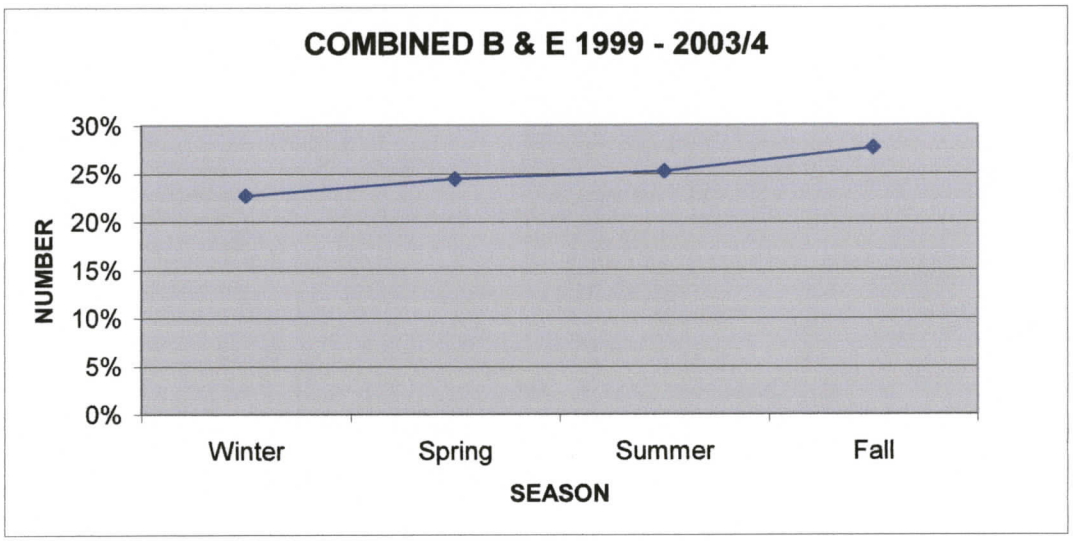


Figure 7.18: Combine Municipal Data Sets for Break and Enter 1999 – 2003/4.[2]

[2] See footnote 3

Discussion and Summary

Clearly, a disproportionate number of break and enters are distributed in the morning and afternoon hours of the day. This pattern replicates itself year over year, in all the municipalities that were examined. When hourly data are aggregated into to four time periods, it is the afternoon hours that received an excessive number of burglaries. This pattern is not exclusive to one municipality, but exists in all of them. In all but Oak Bay, morning hours receive the second highest rate of burglary.

As we move to a lower level of resolution, to the daily distribution of break and enter, patterns exist, but they are not consistent, shifting year over year. Break and enter is predominately a weekday occurrence. When the events are aggregated over the study period and the daily proportions are calculated we see a clearer picture emerge. In all but Victoria/Esquimalt, Friday emerges as the most active day of the week. In Victoria/Esquimalt, Monday has the highest proportion of week day events. In all four municipalities Sunday had the lowest proportion of events. However, we have seen that there is limited variability in the number of events occurring each day, over the course of the week. With few exceptions, there is not a significant statistical difference between the day of the week and the distribution of events.

Moving to the next level of resolution, the monthly distribution of break and enter, patterns exist but again they differ year over year, with no clear consistent pattern of offending evident through the years. In Saanich and Victoria/Esquimalt, the monthly distribution of events varied significantly. In Oak Bay this was not the case where there was a similar distribution of occurrences over the months. When we look at the data

aggregated over the study period a clearer picture arises, still no one-month exhibits unvarying high activity across all the municipalities. There are, however, certain months that have above average activity in three out of the four municipalities. So we find that January, June, July and October stand out as months with above average offence patterns.

Viewing residential break and enter from a seasonal perspective, once again there is a lack of a stable distribution through the years. Patterns exist annually, but vary from year to year. There were a number of cases, where seasonal events varied significantly across the year, but this did not occur in every year. In Central Saanich, no years exhibited significant seasonal dissimilarity. Collating the data over the full study period provides information on seasons which exhibit higher than normal activity. However, there is no agreement on a particular season or seasons, which are consistently above normal. Instead, there is only limited concordance between the municipalities, in fact only one season stood out amongst the group. The fall demonstrated above normal activity in Saanich, Oak Bay and Victoria/Esquimalt, however, in Central Saanich this season proved to be the least active. Summer was the next prominent period with higher than normal activity in Central Saanich and Oak Bay and average activity in Victoria/Esquimalt. Combining the data sets for all the municipalities, we observe the Victoria/Esquimalt – Saanich pattern cloak the pattern displayed by Oak Bay and Central Saanich. This is clear evidence that data aggregated to this level would hide patterns exhibited at the local municipal level.

When we explore the temporal distribution of residential burglary at a high level of resolution, we see the occurrence measured by the volume per hour, is clearly concentrated in the daytime, occurring predominately in the afternoon. Pattern theory

notes that the surrounding backcloth shifts as the day evolves. During these periods of the day homes are generally vacant, lacking a key element mentioned in Routine Activity theory, guardianship. Home owners are at work, shopping, taking children to school or to other activities.

Offenders rise during the daytime hours, ready and willing, motivated by instrumental or expressive needs, for example, seeking a thrill, short on cash or drug sick, begin their search for suitable targets. Rational choice theory (Clarke & Felson, 1993) proposes their behaviour is purposive in nature and designed to reap some form of benefit. The offender is goal oriented, albeit goals tend to be short sighted, hoping to accomplish some gain with a minimum of effort. The offender is generally constrained by the time and effort they can put into the decision-making process. They weigh out only a limited number of benefits and risks in his decision process since the quality of information is usually inadequate and/or inferior, in effect they exercise a limited rationality (Cromwell, Olson et al., 1991). However, since the risk of apprehension is usually low, the benefits generally outweigh the risks.

They are non confrontational so they attack targets emitting cues which informs them on occupancy, surveillance, potential gain and risk. Through the offender's daily activities traveling in their awareness space they observe the temporal patterns of the environment around them. Past opportunities are recognized and marked as potential targets, for example, walking through a neighbourhood, an offender notices a family leaving the home at a particular time on a daily basis throughout the week. Sometimes spontaneous opportunities present themselves, for example, the traveling burglar drives by a house, as they do they notices a car leave a driveway with a female driver and young

children in the car. No other vehicles are present, an immediate opportunity presents itself. The daytime, in particular the afternoon, is the most appropriate period for offending.

We know that a small number of offenders (10% - 15%) are responsible for the majority of offences (50% - 90%). As the week unfolds the pool of motivated offenders are dispersed through out the days. The triggers inducing offenders to commit break and enter present themselves over a longer period of time. The needs motivating offenders swell, ebb and subside as the week plays out. The temporal patterns of guardians shift or vary as the week progresses, increasing or decreasing opportunities for offenders. So we do not see the extreme concentration of offending in one particular period of time. Instead, offending is distributed through out the week with limited variation among the days. Friday may exhibit a high level of activity because of the desire for weekend money. The reduced activity on Sunday may be indicative of a higher level of guardianship with residents remaining home.

Over the course of the year monthly patterns vary significantly. In the winter month of January or the fall month October, darkness comes quickly, in the late afternoon residents are still active outside of the home. An absence of vehicles or no visible lights on in the house are cues within the offender's mental template pinpointing a vacant home. A potential opportunity presents itself. In the summer months of June and July, many residents are on holiday, or take advantage of the long, warm summer evenings to participate in activities outside of the home.

Seasonally, activity rises through the summer months into the fall in Saanich and Victoria. Summer is a time when young offenders have a greater amount of freedom with

school out over July and August. In Central Saanich and Oak Bay it may provide a clue to the pool of additional offenders attacking properties in their jurisdictions. Fall provides an increase in opportunities when darkness comes at earlier hours. It may provide a clue to the diversity of offenders, both young offenders and adult offenders, operating in their municipalities.

We have seen that residential break and enter forms patterns both in space and time. As we move from a micro level of analysis to a macro level we see that the patterns shift both spatially and temporally. We have seen that at certain levels of analysis, patterns remain constant both spatially and temporally. In spatial terms, there are areas that have high levels of offending extending over many years. Temporally, the mid day hours have elevated periods of activity, much higher than other hours of the day. With evidence of the spatial and temporal concentration of events, the next step in this study is to concentrate on police perceptions of the spatial cluster of events. The temporal aspect was not examined, anecdotally it is common knowledge among police that break and enter is a daytime event. The next chapter will focus on spatial component of residential burglary. Do police have a good knowledge of where the spatial patterns of residential break and enter exist, within their jurisdiction?

Chapter 8: Police Perceptions of Residential Break and Enter Hot Spots

Current models of policing are artifacts of the industrial age. With their large hierarchical structures and emphasis on linearity and upon strength in numbers, they were designed to emulate a military model that no longer exists.

Bernard H. Levin and Richard W. Myers

8.1 Introduction

We have seen that residential break and enters form consistent patterns of occurrence concentration over the study period in both space and time. It follows therefore, that if an effective response by the police is to occur, we must ask to what degree police in the CRD have a good knowledge of the location of spatial hot spots. Ratcliffe and McCullagh (2001) asked a group of police participants, from three different subdivisions, to draw locations on a map where they believed hotspots occurred for three different types of crimes, residential break and enter, non-residential break and enter and theft from auto. They took the center points of the areas police drew and overlaid them onto computer generated hot spots for each crime type. They found that police were most accurate in judging residential break and enter hot spots, between 66 %, 62% and 91% for each respective sub-division. Police were far less accurate in judging the location of non-residential break and enter and theft from auto. Bichler and Gaines (2005) used a focus group methodology, taking 200 police officers from four separate districts, dividing them into five groups for each district to determine police perceptions on high crime locations within their patrol districts. The results were used to assess the knowledge of police officers in identifying problem areas and if a consensus existed between police

focus groups. Once crime types and locations were determined they questioned police on the types of response utilized to address the problems. They found police chose problem areas dominated by disorder type behaviour with multi dimensional public safety issues. Locations were very specific, from the block level to individual addresses. It appears officers were biased towards locations receiving high call volumes, generating a variety of call types (Bichler & Gains, 2005: p. 70). However, there was little agreement on locations among officers in each district. In only one case were officers able to agree on a single problem location. Finally, police chose what was considered traditional tactics to address the crime problems. Craglia et al. (2005) tried to fit 40 objectively defined high incident areas (HIA) with 40 HIAs defined by police. Objectively defined HIAs were developed using a combination of violent crimes and offender residents in each enumeration district (ED). There was only a 28% congruence between objectively defined and police defined HIAs. They believe that police may be influenced by the number of years of experience compared to the one year of data used in the objective model. Furthermore, the data used in the objective model was four years old at the time the police identified HIAs. McLaughlin et al. (2006) asked a sample of 53 police officers to point out the top ten cells (25^2 metres) that have above average residential break and enters. They found that only 38% of police officers were able to identify hot areas. It would appear that police have limited to moderate success in identifying high crime areas.

In the current study a sample of police officers was obtained and asked where they believed residential burglary hot spots were located. The purpose of the study contained four parts, first determine the level of agreement between police identified hot

spots and computer generated hot spot, second assess the level of concordance between police officer's hot spots, third question officers on the source of crime information and finally, determine the kinds of responses utilized to address residential break and enter within the community.

8.2 Sample

The study focuses exclusively on operational officers, those working in an investigative function, for example, patrol officers, detectives, or special street crime units (Ratcliffe & McCullagh, 2001). Each municipality contributes a proportion of the total number of operational officers. Table 8.1 outlines a stratified random sample procedure which was used in this study to develop a proportionally representative sample for the region.

Agency	Invest B and E	Strength[1]	% Agency Invest B&E[2]	Regional %	Ran Sample	Actual Sample	Quota Sample
C. Saanich	18	21	86%	6%	2	3	5
O. Bay	16	22	73%	5%	2	2	4
Saanich[3]	84	141	60%	28%	12	10	23
Sooke	12	14	86%	4%	2	0	3
Sydney[3]	19	27	70%	6%	3	3	5
Victoria[3]	114	211	54%	38%	16	14	31
W. shore	35	52	67%	12%	5	3	10
Total	298	488	61%	100%	41	35	82

NOTE:

1.Authorized strengths may not represent the current level of membership - Levels could be higher or lower.

2. % of agency officers that are primary or secondary B AND E investigators.

3. Patrol officers are primary and secondary investigators. Street Crime Unit (SCU) and Detectives have been focused on Major Crimes. therefore, they have not been actively involved in burglary investigations 2004/2005.

Table 8.1: Sampling Method

Originally, a random sample of 41 officers was agreed upon. Right from the outset there was not a lot of interest in the study. After the first request, only a small number of officers in the sample volunteered. A second request was emailed to the original sample group. In response to the email requests 19 individuals volunteered to

participate. The remaining volunteers where approached by other participants or the author of the study[1]. The study was short two officers from the Sooke RCMP detachment[2], one from West Shore RCMP detachment, and three from the Victoria/Esquimalt municipal police force.

The average age of the sample was 40 years and the mean years of service were 14 years (Table 8.2). Forty six percent of the sample indicated they had completed at least four years of university education (Table 8.3). Table 8.4 shows that the sample was dominated by male participants (80%).

	Mean
Age	40
Years Service	14

Table 8.2: Mean Age and Years of service

Education		
Type	Subjects	%
4th Yr Univ	16	46%
3rd Yr Univ	5	14%
2nd Yr Univ	4	11%
1st Yr Univ	3	9%
College Dip	3	9%
College Cert	1	3%
Grd 12	3	9%
Total	35	100%

Table 8.3: Completed years of Education.

Gender		
Male	28	80%
Female	7	20%
Total	35	100%

Table 8.4: Sample Gender

[1] After the lack of response to the first request, the author approached the ethics committee seeking approval on alternative methods to generate the sample.

[2] There were no participants from the Sooke Detachment.

8.3 Methodology

The officers were given a street network map containing the municipality they work in. The map included municipalities contiguous to the municipality under study. Officers were asked (Appendix) to draw on the map those areas in which they believe burglary concentrations exist (Ratcliffe & McCullagh, 2001). The interviews were conducted in early to mid 2005 and data used to generate the computer hot spots were from 2004. This was the most current corrected information available.

The level of certainty in their hot spot choices was rated on a scale of 1 to 5 (1, I am certain a hotspot exists here, 3 meaning I believe a hotspot exists here, and 5, I am guessing a hotspot exists here). The burglary patterns drawn by police officers were digitized into vector maps and the centre points calculated (Ratcliffe & McCullagh, 1999b; Ratcliffe & McCullagh, 2001). The digitized results were laid over the map containing hot spots (HS) generated by computer-detected clusters (Hot Spot Detective ™). In the first part, two methods of agreement will be used. First, the number of police hot spot (PHS) center points found within the computer generated hot spots intensity level 3 or higher was tallied. Second, the proportion of area overlap between PHS identified and computer-generated HS will be calculated. In the computer generated hot spots five intensity levels are created ranging from low intensity to high intensity. In part one and two only the top three intensity layers were used in this analysis.

In the third part, individual police response maps were overlaid to compare the level of agreement between officer choices. The vector maps were converted into raster maps with a 50m x 50m cell size. The correspondence between cells was calculated to determine the area of agreement. Finally, officers were asked where they obtain their

crime information. It is believed that sources of information will influence the currency of perceptions of hot spots.

8.4 Results

There are five levels on intensity in the computer generated hot spots ranging from low intensity to high intensity. Only intensity levels 3 (mid) thru 1 (high) were considered in this analysis. First, those responses found in level 1 were summed, followed by those in level 2 and 3, and finally those responses found in level 3 to 1 inclusive were tallied. The bandwidths used to generate the hot spots were based on the regional average and the average for each individual jurisdictional.

Center Point Agreement

The 35 survey participants drew a total 148 hot spots covering the jurisdictions they worked in. The 148 center points were laid over top of the computer generated hot spots. Table 8.5 shows the number of centre point correspondence with the computer generated hot spots. At the regional bandwidth, there were a total of 36 correct responses. Eight corresponded with level 1 and 28 were located within levels 2 and 3. At the individual jurisdictional bandwidths, a total of 35 centre point corresponded with the computer hot spots, 7 centre points were found in level 1 and 28 were discovered in level 2 and 3. Table 8.3 presents the percentage of centre point congruence. At the regional bandwidth only 24.3% of the responses

	670m Regional Bandwidth			Jurisdictional Bandwidth		
Rate	Lvl1	Lvl 2+3	Lvl 1thru 3	Lvl 1	Lvl 2+3	Lvl 1thru 3
1	5	18	23	4	18	22
2	2	6	8	3	4	7
3	0	2	2	0	3	3
4	0	1	1	0	1	1
5	1	1	2	0	2	2
No response	0	0	0	0	0	0
Total	8	28	36	7	28	35

Table 8.5: Centre Point - Hot Spot Agreement.

were located in level 3 or lower. At the jurisdictional bandwidth only 23.6% of responses were found in the level 3 or lower. These results are lower than those found by Ratcliffe et al. (1999b) and McLaughlin et al. (2006). However, they appear to be more in line with the results found by Craglia et al. (2005).

	Regional Average Bandwidth 670m			Jurisdictional Average Bandwidth			
	Lvl1	Lvl 2 + 3	Lvl 1 thru 3		Lvl1	Lvl 2 + 3	Lvl 1 thru 3
In	5.4%	18.9%	24.3%	In	4.7%	18.9%	23.6%

Table 8.6: Police Perception Agreement with Hot Spots.

Certainty of Choice

At the regional bandwidth of 670m, police were certain of the position of their hot spot with 86% of the subjects rating their choice of location 1 or 2. Only 9% percent felt their choice was a guess.

	Bandwith 670 m			
Rate	Lvl 1	Lvl 2 & 3	lvl 1 to 3	%
1	5	18	23	64%
2	2	6	8	22%
3	0	2	2	6%
4	0	1	1	3%
5	1	1	2	6%
Total	8	28	36	100%

Table 8.7: Confidence in Selection at Bandwidth 670m

There was slightly less certainty with choices at the bandwidths set within each jurisdiction. There was a lower level of confidence with 83% of the subjects rating their choices high. More of the subjects (9%) were unsure of their choice rating their level of certainty at level three. However, there were no changes to the number of guesses.

	Jurisdictional Bandwidth			
Rate	Lvl 1	Lvl 2&3	Lvl 1 to 3	%
1	4	18	22	63%
2	3	4	7	20%
3	0	3	3	9%
4	0	1	1	3%
5	0	2	2	6%
Total	7	28	35	100%

Table 8.8: Confidence in Selection at Individual Jurisdictional Bandwidths

Table 8.9 reveals the results as a percentage of the total number of hotspots rated. Only 24% of the 147 hotspots[3] were rated correctly, while 76% were incorrect. Of the total number of hotspots rated, 21% were rated correctly at level 1 and 2, however,

	670m Regional Bandwidth Combined lvl 1 to 3				
Rate	Correct	%	Incorrect	%	Total
1	23	16%	42	29%	65
2	8	5%	43	29%	51
3	2	1%	22	15%	24
4	1	1%	3	2%	4
5	2	1%	1	1%	3
Total	36	24%	111	76%	147

Table 8.9: Accuracy of certainty – Levels 1 to 3 - Regional Bandwidth 670m

58% were incorrect. In table 8.10 we see the results displayed as a percentage of category totals. Viewing the top two ratings it is evident that certainty of choice is not a good predictor of accuracy. Only 1/3 of subjects who rated their choices 1 were correct and only a 1/5 of those who rated their choices 2 were correct.

[3] Only 147 cases were examined in this part of the study. One case was not rated so it was excluded.

670m Regional Bandwidth Combined lvl 1 to 3			
Rate	Correct	Incorrect	Total
1	35%	65%	100%
2	16%	84%	100%
3	8%	92%	100%
4	25%	75%	100%
5	67%	33%	100%
Total	24%	76%	100%

Table 8.10: Accuracy of certainty within each rating category – HS Levels 1 to 3 - Regional Bandwidth 670m

At the jurisdictional bandwidth the results are similar to those above. Only 20% of the choices where the subject was certain were correct (Table 8.11) down from 21% at the regional bandwidth. Within each category there was a slight decline in correct choices. In table 8.12 certainty rating 1 is down

Jurisdictional Bandwidth Combined Lvl 1 to 3					
Rate	Correct	%	Incorrect	%	Total
1	22	15%	43	29%	65
2	7	5%	44	30%	51
3	3	2%	21	14%	24
4	1	1%	3	2%	4
5	2	1%	1	1%	3
Total	35	24%	112	76%	147

Table 8.11: Accuracy of certainty across all categories – Levels 1 to 3 – Jurisdictional Bandwidth

to 34% while rating 2 is down to 14%. These results seem to mimic those found in McLaughlin et al. (2006) where they discovered certainty of choice is not a good indicator of choice accuracy.

Jurisdictional Bandwidth Combined lvl 1 to 3			
Rate	Correct	Incorrect	Total
1	34%	66%	100%
2	14%	86%	100%
3	13%	88%	100%
4	25%	75%	100%
5	67%	33%	100%
Total	24%	76%	100%

Table 8.12: Accuracy of certainty within each rating category – HS Levels 1 to 3 – Jurisdictional Bandwidth

Area Agreement Police Hot Spots and Actual Hot Spots

In this section a bandwidth of 670m was used to create the computer generated HS. The average area of the police hot spots (PHS) was similar between the municipalities with the exception of Saanich, whose size was approximately three times larger than the next municipality. On average 4 hot spots were created by each subject involved in the study. In table 8.13 we see the average PHS area was larger than average area of the most intense (lvl 1) hot spots (HS) generated by the computer model. However, this was not the case with the level 3 HS. In some municipalities the average level 3 HS was larger than the average PHS.

Year 2004	SNS	CSPD	SPD	VEPD	OBPD	WS
# PHS	12	15	47	53	8	13
Avg # PHS Per Subject	4	5	5	4	4	3
# PHS Contain HS Lvl 3	3	6	17	24	7	8
# PHS Contain HS Lvl 1	3	4	8	7	5	5
Avg Area PHS (Km^2)	0.46	0.38	1.9	0.48	0.65	0.53
# HS Lvl 3 (Combined Levels 1 to 3)	3	4	2	2	2	5
Avg HS Area (Km^2)	0.43	0.45	0.34	0.90	1.11	0.23
Avg Area of HS found W/in PHS as a ratio of Avg PHS area	8%	33%	6%	25%	31%	31%
Avg Area of HS found W/In PHS as a ratio of Avg HS area	9%	28%	36%	14%	18%	73%
Avg Area of Agreement Between PHS and HS (Km^2)	0.04	0.13	0.12	0.12	0.20	0.17
# HS Lvl 1	3	2	1	1	2	2
Avg HS Area (Km^2)	0.08	0.08	0.29	0.26	0.23	0.16
Avg Area of HS found W/in PHS as a ratio of Avg PHS area	1%	3%	2%	3%	6%	10%
Avg Area of HS found W/In PHS as a ratio of Avg HS area	5%	14%	11%	6%	18%	34%
Avg Area of Agreement Between PHS and HS (Km^2)	0.00	0.01	0.03	0.02	0.04	0.05

Table 8.13: Hot Spot Comparison.

There were 32 (22%) instances where a PHS wholly or partially covered a level one HS. When the HS area is expanded to level 3 there were 65 (44%) PHS that wholly or partially covered a HS. As a proportion of PHS area, level 3 HS did not occupy more than 33% of the average PHS area. When the proportion of level 3 HS area covered is compared to the total average HS area, we see the figures decline, with the exception of

West Shore (Table 8.13). In other words the HS area in common between the PHS and the HS makes up a larger proportion of the average PHS than the average HS. When level 1 HS is examined, we see the average PHS/HS concordance never exceeds 28% of the average PHS area. As a percentage of the average level 1 HS area we see the figures plummet with the exceptions of Victoria/Esquimalt, Oak Bay and West Shore.

When PHS area is used instead of centre points, we see a substantial increase in the percentage of PHS which partially or wholly covers HS. In most cases the HS areas in common between PHS and HS on average cover a higher proportion of the PHS than the HS. Craglia et al. (2005) pointed out police perceptions may be based on years of experience versus one year of study data. As a result PHS may reflect or include past HS areas not captured by the shorter term study data (a single year). Another explanation is that police are influenced or biases by current offences, occurring within the last month. A substantial amount of information on offence locations is learned in daily meetings conducted before the officers start their shift. In these meetings crime information occurring within the last eight days is disseminated amongst officers. In this situation it could be current information that may influence police perceptions.

Police Hot Spot Agreement

We have observed that police perceptions of HS locations are limited, with only an average of 22% of the PHS situated on an intense HS location. When the HS is enlarged to include moderate to intense HS area on average 44% of the PHS covered a HS partially or completely. Police may not agree on the location of HS, but do they agree amongst themselves on the location of PHS?

Police officer perceived hot spots from each jurisdiction were compared with fellow participants. To agree the PHS coverage had to overlap one or more PHS, there was no limit on how much overlap area was required. Table 8.14 shows the potential PHS combinations, the number of PHS where there was some area of convergence between PHS and the percent of PHS where there was some union between PHS. The number of combinations varied depending on the number of participants from each jurisdiction. The larger the subject samples within a given jurisdiction, the greater the number of combinations. One subject matched wholly or partially 5 out of a possible 22 combination leading to the highest level of agreement at 23%.

Table 8.15 simplifies the data by compressing the information in table 8.14 into increments. The highest level of PHS concordance did not exceed 25% in the jurisdictions. The majority of PHS agreement, 51%, occurred in the 11% to 15% range of agreement. It is clear that there was only a limited measure of concurrence with subjects in this study.

Combinations	Total Agree	% Agree
15	3	20%
215	31	14%
215	30	14%
135	18	13%
252	31	12%
215	27	13%
252	29	12%
200	20	10%
135	26	19%
215	32	15%
32	4	13%
35	2	6%
27	4	15%
215	23	11%
215	21	10%
54	9	17%
15	3	20%
156	11	7%
36	5	14%
54	6	11%
22	5	23%
245	19	8%
40	5	13%
94	16	17%
245	24	10%
245	32	13%
153	11	7%
200	25	13%
200	24	12%
245	21	9%
200	22	11%
153	24	16%
36	4	11%
22	0	0%
288	28	10%

Table 8.14: Subject Agreement.

Range	Agree	Percent
5% of less	1	3%
6% to 10%	9	26%
11% to 15%	18	51%
16% to 20%	6	17%
21% to 25%	1	3%
Total	35	100%

Table 8.15: Number and Percent Agree.

In table 8.16, the level of congruity between the subject PHS and fellow participants is examined. The level of agreement was calculated by taking each individual PHS area and examining if there was an overlap with other subjects within their respective jurisdiction. If two coverages intersected, the area of the union was divided by the subject's total PHS area. This indicated the degree of agreement the subject had with other participants. Another measure, which was not used in this study, would take the area of union and divide it by the total area of both subjects. However, the concern here was to determine the degree of overlap of an individual had with other participants.

The majority of overlap (41%) between individual subjects occurred in less than 25% of the subject's area (Table 8.16). In table 8.17, we observe in 61% of the cases the overlap in coverage was less than 50% of the subjects PHS. There is still a high amount, 38%, where the overlap constituted 51% or more of the subject's PHS area.

	QUARTILE				
Subject	First	Second	Third	Fourth	Total Agree
1	1	0	1	1	3
2	13	6	3	9	31
3	14	8	4	4	30
4	2	4	3	9	18
5	19	6	5	1	31
6	12	4	2	9	27
7	7	4	1	17	29
8	4	4	6	6	20
9	11	5	1	9	26
10	19	7	2	4	32
11	0	1	1	2	4
12	2	0	0	0	2
13	1	0	1	2	4
14	12	2	3	6	23
15	3	2	3	13	21
16	6	0	0	3	9
17	0	1	1	1	3
18	3	0	5	3	11
19	2	1	1	1	5
20	0	1	1	4	6
21	4	1	0	0	5
22	7	2	6	4	19
23	1	0	0	4	5
24	13	1	0	2	16
25	10	10	2	2	24
26	20	5	1	6	32
27	3	4	1	3	11
28	8	10	4	3	25
29	12	10	0	2	24
30	6	3	4	8	21
31	13	2	4	3	22
32	11	10	1	1	23
33	1	1	2	0	4
34	0	0	0	0	0
35	5	5	4	14	28
Total	245	120	73	156	594

Table 8.16: PHS Convergence Coverage.

Quartile	PHS	Percent
First	245	41%
Second	120	20%
Third	73	12%
Fourth	156	26%
Total	594	100%

Table 8.17: Area overlap in Quartiles (25% increments).

Sources of Police Crime Information

Police were asked the sources of their information on crime. They were allowed to make multiple responses. This enabled the development of a complete list of alternative sources. The responses were not ranked in a particular order by subjects. The information mentioned fell into eleven categories (Table 8.18). The highest chosen information source for police officers is obtained through direct involvement in investigations. The second highest source of information was discussions with other police officers. Daily briefings and Crime Analysis (Maps) were the next most prominent sources of information. The other sources of information were selected much less.

Obtaining the bulk of one's crime information from direct involvement in an investigation would be very limiting. Talking to other officers would broaden ones knowledge of crime locations, however, unless the officer spoke to every officer they would not have a complete picture of crime patterns. Information from daily briefings and crime analysis contain information that is very current, ranging over an eight day period. It would appear based on the major sources of information that police perceptions would be heavily influenced by very recent events.

Source of Information	Frequency	%
Investigation	25	71.4
Other Police Officers	20	57.1
Muster (Daily Briefing)	17	48.0
Crime Analysis (Maps)	16	45.7
Media	10	28.6
Friends Family Community	9	25.7
Experience	9	25.7
internal email	9	25.7
Officer File Review/Computer Checks	8	22.9
Interview Criminals	7	20.0
Supervisor	4	11.4

Table 8.18: Sources of Police Crime Information.

Police Response the Residential Break and Enter

Police were asked what kinds of actions are taken to address to residential break and enter. A list of alternative actions was development based on the responses. Multiple responses were allowed and the list was not ranked in order of importance by subjects.

Type of Response	Frequency	%
Specialized Unit	21	60%
Directed Patrol	17	49%
Target Suspect	13	37%
Block Watch	12	34%
Crime Analysis (Maps)	12	34%
Inteligence	8	23%
Crime Prevention	6	17%
News Release	6	17%
General Information	5	14%
Street Checks	5	14%
Routine Patrol	3	9%
Bike Patrol	2	6%
Web Site	2	6%
Task Force	1	3%

Table 8.19: Response Tactics.

The top tactic in response to residential break and enter is the use of specialized units (Table 8.19). These types of units generally come into play once a potential suspect is identified. The next most common response was to directing patrol members into areas where a problem was developing. A little more than a third of the subjects indicated targeting suspects was a common tactic used in response to a residential burglary. Block Watch was identified by approximately a third of the respondents. However, traditionally Block Watch does not aggressively target problem areas; instead they wait for an invitation from area residents to set up the program. Because of this, many areas where Block Watch is set up are not necessarily the areas that need the intervention. This could be corrected if Block Watch was able to target high activity areas. Crime Analysis was also considered by a third of the subjects as a method used by police to respond to

residential burglary problems. However, the type of analysis is generally in the form of dot or cluster maps identifying the location of crime activity. These types of responses are consistent with what was found in the study conducted by Bichler et al (Bichler & Gains, 2005). Police tend to use traditional tactics to address problems within the community.

8.5 Summary

It is clear from this study that the police did not have a great deal of success in locating the hot spots generated from official data. When the centre points of PHS areas are laid over the HS coverage there is a limited degree of concordance between the two coverages. The degree of certainty in choices was found not to be a good predictor of successful hot spot identification. Exploring PHS area overlap with HS areas showed an improvement in police accuracy. When a HS included medium to high intensity, PHS partially or wholly covered 44% of the HS. It was discovered that the level of agreement amongst subjects was low with less than 25% of the PHS coverages overlapping.

One of the problems with this research and similar projects is controlling the time frame. In this study, police were asked to identify hot spots, without a specific time frame. Another, is the how the sources of police crime information may influence perceptions. The data used in this study were less than a year old at the outset of the police interviews. We have seen that some hot spots are constant over time, however, variation does exist in patterns. Officers receive information about crime on a daily basis. Police interviews were conducted over several months, information is fluid changing daily, potentially influencing PHS locations. A method to examine the potential bias of time differences would be to re-examine PHS against data corresponding to the interview

period. Different time frames could be used, one month, three months, six months and a year.

Finally, police tend to respond to residential break and enter using traditional police tactics. This is consistent with prior research on techniques used by police to address problems within the community.

The next chapter will examine case studies of four residential burglars. The main focus will be on how offenders interact with their environment in the commission of their criminal activity.

Chapter 9: Offender Case Studies

9.1 Introduction

The previous chapters have examined the spatial and temporal contexts of residential break and enter. The study has enquired into police knowledge of burglary hot spot locations. It has looked at the level agreement between police on where break and enter hot spots occur in their respective area of jurisdiction. The final chapter of this study will focus on a group of offender's decision making, with emphasis on the offender's spatial knowledge and the trip dynamics, in committing his/her offences.

9.2 Theoretical Underpinning

Routine activities influence the temporal variation of potential targets within a region, or a neighbourhood, thus, limiting or enhancing opportunities for criminal activity. For example, neighbourhoods vacated by working families produces a decrease in guardianship and an increase in opportunities during certain periods of the day (Felson, 1998b). The theory dictates that offenders will attack targets that fall within areas they are familiar with, where targets exist absent of a suitable guardian. An individual develops an awareness space within a city. This spatial knowledge is not comprehensive; it does not incorporate a complete knowledge or understanding of the city. Within the awareness space is a more familiar, intimate space known as the 'activity space'. It is within the activity space that there exists varying opportunities or an opportunity structure for offending. The offender target selection will occur within a predetermined activity space. Because offenders are not aware of all areas within a city, not all targets

are equally accessible to all offenders. Their offences will form patterns of activity within their awareness space.

Rational choice theory argues that the offender uses a rudimentary risk/benefit analysis of a limited number of characteristics or cues, a cue template, about the environment and its targets to decide on which locations within his awareness space offer the greatest chance of success with a minimum amount of effort. Only targets, which satisfy pre-established criteria for success, will be attacked. Given the limitations imposed on the offender by his routine activities, imprecise knowledge, victim/target routines and the environmental backcloth, distinct patterns of offence activity should emerge.

Offenders' Use of Space

Burglars, like others, develop a mental image of the environment through both primary and secondary forms of spatial interaction (Rengert & Wasilchick, 1985). However, like every one else their spatial knowledge is incomplete, incorporating only chunks of the environment learned through multi-modal exposure to a limited number of areas, areas which become the offenders' awareness space (Brantingham & Brantingham, 1993a; Pettiway, 1982; Rengert & Wasilchick, 1985). Offenders commit their crimes within their sphere of daily activities, along familiar routes and trip termination points (Wright, Decker et al., 1994). The majority of crimes trips are initiated from the offender's residence traversing a relatively short distance (Davidson, 1980; Reppetto, 1974). However, they will not commit offenses in the immediate vicinity of their own home (Van Koppen & De Keijser, 1997), unless a good opportunity presents itself (Rengert & Wasilchick, 1985). As distance increases from their residence the number of

offences decreases (Baldwin & Bottoms, 1976; Costello & Wiles, 2001; Gabour & Gotheil, 1984; Kocsis, Cooksey et al., 2002).Their access to potential targets is limited to those chunks of the environment which forge their routine activity space (Decker, 1998; Felson, 1998b; Felson & Clarke, 1998a).

Offenders make rational choices (Bennet, 1989; Clarke & Cornish, 1985) a simple risk benefit analysis about where they will commit their crimes and the targets they choose. They try to minimize costs in time, money and energy by offending close to home (Clarke & Felson, 1993). A limited amount of information is assessed (Cromwell, Olson et al., 1991) based on learned cues about areas and targets (Brantingham & Brantingham, 1993a; Brown & Bentley, 1993; Decker, 1998) acquired through social interactions and the surrounding environment. A Dominate Co-offenders may influence the assessment process (Hochstetler, 2001). Criminal activity should be concentrated in areas known to offender, within a short distance of, but not in the immediate vicinity of his residence.

This segment of the research will explore offender's use of space in committing their residential break and enters. It is expected that an offender operating alone will commit their crime within a known area, where they conduct their routine activities. They will set out to commit their crime from a known location, within the offence area, from which they have made there decision to offend. They will travel as short a distance as possible (perceived by the offender), to locate a target. The originating goal behind the travel plan will influence the area in which the offender will seek out targets. For example, if the offender's original trip plan was to visit a friend they will commence the journey along a known route. If, while traveling, an offender is presented with an

opportunity to offend, they are motivated to offend and the opportunity lacks a suitable guardian, they will exploit the opportunity.

9.3 Methodology

Spatial knowledge is anchored in the surrounding physical environment. Research has shown that spatial knowledge is hierarchically constructed (Hirtle, Heidorn et al., 1993; Hirtle & Jonides, 1985; McNamara, Hardy et al., 1989). Individuals form a spatial schemata consisting of regions, primary landmarks and the paths that connect them (Golledge & Stimson, 1997; Lynch, 1960).

To gain an understanding of the offender's spatial knowledge, burglars were asked a number of questions constructed in a hierarchical fashion, seeking information about their knowledge of the municipalities, neighbourhoods, nodes, primary landmarks, and the paths connecting them. Offenders were shown a map of the region, containing the municipalities, local area polygons[1] and road network. Participants were asked to point to those attributes they had mentioned in the previous section and rate their spatial familiarity with the attribute on a scale of 1 (well known) to 5 (know small portion). This information was used to identify the offender's awareness space within the Capital Region. Offenders were asked a number of questions about, start point, trip planning, spatial decision-making, co-offending, and methods of travel. Other questions unrelated to the spatial aspect where also asked to:

1. gain an understanding of the motivation behind the offences,

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[1] Local area polygons were used as a surrogate for neighbourhoods. They are a rough representation of local neighbourhoods, but do not aspire to conform to neighbourhood boundaries. Saanich staff indicated they are used more as a management tool. I was told that true neighbourhoods are too difficult to establish because of the lack of consensus from residents on their boundaries. Boundaries tend to be fuzzy varying amongst residents.

2. determine cues used to select targets,
3. ascertain the types of property removed, and
4. discover the disposition of the property.

Sample

At the outset of the research it was anticipated that a minimum sample of 30 offenders would be selected for the study. Participants were sought through contacts with Provincial corrections, probation and police. Unfortunately, complications crippled efforts to derive a suitable sample for the project. Initially, Provincial corrections denied access to offenders on probation and those who were incarcerated. Police could not find candidates who were willing to participate.

Approximately a year after the inception of the study, corrections granted access to incarcerated offenders. No favors were tendered, considered or granted for the offender's participation. A request was sent out for participants, but there was only a minimal response. Only two candidates volunteered, however, only one was suitable since the other committed his offences outside the study area. Police identified three individuals who wanted to take part in the research. Since an adequate sample was not obtained it was decided to present the results in the form of a case study.

Subject	1	2	3	4
Age	21	31	34	41
Education	> 9	> 12	> 11	> 12
Employment Status	U/E	Part Time	Full Time	U/E
Length of Residency	7 weeks	> 1 year	Grew Up	Life
Age fist B and E	12	Teens	N/R	Teens
Drug Dependency	Yes	Yes	Yes	Yes
Incarcerated at time of interview	Yes	Yes	Yes	Yes
Break and Enters Discussed	3	2	13	12

Table 9.1: Offender Characteristics.

In table 9.1 we see the sample consisted of four individuals ranging in age from 21 to 41 years with an average age of 32 years. The average level of education was grade 11. Two of the subjects were unemployed, while two had either full or part time employment at the time of their offences. However, over the course of their offence series, employment would have been sporadic. The subjects had lived in the CRD for as little as 7 weeks and as long as their whole life. Three of the four offenders admitted committing their first break and enter while in their teens. Each offender admitted to having a drug dependency at the time of the offences. All four offenders were incarcerated awaiting trial for break and enter at the time of the interviews. A total of 30 break and enters were discussed during the course of the interviews. What follows are summaries of three out of the four individual's interviewed and a full case study on one subject's recent burglary activity. For full details on each offender case study refer to Appendix IV.

9.4 Case Summaries

Subject 1 – "Randy"[2]

Randy's spatial knowledge of Victoria was very sparse. He was aware of basically two small areas within the region. He relied on taxis or friends for transportation, which took him on finite paths to the limited number of locations he frequented. His spatial learning was constricted by his recent arrival to the region compounded by a lack of transportation. This severely impacted his knowledge of areas outside of the two neighbourhoods he knew. His lack of transportation also made it

[2] The names of the subjects are fictitious assigned by the researcher.

Subject	1	2	3	4
Spatial Knowledge[1]	Limited	Limited	Extensive	Extensive
Co-Offender	2	2	No	No
Decision Maker[2]	No	Yes	N/A	N/A
Planning	Limited	N/A	Moderate	Limited
Intoxicants	No	No	No	No
Trip Complexity				
Simple	3	2	13	10
Multiple				2
Trip Origin				
Home	3		12	11
Other		2	1	1
Purpose of Trip				
Burglary	2		13	11
Other	1	2		1
Transportation				
foot	2	1	6	
vehicle	2	1	2	12
Public			8	
Bike			1	
Combination	1		4	
Average Distance to Crime Km				
Straight line	0.5	4.7	6.3	6.6
Actual	1.3	5.2	7.9	7.5
Awareness Space				
In	3		9	12
Out		2		
Close			4	

[1]Limited - Moderate -Extensive

[2] Did Co-Offender make decision to commit B and E

Table 9.2 Offender Trip Dynamics.

difficult for him to seek out targets at greater distances, because of the effort involved and the difficulty he would have transporting the property. These circumstances forced him to commit his crimes within his own neighbourhood.

The journey to crime straight line distances ranged from 0.3 Km to 0.8 Km. The actual distances were farther, since they measured the route described by Randy. Actual distances ranged from .5 Km to 2.2 Km. The average straight-line distance to crime was .5 Km and the average actual distance to crime was 1.3 Km. The difference between the two measures was 0.8 Km on average.

Randy used some planning in his offences, but would take advantage of opportunities that presented themselves. He used cues to establish occupancy and the potential reward. He would commit crimes with a co-offender, but was adamant that the targets selected were his choice. The property was sold to a friend. The proceeds from the crimes were used mainly to generate cash for support.

Subject	1	2	3	4
Property				
Small - Jewelry/Money	Yes	Yes	Yes	Yes
Medium - Small electronics	Yes		Yes	
Large - TV/Computer	Yes		Yes	
Property Disposition				
Friends	Yes		Yes	Yes
Drug Dealers		Yes	Yes	Yes
Proceeds of Property				
Drugs	Yes	Yes	Yes	Yes
Money	Yes	Yes	Yes	Yes

Table 9.3: Property Characteristics.

Subject 2 – "Bill"

Bill lived in the CRD for a year, therefore, he had limited knowledge of the region. He did not know the area in which the offences were committed. Judging from Bill's account of these two offences, it is evident they occurred in his co-offender's awareness space. Bill asserted several times that he did not commit break and enters anymore. A check of police records shows that Bill's cohort had committed numerous break and enters in 2004 in the area of the second burglary. Furthermore, both he and his co-offender entered into the neighbourhood and walked through the side streets to locate the second target. This behaviour is indicative of an individual who is an insider (Brantingham & Brantingham, 1993a), an individual who knows an area and feels comfortable fitting in. It is not uncommon for one of the two offenders to take the initiative in offending (Hochstetler, 2001). In this case, there is evidence to support the

premise that the dominant offender instigates the offence concomitantly selects the offence location.

The straight line distance to the break and enters from Bill's residence was 2.5 Km and 6.9 Km. The actual distance to the break and enters was 3.12 Km and 7.36 Km. The actual distance is greater because the distance is measured following the path described by the offender. The average distances were straight line 4.7 Km and actual 5.2 Km, a difference of only 0.5 Km. In burglary two, If you consider the distance from the point of the failed drug transaction to the offence site, the actual distance is approximately 1.1 Km. The average actual distance is 4.2 Km a reduction of 1 Km.

The trip objective for the both offences was not to commit a burglary; at least this was the case in Bill's mind. In both cases Bill believed he and his cohort were meeting with others to conduct a drug transaction. In the first case, Bill's co-offender decided to break into a house where he knew a drug dealer resided. In the second instance, the drug transaction failed so Bill's cohort decided to commit a burglary. As a result, the trip start points were much closer than Bill's residence and therefore the journey to crime much shorter.

It was apparent from Bill's description of events he understood cues used to assess the viability of a target. In the first instance, his co-offender selected a house that was secluded. They made occupancy checks and entered once they were convinced the house was empty. In the second break in, Bill was adamant that the house did not present itself as a good target, but instead of following his instincts, he carried on. In the second offence, he could not articulate what cues lead him to believe it was a bad target.

The two used both public transit and private vehicles to conduct their crimes. The property in the first burglary was disposed of at friend's house in exchange for money and drugs.

Subject 3 – "Trevor"

Trevor committed 16 residential break and enters over a two and half month period. On three occasions he committed multiple offences in the same day. The area he operated in was much larger than the previous subjects due to his familiarity with the CRD. Other than Sooke, his crimes were committed in municipalities he had limited knowledge of. He mentioned several areas he knew about, but rated his overall spatial knowledge of the areas as limited. However, Trevor offended in areas he had lived, close to friend's residences or near nodes and landmarks he was familiar with. During our conversation, it was evident that he knew areas better than he had initially acknowledged. He operated in areas he was comfortable, but he would not over extend his welcome for fear police would concentrate or target the area.

Trevor viewed burglary as a job - he was patient and refrained from risky behaviour. Trevor used limited planning, but he would exploit a good opportunity if it presented itself. Trevor stated he did not use intoxicants while he worked, however, proceeds from his crimes went to support his heroin addiction.

Not all Trevor's crime trips started from home. He came up with the idea to offend while visiting friends. However, in the majority of situations the trip was initiated from his residence. In terms of straight line distance, Trevor traveled between 1.9 Km and 23.8 Km to commit his crimes. In Actual distance he traveled between 2.3 Km and 32.6 Km. On average in straight line distance he traveled 6.3Km, in actual distance it was

7.9 Km. If the one extreme distance is excluded, the average straight line distance to crime is 4.7 Km and the actual distance is 5.9 Km. Trevor's crime trips consumed long distances for a person who predominately walked and used public transit.

Trevor used risk and wealth rationale using cues to establish if a house was a good target. He also used a separate cue set to determine if the premises was occupied. He removed small valuable items that were easily concealed and transported by bus, taxi or on foot. When he had a vehicle he took larger items for instance a TV.

Subject	1	2	3	4
Cues				
Occupancy	Yes	Yes	Yes	Yes
Property/Reward	Yes		Yes	
Prevention Tech Deter	No		No	
Surveillance/Secluded		Yes		Yes
Wealthy Home			Yes	
Past Success				Yes
Risk Avoidance				
Wealthy Area - Police Response			Yes	
Did not Over Work Area			Yes	Yes

Table 9.4: Target Cues.

Trevor used various modes of transportation to travel to his crimes. He traveled on foot, by bus and vehicle. On several occasions he used taxis, or bikes taken from the burglary, to travel home after committing the offence. When he used a bus or a vehicle he took a direct route to the search area. When he traveled on foot he tended to meander through neighbourhoods, sometimes walking for hours, taking his time searching for targets. This involved a great deal of time and energy not consistent with the principle of least effort. However, Trevor said if he was comfortable he could walk for hours.

One interesting observation is how Trevor was confused over the sequence of events occurring in a specific area. It would not be unexpected that a subject would suffer from some form of memory effect. This misunderstanding was not intentional instead it

was plausible it was associated to a lapse in memory. It was through police notes that this confusion was rectified. It is an example of the need to compare information obtained through subject interviews with other sources of information to corroborate the facts.

9.5 Case Study

Subject Four "Joe"

Joe was 41 years of age at the time of the interview. He was born in Victoria and has lived in the CRD most of his life. He is a prolific property offender committing hundreds of burglaries over his life course. Joe was in a relationship and working full time prior to his recent series of break and enters. He and his partner got into a fight and she left him. Joe started using cocaine to deal with the collapse of his relationship. He started to get into trouble so he asked his partner to help him. The two left town, but Joe had difficulty abstaining from cocaine. He said once he got the taste for cocaine it was difficult to stop. They returned to town and Joe enrolled in a drug detoxification program funded by his employer. Joe was enrolled in this type of program in the past and was not enthusiastic about it, but he tried in an attempt to preserve his relationship with his partner. Joe and his partner continued to argue, realizing they could not resolve their differences they split up. Shortly after his break up, Joe quit the program, used the money he had left to buy cocaine and got high. Joe told me he "fucked up", but with out structure in his life he could not control his habit. Joe was collecting unemployment benefits at the time of his offences.

Spatial Knowledge

When asked which municipalities he knew, Joe stated he knew them all. He named the Western Communities, Sooke, Saanich, Central Saanich, Victoria, Esquimalt, Oak Bay, and Sidney. He rated his knowledge of each municipality as high, scoring each at 1 or 2.

Joe was shown a map and asked to point out the municipalities he had named. His immediate response was it was hard to do without the names. He pointed correctly to 6 out of 8 municipalities, however, it was clear by his descriptions he knew where each municipality was located.

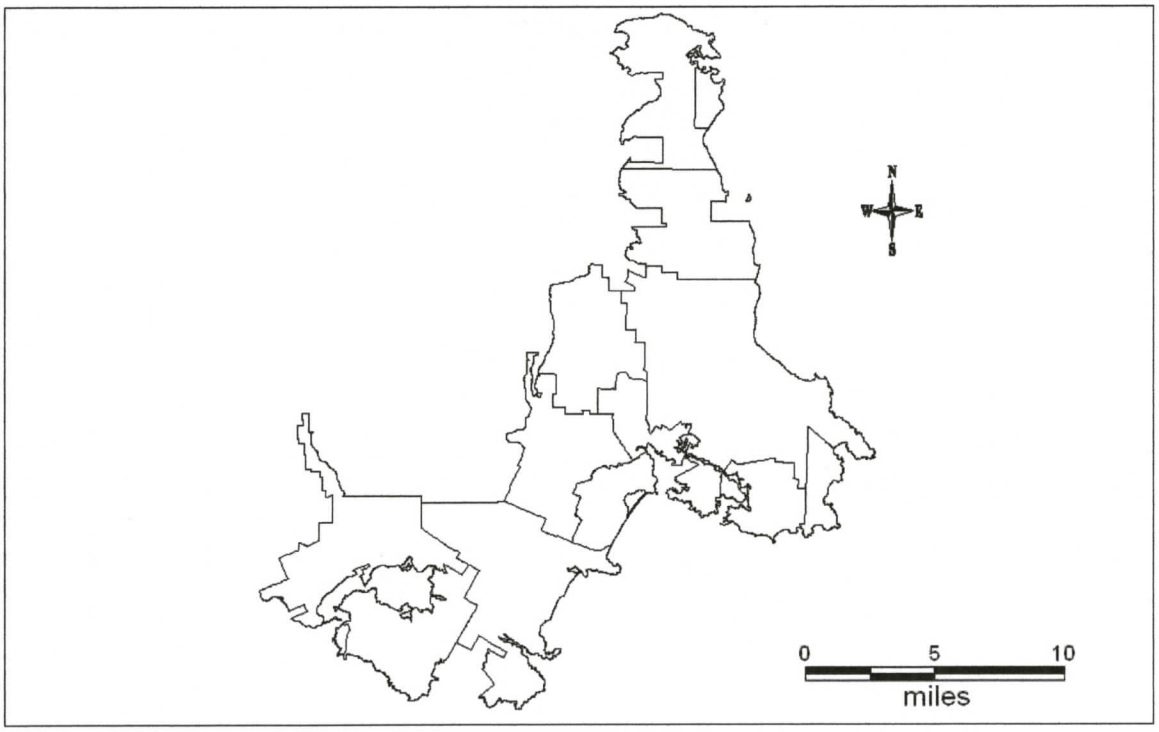

Figure 9.1: Municipal Awareness.

Joe was able to name 16 neighbourhoods (Figure 9.2). He correctly identified each municipality in which each neighbourhood was located. He rated his knowledge of each neighbourhood between 1 and 2. He was able to point to a number of neighbourhoods on a map, but without the names he had trouble pinpointing all of them. Joe identified a number of nodes and landmarks. Figure 9.3 exhibits his awareness space containing the municipalities, neighbourhoods, nodes and landmarks identified by Joe. Figure 9.1 and 9.2 is not an absolute illustration of Joe's knowledge of the CRD. He has spent most of his life in the region and as he stated he knows it like the back of his hand. It is clear he has extensive knowledge of the region, which is not fully represented in the description of his awareness space.

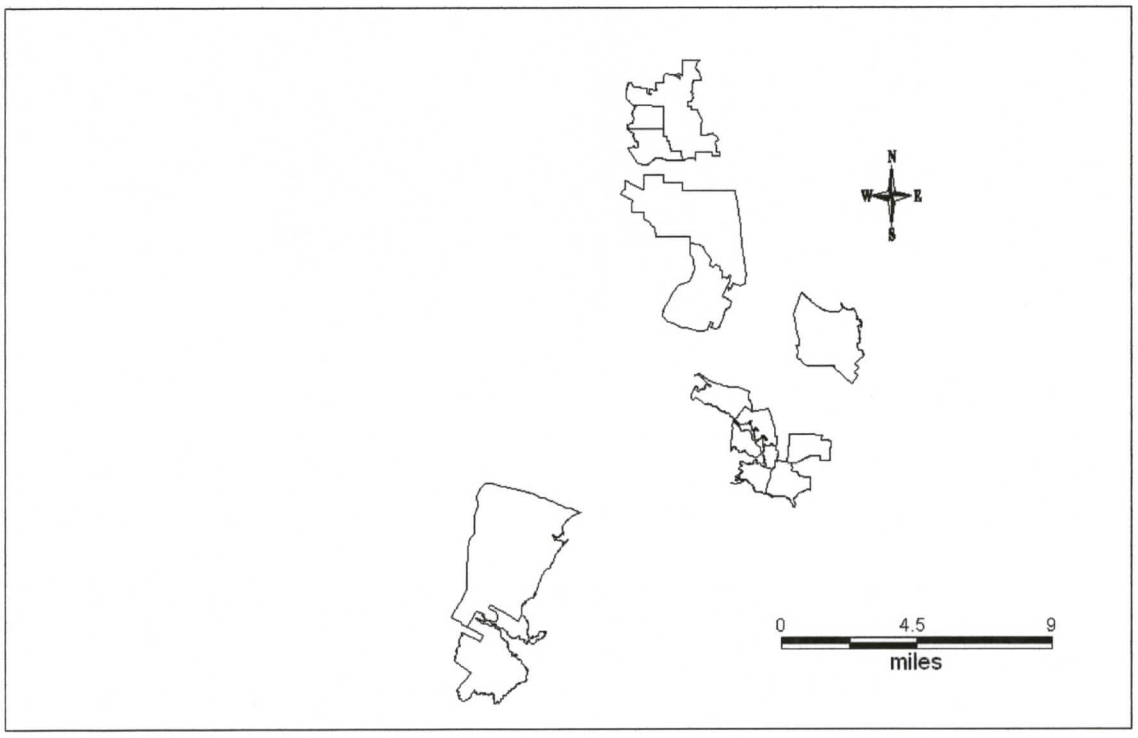

Figure 9.2: Neighbourhood Awareness.

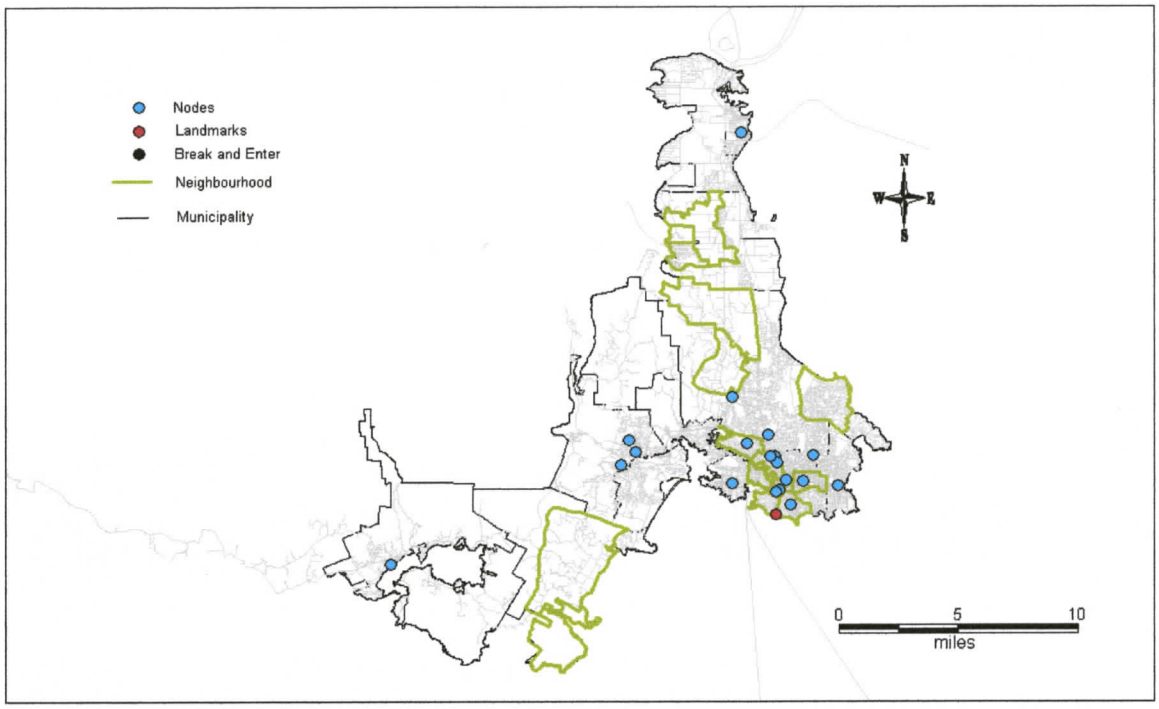

Figure 9.3: Subject Four Awareness Space.

Break and Enter

Joe pointed out that the primary objective of a crime trip was to commit a burglary. If there was a secondary objective it was to purchase drugs. He stated he never did a burglary for the rush. If he was not drug sick, he would travel greater distances. His illness created constraints on the time available to seek out targets, thus limiting the distances he would travel. He would travel shorter distances when he needed money right away. When traveling to and from an offence site, he would take the straightest and fastest routes, using only the main roads, especially when he in possession of stolen property. He likes to blend into traffic when he leaves a crime site.

He chose specific areas that he was familiar with, ones he knew really well. He liked to work in rural areas where houses were farther apart, more secluded, with limited

neighbourhood surveillance. He found these areas were safer providing a lower risk of detection.

Joe as with Trevor, did not like to offend in areas for a lengthy period of time. Joe made it very clear he did not like to 'burn' an area. He would continually move around to different locations, but he would always operate in areas he understood. This was another mechanism he used to avoid detection and arrest.

When Joe arrived in his target area he would patiently search for a suitable residence. He would look for targets exhibiting fundamental cues, houses farther apart; secluded surrounded by trees, bushes or hedges; with the lights off and no vehicles present. When a viable target was found he would approach the house, knocking or ringing the door bell as a final occupancy check. If confronted he could easily furnish an excuse for his presence. In most cases he would ask for a fictitious character. Joe felt no one called the police under these circumstances, yet he said if more individuals contacted the police with this information more offenders would get caught.

Although, Joe selected specific areas to offend in, he was always cognizant of good opportunities which presented themselves traveling to or from a break and enter. For example, if he was driving to an area and observed a family leave a house, he recognized the house was probably vacant. He would stop and assess the suitability of the property. If it was good he would take exploit the opportunity. If time permitted he would exploit as many opportunities as he could.

Joe focused on small items within a residence. He took mostly cash or jewelry. He found the bigger the house the less the property he would get. He would sell the property for cash or trade it for drugs. In many cases Joe would make arrangements for drug

dealers to meet him at his residence. The dealer would complete the transaction and leave. In our conversations it was evident that there was no shortage of individuals who purchased stolen property for cash or drugs.

Joe did not use drugs or other intoxicants when he committed his burglaries. However, he stated that in many cases he was drug sick, which motivated the offence. His drug dependency placed trip/travel constraints on his offending behaviour. It would limit his time, reduce distanced traveled and restrict his ability to take advantage of secondary opportunities. His only concern was to immediately purchase drugs and get high. Upon the successful completion of a burglary, he would immediately arrange to purchase drugs to satisfy his need.

Joe made an interesting comment. He pointed out that once police knew he was on drugs, all they had to do was follow him and they would have little difficulty in apprehending him within a short time period.

Joe did not like to work with a co-offender believing it increased his risk of apprehension. He could not remember going back to a residence a second time. He thought he had returned to a business he had burglarized, however, he could not remember how long it was after the initial incident he had returned.

Break and Enter Interviews

Joe admitted to police he had committed more than 63 break and enters over a six year period. Investigators searched police records and discovered 41 break and enters reported at locations identified by Joe. Thirty eight of the burglaries occurred between 2005 and 2006. The discussion concentrated on those which occurred in 2006. For the

purpose of this research, Joe was able to remember sufficient information on only 12 of the 20 burglaries committed in 2006.

In figure 9.4, the break and enters committed between 2005 and 2006 were placed over Joe's awareness space. Figure 9.5 shows the twelve break and enters in relation to his awareness space. The entire series of burglaries occurred along routes, near paths, or nodes in municipalities Joe knew.

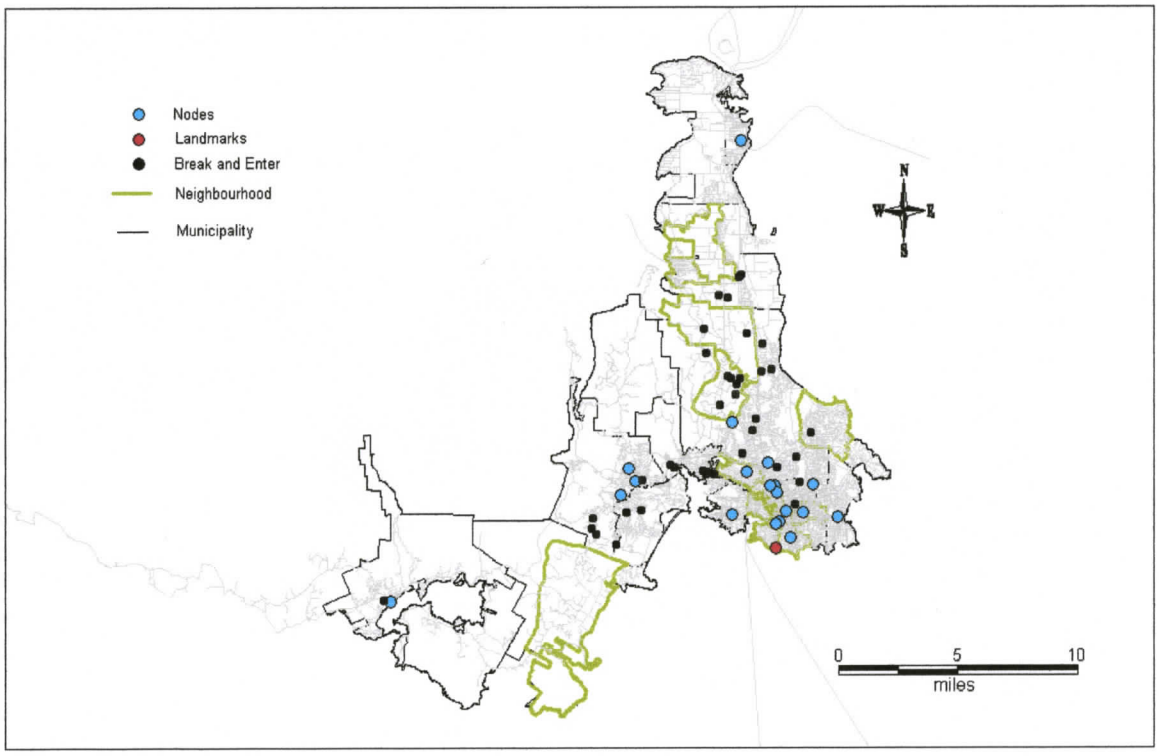

Figure 9.4: Break and Enters Over Awareness Space.

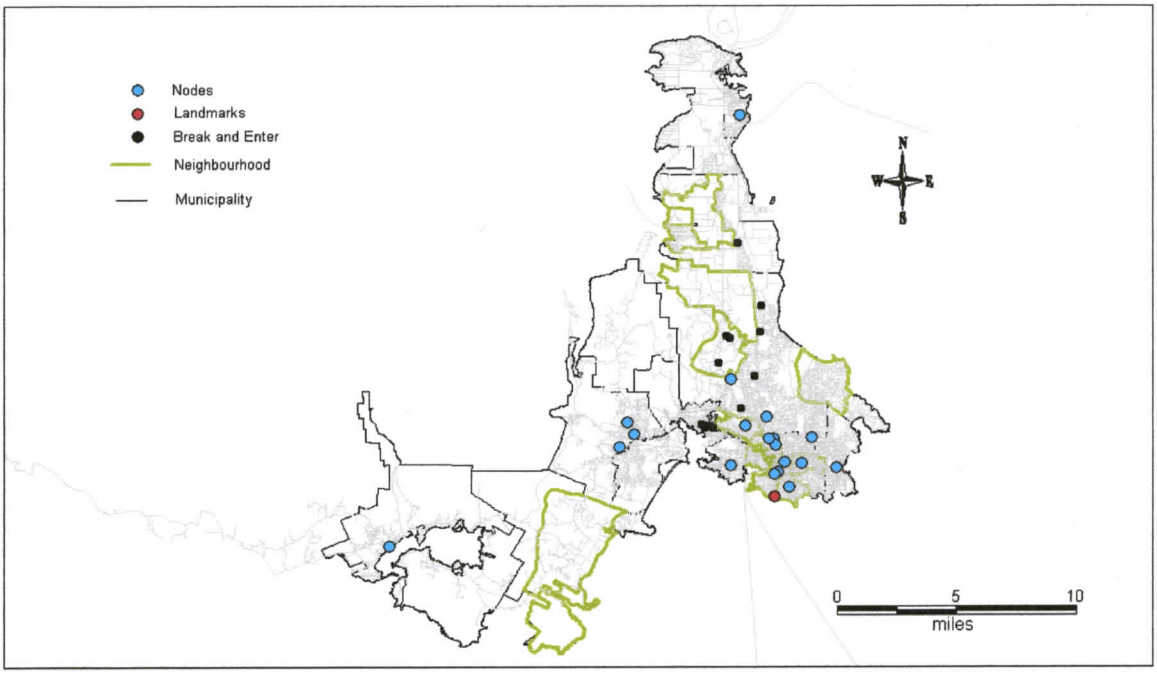

Figure 9.5: Break and Enters Discussed Over Awareness Space.

Table 9.5 shows the date each break and enter was reported to police. There is a gap of approximately six months from the beginning of 2006 to July of 2006. Joe stated that he was working full time so he was not active during this period. Table 9.6 provides dates for each break and enters the interviewer discussed with Joe. Table 9.7 shows the straight-line distance, the actual distance from Joe's residence to the offence site and the difference between the two distances. Joe traveled an average straight-line distance of

Break and Enter Master ID	DATE
1	19/01/2006
2	01/07/2006
3	02/07/2006
4	02/07/2006
5	23/07/2006
6	24/07/2006
7	29/07/2006
8	04/08/2006
10	07/08/2006
11	08/08/2006
12	08/08/2006
13	11/09/2006
14	11/09/2006
15	13/09/2006
16	14/09/2006
17	17/09/2006
18	19/09/2006
19	02/10/2006
20	28/10/2006

Table 9.5: Break and Enter 2006 in Date Order.[3]

Break and Enter Maste	Date
2	01/07/2006
5	23/07/2006
7	29/07/2006
8	04/08/2006
10	07/08/2006
13	11/09/2006
15	13/09/2006
16	14/09/2006
17	17/09/2006
19	02/10/2006
20	28/10/2006

Table 9.6: Break and Enter Discussed.

6.6 kilometres and an actual average distance of 7.5 kilometres. The actual distance is greater than the straight line distance, but on average there is only a disparity of 1.2 kilometres.

[3] The police summary of the interviews with Joe, indicated break and enter 9 was committed in 2006, however, after reading the police case report it was discovered it occurred in 2005. Therefore, it was removed from the discussion.

Distance From Res to B and E in Km			
Master ID	Straight Line	Actual	Difference
2	10	10.97	0.97
5	11.8	13.26	1.46
7	16.4	17.35	0.95
8	10.4	11.32	0.92
9	10.1	11.01	0.91
10	8.9	11.48	2.58
12	0.73	1.5	0.77
13	0.9	1.54	0.64
15	1.9	3.53	1.63
16	3.5	4.7	1.2
17	4	5.7	1.7
19	0.59	0.95	0.36

Table 9.7: Distance from Residence to Break and Enter.

Break and Enter Two

Joe left his residence with the explicit purpose to commit a break and enter. Figure 9.6 shows the route he used in his journey to the crime site. Joe had a specific target area in mind when he left his residence, an area where he felt houses were spread out and more secluded. As he entered the target area, he found a house with no cars in the driveway. He parked his car on a side street a block away from the residence. He went back to the house, approached the front door and knocked. When he did not receive an answer he rang the door bell. He proceeded around to the back yard where he managed to gain entry into the house. Joe searched the premises finding cash and jewelry. Satisfied with his catch he returned home using the same route. Once home he contacted a drug dealer who traded drugs for the property.

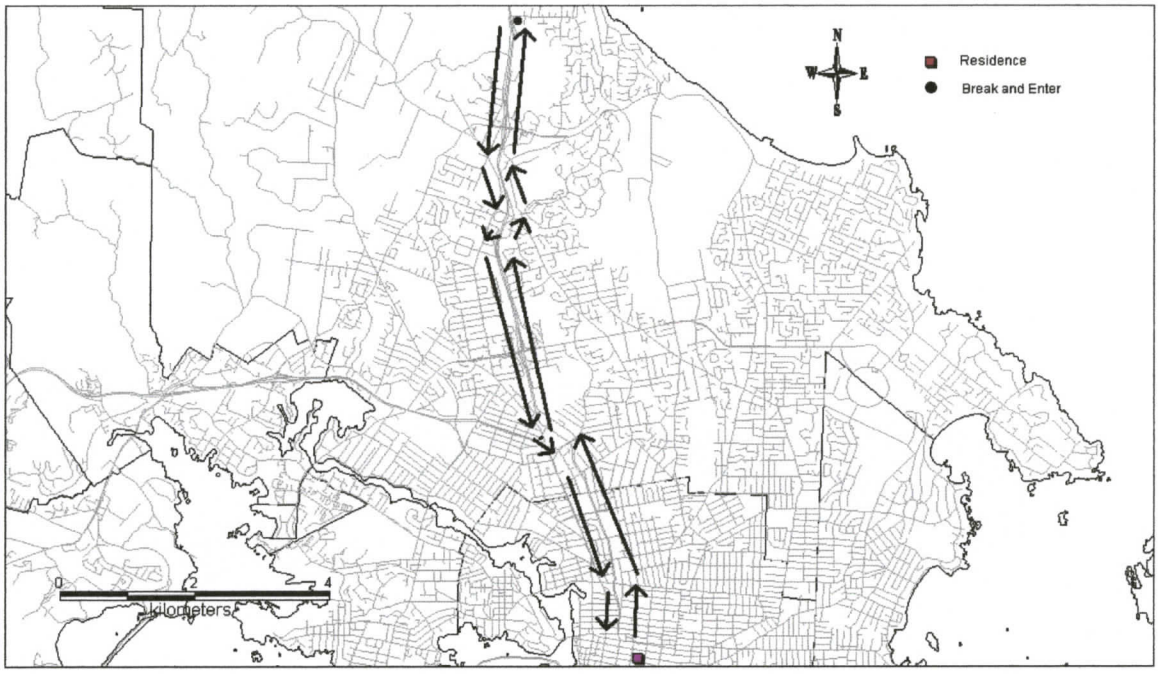

Figure 9.6: Journey to Break and Enter Two.

Break and Enter Five

Joe left the area of break and enter two and committed break and enters 3 and 4 in Langford. He returned to the general area of break and enter 2 three weeks later.

Joe was hurting for money he decided he had to commit a burglary. He stated he liked the rural nature of this area and the seclusion it afforded. He had committed successful burglaries in this area in the past. This success motivated him to return to the area.

He was not sure of his route, but believes he traveled the path set out in figure 9.7. Joe found a townhouse complex across the street from an open-air commercial operation. He parked his vehicle across the street from the complex. He described proceeding to the unit directly across the street from where he parked his vehicle, possibly the end unit. There were no lights on or vehicles present. He rang the doorbell, and then banged on the

door to determine if anyone was home. When he was satisfied the home was vacant he went to the rear of the residence and entered through an unlocked window. Once inside the premises, Joe heard someone call out, "call the police", he realized the residence was not vacant; he immediately fled and returned home. He stated it "was too close."

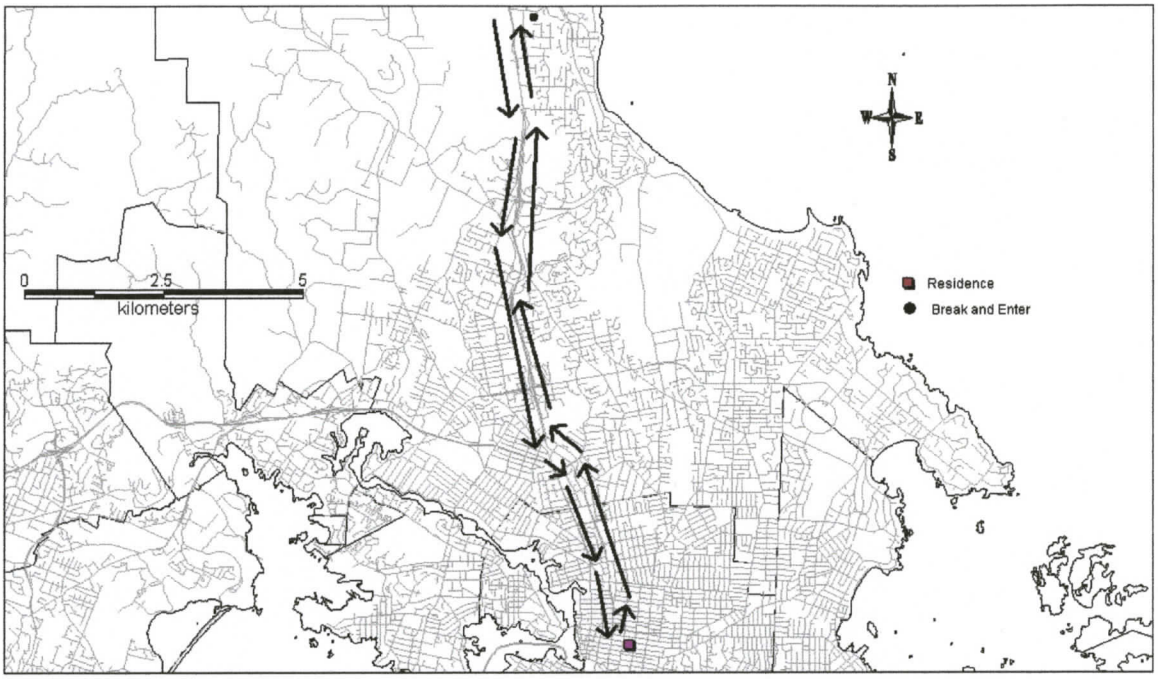

Figure 9.7: Journey to Break and Enter Five.

Break and Enter Seven

After failing to secure property at break and enter 5, Joe committed burglary 6 traveling 2.7 Km from his home to the crime site, a much shorter distance than the previous two burglaries. Joe did not discuss this burglary so it is not clear why he offended so close to home. It is possible he wanted to break up his previous offence pattern, but it was more likely the previous days failure to obtain funds to satisfy his need for drugs that motivated him to offend closer to home.

Five days later Joe traveled 17 Kilometres north from his residence to his next crime scene (Figure 9.8). He stated he had been in this area several times. He was born not far from the location of the offence. He could remember going to a school and participating in social activities close by. He admitted to committing burglaries in the area when he was young.

The purpose of the trip was to commit a break and enter. He parked his car on a main road approximately 1/2 a kilometre from the burglary. He checked properties on and around this road without any luck. When he could not find an appropriate target, he walked up a side street where he discovered a suitable residence.

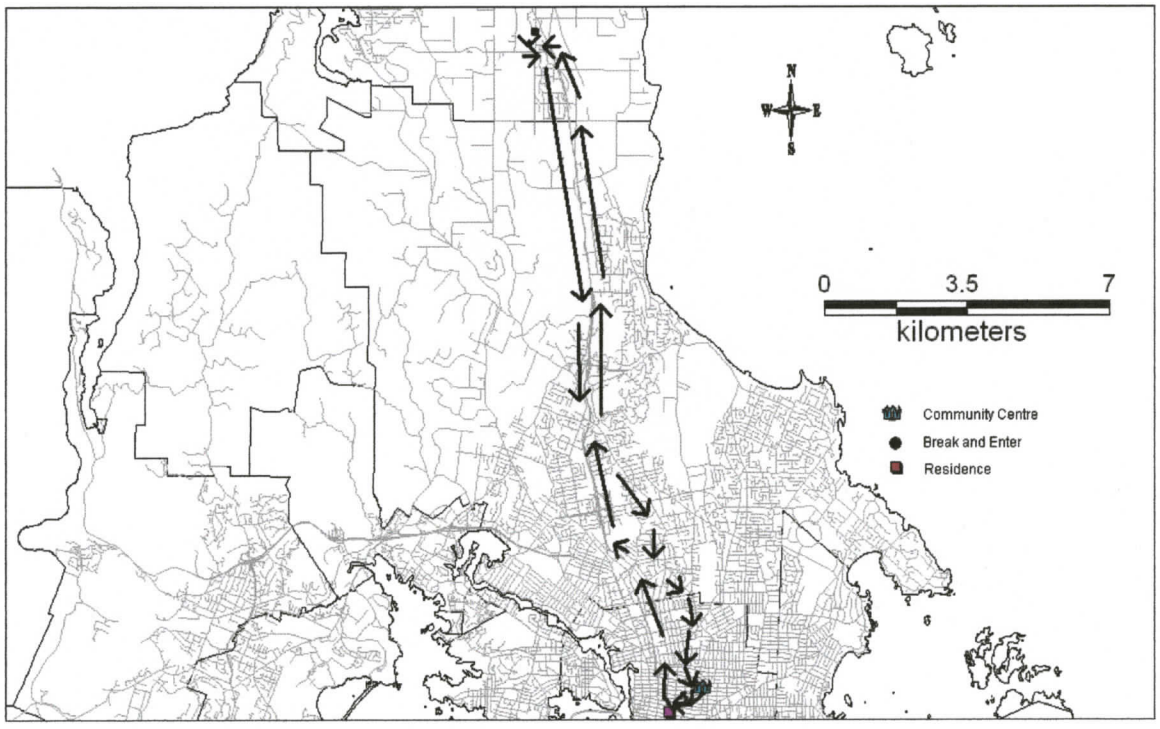

Figure 9.8: Journey to Break and Enter Seven.

He found a door at the rear of the garage insecure and gained entry to the house. He found a substantial amount of US currency in the residence. He returned to his vehicle on a bike he removed from the garage. Joe traveled to the Fernwood area to meet with a

drug dealer (Figure 9.8). When the deal collapsed he returned to his home and purchased drugs from another source located in his apartment complex.

Break and Enter Eight

Six days later Joe struck out with the intent to commit another burglary. He traveled approximately 11 kilometres north from his home to initiate his target search. Joe stated he liked to travel in a straight line to his search areas taking the fastest route possible. He found a residence, gained entry and removed some small items. He returned home and traded the property for drugs.

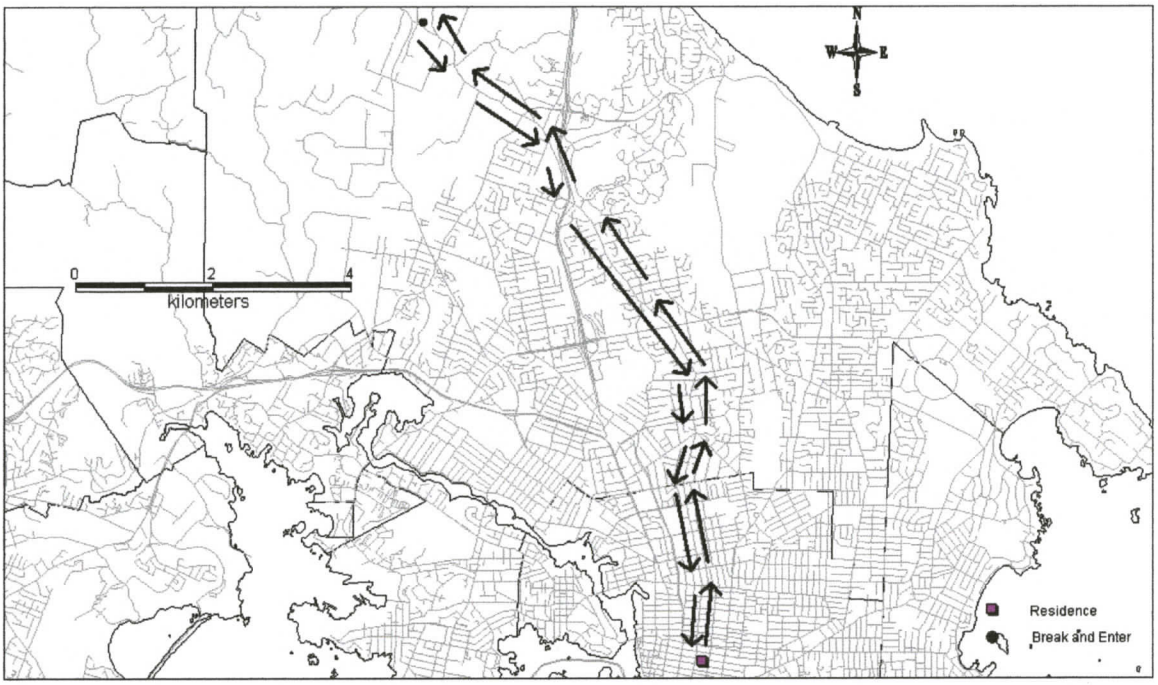

Figure 9.9: Journey to Break and Enter Eight.

Break and Enter Nine

After reviewing the police summary report it was discovered that the date was wrong. The offence occurred in 2005; therefore, it was excluded from the discussion.

Break and Enter Ten

Within two days later, Joe found himself in need of money. He traveled 11 kilometers N.W. of his residence. He took what he termed a straight route, traveling main roads to the target area. He was not sure of the exact route but he believes he proceeded along the route shown in figure 9.10. After successfully completing the break and enter he returned to his residence.

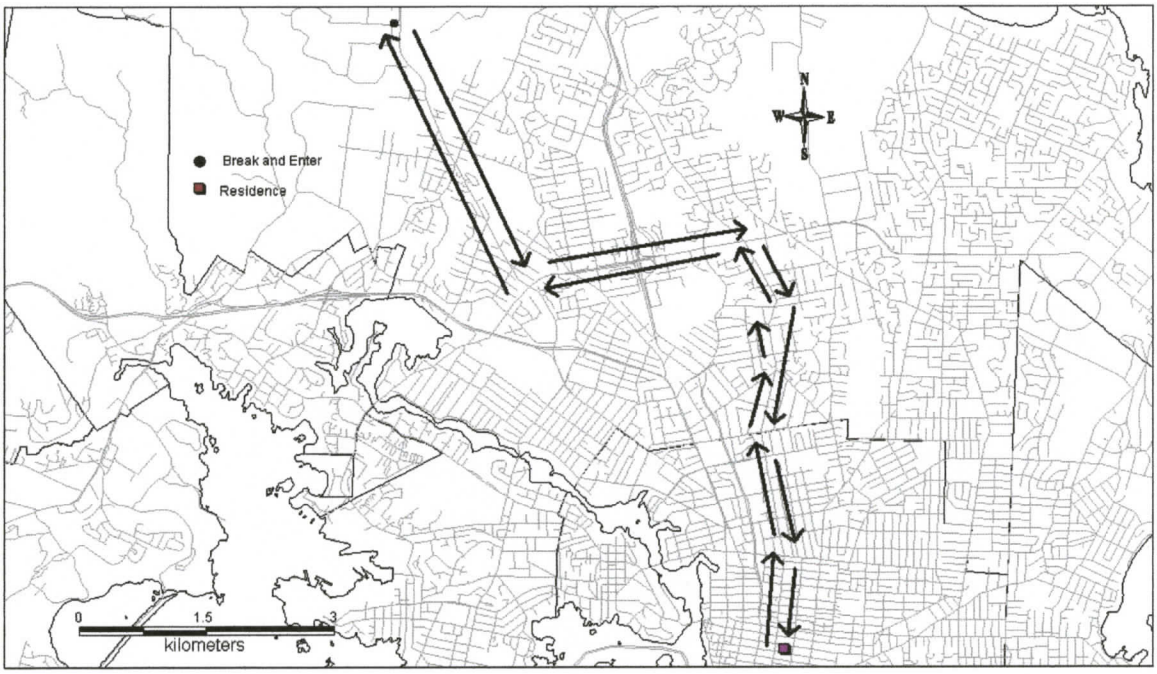

Figure 9.10: Journey to Break and Enter Ten.

Break and Enter Thirteen

After he committed break and enter ten, Joe committed two more break and enters the next day. One was in Central Saanich and the other was in Langford. Using the main roads, these two locations are approximately 24 kilometres apart. The journey from Joe's residence to either site is about 17 kilometres. Joe would have traveled 17 kilometres to one site, 24 kilometres to the second site and then 17 kilometres home.

Joe moved from Victoria to View Royal some time after August 8. He was living in View Royal when he committed break and enter thirteen. He struck out from his residence with the intent to commit a burglary. Joe traveled approximately 1.5 kilometres to the crime scene using the route in figure 9.11. He parked his vehicle in a commercial parking lot across the street from the target. He chose this area because the houses were secluded and he knew the area.

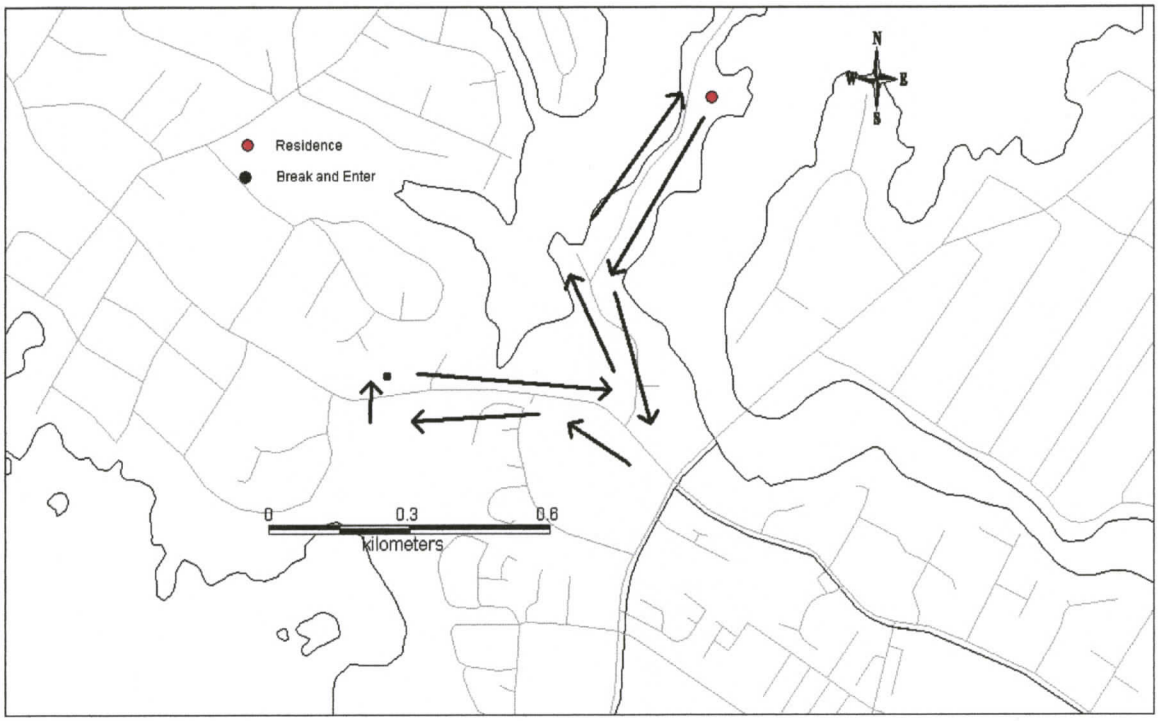

Figure 9.11: Journey to Break and Enter Thirteen.

Joe entered the home through a door. The homeowner's dog immediately started barking. The dog was not aggressive but it made a lot of noise. When Joe went to the bedroom he found a resident in bed asleep. He was about to leave, but he realized that the person was not waking up even though the dog was barking. He grabbed money and left returning to his home. He stated the experience scared him, however, it did not discourage him from completing the offence.

Some time during the same day Joe committed another break and enter (14) in Langford. We did not discuss this event.

Break and Enter Fifteen

Joe was traveling by car approximately 3.5 kilometres to the target area along

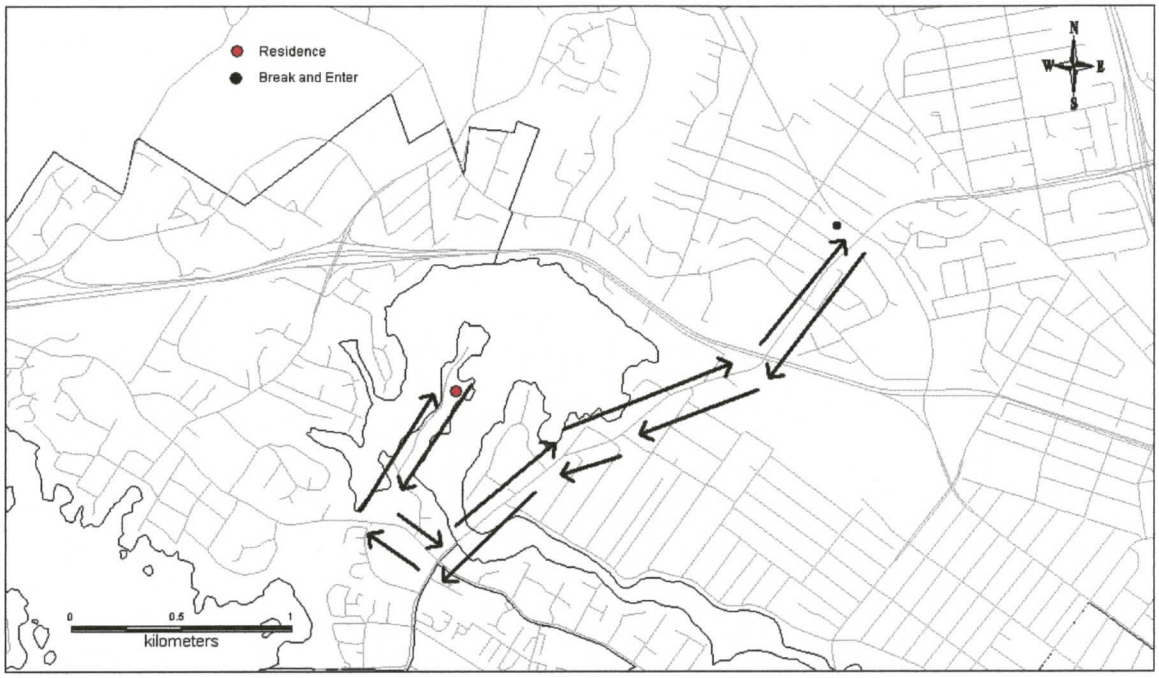

Figure 9.12: Journey to Break and Enter Fifteen.

the route identified in figure 9.12. The trip purpose was to commit a break and enter. As he was driving, Joe observed the resident pulling out of their driveway.

Joe approached the house confident that the home owners were not present. He did his occupancy checks and then tried to break in. He could not kick in the door because of an injury to his leg, however, he did get into the garage. He considered this venture a failure so he gave up and went home.

Break and Enter Sixteen

Joe was staying at a friend's home for a few days. He set out on his trip with the intent to commit a burglary. He traveled in his vehicle approximately 5 kilometres along the route in figure 9.13 to the target area. He found a house, but did not get anything from it. Frustrated, he left and attempted a burglary at a residence nearby. The police apprehended Joe before he entered the residence. He would not elaborate on the details of his arrest. He remained in cells for the night and was released the next morning.

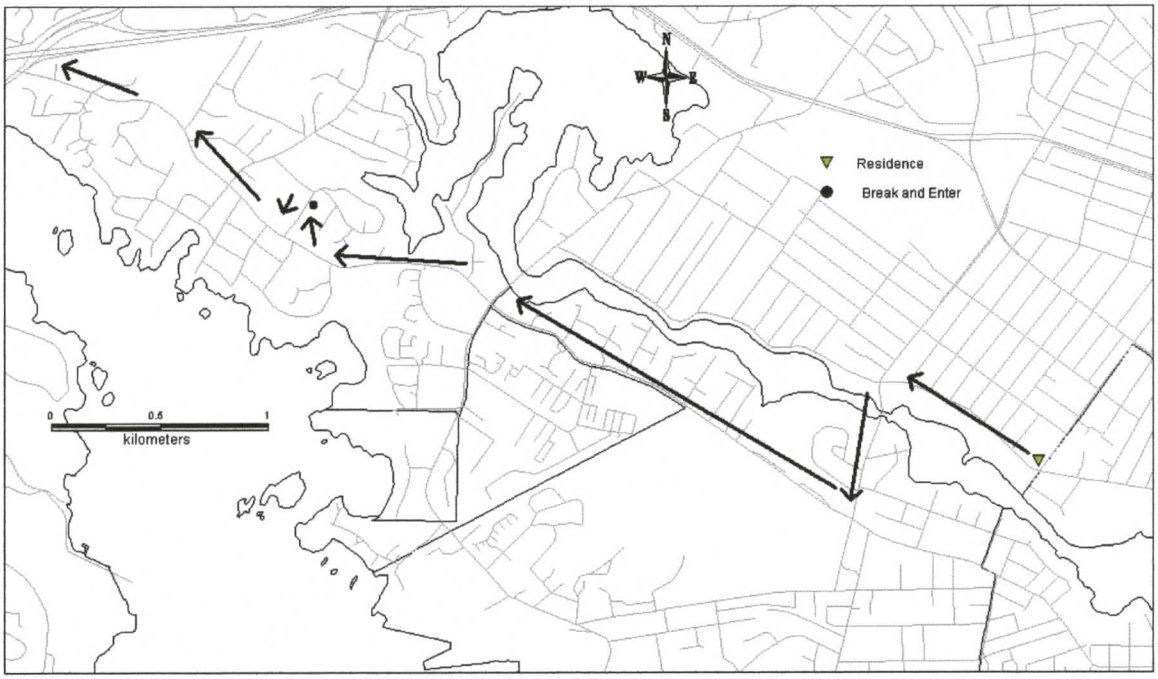

Figure 9.13: Journey to Break and Enter Sixteen.

Break and Enter Seventeen

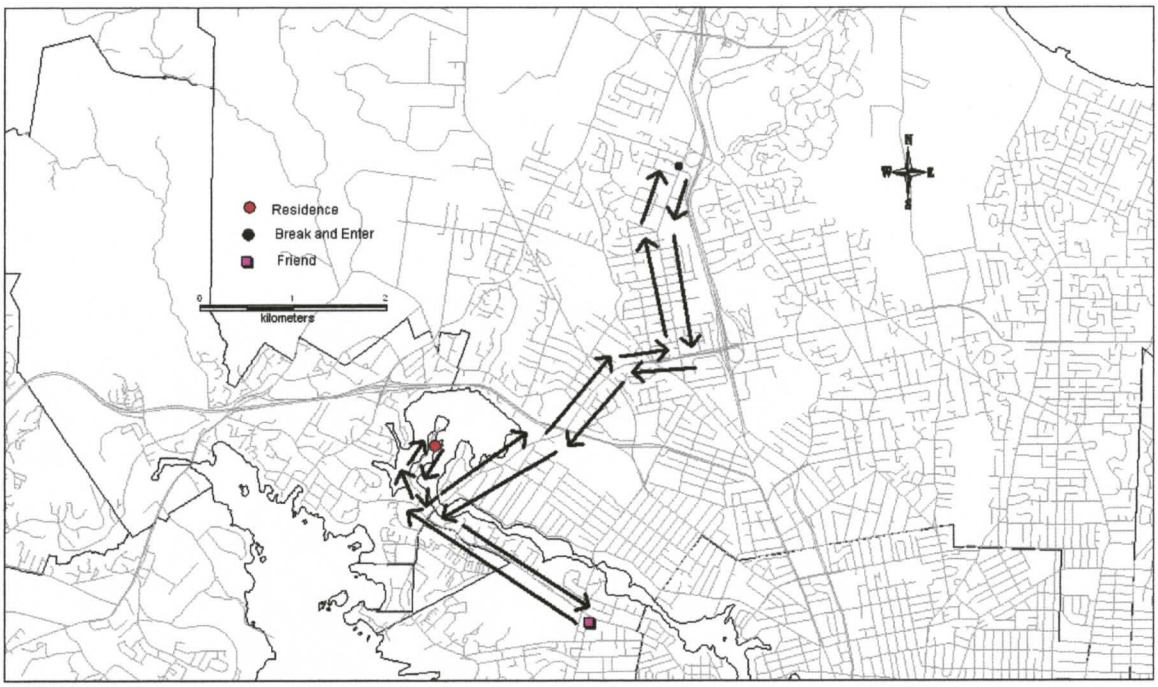

Figure 9.14: Journey to Break and Enter Seventeen.

Joe's arrest, charge and release from custody did not deter him from continuing with his criminal activity. Three days after his arrest he set out to commit another break and enter. He left his home traveling approximately 5 kilometres along the route specified in figure 9.14 to the target site.

Joe observed a resident, in a vehicle, pull out of the driveway and leave the property. The house was located in a neighbourhood with mixed residential - commercial buildings. The buildings across the street from the house were all business premises. He felt the house was probably unoccupied so he decided to check it. He parked his vehicle in one of the commercial lots across the street. He broke into the house, obtained property and left. Instead of going home, Joe traveled to a friends place to buy drugs. After making his purchase he returned to his residence.

Break and Enter Nineteen

Two days after he committed the break and enter in Saanich, Joe burgled a house in Victoria. If Joe started his trip from home, which is highly probable, he traveled approximately 6 kilometres to the offence location.

Within two weeks he struck again. Joe traveled in his vehicle, approximately one kilometre, from his residence to the target area. The original intent was to go to a drug dealer's house and obtain drugs. He noticed a house concealed by hedges. He took a look at the house and felt no one was present. He parked his vehicle up the street across from the residence and walked back to the target. He knocked on the door and found no one was home. Originally, he was going to break into the house but changed his mind. He felt the neighbour houses were too close and someone may be staying in the residence basement suite.

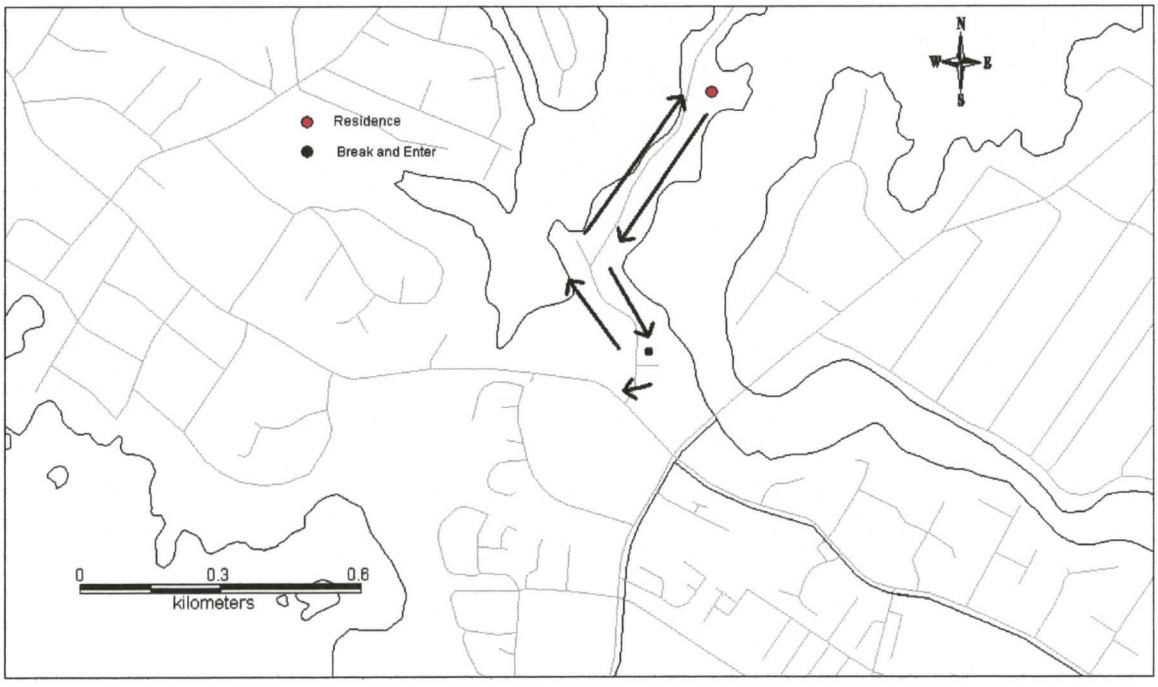

Figure 9.15: Journey to Break and Enter Nineteen.

Joe found the back door to the garage unlocked. He entered the garage and found three safes. Over the course of an hour, he used tools from the garage to break into the safes. He removed some cash and tools then returned home.

Break and Enter Twenty

Joe commented that this was the last break and enter he did. He left his residence with the intention of committing a break and enter. He traveled in his vehicle for approximately 1.5 kilometers to the target area. He parked his vehicle in a commercial parking lot. He liked this area because it was secluded, lots of trees and bushes. He mentioned that he had committed several successful burglaries in this area. He started walking and observed a woman pull out of a side street. Joe felt the woman had just left her residence vacant so he proceeded up the side street.

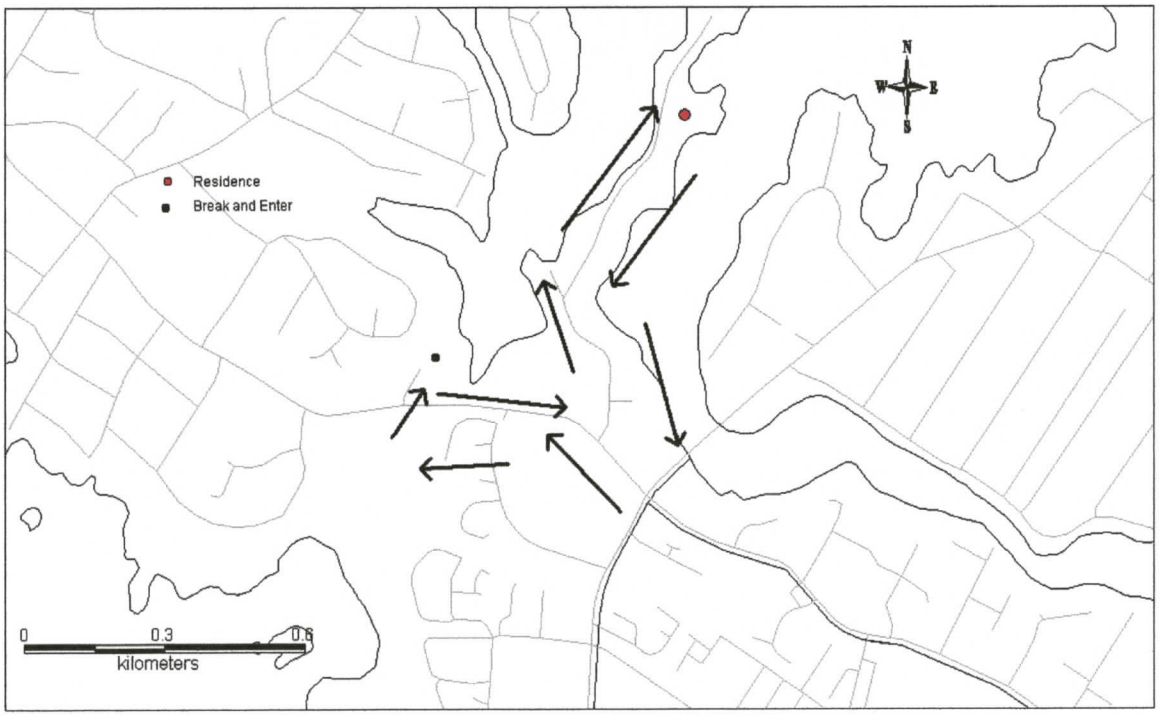

Figure 9.16: Journey to Break and Enter Twenty.

He found an empty house, approached it and made some occupancy checks. When he was satisfied no one was home he removed the screen off a front dining room window. He lifted the window and opened it. Joe commented that people should screw the screen to the window frame. He added that this will not prevent a determined offender, but it does act as a deterrent because it takes time to remove. He stated that there are locking systems that prevent a burglar from lifting the window. Both these methods are easily overcome, but they take precious time.

Joe removed computer equipment, cash and food. He left and returned home.

Discussion

Joe was born and raised in the CRD. He has a detailed knowledge of the region, which was under-represented in his explanation of his spatial knowledge. His knowledge grew through direct interaction as he moved through the region from his youth to adulthood. His imagery of the region was extensive, he easily verbalizing locations using municipal names, main roads, landmarks, nodes, intersections, and side streets to describe or pinpoint locations. His ability to read a map was limited, he required assistance to orient himself so he could point out known locations. However, he made it clear without the names on the map, identifying features on the map were difficult. He has grown up in, lived in, and previously offended in areas where he committed his most recent series of offences. It was abundantly clear as the interviews progressed that his spatial knowledge was much more comprehensive than that identified in the preliminary questioning.

In this series, Joe always used a vehicle to travel to his crime sites. He traveled the most direct and quickest roads to his target areas. He made it clear he did not want to waste time and profit in his criminal ventures. When he was unusually drug sick, he

would travel shorter distances to his crime sites, into areas he was familiar with but did not meet his usual criteria of separation and seclusion. The travel-time constraint was motivated by his need to expedite a drug purchase to satisfy his need. The distance he traveled was only limited by his knowledge of the region and time-travel constraints placed on him by his drug habit. On average Joe traveled 6.6 kilometres using straight line distance. His average actual journey to crime was 7.8 kilometres. There was a difference of 1.2 kilometres between straight line distance and actual distance. At this, a micro level of analysis, distance decay did not seem to operate in Joe's offence series, it was evident he was willing to travel long distances to areas where he could find houses that met his success criteria.

Joe always offended in areas he was intimately familiar with, developed over years of direct exposure. He offended in areas near trip termination points within close proximity to the paths he traveled rather than delving deep into neighbourhoods. This is indicative of an outsider (Brantingham & Brantingham, 1993a), an individual who is not familiar with a neighbourhood, instead of an insider, one who is knowledgeable of a neighbourhood and comfortable traveling through it. There were exceptions, for example, break and enter 19, where an opportunity presented itself on a journey to a different crime area. In this case he traveled less than a kilometre from his residence when he encountered an opportunity he could not pass up. He chose offence areas with restricted surveillance, thus avoiding interference from potential guardians. He offended during periods when there was a high likelihood the occupants would not be home. He removed small easily portable and profitable items from his targets. Using a simple risk -

reward rationale he picked areas and targets while minimizing his time - cost expenditures.

9.6 Summary

The subjects who participated in the interviews demonstrated a broad spectrum of spatial awareness and offence knowledge. Randy and Bill both lived in the CRD for a very short time. Their knowledge of the CRD was constrained by the time spent in Victoria and their dependence on friends or public services for transportation. Trevor and Joe on the other hand had grown up in the CRD and had extensive knowledge of the surrounding environment. Both offenders were willing to travel long distances to their target areas.

The results of the map exercises were disappointing. All four subjects had difficulty recognizing the map without some help with orientation. Both Randy and Bill had difficulty pointing out the areas they easily verbalized. Once Trevor had his bearings, he recognized areas on the map. However, he still he had trouble locating areas or streets without help. Joe could not read the map, he found it difficult to adjust without the names printed on the map, yet it was apparent by his verbal descriptions that his imagery of the region was coherent and profound. He later familiarized himself with the map and was able to point out locations he knew with limited or no help.

All participants identified spatial features in the initial questioning, but this failed to expose the limits of their spatial knowledge. It was noticeable when challenged with questions on spatial features the subject's responses were incomplete even when assisted with a map. It was not until the conversations turned to their break and enters, a point where they began to think about the routes, the area, and the offence, that greater spatial

detail surfaced. The only exception was Joe, who could easily rattle off major roads, side streets, nodes and districts.

Bill and Joe both had prolonged series of burglaries spanning several months. During the discussions about individual offences, clues surfaced indicating they were having trouble remembering details about the events. There were a couple of occasions, Joe was unsure of the route he took to an offence site. He would think about it then confidently describe a route to the site, assuring the interviewer it was correct, because it was the direct route. It was not clear if Joe was trying to convince himself of the route accuracy, or if it was the actual route. In some cases, Joe had trouble remembering where he was living at the time of the offence. In a series of three burglaries, Trevor confused the sequence of events. It is important to have alternate sources of information, i.e. police reports to corroborate the offender's account of the circumstances.

The subjects described thirty break and enters through the course of the interviews. The average journey to crime measuring straight-line distance was 5.6 kilometres. However, straight-line distance tends to under- estimate the actual trip distance. Tracing the routes to the offence sites, described by each subject, the actual average distance was 7 kilometres; this meant that the subjects traveled approximately 19% further than estimated by straight-line distance.

Average Straight Line Versus Actual Distance				
# B & E	Straight	Actual	Difference	% Difference
30	5.6	6.9	1.3	19%

Table 9.8: The Average Straight Line Distance to Crime versus Actual Distance.

Minimizing distance was not an issue, other concerns influenced decisions on target areas selected. In Randy's case, he committed his offences at the edges of his awareness space restricted by his limited spatial knowledge. He moved around freely in

this area, but not out of it. Trevor traveled to the extremes of his spatial boundaries, with most of his travel done on foot. He would walk for hours in known areas, patiently assessing potential targets. Joe traveled long distances to his offences interspersed with short ones, but always attacking in a familiar area. He liked rural areas where houses were secluded. In Trevor and Joes cases they liked to mix up their offence areas to avoid detection. At the micro level, distance decay is affected by the subject's cue template, drug demands, desire to change areas, or limitations on spatial knowledge.

Trip Purpose	Percent
B & E	87
Other	13
Trip Origin	
Home	87
Other	13
Trip Complexity	Percent
Simple	90
Multi	10
Transportation	Percent
Foot	27
Vehicle	57
Public	30
Bike	3
Combo	17

Table 9.9: Aggregated Trip Dynamics.

The majority of trips (87%) commenced with the intent to commit a break and enter (Table 9.9). Almost all of the trips (87%) originated from the offender's residence. Ninety percent of the trips were simple in nature with only one purpose, which was to commit a burglary. The most common method of transportation was a vehicle (57%), public transit (30%), and foot (27%). A combination of methods was used in 17% of the cases, for example, walk on foot, steal a bike, and leave the scene.

In Randy's case, his lack of a vehicle affected his ability to reach out and interact with the environment. This restricted his ability to learn other areas to target. In Trevor's

case, he used bus, vehicle and walked to his burglaries. Having to use multiple transportation options did not constrain his offending because of his breadth of understanding of the environment.

Awareness Space	Percent
In	80
Out	7
Close	13

Table 9.10: Relationship of Offence Location to Awareness Space.

The bulk of the offences occurred in (80 %) or near (13%) the offenders' awareness space. Areas learned by the offenders through direct interaction with the environment during their routine activities. The one exception is Bill who was introduced to the areas by his co-offender. The offenders committed their offences during periods they were confident the residents would be vacant. However, there were exceptions. Joe entered and took items in two instances where the residents were home. Trevor targeted old age homes entering insecure apartments sometimes encountering the residents. Each offender described a limited number of cues, which assisted them in rationalizing the risk, benefit, and occupancy of targets. Both Bill and Joe interchange offence areas to avoid creating patterns, which may come to the attention of the police. Yet, each offender created offence patterns because they offended in only a few areas in which they were familiar.

In two cases, a co-offender was present during the offences. Randy insisted that he made the decision to commit the burglaries and the location area they would offend. In Bill's case, he accompanied his co-offender into areas he was not familiar with, not to commit a burglary, but to conduct a drug transaction. The burglaries were secondary to the drug transactions and on both occasions instigated by the co-offender. In these cases

it would appear only one individual made the decision to offend, while the cohort followed.

The conversations identified several interesting comments on crime reduction or prevention strategies. Alarmed houses did not seem to bother Randy, Trevor and Joe. They were confident they could defeat the alarm or be in and out of the house before the police arrived. However, they will avoid them if a better target is available. Trevor stated he would go out of his way to break into a house if they advertised an alarm system, but did not have one in place. Joe and Trevor mentioned Block Watch did not intimidate them. They felt they fit in when they offended so they would not be noticed.

When a burglar is confronted during occupancy checks, they fabricate a weak story to cover the intrusion. Joe stated if the public called the police during such encounters burglars would be caught or discouraged.

Every subject's life was complicated by varying degrees of drug dependency. Bill indicated he was trying to get off heroin by taking methadone. Nevertheless, he was still chipping, using small amounts of heroin when he forgot to get his methadone. Randy, Trevor and Joe were all descending deeper into their addictions. Although, they needed money to support themselves their demand for cash was driven by their need to feed their dependencies. It was interesting to listen to Joe who made it clear once he was on drugs he did burglaries to support himself. This was the easiest and quickest means to earn cash. All the police had to do was follow him around and they would eventually apprehend him. Targeting career burglars who have fallen off the wagon may reduce the number of crimes they commit when they become active.

The subjects mentioned several target hardening options. Home owners should secure screens to the window frame. Wood placed in window tracks should be screwed into the track instead of being left in the track insecure. Screw locks for window and sliding door tracks are an effective means of preventing entry. These tactics will not stop a determined burglar, but they take valuable time, which would discourage many.

Finally, the market for the property stolen is their drug dealers. Yet, it is not clear if there is any coherent action taken to reduce this market. It would appear that it is mainly hit and miss.

Chapter 10: Summary and Conclusions

10.1 Summary

This study embarked on an exploration of the spatial patterns of residential break and enter in the Metropolitan Region of Greater Victoria. It was argued, based on the research literature and the Author's experience as a police officer, that there would be considerable utility in understanding crime patterns in order to enhance police response to this type of offence and hence have some value in reducing the number of potential victims.

Background

City structures and their environmental backcloth influence the spatial variation in property crime, thus limiting or enhancing the availability of crime targets in both time and space. Not all neighbourhoods or blocks contain potential targets, for example, the physical environment limits suitable sites for construction, legal zoning regulations dictate where residences may be built, socio-economic barriers (Rengert & Wasilchick, 1985) limit access to particular segments of society, and culturally (Pettiway, 1982) distinct areas restrict offender movement.

The routine activities of the general population influence access to potential targets in both a spatial and temporal context, thus, limiting or enhancing opportunities for criminal activity. For example, neighbourhoods vacated by working families produces a decrease in guardianship and an increase in opportunities during certain periods of the day (Felson, 1998b).

Given the limitations imposed on the offender by his routine activities, imprecise knowledge, victim/target routines and the environmental backcloth, distinct patterns of offence activity should emerge within a region.

Clusters of burglaries indicate locations of higher than average incidence and opens up opportunities to discover what underlying conditions contribute to the patterns. Evans (1989) suggests, that without the temporal and geographical understanding of crime patterns police patrols are not very effective in preventing or reducing crime levels. Analysing clusters opens up the potential for the development of alternative actions, efficient deployment of manpower, leading to a reduction or the elimination of the conditions or circumstances which contribute to the crime pattern (Goldstein, 1990), efficient deployment of manpower However, if there is a lack of understanding of where burglary patterns or clusters form, together with their temporal dynamics, it becomes difficult to develop strategies to address them.

Burglars commit the majority of their crimes within a relatively short distance from their home. As distance increases from their residence there is a lower likelihood they will commit an offence (Baldwin & Bottoms, 1976; Costello & Wiles, 2001; Gabour & Gottheil, 1984; Kocsis, Cooksey et al., 2002). Research points to the fact that burglars offend within their sphere of daily activities (Carter & Hill, 1980; Costello & Wiles, 2001; Cromwell, Olson et al., 1991; Rengert & Wasilchick, 1985). It is within this realm of routine activities the offender forms a "spatial opportunity structure" (Carter & Hill, 1980). There is a great deal of indirect evidence that supports the theory that offenders commit their crimes within their routine activity space (Baker & Donnelly, 1986; Davidson, 1980, 1981; Letkemann, 1973; Rengert & Wasilchick, 1985). Yet, there

appears to be no research that identifies the offender's activity space and compares it with his/her crime sites in an effort to determine what, if any, relationship exists between the two. In other words, do burglars really commit their break-ins solely within their activity space?

Theoretical Approach

This research flows from three associated theories developed during the last quarter of the twentieth century. Routine activity theory (Clarke & Felson, 1993; Felson, 1998b) argues the daily routines in space and time of both the offender and their victim influence the time and location of a criminal event. Three basic elements must coincide in time and space if a crime is going to occur. There must be a motivated offender encountering a likely victim absent of a capable guardian. If either an offender or a victim is absent, or there is some form of guardian present which will prevent the event, it is unlikely a crime will occur.

Rational choice theory (Clarke & Cornish, 1985) focuses on the offender decision-making process. The offender is goal oriented, albeit goals tend to be short sighted. The object of the crime is to obtain some benefit whether it is instrumental or affective in nature with a minimal amount of effort. Offender decision-making is normally constrained by time and energy. Therefore, the quality of information considered is inadequate or inferior. As a result, the offender considers only a limited number of benefits and risks. However, initially the risk of apprehension is usually low, thus the prospective benefits normally outweigh the risks.

Pattern theory (Brantingham & Brantingham, 1993b) proposes crime is a complicated process of circumstances and situations, but, given this complexity, clear

patterns of activity exist when observed at different levels of spatial and temporal resolution. Patterns are evident amongst individuals, across groups, throughout regions, municipalities and neighbourhoods.

For a crime to occur there must be a motivated individual willing to take advantage of an existing opportunity to accomplish a spontaneous or predefined goal. Crime triggering events activate the individual's readiness to offend. Using a template of cues, offenders assess areas to seek out targets and to judge their suitability for exploitation.

Daily non-criminal routine activities form the activity space of offenders. It is in this activity space that offenders will commit their crimes. It is clear that this activity space is limited in scope and does not cover all areas within a region; instead, it forms patterns of localized activity.

All this transpires within an environmental backcloth. At minimum, the backcloth consists of social, legal, cultural, economic, and physical settings in which criminal acts take place. All these conditions vary under different situations at an assortment sites under a variety of circumstances. Tolerance for criminal behaviour varies within social groups; some groups are more accepting of minor property and violent acts. Pettiway (1985) found burglars will commit offences within culturally homogenous areas. Zoning regulations limit targets for some types of crimes, for example, a residential burglary cannot occur in a park. Beavon (1984) found that the physical layout of city streets influenced its vulnerability to certain types of criminal events. At certain times in particular locations crime opportunities increase, for example, downtown parking lots are filled with automobiles left unattended by day time shoppers and workers (Felson &

Clarke, 1998a). Rengert and Wasilchick (1985) found burglars were reluctant to cross a major highway into an affluent area to offend. The highway acted as a physical, cultural and social barrier. The backcloth is interconnected and constantly shifting. Change amongst the elements is constant, but it varies in tempo, moving at irregular intervals.

Location of Study

The Capital Regional District area has a unique multi jurisdictional (municipal) composition. It consists of a geographical area enclosed by land and sea. There are a number of independent municipal police forces and a national police force that provide police services to individual municipalities. The municipal makeup of the region creates an opportunity to explore inter jurisdictional and intra jurisdictional patterns of burglary.

Objectives

The first part of this research set out to describe and analyse burglary at the regional, municipal and household levels of analyses within the Capital Regional District. From the hypothesis presented in Chapter 1 three questions were posed, specifically, which, if any, spatial clustering or concentrations (hotspots) of burglaries exists in the CRD? Second, what differences exist between intra municipal patterns and inter municipal (regional) patterns? Finally, are there distinct temporal patterns of residential burglary within the region? The results obtained built on the existing information about crime clusters and contributed direct knowledge about crime patterning in a multi jurisdictional environment.

A second function of this research was to determine where police think spatial patterns of burglary exist at the municipal level of spatial analysis. Two questions were

derived from the hypotheses, first are police perceptions consistent with actual patterns? Second, do police agree on the location of burglary patterns? The research built on the current but limited body of knowledge. Using area instead of point/area comparison it created a new method for measuring hot spot concurrence. Officers were asked how they learn about burglaries. Finally, officers were questioned about their organization's response to burglary. The research contributed new insight into police knowledge about hot spot locations. Furthermore, it provided insight into the level of agreement between police in their selection of hot spot locations.

The last objective of this research was to examine burglar's use of space in committing his/her offences. Based on the hypotheses a number of questions were proposed. Do offenders commit their burglaries in areas they conduct their routine activities? Do offenders commit their offences in the same area in which they made the decision to offend? Are offenders constrained by distance in their crime trips? Will the original goal of the trip determine the area in which the burglary is committed? Other factors in offender decision making were also explored. The research provided a new contribution by determining to what extent individual offenders commit their crimes within their activity spaces.

10.2 Conclusion

Data

There were a number of problems encountered at the outset of this research project. The CRD maps were at least two years old and lacked a master index file of addresses to geo-code. Data obtained from Police originated from three distinct, incompatible Record Management Systems (RMS), PIRS, Motorola, and Versadex. The data supplied arrived in several different data formats, for example, Excel, SPSS, and Fox Pro. The quality of the data was problematic, the researcher discovered missing data, classification inconsistencies, coding errors, different data formats and missing, incomplete or incorrect date and times. To overcome these difficulties, a number of techniques were used to generate sufficient data for use in the study. Central Saanich, Esquimalt, Oak Bay files were individually reviewed and the residential break files extracted. Secondary break and enter codes were used to identify and isolate Victoria residential burglary files. RCMP files were delivered with all jurisdictions contained in a single file. RCMP Jurisdiction collators were used to filter out residential break and enter files for each sub jurisdiction, i.e. West Shore, Sidney/North Saanich and Sooke.

The RCMP data was missing substantial portions of temporal information, therefore, they were not used in the analysis. The date/time fields in the municipal police data were reconstructed into a single data/time attribute for use in the research. Those files which contained incomplete, incorrect, or missing date or time information, ranging between 25% (Central Saanich) and 34% (Victoria/Esquimalt) were excluded from the

analysis. This meant that approximately 70% or more of the events contained reliable time/date information for use in the research.

Geo-coding proved a formidable task, requiring interactive coding of every break and enter event. The geo-code rate did not reach 100%, due to the age of the map which contained a two years old address file, incorrect data entry of break and enter addresses and researcher geo-code fatigue. The process to rectify these difficulties was extremely time consuming and did not prove completely successful with geo-coding hit rates varying over the region. However, modifications and cross checking provided a geo-code success rate of 87% for the region an acceptable and reliable level to proceed with the research.

The acquisition of police and offender samples proved to be a difficult challenge. The initial response to the police request was disappointing. A small proportion of the initial sample volunteered. After a return trip to the Ethics committee a second attempt managed to assemble a suitable sample for the project. Procuring a large enough sample of offenders met with obstacles from the inception of the project. On two occasions access to Corrections was denied. Finally, after a year into the research and a third application to Corrections, access was granted. Unfortunately, the response was limited. Through police and corrections, only five participants came forward, however, only four met the qualifying criteria.

The proportion of residential break and enter in the Capital Regional District is similar to the research literature. In the current study, residential break and enter accounted for 10% Criminal Code offences and 17% of all property crime, compared to 15 - 16% of Criminal Code offences and 25% of property found in similar studies.

Residential break and enter trended downward during the seven years study period, however, there were signs it was reversing its trend in 2004. The proportion of break and enter in each municipality did not vary much from 1998 to 2004. For example, Saanich suffered between 23% and 26%, on average of 24% of the annual regional break and enter. Clearance rates fell with the range of findings in previous research. Sidney Provincial had the highest average clearance rate over the study period. Victoria/Esquimalt had the lowest average rate.

Simple methods for examining break and enter, for example, measuring the ratio of break and enter to population, although less demanding, do not provide an adequate description of break and enter in the CRD. Populations shift throughout the day. Victoria's daytime population is much larger than its nighttime population due to the disproportionate share of regional employment and entertainment found in the city. A more accurate ratio, but more difficult to calculate is the ratio per household. Using this method revealed surprising results; Langford (15%) and View Royal (15%) had the highest rates in the region. In terms of the break and enter prevalence, only a minority of residences in the CRD are victimized, a rate similar to that found in previous research. There is evidence of re-victimization of residences in the CRD, with Victoria having the highest level of concentration in the CRD. Residential break and enter is concentrated in a small proportion of the population at risk. The different methods used to examine residential break and enter provided interesting, informative, and more comprehensive information. It is clear that residential break and enter, contrary to the raw number of incidence or the ratio to population, is not concentrated solely in Victoria. Instead, when

alternative measures more accurate ratios are calculated, other municipalities in the CRD have similar levels of victimization to Victoria.

Geographical Patterns – Variation in Space and Time

We have seen in the preceding paragraph that residential burglary is concentrated amongst a small proportion of the potential opportunities. Consistent with pattern theory, there is evidence of non random clustering of residential break and enter in the CRD. The nearest neighbour analysis showed that burglary forms statistically significant clusters at the regional level. At the micro level, point pattern analysis using the Hot Spot Detective™ identified a number of areas of high activity (hot spots) within the municipalities. The GAM technique indicated that many of these patterns exceeded activity, which might be expected within the underlying opportunity structure. The Getis G*I statistic located one significant pattern in Victoria at both the municipal level and the regional level.

At the regional or meso level there is a distinct change in the patterns of residential break and enters. The number of clusters observed at the municipal level disappeared, with clusters at the regional level concentrating predominately in the Saanich/Victoria – Victoria/Esquimalt border areas. The most active area was found in the north centre of Victoria. Pattern theory proposes crime concentrations will fluctuate with changing resolutions.

Pattern theory points out that edges or boundaries, both artificial and natural will act as inhibiters or conduits for criminal activity. In this research residential break and enter was not constricted by municipal boundaries. There were several examples of high activity areas traversing municipal borders. If residential settlement patterns straddle

borders there exists a potential for cross jurisdictional offending. Furthermore, offender's daily routines often will take them across municipal boundaries for both legitimate and illegitimate activities.

Only a limited number of "hot spots" (high incidences) were generated in each municipality, at the selected bandwidths. Furthermore, the total area covered by the hotspots represented only a small proportion of the total area of each municipality. Yet, at higher bandwidths, concentrations of 10% or more of the municipal burglaries were found within the hot spots in more than three quarters of the cases. This means that 10% or more of the residential break and enters is concentrated in proportionately small areas of each municipality.

There is clear evidence that residential burglary forms significant non-random clusters or concentrations in the CRD. Clusters shift when the analysis moves from the intra-municipal level to inter-municipal (regional) level.

Temporal Stability

There are persistent burglary clusters over time within municipalities, which continue over the years, seasons and months. Minor shifts occur, but they still occupy similar spaces through time. Many of the patterns are located in areas where prominent or influential nodes, paths and landmarks are located. Using 2004 data from Saanich and Victoria/Esquimalt we found a clear visual relationship existed between offender residences and hot spot concentrations. Offenders either lived in or on the periphery of hot spots found in the municipalities.

Not only were spatial patterns evident over the study period, but offences were found to cluster in time. However, only one time frame proved persistent through the

study period. It was the hourly rate, in particular the afternoon hours, which exhibited the highest period of activity, year over year. No other time frame, season, month, week or day had the same uniformity. It wasn't until data was aggregated for the full study period did a consistent daily, monthly or seasonal pattern emerge. Burglary is clearly a weekday occurrence, with peak days on Friday and Monday, while Sunday had the lowest proportion of offences. January, June, July and October stood out as months where there was above average activity. Seasonally, the fall demonstrated above average activity, however, this was not consistent across municipalities.

These findings are consistent with routine activity theory, where the daily activities of victims and offenders create opportunities in space and time. Residences are vacant during daytime hours particularly in the afternoon. Offenders rise during the day time hours and commence their daily activities. Search activity is concentrated in the afternoons. However, there is only a limited pool of offenders. Over time there will be periods of activity and inactivity spread out over the week, month and season. This will tend to disperse patterns over longer periods of time. With greater likelihood residents will be home on Sunday it follows that there will be less activity during this day. Seasonal variations in the hours of light create or limit potential opportunities. Summer provides longer periods of home vacancy with families participating in more outdoor activities and vacations. In summer windows and doors are often left open to provide extra ventilation.

The existence of spatial and temporal patterns provides information on high offence locations. However, this information does not tell us why offenders are more active in these areas. It is clear that a more in depth inspection of high crime areas is

required to understand the dynamics underlying the activity. Knowledge of the underlying activity opens up opportunities for the implementation of primary, secondary, and tertiary crime prevention tactics.

Police Perception of Spatial Variation

In previous studies, centre points, single grid square, or verbal descriptions were used to assess police knowledge. In this study, police hot spot coverage's were placed over actual hot spots. Chapter 8 looked at police perceptions of hot spot locations, where accuracy in correspondence between police hot spots and computer-generated hot spots averaged 44%. This was far better than centre point agreement where there was on average 25% accuracy. The level of agreement between police was limited, with an average of only 24% correspondence. Police judgment about hot spots was, therefore, mediocre to poor. This was consistent with other studies where police were accurate in less than 66% of their choices.

Police crime information is obtained from a limited number of sources. The two most common sources of information are from individual investigations and discussions with other officers. Most information focuses on serious criminal events occurring over an eight-day period. There is little, if any, secondary or tertiary analysis, unless individual officers specifically request it. This has an impact on the depth of information available to police officers.

Responses to burglary conformed to traditional police tactics, concentrating on specialty units to target offenders, or directing patrol in areas where problems were developing. The first response normally requires a pre-identified suspect to target resources. If a suspect has not been identified this method is not an option. The second

method requires committed resources, detailed analysis of characteristics of the offence and the area, for example, outlining probable time, location to direct patrol, potential suspect residences and more. Directed patrol identified by the subjects interviewed does not operate under these ideal circumstances. Generally, the police response to residential burglary is limited, falling mainly on the shoulders of patrol officers. Police work very hard, are pulled in numerous directions, attempting to create a safe environment for their communities. In an atmosphere where demand for service has priority, no matter how small the call, officers appear unable to direct their full attention to high crime areas.

Police knowledge of burglary concentrations was limited. Clearly, the type, timeliness and completeness of information in all likelihood affects police judgment in locating hot spot areas and agreeing between themselves on hot spot locations.

Offender Spatial Perceptions and Activity

Early attempts at obtaining a suitable sample of offenders met with unsatisfactory results. The B.C. Correctional system declined access on two separate occasions. There were several concerns mentioned - information privacy, charter rights, interview facilities, and security availability to accommodate the request. Furthermore, Corrections priority was to accommodate research that had direct strategic benefits for their organization. Approximately a year after the research started, a third attempt to gain access met with success. Due to the limited number of volunteers, a case study format was considered the best approach. Four volunteers met the initial criteria for participation. The four burglars demonstrated a diverse knowledge of the CRD. Two subjects had only limited experience with the CRD, therefore they had a narrow spatial

understanding of the region. The other two subjects had extensive insight into the spatial composition of the CRD.

The map exercise did not go well; the subjects had greater success in verbally describing places, nodes, landmarks and paths than pointing to them on a map. It was clear as we continued through the interview that the offenders, even those with limited knowledge, knew more about the CRD than was initially disclosed. The subjects were not intentionally trying to mislead the researcher, instead, as they tried to remember the circumstances of individual offences, a clearer picture of the surrounding details developed. The combination of map viewing and discussion about the offence circumstances tended to act as cuing technique unlocking their memories.

The offenders learned about the environment through past experiences, both criminal and non-criminal. The subjects commented that they new a friend in a particular area. They became aware of areas they had previously worked in. they attended locations where they purchased drugs. A friend familiarized them with areas. One subject just wandered around his neighbourhood exploring areas he was previously unfamiliar with.

In chapter 9 it was discovered that the majority of trips had one simple purpose, to commit a burglary. The subjects used several modes of transportation, foot, bicycle, public, private vehicle. Offences occurred predominately in the offender's awareness space. Spaces learned in the past, built up over time, during non-criminal interaction with the environment. Actual journey to crime distances averaged 7 kilometres. Straight-line distance underestimated actual distance by 19%. On an individual basis, offenders were not constrained by the friction of distance. They traveled to the extremes of their awareness space, making both long and short trips to their targets. In some instances,

offenders took the most direct route to the target areas. Most committed crimes along the route they took. This was not always the case, one offender like to wander through known neighbourhoods assessing potential targets along his journey. Distance did not seem to restrict movement; rather, it was the limitations of their awareness space, drug demands, or their desire to change areas to avoid establishing an offence pattern.

The subjects were motivated first by the need for drugs and second to obtain money to support their lifestyles. Most journeys to crimes started from the offender's residence only a few were initiated from an alternative location. In almost every case the purpose of the trip was to commit a burglary. In only a few cases subjects commenced their journey to crime with some other trip purpose?

They used a limited number of cues to determine risk and potential benefit. The type of house, children's toys outside the house acted as cues to potential rewards the house may contain. Absence of vehicles, lights on with no visible activity provided evidence on occupancy. Houses on larger lots with restricted surveillance guaranteed no one would interfere with the offence. In some cases offenders had difficulty describing cues, for example, 'I sensed it was a good target, I had a gut feeling', or 'I had a premonition about the house'. The subjects exhibited a limited rationality similar to that described by Cromwell et al. (1991). They were concerned less about distance minimization than creating an offence pattern that would spark the curiosity of police. The offenders committed their offences with limited knowledge of the outcomes. However, all the subjects had extensive break and enter histories, so they knew that the risk was low. Yet, eventually they were apprehended because of simple mistakes;

fingerprints were left at the scene, a passerby noticed something suspicious and reported it, occupancy checks were inadequate - failing to disclose a resident.

All of the subjects sold or traded the stolen goods for money or drugs. It would appear that drug dealers are a major purchaser of the property obtained in break and enters. They are mobile - attending agreed upon locations to purchase stolen property. The subjects in this study did not disclose any other methods for property disposal.

Interviews with offenders provide a wealth of information, for example, information on offence areas, knowledge of areas, MO, method of travel, how travel is executed - all provide a package of knowledge unique to an individual. Offenders Debriefings are an important opportunity to learn details about offender characteristics, travel methods, spatial knowledge, and MO.

Information learned from spatial, temporal and offender analysis creates opportunities to develop evidence based crime prevention strategies to modify, change, or correct the situations underlying the offence patterns (Brantingham, Brantingham et al., 2005). Researched interventions increase the effort and risks in committing criminal acts while reducing the rewards realized from the behaviour (Clarke, 1995). Concomitantly, developing strategies to reduce activity, which may provoke a criminal response (Brantingham, Brantingham et al., 2005) and the elimination of excuses, which permit the rationalization of criminal acts (Clarke, 1998). For example, most items stolen in a break and enter are small, valuable, located in common areas and easily transported from the residence. Research based information can be used to educate homeowners on proper security, concealment, and selective property marking. Research shows that repeat victimization occurs within about 400 metres of an offence. Police volunteers could

attend houses within a 400 metre radius of a break and enter informing residents about recent activity in their neighbourhoods. Police volunteers could follow up and offer assistance with target hardening methods. Police could increase public awareness about developing trends through web pages, volunteers and the media. These are examples of methods which could be used to increase effort, reduce rewards and increase risk.

Residential break and enter is a sub component of activities that are categorized as criminal. Figure 10.1 diagrams a network of broad activities in essence creating a systematic approach to address residential break and enter hot spots. It builds on research ideas generated by other scholars and the author's experience as a police officer. It is a by product of continuing analysis of the geographical, community and offender attributes. Its base is in analysis of the characteristics surrounding the offence tailoring proven and unique responses to prevent or reduce the continuation of the offence. It is by no means exhaustive and incorporates many traditional police methodologies with slight modifications in some instances. It recognizes that policing alone cannot solve all social problems, however, through joint efforts with other agencies they can work together to combat problems that impact residential break and enter.

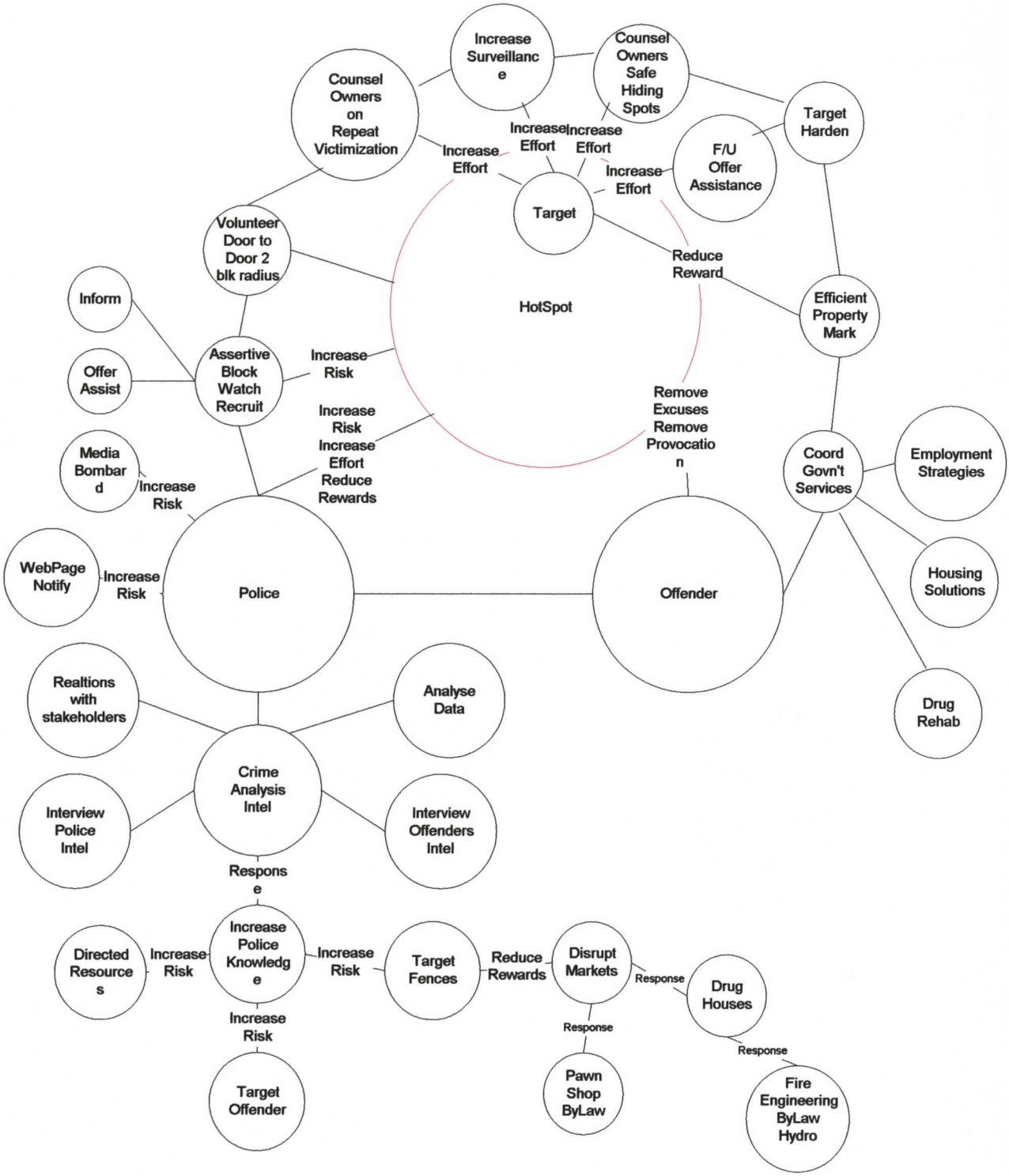

Figure 10.1: Common Response to Burglary with some modification: A Simplified Map of the system.[1]

[1] There is no clear evidence that Block Watch reduces the incidence of burglary, however, getting resources out immediately to provide current burglary information may induce residents to take steps to reduce the opportunity or increase the effort for someone trying to break into their residence.

In a perfect world, people would not steal, however, for the moment, crime studies have to be approached systematically, thus for example, police analysts (Figure 10.1) would explore crime concentrations, looking for root causes of problem areas. Police researchers would examine internal and external sources of information on emerging short and long-term responses to crime. From analysis and research flows evidence based interventions, first to prevent, and second to reduce or eliminate crime hotspots. An information loop would inform on the success and failures of tactics implemented. Failures would lead to reform, learning from mistakes to improve future solutions. It is time police leaders focused more resources on alternative actions to prevent and reduce crime, rather than relying mainly on traditional practices which only provides evidence that police are primarily dealing with crime. While it is difficult for any institution steeped in its traditions, to break free from its historical encumbrances, to move forward to meet new challenges, to constantly improve seeking new methods to conduct its business, it is not impossible.

There will always be individuals who will commit residential break and enters. The aim is to reduce the frequency of victimization. It is here geographical analysis provides a valuable tool, in understanding crime clusters, offender motivation – methods - use of space and police perceptions of crime patterns. Future studies should examine the contribution of repeat and near repeat victimization to offence clusters. Another prospective study would analyze clusters in more detail, develop evidence based responses to address the clusters, implement and evaluate the outcomes. Would concentrating scarce resources on clusters which comprise 10% or more of the total burglary count, concentrated in small areas, cause a significant reduction?

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Appendix I: Regional Crime Rates for B and E by Municipality

I.1 Annual Change

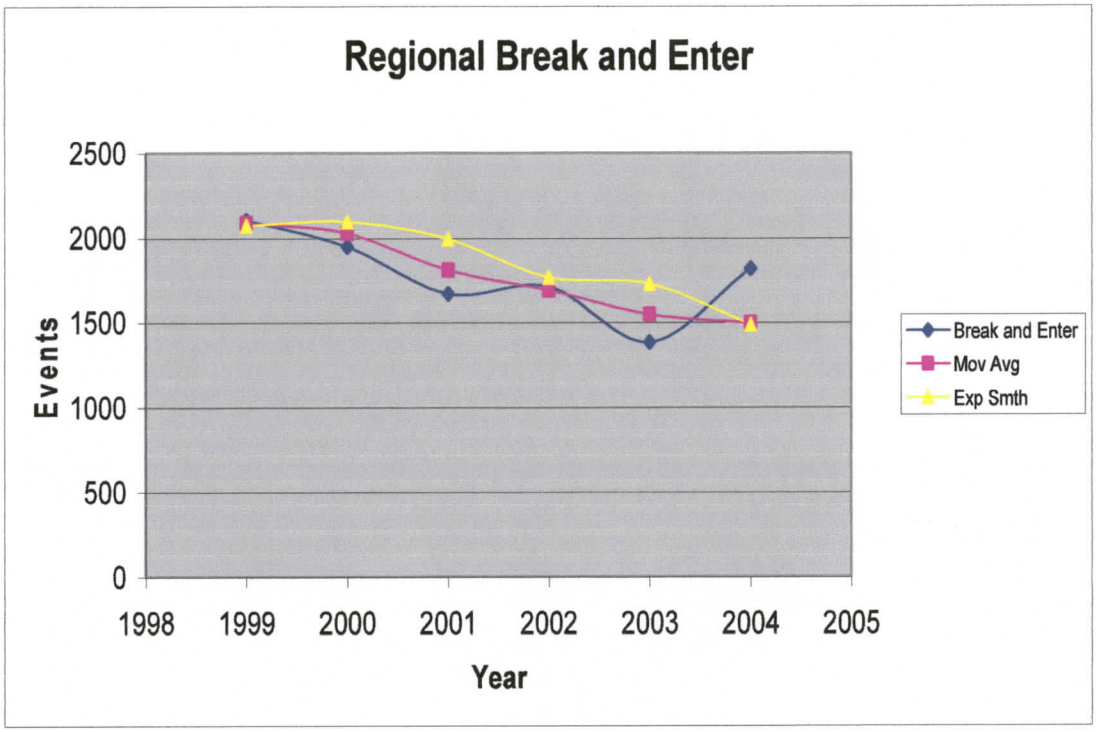


Figure I.1: Regional Trend.

The Core municipalities exhibited stable patterns until 2001 when break and enters started to decline, dropping below previous levels of activity. The moving average shows that break ins continued to decline until 2003 when the curve trended slightly upward coinciding with an increase in activity across the three municipalities. Victoria's 2004 break and enter increased 60% over 2003, which would have a substantial impact on the groups moving average. The exponentially smoothed line was not affected to the same degree as the moving average and continued to trend downward. With the exception of Victoria all of the municipalities remained at levels below those in the late 1990s.

Collectively, the Core municipalities break and enter for 2004 were 8% below the point were break and enters peaked in 1999.

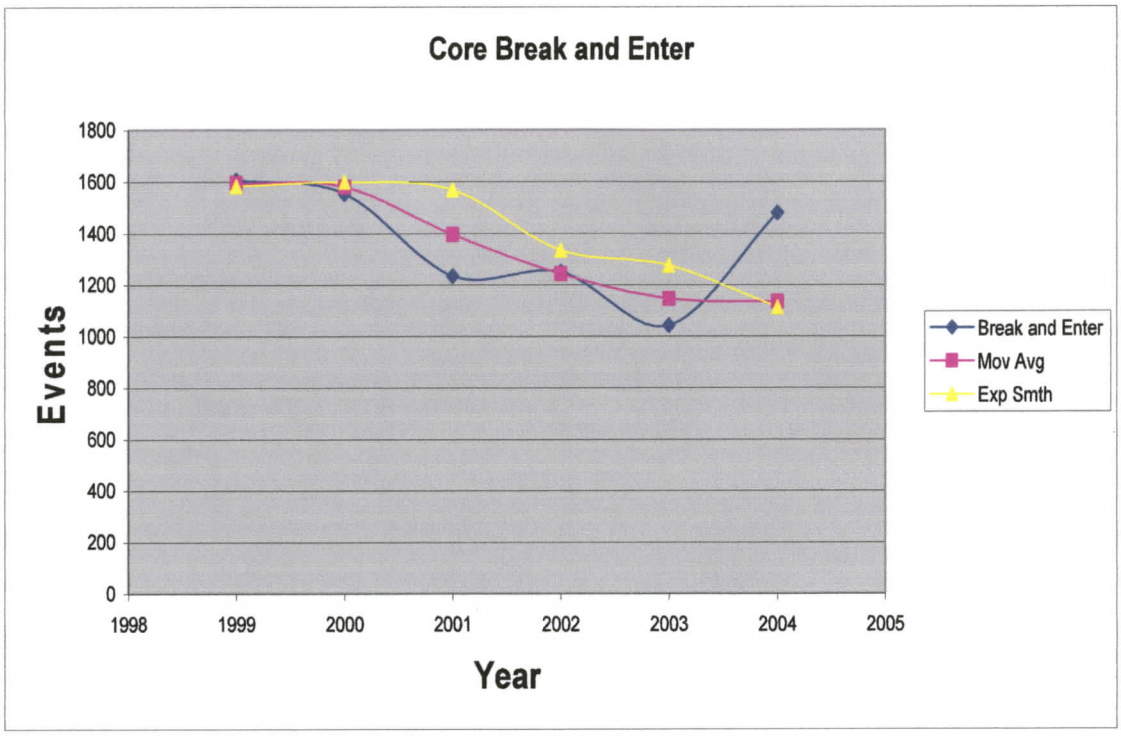


Figure I.2: Core Trend.

In the West Shore communities break and enter occurrences tended to remain relatively stable. They moved upward from 1998 to 2001 then started to trend downward. Break and enters increased in 2004, but, they remained below levels experienced in the late 1990's early 2000. In 2004 break and enters were 24% below their peak in 2001. The moving average and exponential smoothed line continue to trend downward.

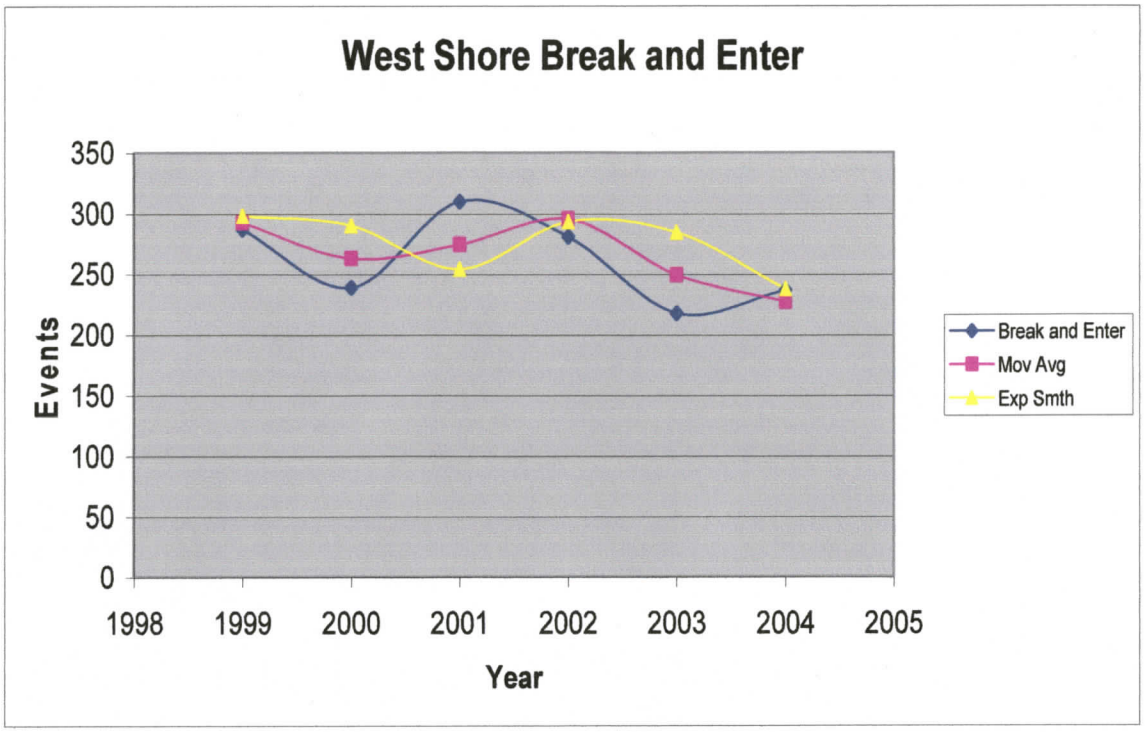


Figure I.3: West Shore Trend.

The municipalities that make up the Peninsula have recorded fewer break and enters annually since 1999. There were two exceptions 2002 and 2004 where break and enters moved upward. The moving average is starting to trend upward in conjunction with the change in 2004. The Peninsula recorded 37% less break and enters than it did at its peak in 1999.

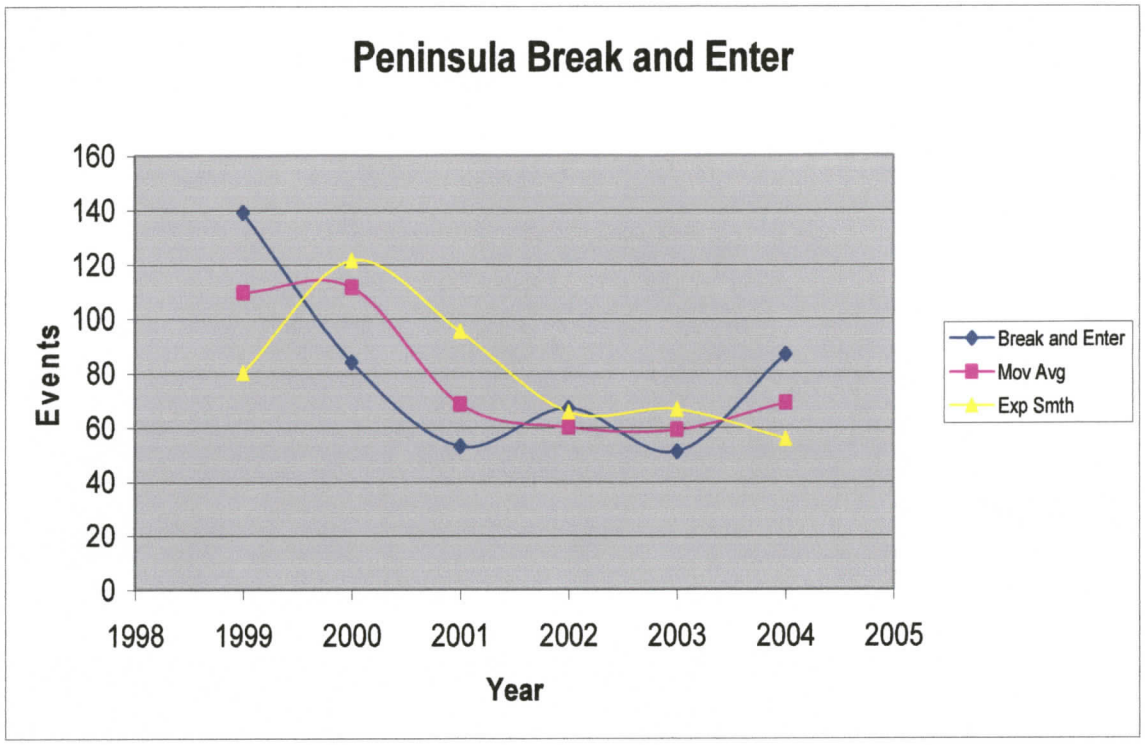


Figure I.4: Peninsula Trend.

In Sooke break and enters rose in 2002 after a period of relative stability. The burglaries started trending downward in 2003 and remain below levels registered in the late 1990s. In 2004 Sooke had 43% fewer break and enters than it had at its peak in 2002.

Break and enter in the Region has trended down over the study period. In 2004 this trend stopped with a sudden increase in break and enters of 35%. Even with the increase in 2004 break and enter is still 10% lower in 2004 than it was at its peak in 1998.

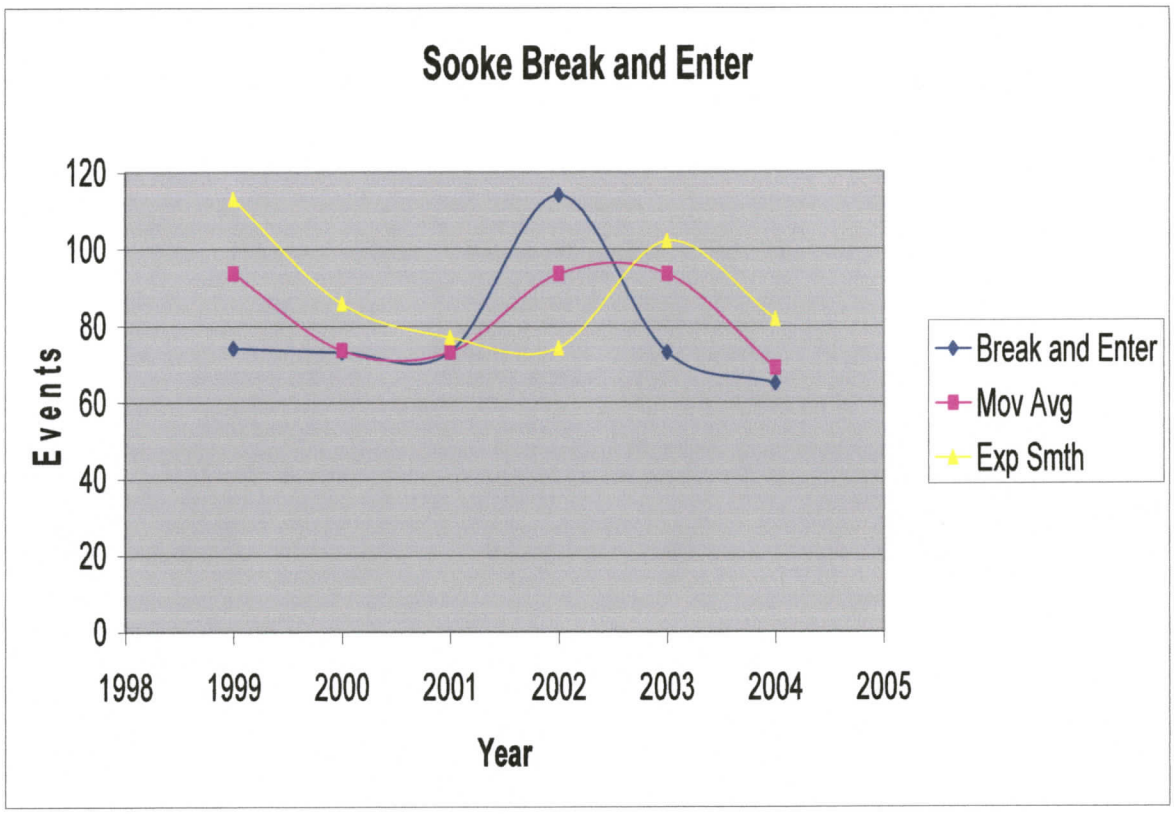


Figure I.5: Sooke Trend.

I.2: Annual Percent Change

In terms of annual percent change there were some extreme variations over time. However, a number of these acute shifts are based on small numerical changes in year over year break and enters. In 1999 Sidney and North Saanich suffered increases of 200% and 167% respectively. Yet, this amounted to a difference in break and enters of only 38 and 25 events respectively. In the following year break and enters returned to levels consistent with past years. All but two municipalities had an increase in break and enters in 2004.

Police RMS Residential Break and Enter Percent Change							
	1998	1999	2000	2001	2002	2003	2004
Victoria		1%	-5%	-22%	7%	-8%	20%
Esquimalt		2%	-7%	-3%	-3%		
Saanich		5%	1%	-23%	1%	-16%	15%
Oak Bay		-9%	-3%	-14%	-48%	78%	0%
Core Total		2%	-3%	-21%	1%	-17%	17%
Central Saanich		-12%	-13%	-31%	-6%	12%	53%
North Saanich Mun		167%	-60%	-31%	73%	-11%	71%
Sidney Mun		200%	-51%	-46%	40%	-67%	129%
Sidney Prov[1]		0%	17%	-36%	11%	-20%	63%
Peninsula Total		74%	-40%	-37%	26%	-24%	71%
Colwood Mun		-15%	4%	18%	3%	-21%	-13%
Langford Mun		9%	-16%	12%	19%	-29%	7%
View Royal Mun		-10%	-23%	11%	-31%	-18%	18%
West Shore Prov[2]		-10%	-33%	123%	-50%	-5%	38%
West Shore Total		-4%	-17%	30%	-9%	-22%	9%
Sooke Mun[3]				26%	48%	-41%	7%
Sooke Prov[4]		-35%	-53%	-29%	72%	-28%	-35%
Sooke Total			-1%	0%	56%	-36%	-11%
Region Total		2%	-7%	-14%	3%	-19%	17%

Table I.1: Percent change over time

I.3 Clearance Rates

Clearance rates were obtained from Police Services since Police RMS data was not readily available in a usable format. Clearance rates demonstrated some extreme highs and lows over the study period. Sidney municipality experienced a 71% (5) clearance rate in 2003, while North Saanich had two successive years (2000 and 2001) where no residential break and enters (0%) were cleared. However, percentages can be deceptive, Sidney had a total of 7 residential break and enters in 2003 and North Saanich had only 13 residential break and enters in 2000 and 5 in 2001.

Annually, Clearance rates in the Core varied from a low of 10% in 2004 to high of 18% in 2002. On average, police agencies in the Core cleared 14% of the residential

burglaries over the 6 year study period. The Core suffered the highest number of residential burglaries in the region.

Police agencies located in the Peninsula had annual clearance rates that ranged from a low of 10% in 2000 to a high of 36% 2003. The Saanich Peninsula had the highest clearance rate 21% from 2000 to 2004; however, it also had the lowest number of break and enters over the same period.

Year over year West Shore Police clearance rates varied from a high of 18% in 2000 to a low of 6% in 2004. Over the course of the study period West Shore cleared an average 13% of its residential break and enters.

Sooke's clearance rate ranged from a low of 9% in 2002 to a high of 19% in 2000. Over the course of the study period Sooke averaged a clearance rate of 14%. Sooke had the second lowest number of residential burglaries during the study period.

Clearance Rates						
JURISDICTION	2000	2001	2002	2003	2004	Average
Victoria Mun	11%	7%	13%	13%	9%	10%
Saanich Mun	16%	26%	28%	17%	14%	20%
Oak Bay Mun	7%	20%	27%	16%	6%	14%
Core	12%	14%	18%	15%	10%	14%
Central Saanich Mun	18%	22%	17%	35%	7%	19%
North Saanich Mun	0%	0%	33%	21%	21%	19%
Sidney Mun	4%	21%	22%	71%	7%	18%
Sidney Prov	20%	13%	40%	33%	42%	31%
Peninsula	10%	18%	27%	36%	17%	21%
Colwood Mun	16%	36%	7%	17%	5%	17%
Langford Mun	22%	4%	21%	12%	9%	14%
View Royal Mun	15%	20%	6%	5%	6%	11%
West Shore Prov	12%	11%	15%	3%	0%	8%
West Shore	18%	15%	15%	11%	6%	13%
Sooke Mun			5%	25%	15%	13%
Sooke Prov	19%	15%	15%	4%	22%	16%
Sooke	19%	15%	9%	17%	17%	14%
Region	13%	14%	17%	15%	10%	14%

Table I.2: Clearance Rates[1]

The Regional rates varied from 10% in 2004 to 17% in 2002. On average 14% of all regional residential break and enters were solved over the research period. These rates are consistent with those found in prior research where clearance rates vary from a low of 8% to a high of 30% (Burrows, 1986; Coupe & Griffiths, 1996; Maguire & Bennet, 1982; Simmons, 2002; Stockdale & Gresham, 1995). Sub Regional rates corresponded to prior research with averages of 14% in the Core, 21% in the Peninsula, 13% in West Shore and 14% in Sooke for the study period.

[1] In tables were Esquimalt is not present – the data has been collapsed into Victoria. Sooke District organized in 2002, originally reported as Sooke Provincial. Victoria includes Esquimalt clearance rate. West Shore Provincial includes Metchosin and Highlands.

I.4 Incidence of Residential Break And Enter

Offences are usually described in terms of the number of occurrences of a particular crime type. A raw number is used to determine the differences over time and between jurisdictions. This has limitations because it tells us very little about the underlying difference between jurisdictions. One way to overcome this deficiency is to create a ratio for the purpose of comparing crime over time and between other jurisdictions. One popular method is to use jurisdictional populations as the denominator in the ratio. Population data for all jurisdictions are generally reliable and easily accessible; therefore, they are frequently used.

I.5 Ratio of Population

The Population rate is calculated on the basis of number of residential burglaries per 1000 residents. Rates varied throughout the region with some municipalities having unexpectedly high rates during specific years. This was evident in West Shore, which had a regional rate of 6.1 in 2001and Sooke region with a rate of 8.5 in 2002. In both cases unusually high numbers of residential break and enter had occurred in one of the municipalities making up the sub region. In 2001, West Shore Provincial recorded 78 break and enters, 35% higher the next highest year and 38% higher than the average over the 5 year period. The newly formed Sooke Municipality recorded an unusually high number of residential burglaries, 71 in 2002. This number was 31% higher than the next highest year and 32% higher than the average number of burglaries for the municipality over the 5 years of data.

Rate Per 1,000 Population						
Jurisdiction	**2000**	**2001**	**2002**	**2003**	**2004**	Average
Victoria Mun	10.4	8.2	8.6	6.9	8.2	8.5
Saanich Mun	4.8	3.7	3.7	3.1	3.5	3.8
Oak Bay Mun	4.0	3.3	1.7	3.1	3.1	3.1
Core	7.0	5.5	5.6	4.6	5.4	5.7
Central Saanich Mun	1.6	1.1	1.1	1.2	1.8	1.3
North Saanich Mun	1.5	1.0	1.7	1.5	2.6	1.7
Sidney Mun	2.5	1.3	1.8	0.6	1.4	1.5
Sidney Prov	4.2	3.1	3.3	2.6	4.2	3.5
Peninsula	2.0	1.3	1.6	1.2	2.1	1.6
Colwood Mun	3.8	4.5	4.6	3.6	3.1	3.9
Langford Mun	5.4	6.0	7.0	4.9	5.1	5.7
View Royal Mun	5.9	6.5	4.4	3.5	4.1	4.9
West Shore Prov	4.1	8.7	4.3	4.0	5.4	5.3
West Shore	4.8	6.1	5.5	4.2	4.5	5.0
Sooke Mun1	---	---	7.7	4.5	4.6	5.6
Sooke Prov	2.8	1.9	10.3	7.4	4.7	5.4
Sooke	5.8	5.5	8.5	5.4	4.6	6.0
Region	6.0	4.6	5.7	4.0	4.8	5.0

Table I.3: Residential Break and Enter Rate per 1,000 Population[2]

Victoria/Esquimalt had the highest rates of residential burglar during the study period ranging from 6.9 in 2003 to 10.9 in 2004. The lowest overall rates were in Central Saanich with a low of 1.1 in 2002 and a high of 1.8 in 2004. On average, Victoria/Esquimalt had the highest rate of residential break ins with 9 per 1000 residents over the 5 year study period. This was 37% higher than the closest municipality. This data seem to support the concept that crime, in this case residential burglary, is higher in the older inner city residential areas near the central business district of a region.

However, Sooke Region had the highest rate of burglaries with 6 residential burglaries per 1000 residents. The next highest was the Core with 5.9 residential burglaries per 1000 residents. This is deceiving since Sooke's high rate is attributable to

[2] Population figures obtained from the Ministry of the Solicitor General – Police Services (They are supplied the data from Vital Statistics B.C). Break and Enter obtained from Police RMS. Esquimalt Population is included in the Victoria Base.

one extreme score recorded in 2002, discussed above. Removing the high score from the data leaves an average rate of 5.3 residential burglaries per 1000 residents. This is in line with recorded burglaries in other years. Removing this score from the mix leaves the Core with the highest rate of residential break and enter.

The average rate for the region over the study period was 5 burglaries per 1000 residents. There were five out of the 13 (38%) reporting entities that had break and enter rates higher than the regional rate. The majority of municipalities (8 or 72%) had rates below the regional average.

I.6 Ratio of Households

A more accurate method of determining the incidence of a criminal event is to examine the proportion of the offence against the offence target. Population is a reasonable surrogate in the absence of household stock in measuring rates of residential break and enters, but it is not the best method. Population is commonly used due to the difficulty in obtaining accurate housing stock data. An effort was made here to gather information on housing stock for the purpose of developing a more informative measure of incident rates. However, the process of matching police reporting and municipal household stock numbers was difficult. RCMP Provincial reporting entities include municipalities that have not reached populations of 5000 residents, both the Highlands and Metchosin fall into this category. First Nations reserves are also included in provincial reporting. It was not clear which reporting entities captured which First Nations reserves as data units. Therefore, West Shore Provincial and Sidney Provincial were dropped from this examination. Sooke Provincial was included since it did not appear to suffer from the same uncertainty. That left 11 municipal/reporting entities. For

the established municipalities with populations over 5000, a reasonable household incidence rate was attainable.

Another concern is how the household inventory was established. Most municipalities have a rough idea on the amount of residential units within their districts, based on census data, assessment rolls and building permits issued. However, there is no guarantee that the number is correct. Building may not be completed or census and assessment information may miss multiple dwelling units, i.e. basement suites. In many cases municipalities make projections based on several sources of information. The figures used in this analysis were obtained from the CRD. The totals for the years 2002 to 2004 are estimates based on the 2001 census. Caution should be exercised in quoting the figures presented below. They are presented here as an exploratory method to uncover patterns of residential burglary.

Residential break and enter rates were established using the number of break and enters per 1000 residences. Langford and View Royal surpassed Victoria with the highest average rate for the study period, 15 break and enters per 1000 households. Even when the extreme municipal rates are removed, Langford and View Royal on average are higher than any other municipality. Victoria/Esquimalt had the second highest average rates with 14 burglaries per 1000 households. Sidney had the lowest average rate in the CRD.

The Peninsula had a substantially lower rate of offences than any other Sub Region with only 3 residential burglaries per 1000 households. West Shore had the highest rate among the Sub Regions at 12 burglaries per 1000 households. The Core and

Sooke were right behind West Shore with 11 residential break and enters per 1000 households.

Examining break and enter rate per 1000 household versus per 1000 population View Royal emerges as an area of concern. View Royal had a four year average rate (13:1000) well in excess of the Regional four year average rate of 10:1000. Sooke district, Langford and Victoria were the remaining municipalities with 4 year average rates higher than the Regional equivalent.

Table I.5 shows percent change in incidence. Table I.5 may indicate there has been an increase or decrease, while Table I.4 shows no corresponding change. The difference is due to the rounding method used in Table I.4. There are also some of the extreme percentages due to the low number incidences in the comparison. Sidney for example, had an increase of approximately 2 break and enters, yet in terms of percent change it amounted to a 120% increase.

Burgalry Rate Per 1000 Households					
Municipality	**2001**	**2002**	**2003**	**2004**	Average
Oak Bay	8	4	7	7	6
Saanich	9	9	7	8	9
Victoria	15	16	12	15	14
Core Rate	12	12	10	11	11
Central Saanich	3	3	3	5	3
North Saanich	3	4	4	6	4
Sidney	3	4	1	3	3
Pennisula Rate	3	4	3	5	4
Colwood	13	13	10	8	11
Langford	16	18	13	13	15
View Royal	16	18	13	13	15
West Shore	18	15	11	12	14
Sooke District		18	11	11	13
Sooke Prov	4	6	9	8	7
Sooke	11	16	10	9	11
Total	11	11	9	10	10

Table I.4: Residential Break and Enter Incidence Rate per 1000 households[3]

Examining the incidence percent change shows break and enter in 2004 is on the increase in eight of the 11 municipalities examined. This is in contrast to 2003 where burglary increased in only 3 municipalities.

[3] Information on residential stock was gathered from the CRD Regional Planning Services website at http://www.crd.bc.ca/. Housing counts for 2002 to 2004 are estimates based on the 2001 census.
Esquimalt contracted Victoria to provide Police services in 2003. The two data sets were combined for the study period.
In 2001 Sooke was included in Sooke Prov. In 2002 Sooke District separated from Sooke Prov.
Sooke Prov. Includes: Juan de Fuca E.A. and First Nation reservations housing stock count. Other areas fall within Sooke Prov. which is not used in calculating the rate, therefore, caution should be used in quoting this figure.
The highlands and Metchosin were excluded.
West Shore: includes all West Shore municipalities and unorganized territories – Excludes First Nations Reserves.

Percent Change			
Municipality	2002	2003	2004
Oak Bay	-50%	78%	-1%
Saanich	-4%	-17%	15%
Victoria	1%	-21%	19%
Core Rate	-3%	-17%	16%
Central Saanich	-10%	11%	52%
North Saanich	65%	-11%	69%
Sidney	34%	-67%	120%
Peninsula Rate	21%	-25%	68%
Colwood	-1%	-23%	-15%
Langford	13%	-31%	4%
View Royal	13%	-31%	4%
West Shore	-14%	-24%	6%
Sooke District		-41%	4%
Sooke Prov	62%	52%	-9%
Sooke		-37%	-13%
Total	1%	-19%	17%

Table I.5: Residential Break and Enter Incidence Rate Percent change

I.7 Prevalence of Break and Enter

To examine prevalence and concentration, residential break and enters were broken down by year, for a period of four years from 2001 to 2004. The data from the RCMP is aggregated to the detachment level, therefore, break and enters in the Highlands, Metchosin, Colwood, Langford, and View Royal municipalities were aggregated up to the sub regional level, West Shore. Langford, Colwood and View Royal all had high incidences of burglary, therefore, they were separated out of West Shore for comparison to Core municipalities. The Sooke data are aggregated and reported as one entity, Sooke. Residential burglaries in Sidney and North Saanich were combined.

Break and enters in this part of the examination consist of only geo-coded events, thus reducing the numbers of incidences from those reported above (See Chapter 5 – Geo Coding - for discussion number of events geo-coded).

When we examine prevalence, it is clear that the vast majority of households in the region do not suffer victimizations. In all of the jurisdictions, between 2001 and 2004, 98% or more of the households were not burglarized. This is somewhat higher than in the research conducted by Townsley et al. (2000) and Polvi et al. (1990) where they found 92% and 96% of the households respectively were not victimized. This does not undermine the notion that burglary is a serious problem throughout the region. What it does point out is that victimizations occur at a minority of locations in any one year while the preponderance of residences remains untouched.

As we have seen above break and enter is limited in Central Saanich. More than 99% of the houses (population at risk) were not victimized in any of the four years. In fact, 0.36 percent or less of all households were a victim of a break and enter in each of the four years (Table I.6). The incidence of burglary is low with less than a 5 in 1000 residences victimized in each of the four years examined. This is extremely low compared to previous studies and probably reflects the rural nature of the area compared to most studies, which examine crime in cities.

The incidence of break and enter is low in both Sidney and North Saanich. In terms of prevalence, similar results were found, where in excess of 99% of all residences were not victimized in the each of the four years studied. In essence less than 0.4%, on average 0.28% of the population at risk were victimized.

Municipality	Prevalence of Break and Enter				Average
	2001	2002	2003	2004	Average
Saanich	0.75%	0.59%	0.76%	0.81%	0.73%
Victoria	1.10%	0.85%	1.24%	1.15%	1.09%
Oak Bay	0.57%	0.62%	0.37%	0.72%	0.57%
Core	0.81%	0.69%	0.79%	0.89%	0.79%
Sidney/N. Saa	0.36%	0.20%	0.34%	0.23%	0.28%
Central Saa	0.36%	0.22%	0.20%	0.26%	0.26%
Peninsula	0.36%	0.21%	0.27%	0.25%	0.27%
Colwood	1.11%	1.08%	0.79%	0.61%	0.90%
Langford	1.32%	1.50%	0.91%	1.07%	1.20%
View Royal	1.14%	0.84%	0.65%	0.24%	0.71%
West Shore	1.19%	1.14%	0.78%	0.64%	0.94%
Sooke	0.56%	0.63%	1.04%	0.69%	0.73%

Table I.6: Prevalence of break and enter in the Region

In Saanich the break and enter incidence rate has not change much over the four years, ranging from 7:1000 to 9:1000. As we discovered above, 99% of homes do not suffer victimization. The actual rate of prevalence is higher, but only slightly than the municipalities on the Peninsula, on average 0.73%, in other words, less than one percent of homes in Saanich suffered victimization in each of the four years.

As in the previous results, break and enter in Oak Bay affects very few houses within the municipality, more than 99% of households are not victimized. The rate of prevalence ranged from 0.37 to 0.72% for an average rate of 0.57% over the four year period. This rate is higher than the peninsula but lower than Saanich.

Victoria led the Core municipalities in the percentage of victimization amongst the population at risk. Victoria, with one of the highest incidence rates, had prevalence rates vary from a low of 0.85 to a high of 1.24% of households victimized for an average rate of 1.09% over the four years. This was approximately 25% higher than Saanich and double the rate encountered in Oak Bay.

Sooke's rate of prevalence varied from a low of 0.56 (2001) to a high of 1.04% (2003). Over the four year period, Sooke had an average rate of 0.73%. The combined average rate of prevalence for the Core municipalities was 0.79%.

Langford had the highest percentage with an average of 1.20 % of its population at risk suffering a break and enter. Although, Colwood had a lower incidence rate than View Royal its prevalence rate was higher 0.90% compared to 0.71%.

In terms of the regional differences, West Shore had the highest average rate of prevalence at 0.94% (Table I.6). The Core followed with an average rate of 0.79%. The peninsula has a very low average rate of .27%. Table I.7 shows that on average the prevalence of burglary has declined between 2001 and 2004 in all jurisdictions excluding those in the Core and Sooke.

Annual Percent change Prevalence				
	2002	2003	2004	Average
Saanich	-21%	28%	7%	4%
Victoria	-23%	46%	-7%	5%
Oak Bay	8%	-40%	95%	21%
Core	-15%	15%	13%	4%
Sidney/N. Saa	-45%	72%	-32%	-2%
Central Saa	-39%	-6%	29%	-5%
Peninsula	-42%	31%	-9%	-7%
Colwood	-2%	-27%	-23%	-17%
Langford	14%	-40%	18%	-3%
View Royal	-26%	-23%	-64%	-38%
West Shore	-4%	-31%	-19%	-18%
Sooke	12%	66%	-34%	15%

Table I.7: Annual Percent Change in Prevalence

I.8 Concentration of Break and Enter Within the Population (Repeat Victimization)

Concentration explores the number of crimes per victim within a study area. There is an abundance of evidence that points to a concentration of events within a small proportion of the population at risk. Spelman (1995) discovered that crime is often concentrated in a limited number locations with repeated incidences (re-victimizations). Ellingworth et al. (1995: p. 365), in their review of the British Crime survey, note "All ways of looking at the data confirm the notion that crime victimization is heavily concentrated on a small proportion of victims, and a smaller proportion of the population." Exploring concentration provides a further context in understanding patterns of offending within the CRD.

The current examination reviewed residential burglary on an annual basis. Bennet and Durie (1999) found that reviewing burglaries within a specific time context, for example yearly intervals, can mask incidences of re-victimization. Events occurring early in the year have a greater chance of being re-victimized in that year than ones victimized later in the year. This point was taken into consideration, but the focus of this research is not repeat victimization; instead this segment of the examination is intended to add a further dimension by uncovering patterns of burglary concentrations. A further note, it is suspected that the amount of repeat victimization is probably underestimated in the current discussion.

Table I.8 shows Victoria had the highest average concentration rate of burglary with a rate of 1.18. Sooke and Langford were next with rates of 1.13 and 1.10 respectively. In I.9 we see that concentration declined between 2001 and 2004 in the

Municipality	Concentration of Break and Enter				Average
	2001	2002	2003	2004	
Saanich	1.06	1.07	1.07	1.05	1.06
Victoria	1.19	1.21	1.17	1.13	1.18
Oak Bay	1.02	1.03	1.04	1.00	1.02
Core	1.09	1.10	1.09	1.06	1.09
Sidney/N. Saa	1.05	1.03	1.00	1.00	1.02
Central Saa	1.06	1.08	1.00	1.00	1.03
Peninsula	1.05	1.05	1.00	1.00	1.03
Colwood	1.11	1.04	1.07	1.12	1.08
Langford	1.06	1.09	1.21	1.03	1.10
View Royal	1.08	1.04	1.00	1.11	1.06
West Shore	1.09	1.05	1.09	1.09	1.08
Sooke	1.11	1.08	1.22	1.10	1.13

Table I.8: Concentration of break and enter in the CRD

Core and the Peninsula, but had a small increase in West Shore and Sooke. Colwood, View Royal and Sooke all showed average increases over the period.

Annual Change Concentration				
	2002	2003	2004	Average
Saanich	0.01	0.00	-0.02	0.00
Victoria	0.02	-0.03	-0.04	-0.02
Oak Bay	0.01	0.01	-0.04	-0.01
Core	0.01	-0.01	-0.03	-0.01
Sidney/N. Saa	-0.02	-0.03	0.00	-0.01
Central Saa	0.01	-0.07	0.00	-0.02
Peninsula	0.00	-0.05	0.00	-0.02
Colwood	-0.07	0.03	0.05	0.00
Langford	0.02	0.11	-0.15	0.00
View Royal	-0.04	-0.03	0.11	0.01
West Shore	-0.03	0.04	-0.01	0.00
Sooke	-0.02	0.13	-0.10	0.00

Table I.9: Annual Change in Concentration

Examining Table I.7 and I.9 provides evidence of contrasting patterns across the region. First, the prevalence of burglary is declining in two of the four sub regions, the exception is the Core municipalities and Sooke (Table I.7). This means that on average

over the three year period one time victims increased in the three Core municipalities and in Sooke. On the other hand, the two other sub regions, West Shore and the Peninsula, showed an average decline in prevalence. Second, the Core and Peninsula municipalities have witnessed a decline in the concentration of residential break and enter, while West Shore and Sooke have witnesses an increase over the same period (Table I.9). On average Colwood and View royal showed an increase in concentration of break and enters, while Langford had a decline. The decline in Langford was not strong enough to influence the overall increase within the sub region. Third, Sooke suffered both an increase in one time victimizations and an increase in the concentration of burglaries. There are obvious differences in how victimization operates within the region. Finally, the municipalities on the peninsula witnessed a reduction in both prevalence and the concentration of break and enter. This examination provides an interesting perspective on the types of burglary patterns that exist in the region.

Central Saanich

There are only two years, 2002 and 2001, where break and enter is concentrated at the same address (Table I.10). Central Saanich had an average concentration rate of 1.035 (Table I.8) which was the lowest over the four year period. On both occasions a single residence was targeted twice. Although small, this represented 6 (2001) and 8% (2002) of the residences burgled and 14 and 12% of the break and enters in each year respectively. The chance of being a victim a second time was 40 (2002) and 30 (2001) times greater than being a victim once. These figures are far greater than those reported in prior research (Polvi, Looman et al., 1990; Townsley, Homel et al., 2000), however, the numbers are so low that the risk may be exaggerated. Furthermore, Townsley et al (2000:

45)found that the initial chance of victimization was 0.07 and re-victimization was 0.1633, both these figures are much higher than those found in Central Saanich, which had rates 0.002 (2001 and 2002) for initial victimization and 0.06 (2001) and 0.08 (2002) for re-victimization.

The rural nature, limited population, and low housing stock of Central Saanich may explain the low incidence of burglary. The results of this analysis should be used with caution because of the very limited number of events, compounded by the reduced number after geo-coding. Furthermore, the concentration of burglary at addresses is not evident in 2003 and 2004.

Central Saanich	Times Victimized	Estimated number of residential properties	Per cent of residential properties	Percent of victimized addresses	Number of crimes	Per cent of crimes
2004	0	6410	99.64%	0	0	0
	1	23	0.36%	100%	23	100%
Total		6433	100.00%	100%	23	100%
2003	0	6392	99.78%	0	0	0
	1	14	0.22%	100%	14	100%
Total		6406	100.00%	100%	14	100%
2002	0	6338	99.80%	0	0	0
	1	12	0.19%	92%	12	86%
	2	1	0.02%	8%	2	14%
Total		6351	100.00%	100%	14	100%
2001	0	6031	99.7%	0	0	0
	1	15	0.2%	93.8%	15	88%
	2	1	0.02%	6.3%	2	12%
Total		6047	100%	100.00%	17	100%

Table I.10: Concentration of break and enter in Central Saanich

Sidney - North Saanich

Similar results were found in Sidney – North Saanich, where both the incidence and prevalence of residential burglary is very low.

Sidney North Saanich	Times Victimized	Estimated number of residential properties	Per cent of residential properties	Percent of victimized addresses	Number of crimes	Per cent of crimes
2004	0	10343	99.64%	0	0	0
	1	37	0.36%	100%	37	100%
Total		10380	100.00%	100%	37	100%
2003	0	10094	99.80%	0	0	0
	1	20	0.198%	100%	20	100%
Total		10114	100.00%	100%	20	100%
2002	0	9965	99.66%	0	0	0
	1	33	0.33%	97%	33	94%
	2	1	0.01%	3%	2	6%
Total		9999	100.00%	100%	35	100%
2001	0	9535	99.8%	0	0	0
	1	21	0.2%	95.5%	21	91%
	2	1	0.01%	4.5%	2	9%
Total		9557	100%	100.00%	23	100%

Table I.11: Concentration of break and enter in Sidney - North Saanich

In 2001 and 2002 there are two cases, one in each year, where a home was victimized more than once (Table I.11). The municipalities had a combined average concentration rate of 1.019, the second lowest rate in the region (Table I.8). Re-victimization accounted for 9 and 6% of the burglaries and 4.5 and 3% of the houses burglarized in 2001 and 2002 respectively. In every year, less than one percent of the residences suffered a break and enter. The chance of re-victimization 2001 and 2002 was approximately 20 and 10 times higher respectively. This is smaller than Central Saanich, but it is still much higher than found in previous research (Townsley, Homel et al., 2000).

The evidence shows that notion of concentration of breaks and enters is relatively rare in both these municipalities. This could be expected since the number of houses, the size of the population and the incidence of burglary are very low. Sidney - North Saanich are located at the tip of the peninsula at the opposite end of the region from Victoria. North Saanich is a predominately a rural municipality. However, Sidney is a small town which acts as the business/shopping centre for both municipalities.

Saanich

In Saanich, repeat victimization is more common than in the Peninsula (Table I.9). In each year Saanich experiences varying degrees of repeat offences. When re-victimization occurs the chance is not near as high as Central Saanich and Sidney – N. Saanich experienced in 2001 and 2002. The chance of re-victimization in Saanich is between 4 to 6 times greater than being a victim once. Burglary is concentrated at an average rate of 1.063 (Table I.8). In the four years examined, on average 11% or 37 break and enters per year where attributable to repeat victimizations. Approximately, 5% of the victimized addresses resulted from being a victim more than once in each of the four years.

Saanich	Times Victimized	Estimated number of residential properties	Per cent of residential properties	Percent of victimized addresses	Number of crimes	Per cent of crimes
2004	0	45473	99.25%	0	0	0
	1	327	0.71%	95%	327	90%
	2	18	0.04%	5%	36	10%
Total		45818	100.00%	100%	363	100%
2003	0	45183	99.41%	0		
	1	254	0.559%	94%	254	88%
	2	11	0.024%	4%	22	8%
	3	4	0.009%	1.5%	12	4%
	4	0	0.000%	0%	0	0%
Total		45452	100.00%	100%	288	100%
2002	0	44523	99.24%	0	0	0
	1	320	0.71%	94%	320	88%
	2	15	0.03%	4%	30	8%
	3	4	0.01%	1%	12	3%
Total		44862	100.00%	100%	362	100%
2001	0	42559	99.2%	0	0	
	1	332	0.8%	96.0%	332	90%
	2	11	0.03%	3.2%	22	6%
	3	1	0.002%	0.3%	3	1%
	4	1	0.002%	0.3%	4	1%
	5	0	0.000%	0.0%	0	0%
	6	1	0.002%	0.3%	6	2%
Total		42905	100%	100.00%	367	100%

Table I.12: Concentration of break and enter in Saanich

Oak Bay

Oak Bay suffered a repeat victimization in three of the four years (Table I.13). In 2001 and 2002 one house in each year was targeted twice and in 2003 two houses were targeted two times. However, Oak Bay's average concentration rate was low at 1.022 (Table I.8). Repeat burglaries accounted for 3, 6 and 7% of the total break and enter for years 2001, 2002, 2003 and made up 2, 3, and 4% of the total number of victimized residences respectively. The chance of re-victimization was 3, 7 and 4 times greater than a single victimization in 2001, 2002 and 2003 respectively. The concentration of burglary is low as in Central Saanich and Sidney – North Saanich.

Oak Bay	Times Victimized	Estimated number of residential properties	Per cent of residential properties	Percent of victimized addresses	Number of crimes	Per cent of crimes
2004	0	8485	99.43%	0	0	0
	1	49	0.57%	100%	49	100%
Total		8534	100.00%	100%	49	100%
2003	0	8362	99.38%	0	0	0
	1	50	0.594%	96%	50	93%
	2	2	0.024%	4%	4	7%
Total		8414	100.00%	100%	54	100%
2002	0	8376	99.63%	0	0	0
	1	30	0.36%	97%	30	94%
	2	1	0.01%	3%	2	6%
Total		8407	100.00%	3%	32	100%
2001	0	8026	99.3%	0	0	0
	1	57	0.7%	98.3%	57	97%
	2	1	0.01%	1.7%	2	3%
Total		8084	100%	100%	59	100%

Table I.13: Concentration of break and enter in Oak Bay

Victoria

Victoria had the highest incidence, the highest rates of prevalence and suffers many more re-victimizations than other areas within the region (Table I.14). In the four years examined, between 20 (2004) and 31% (2002) of break and enters resulted from re-victimizations. This means that 133 (2004) to 246 (2002) burglaries were attributed to residences targeted more than once. Victoria had the highest average concentration rate throughout the region at 1.177 (Table I.8). The chance of re-victimization in Victoria was 12 time greater in 2001, 17 times greater in 2002, 13 times greater in 2003 and 10 times greater in 2004 than being a victim only once in each of the four years.

Victoria	Times Victimized	Estimated number of residential properties	Per cent of residential properties	Percent of victimized addresses	Number of crimes	Per cent of crimes
2004	0	52678	98.90%	0	0	0
	1	532	1.00%	91%	532	80%
	2	41	0.08%	7%	82	12%
	3	9	0.02%	2%	27	4%
	4	2	0.004%	0.3%	8	1%
	5	2	0.004%	0.3%	10	2%
	6	1	0.002%	0.2%	6	1%
Total		53265	100.00%	100%	665	92%
2003	0	52249	99.15%	0	0	0
	1	389	0.738%	87%	389	74%
	2	46	0.087%	10%	92	17%
	3	10	0.019%	2.2%	30	6%
	4	1	0.002%	0%	4	1%
	5	1	0.002%	0.2%	5	1%
	6	1	0.002%	0.2%	6	1%
Total		52697	100.00%	100%	526	100%
2002	0	51833	98.76%	0	0	0
	1	542	1.03%	83%	542	69%
	2	90	0.17%	14%	180	23%
	3	13	0.02%	2%	39	5%
	4	4	0.01%	1%	16	2%
	5	1	0.00%	0%	5	1%
	6	1	0.00%	0%	6	1%
Total		52484	100.00%	100%	788	100%
2001	0	49630	98.8%	0	0	0
	1	507	1.0%	87.6%	507	74%
	2	49	0.10%	8.5%	98	14%
	3	13	0.026%	2.2%	39	6%
	4	7	0.014%	1.2%	28	4%
	5	2	0.004%	0.3%	10	1%
	6	0	0.000%	0.0%	0	0%
	7	1	0.002%	0.2%	7	1%
Total		50209	100%	100.00%	689	100%

Table I.14: Concentration of break and enter in Victoria

The percentage of burglarized homes suffering a repeat occurrence ranged from 9, 13, 17 and 12 % in 2001, 2002, 2003 and 2004 respectively. Yet, the majority of residences, in excess of 98%, remain victimless in each of the four years examined.

West Shore

In each year examined, West Shore had a number of cases of repeat victimization (Table I.15). There were 14 (33), 11 (27), 18 (31) and 10% (17) of the break and enters concentrated in approximately 7, 6, 9, and 5% of the burglarized residences for the years 2001, 2002, 2003 and 2004 respectively. Langford had an average concentration rate of 1.099 the highest for the area. Colwood had the second highest average rate at 1.084, with View Royal following at 1.059. The sub region had an average concentration rate of 1.079 for the four year study (Table I.8). The chance of being broken into more than once ranged from 7 times greater in 2001, 6 times greater in 2002, 9 times greater in 2003 and 5 times greater in 2004. Overall, the number of residences suffering a break and enter in each of the years was less than 2%.

West Shore	Times Victimized	Estimated number of residential properties	Per cent of residential properties	Percent of victimized addresses	Number of crimes	Per cent of crimes
2004	0	19377	99.19%	0	0	0
	1	151	0.77%	95%	151	90%
	2	7	0.04%	4%	14	8%
	3	1	0.01%	1%	3	2%
Total		19536	100.00%	100%	168	100%
2003	0	18915	99.21%	0	0	0
	1	137	0.72%	91%	137	82%
	2	9	0.05%	6%	18	11%
	3	3	0.02%	2.0%	9	5%
	4	1	0.01%	1%	4	2%
Total		19065	100.00%	100%	168	100%
2002	0	18433	98.80%	0	0	0
	1	210	1.13%	94%	210	89%
	2	12	0.06%	5.4%	24	10%
	3	1	0.01%	0.4%	3	1%
Total		18656	100.00%	100%	237	100%
2001	0	17488	98.7%	0	0	0
	1	207	1.17%	92.8%	207	86%
	2	15	0.08%	6.7%	30	13%
	3	1	0.01%	0.4%	3	1%
Total		17711	100%	100.00%	240	100%

Table I.15: Concentration of break and enter in West Shore

Sooke

In the four years studied Sooke had a number of locations which were burglarized 2 or more times in each year. Of the houses broken into 8 (2001), 5 (2002), 16 (2003) and 10% (2004) of the homes were targeted on more than one occasion. The total number of burglaries resulting from repeat victimization were 9 (18%), 10 (10%), 17 (31%), 8 (18%) from 2001 through 2004. Sooke's average concentration rate was 1.127, the second highest in the region (Table I.8). The chance of being a victim of a second time in Sooke was 9 times greater in 2001, 5 times greater in 2002, 16 times greater in 2003 and

10 times greater in 2004. However, as in previous jurisdictions, the majority of residences 99% were not targeted in any of the four years examined.

Sooke	Times Victimized	Estimated number of residential properties	Per cent of residential properties	Percent of victimized addresses	Number of crimes	Per cent of crimes
2004	0	7328	99.44%	0	0	0
	1	37	0.50%	90%	37	82%
	2	4	0.05%	10%	8	18%
Total		7369	100.00%	100%	45	100%
2003	0	7150	99.37%	0	0	0
	1	38	0.528%	84%	38	69%
	2	5	0.069%	11%	10	18%
	3	1	0.014%	2.2%	3	5%
	4	1	0.014%	2%	4	7%
Total		7195	100.00%	100%	55	100%
2002	0	7037	98.96%	0	0	0
	1	70	0.98%	95%	70	88%
	2	3	0.04%	4%	6	8%
	3	0	0.00%	0%	0	0%
	4	1	0.01%	1%	4	5%
Total		7111	100.00%	100%	80	100%
2001	0	6663	99.3%	0	0	0
	1	42	0.6%	91.3%	42	82%
	2	3	0.04%	6.5%	6	12%
	3	1	0.015%	2.2%	3	6%
Total		6709	100%	100.00%	51	100%

Table I.16: Concentration of break and enter in Sooke.

Appendix II: Spatial Analysis Municipal Offence Patterns by Municipality

IL.1 Bandwidth Variation

Sidney – North Saanich

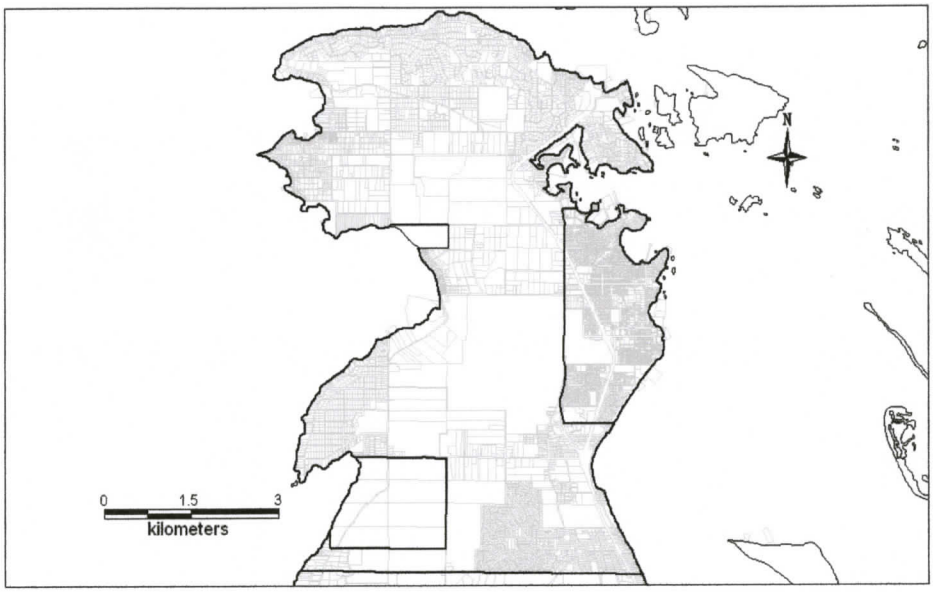


Figure II.1: Sidney – North Saanich lot boundaries.

The Sidney North Saanich RCMP detachment recorded 58 burglaries[1] in 2004, 37 were geo-coded. This RCMP detachment provides police services for Sidney – North Saanich. Looking at the point pattern (Figure II.2) it is evident that the majority of offences are committed on the east side of region, in or near the Town of Sydney. In a situation where there are a limited number of points, it is easier to notice patterns. Yet, caution must be exercised when visually examining point patterns, a single point may represent multiple incidents. Patterns are less clear when the prevalence of offences increases.

[1] All Break and Enter point data was obtained from Police Record Management Systems (RMS)

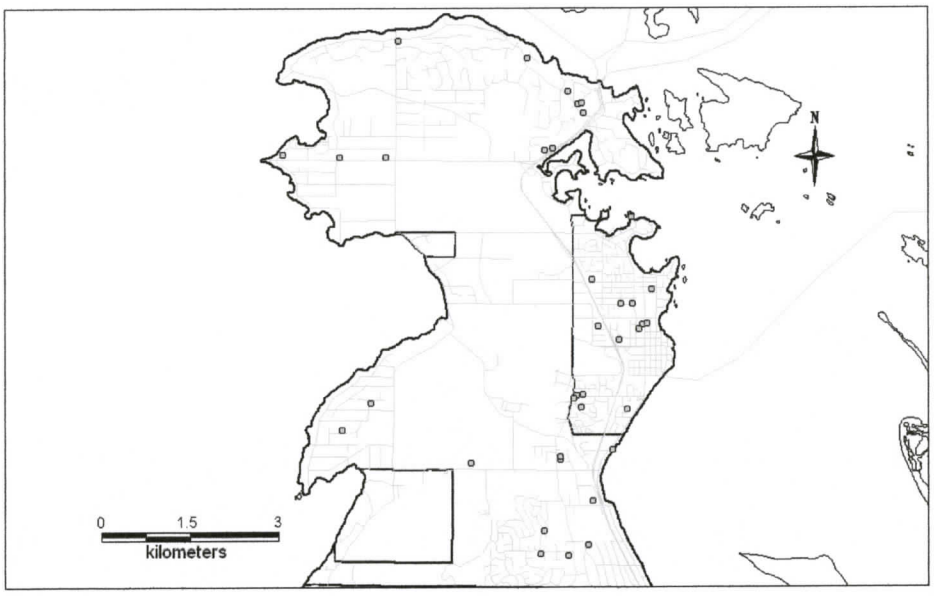


Figure II.2: Sidney – North Saanich 2004 Break and Enters with the road network.

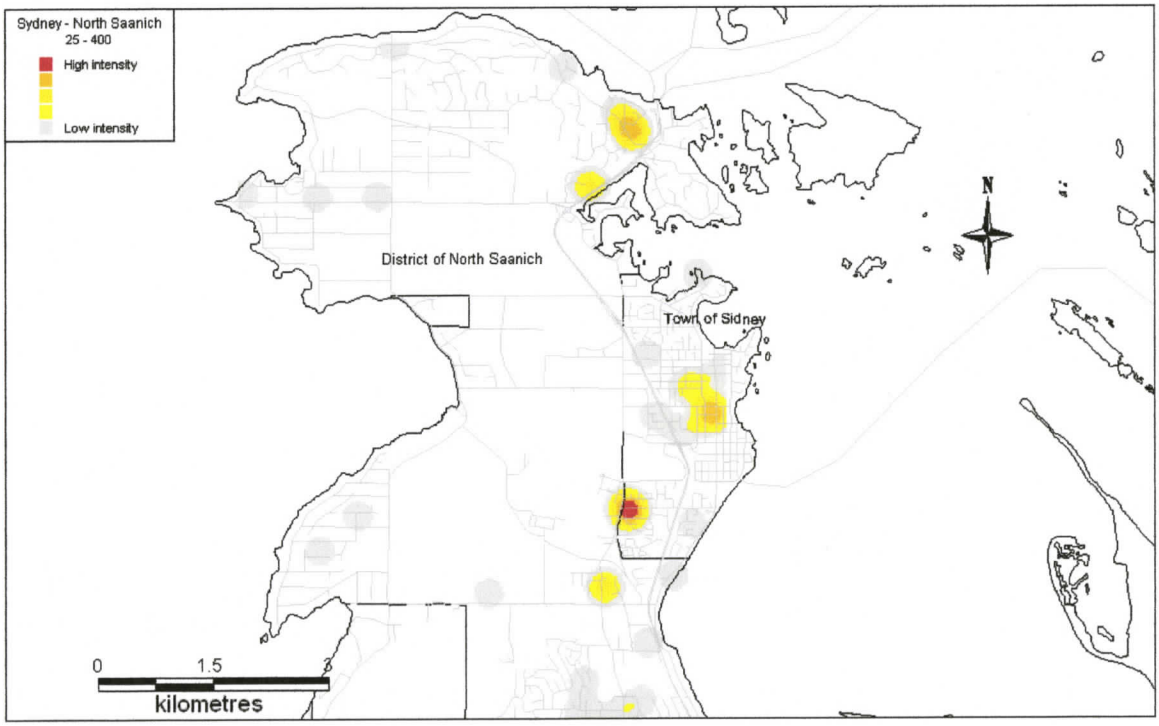


Figure II.3: Break and Enter Hot Spots Sidney – North Saanich 2004 (25m2 cell – 400m bandwidth).

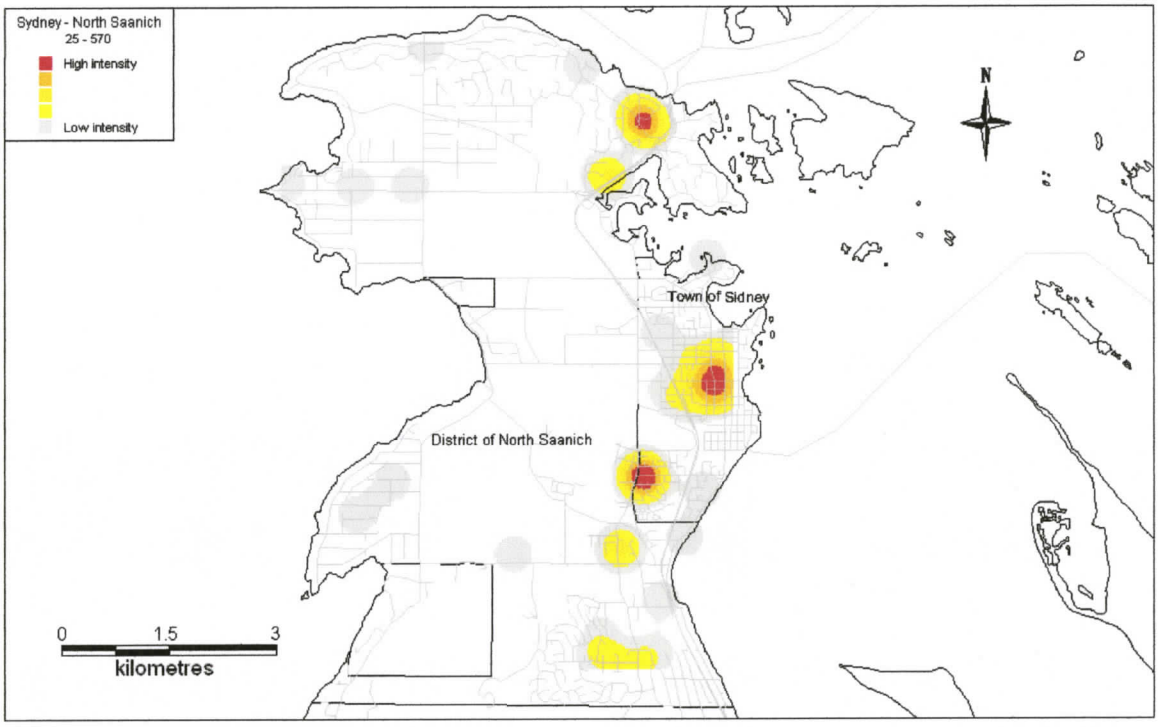


Figure II.4: Break and Enter Hot Spots Sidney – North Saanich 2004 (25m2 cell – 570m bandwidth.

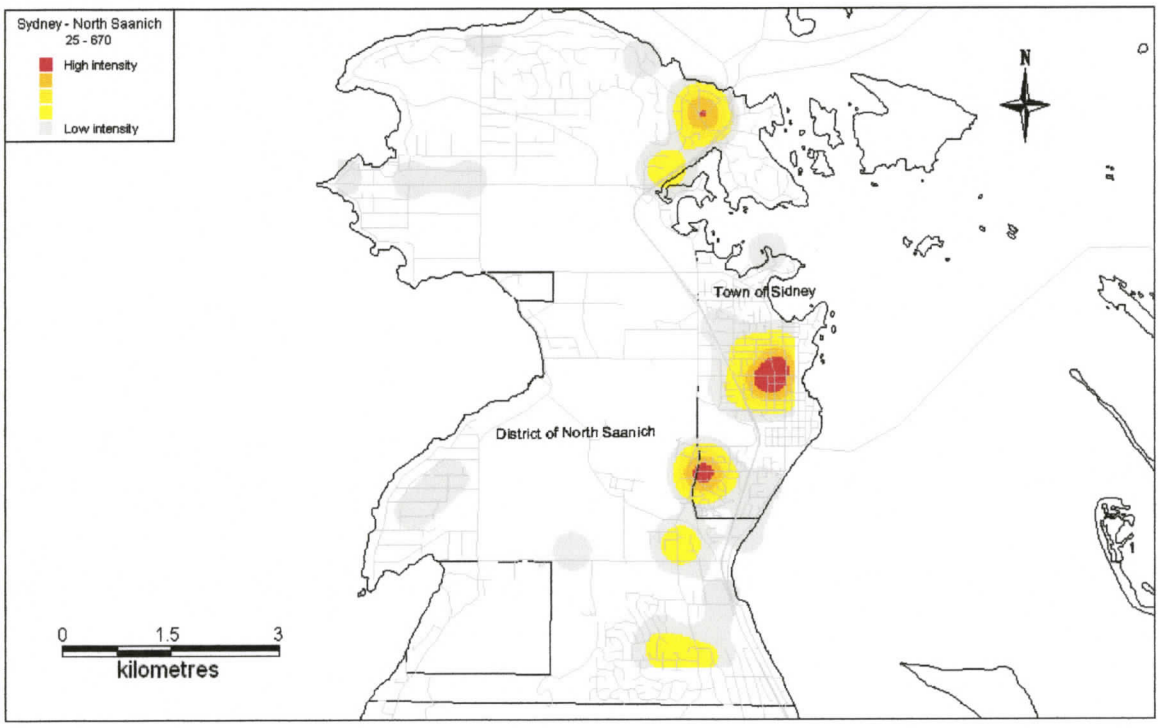


Figure II.5: Break and Enter Hot Spots Sidney – North Saanich 2004 (25m2 cell – 670m bandwidth).

The average radius of the police hot spots perceptions was 570 metres. Three hot spots emerged, which were evident at all three bandwidths. One pattern is apparent in the north-east area of North Saanich and the other two are situated in the Town of Sydney. As the bandwidth increases from 400m (Figure: II.3) to 570m (Figure: II.4) the hot spot in North Saanich and the one in the centre of Sidney become more intense. The intensity of the North Saanich hot spot tends to smooth out as the bandwidth increases to 670m (Figure: II.5). When there is a dense point pattern larger bandwidths will tend to smooth out the detail.

What is striking about the patterns is the lack of activity on the west side and north end of North Saanich. Offence patterns clearly are not evenly distributed throughout Sidney – North Saanich municipalities. Although the west side is less densely populated, there are a number of high value targets available within the area.

Crime tends to focus in or near the central business district and contiguous urban areas declining as one moves farther from the city core (Davidson, 1981). Sidney provides a number of services to residents living on the peninsula. It is considered "…the primary business anchor for the peninsula"[2]. This may provide an explanation why there is a concentration of activity in Sidney.

Central Saanich

Central Saanich Municipal Police recorded 29 break and enters in 2004, 23 were geo-coded. A quick inspection of the lot boundaries shows a concentration of housing in two areas. One is in the centre of the municipality in a northwest/southeast orientation. The other is located in the centre - west side of the municipality. Inspection of the point

[2] Quote was obtained from the Township's website. - www.sidney.ca/Town_of_Sidney.htm

data indicates that the most residential burglaries are concentrated in both these settlement areas.

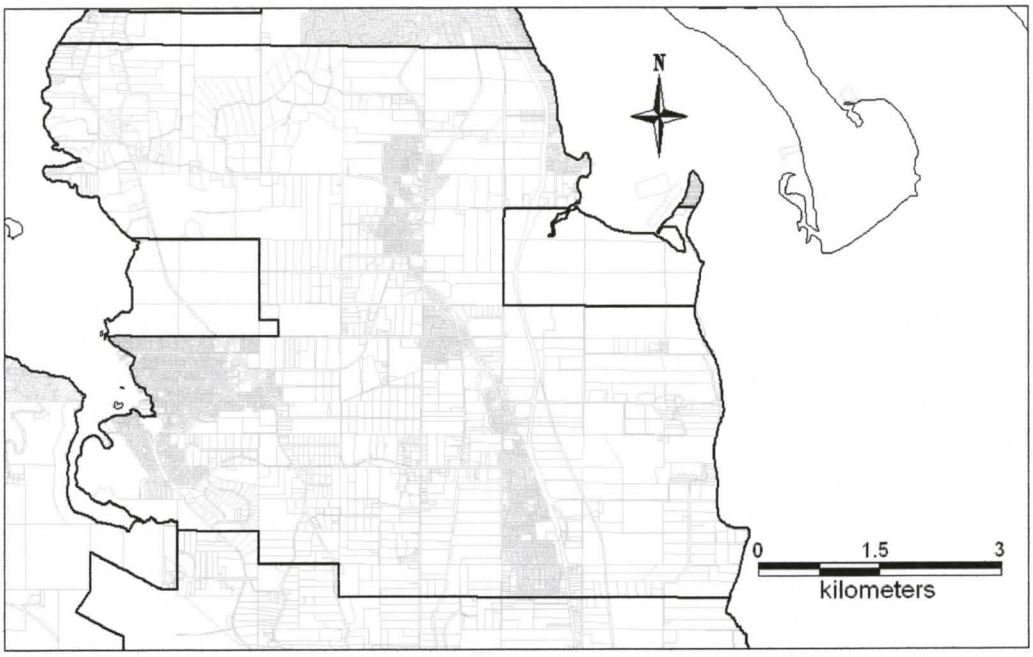


Figure II.6: Central Saanich Lot Boundaries.

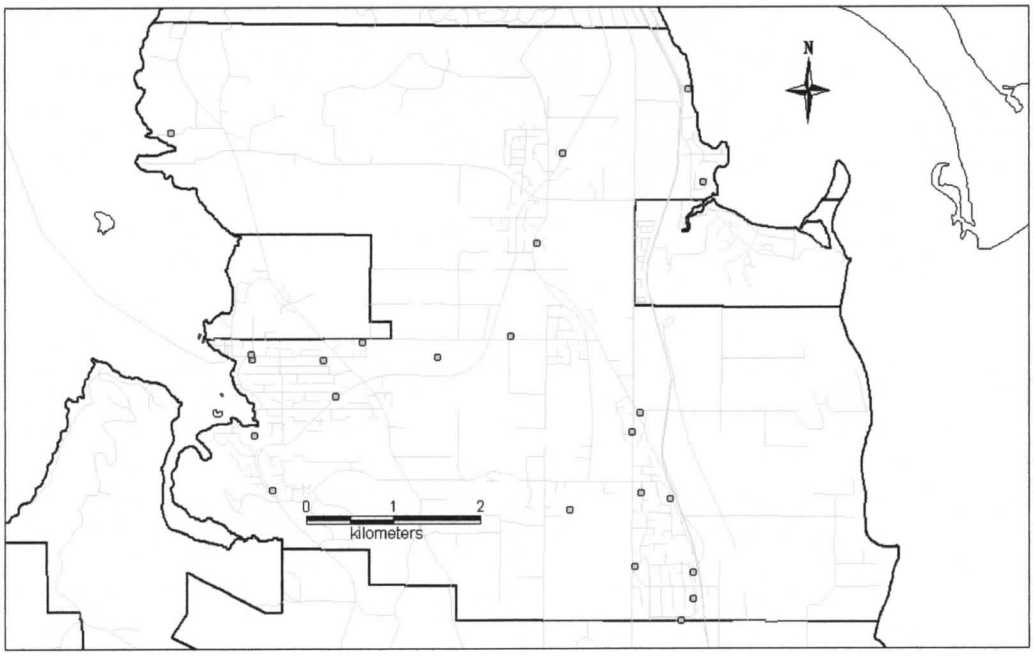


Figure II.7: Central Saanich 2004 Break and Enters with the road network.

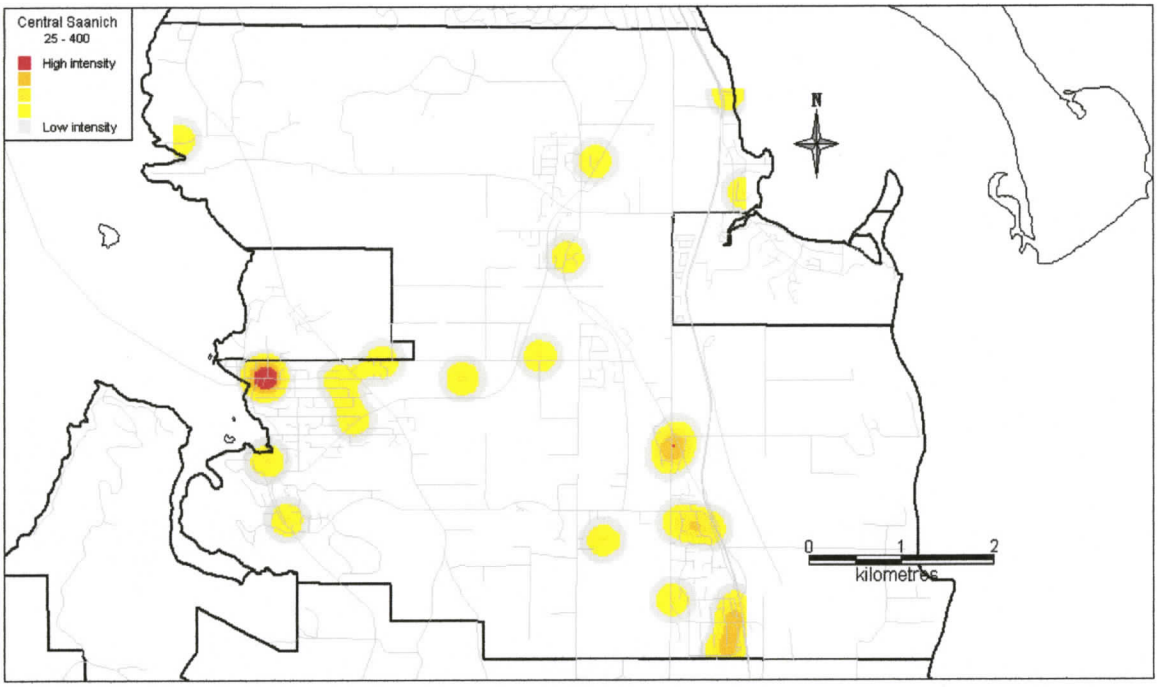


Figure II.8: Break and Enter Hot Spots Central Saanich 2004 (25m2 cell – 400m bandwidth).

An average radius of 500 metres was obtained from the subjects in the Central Saanich police sample. At a bandwidth of 400m (Figure: II.8) one hot spot is evident in the centre west area. There are three other hot spots developing in the southeast portion of the municipality. At 500m (Figure: II.9) two of the developing hot spots located in the southeast turn into hot spots, creating three hot spots. Two other hot spots are materializing, one in the centre west and one in the southeast. At 670m (Figure: II.10) one hot spot has disappeared and the other two have declined in intensity.

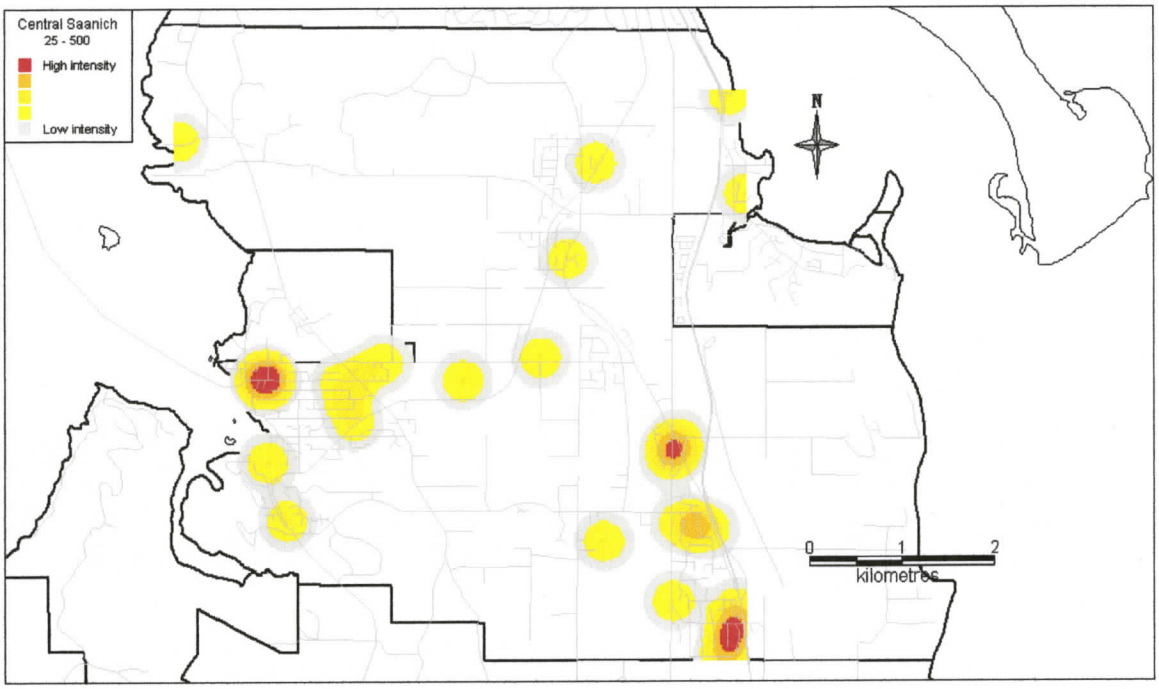


Figure II.9: Break and Enter Hot Spots Central Saanich 2004 (25m2 cell – 500m bandwidth).

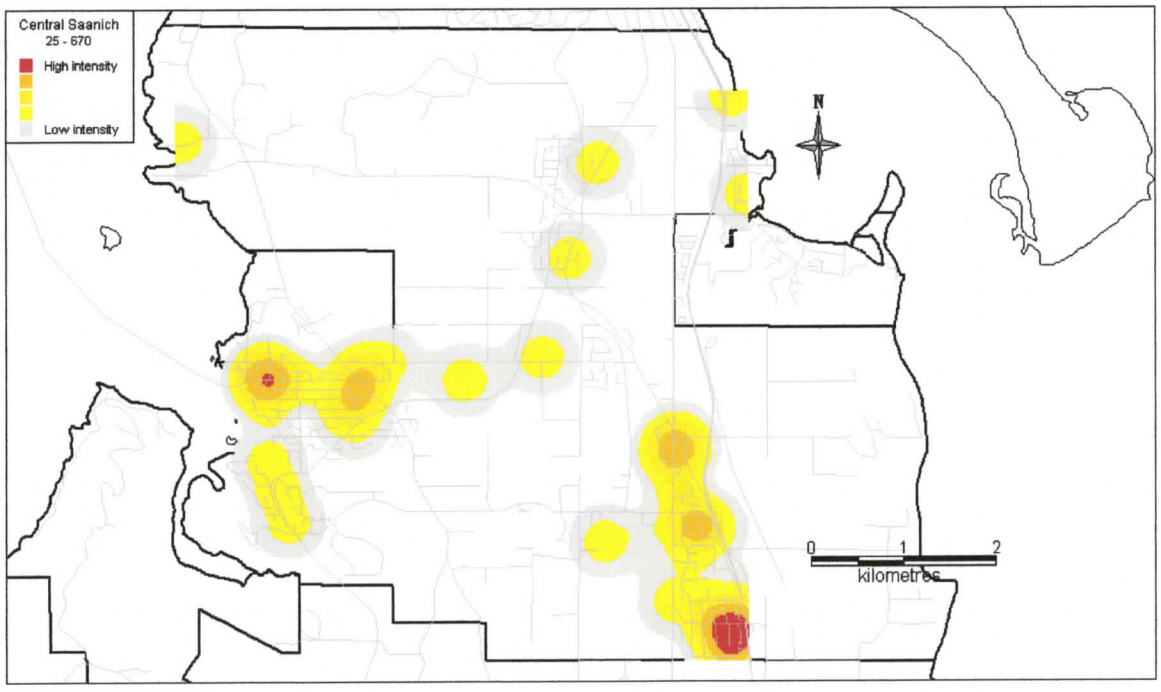


Figure II.10: Break and Enter Hot Spots Central Saanich 2004 (25m2 cell – 670m bandwidth).

The hot spot in the centre west is located in a small commercial area on a bay, where there are several restaurants, a number of small craft moorages, a hotel and a bed

and breakfast. There is also a ferry terminal, which links the Saanich Peninsula with Mill Bay. The hot spots evident in the southeast portion of the municipality adjoin two major roadways, East Saanich Rd. and the Pat Bay Hwy. The Pat Bay Hwy is the major Hwy from the Swartz Bay ferry terminal to downtown Victoria. East Saanich Rd. serves a well-traveled secondary roadway.

Saanich

Saanich had 389 break and enters of which 363 were geo-coded. The majority of residences are clustered in the southern portion of the municipality (Figure: II.11). The northern section of the municipality has limited residential development. Looking at the point data (Figure: II.12) indicates that there is prevalence of residential burglary in southwest – south centre region of the municipality.

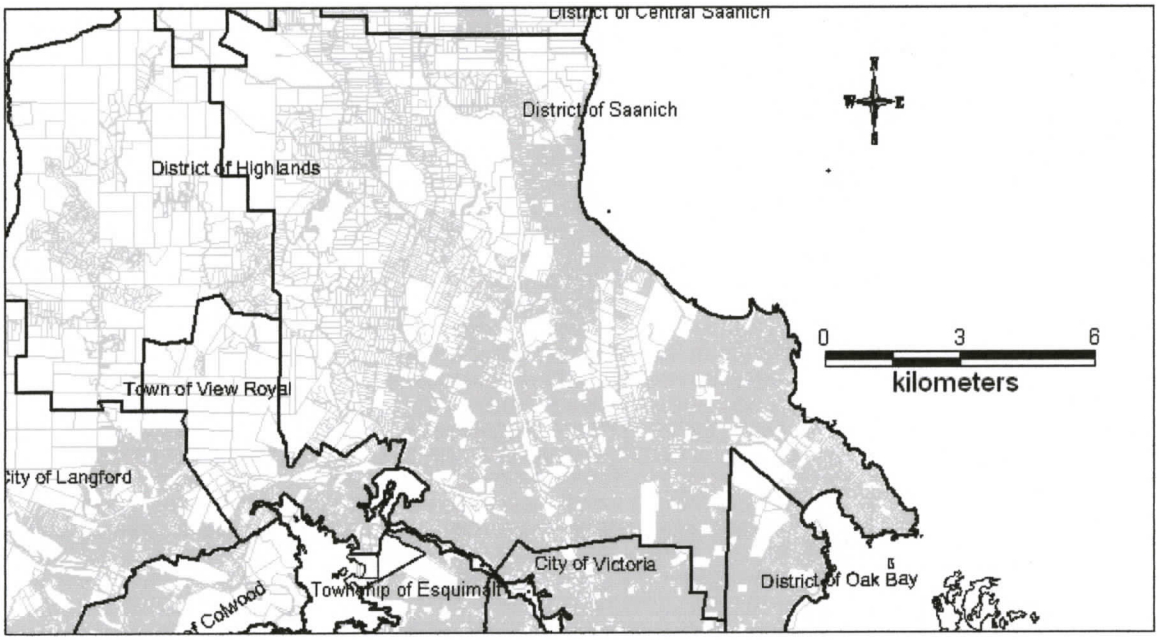


Figure II.11: Saanich Lot Boundaries.

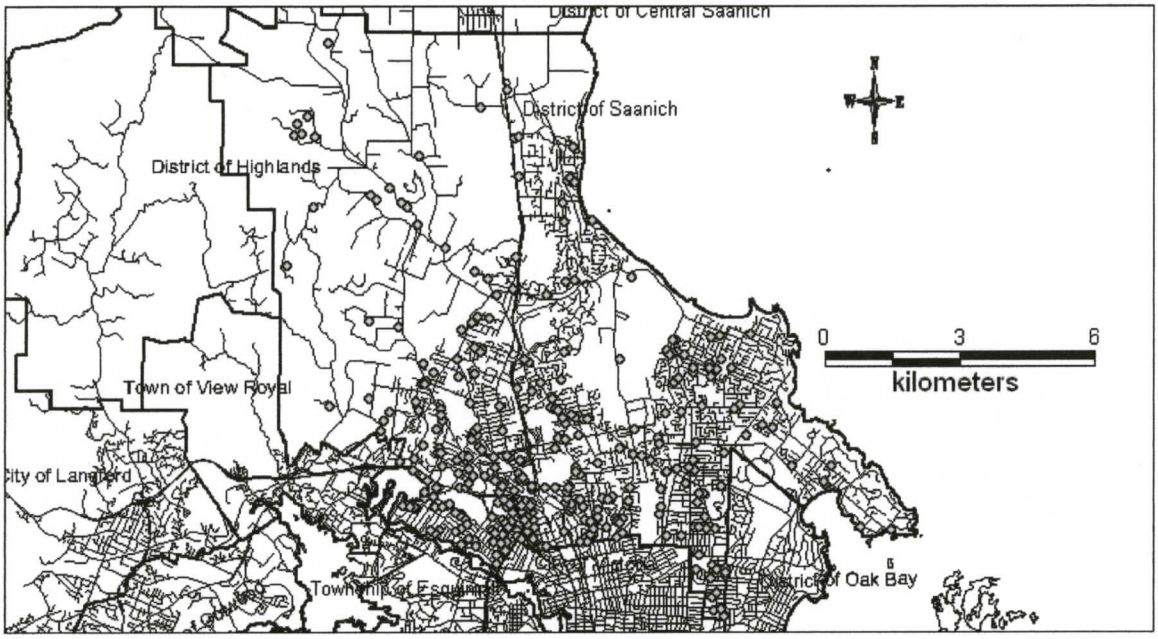


Figure II.12: Saanich 2004 Break and Enters with the road network.

It is interesting to note the hot spot (Figure: II.10) that surfaced in the southeast residential development of Central Saanich does not continue into Saanich. The residential development in southeast portion of Central Saanich does not continue into Saanich instead, it stops at the border. This a consequence of zoning and planning differences between the two municipalities. What in one municipality is a densely populated residential area continues into a rural area with limited residential development.

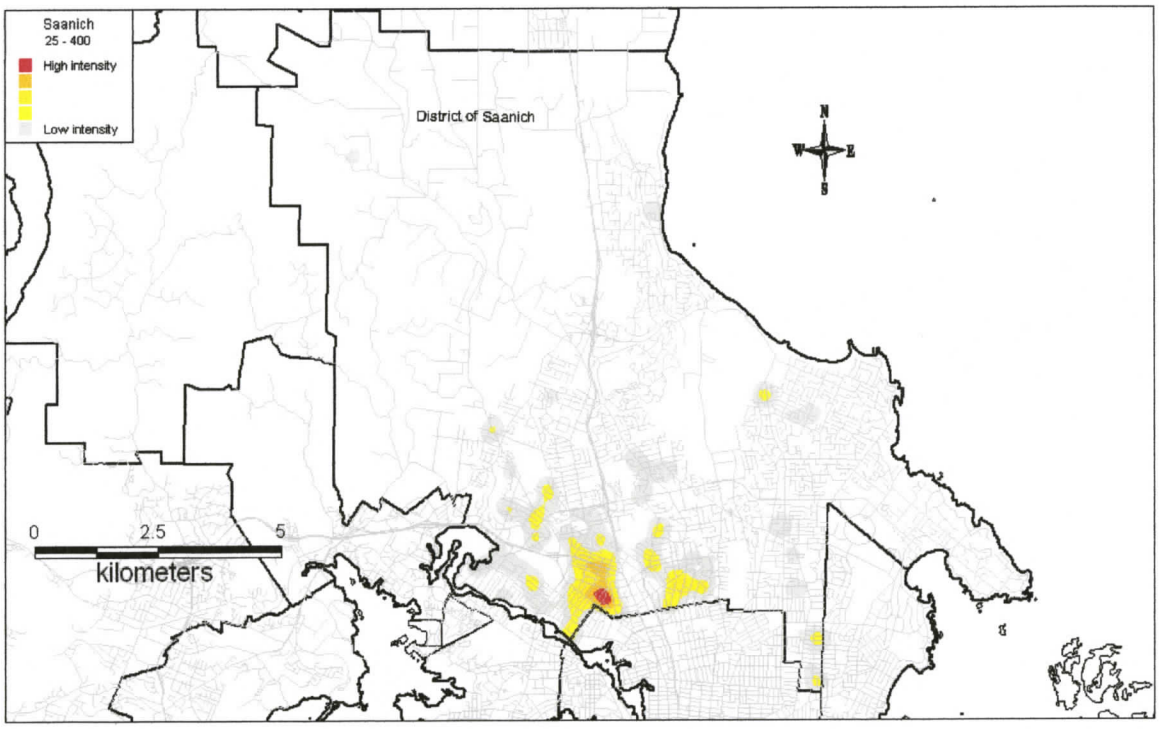


Figure II.13: Break and Enter Hot Spots Saanich 2004 (25m2 cell – 400m bandwidth).

An average radius of 1000 metres was obtained from the subjects in the Saanich police sample. At a 400 meter bandwidth (Figure: II.13) one hot spot is evident in the south - southwest portion of the municipality. There are two other hot spots developing, one north and the other east of the sole hot spot. There is a number of low intensity configurations scattered around the hot spot. At 670 metres (Figure: II.14) the single hot spot increases in size absorbing the hot spot to the north.

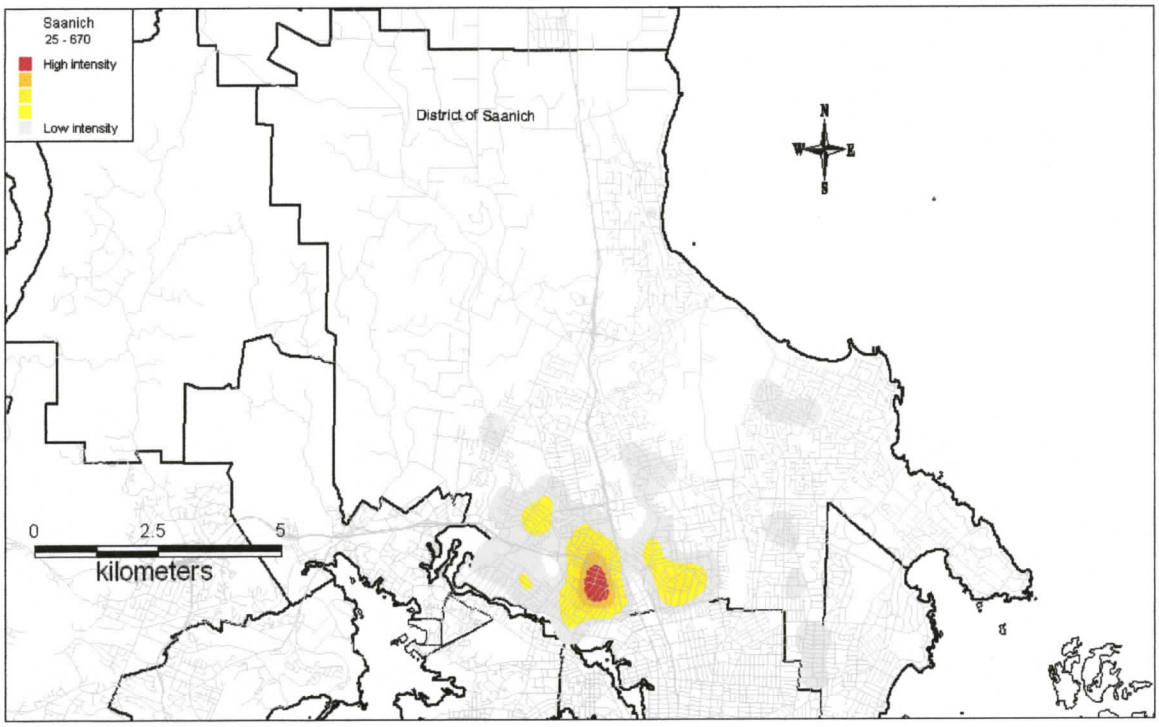


Figure II.14: Break and Enter Hot Spots Saanich 2004 (25m2 cell – 670m bandwidth).

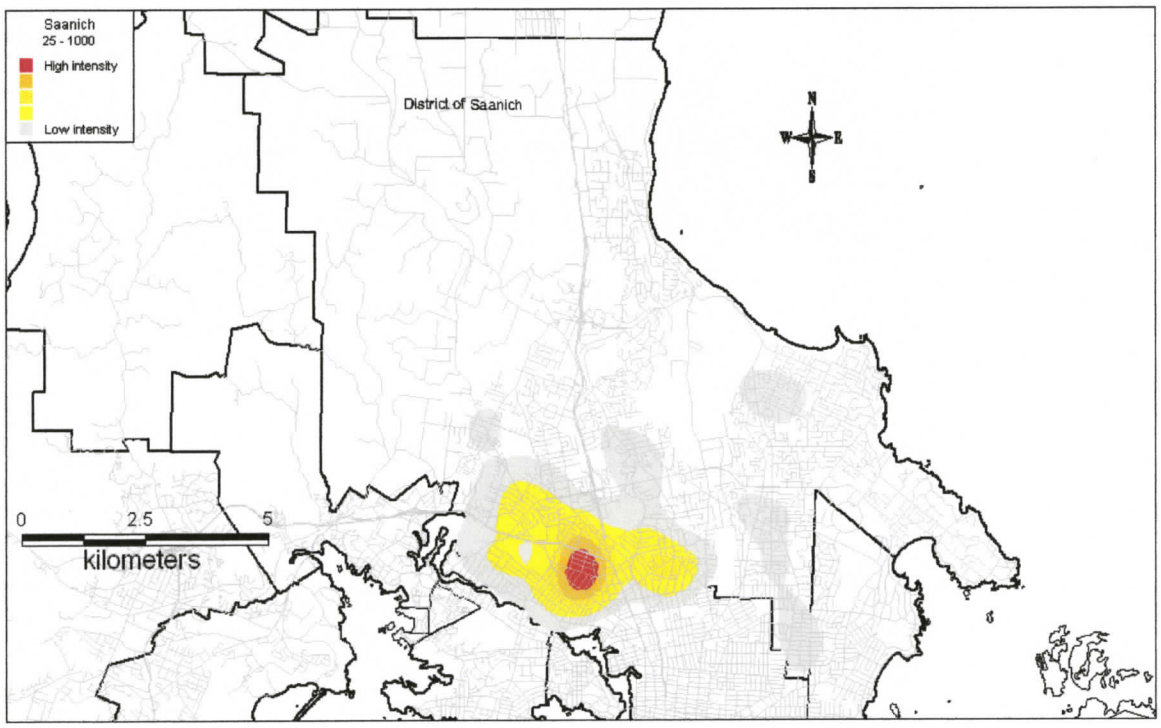


Figure II.15: Break and Enter Hot Spots Saanich 2004 (25m2 cell – 1000m bandwidth).

The majority low intensity spots witnessed at 400 metres have been smoothed out and decreased in intensity. At 1000 metres (Figure: II.15) the original hot spot has increased in size and incorporated many of the low intensity sites evident at 400 metres into to one continuous hot spot pattern. The analysis indicates residential burglary is concentrated in the south-centre of the municipality.

Oak Bay

Oak Bay police department had 57 residential burglaries in 2004, 49 were geo-coded. Again the prevalence of break and enters seems scattered from north to south with events concentrated around the center of the municipality (Figure: II.16). At 400 metres (Figure: II.18) one hot spot is evident just south of the Saanich/Oak Bay boundary – adjacent to the Victoria/Oak Bay border. A second area of intense activity is emerging northeast of the hot spot. At 670 metres (Figure: II.19) the area to the northeast has increased in intensity as the bandwidth includes more points in the kernel density calculation.

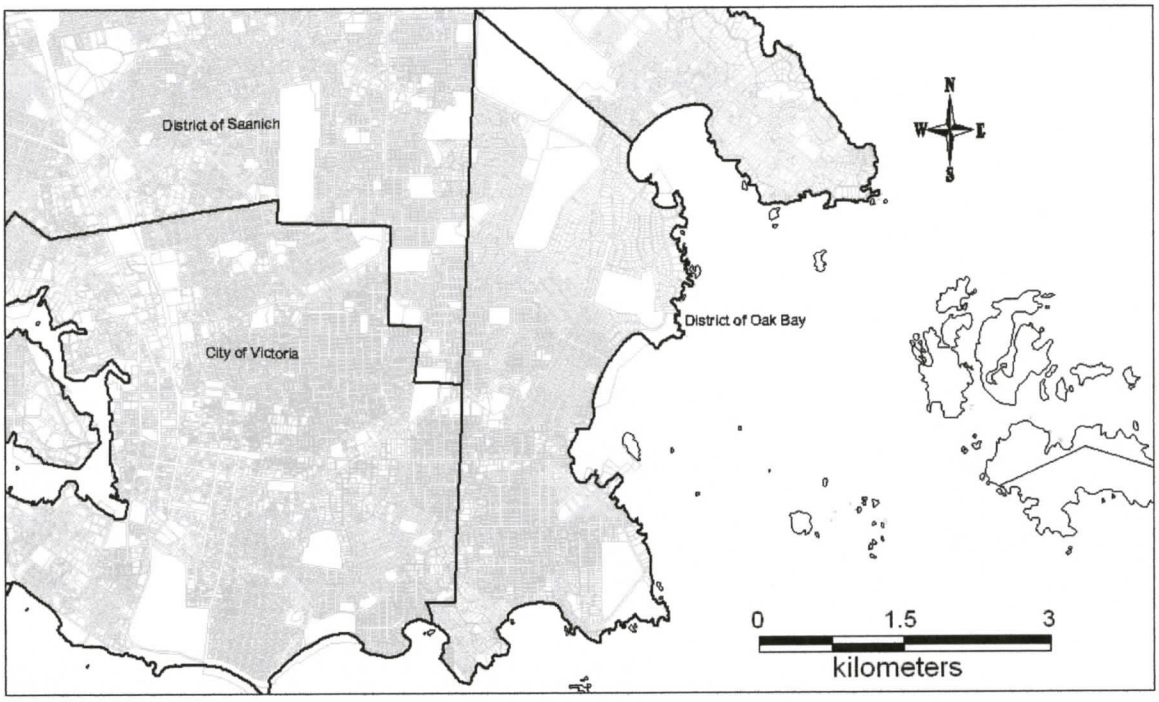


Figure II.16: Oak Bay Lot Boundaries.

At 720 metres (Figure: II.20), the radius obtained from the police sample, the two hot spots have merged into one. Based on the analysis the most intense burglary activity occurs in the centre area of the municipality.

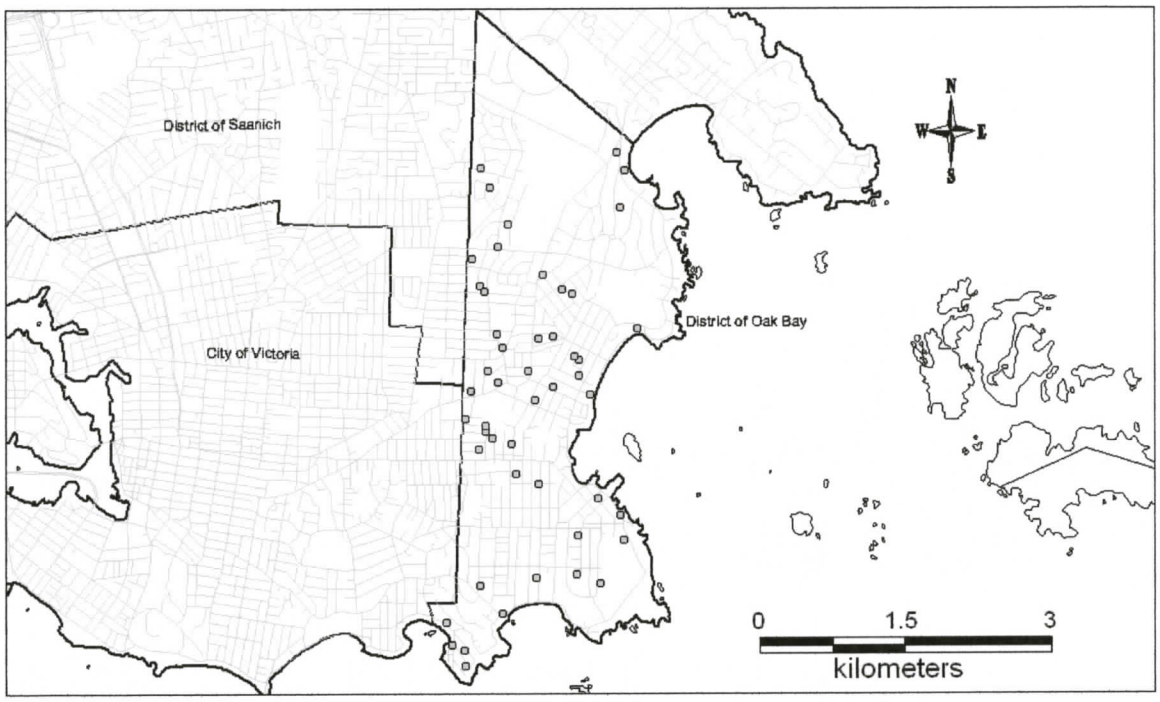


Figure II.17: Oak Bay 2004 Break and Enters with the road network.

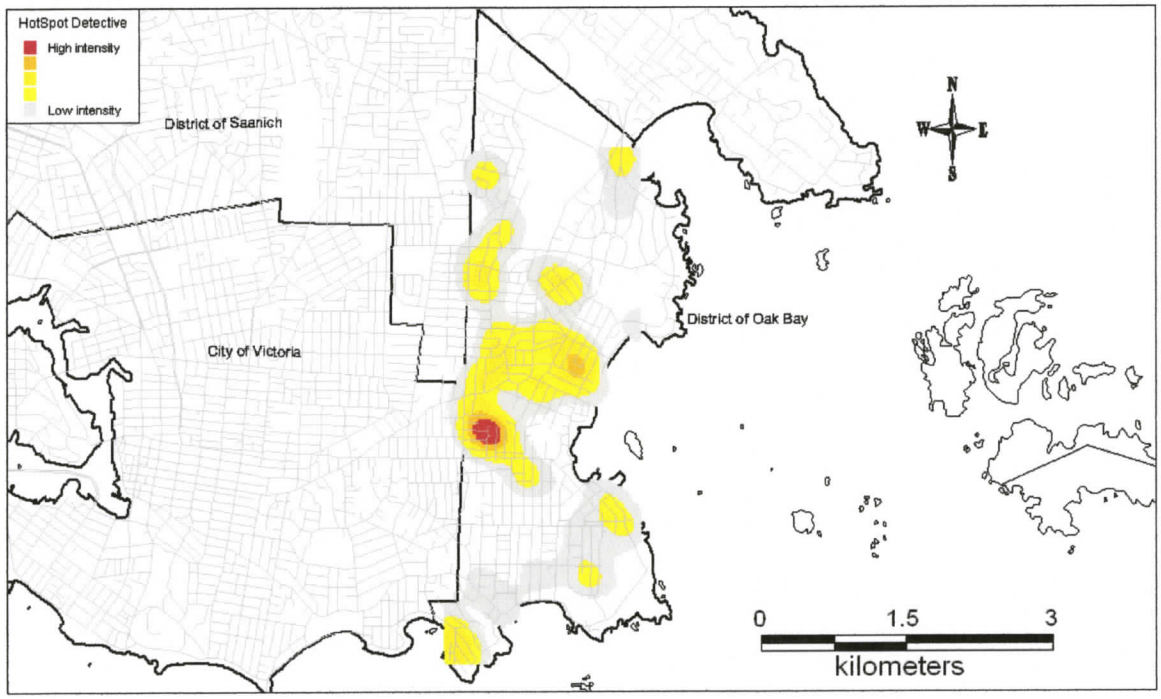


Figure II.18: Break and Enter Hot Spots Oak Bay 2004 (25m2 cell – 400m bandwidth).

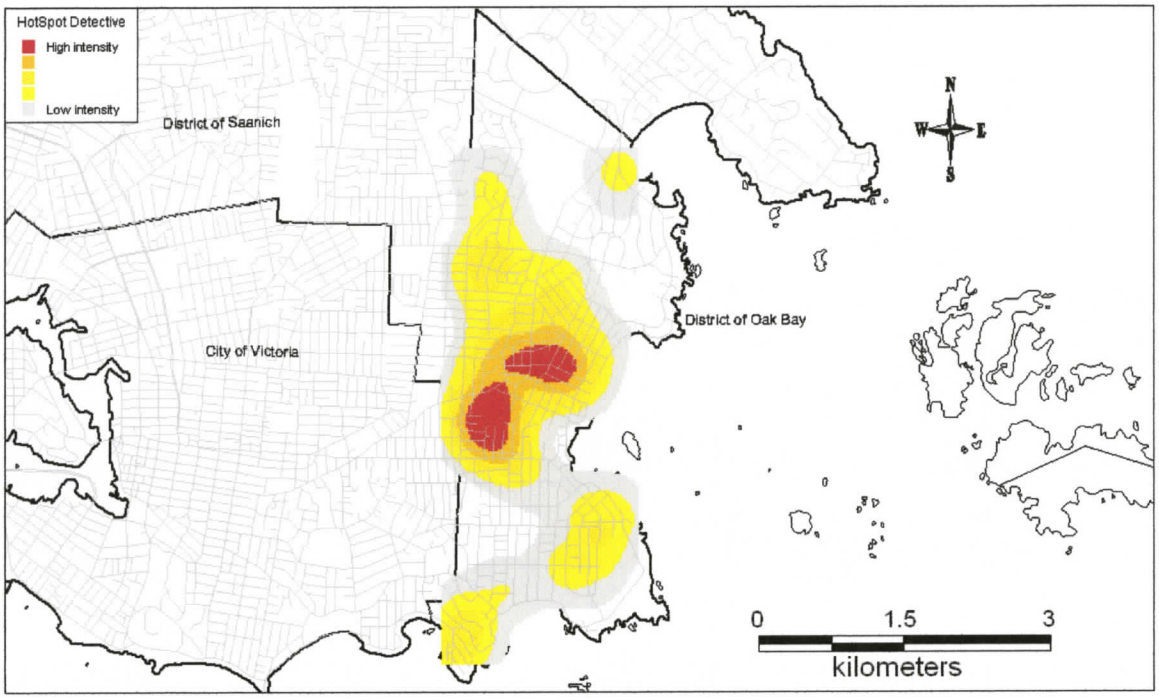


Figure II.19: Break and Enter Hot Spots Oak Bay 2004 (25m2 cell – 670m bandwidth).

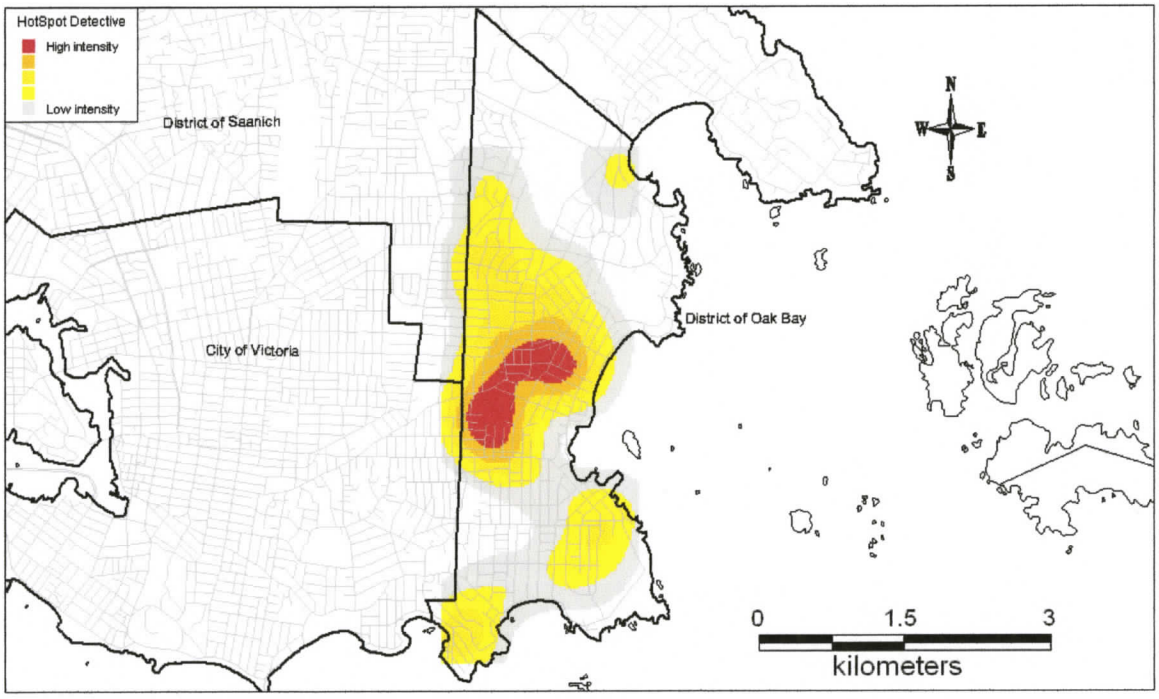


Figure II.20: Break and Enter Hot Spots Oak Bay 2004 (25m2 cell – 720m bandwidth).

West Shore

West Shore RCMP detachment provides police services for five municipalities. Langford, Colwood, and View Royal appear to have the densest concentration of housing (Figure: II.21). The point data shows a prevalence of residential burglary along the Langford/Colwood border and in the southern portion of View Royal. The point pattern (Figure: II.22) mimics the settlement patterns of the three municipalities.

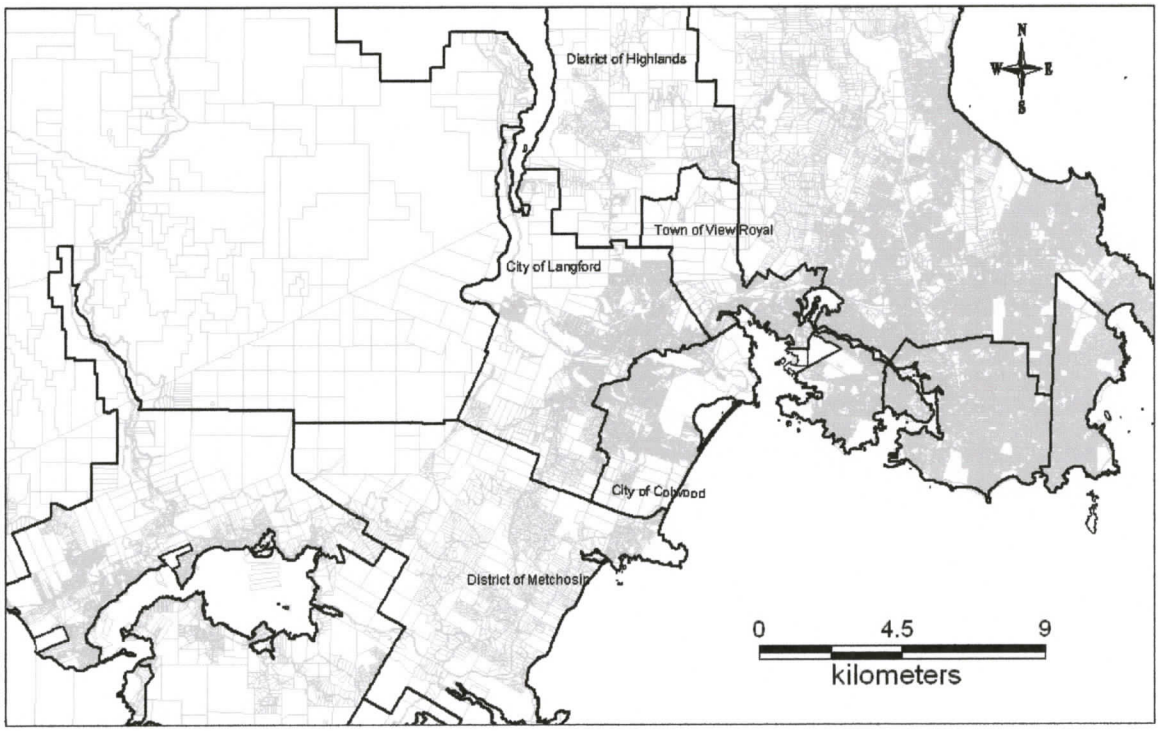


Figure II.21: West Shore Lot Boundaries.

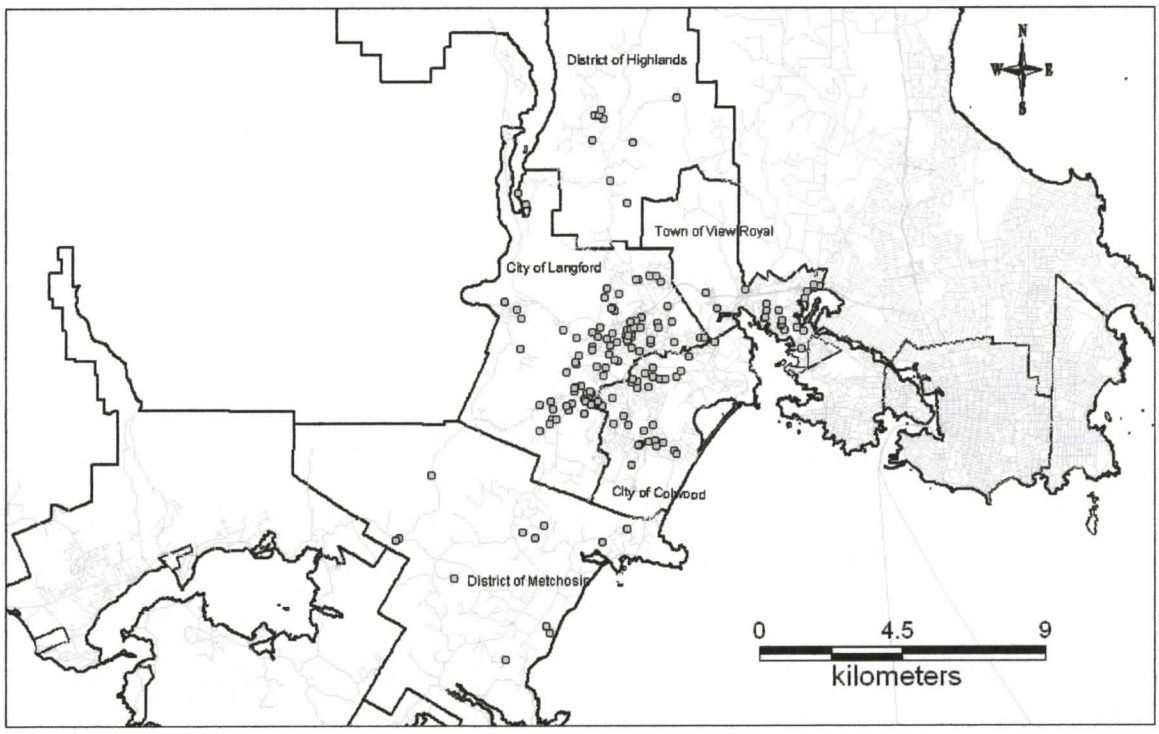


Figure II.22: West Shore 2004 Break and Enters with the road network.

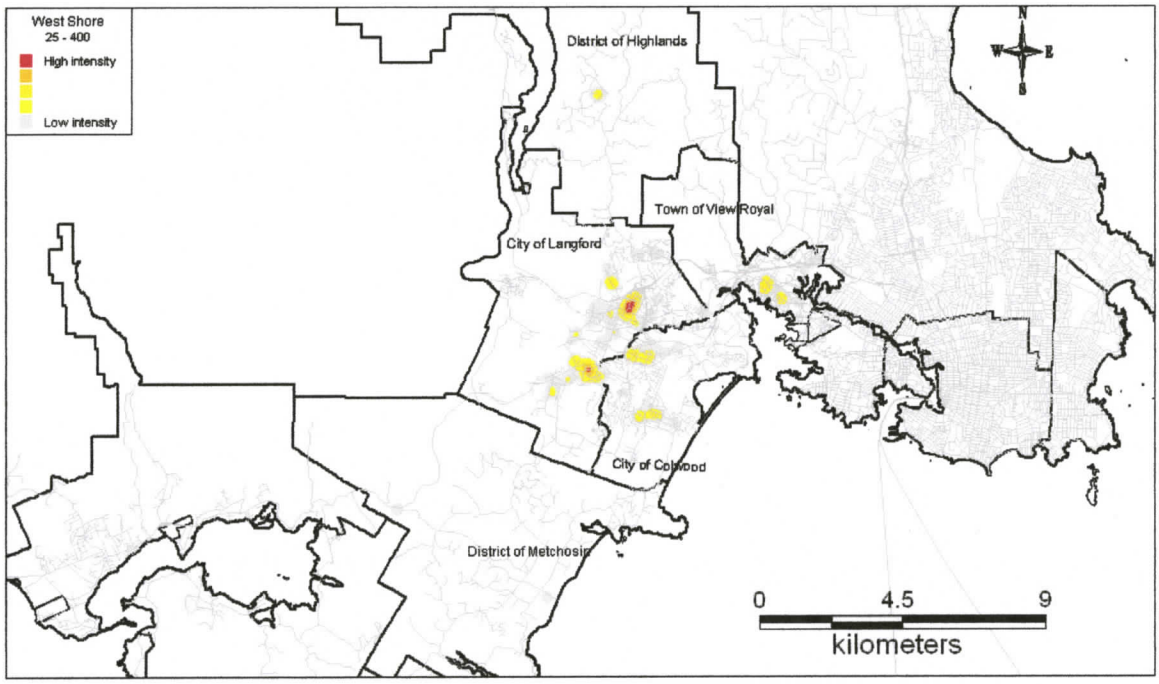


Figure II.23: Break and Enter Hot Spots West Shore 2004 (25m2 cell – 400m bandwidth).

Two hot spots emerge from the analysis, both in Langford. One hot spot is located in the northeast section of the municipality close to the Langford/Colwood border, while

the second is located to the south on the Langford/Colwood boundary. At 600 metres (Figure: II.24), the radius obtained from the police sample, the pattern does not change.

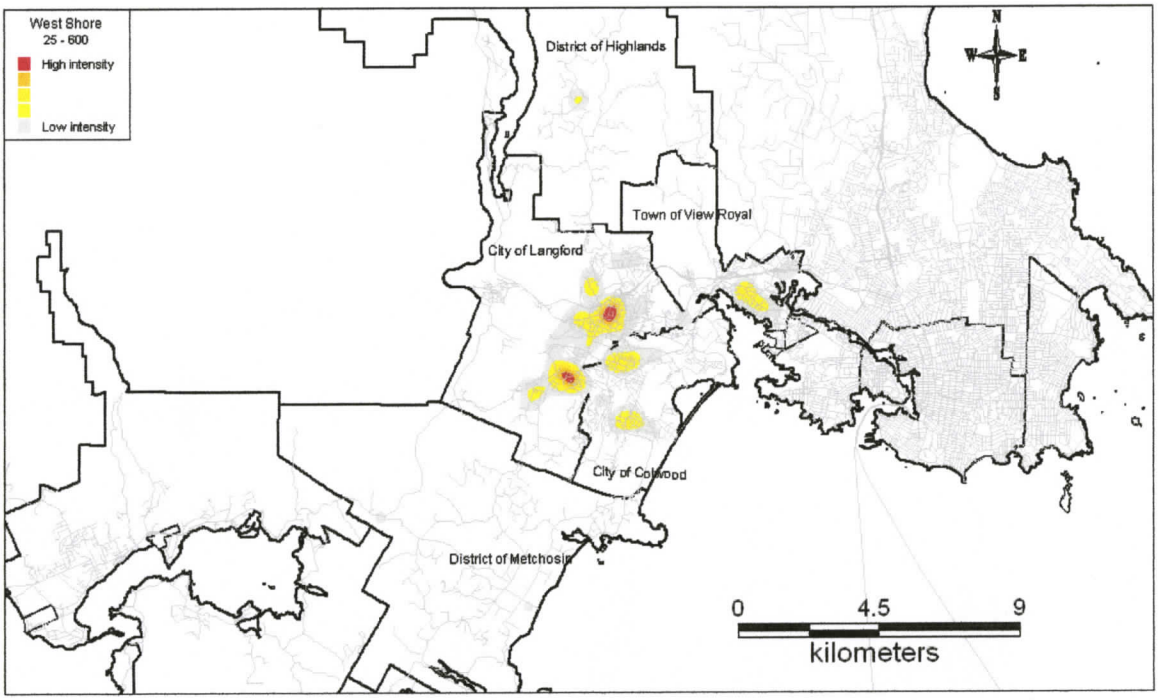


Figure II.24: Break and Enter Hot Spots West Shore 2004 (25m2 cell – 600m bandwidth).

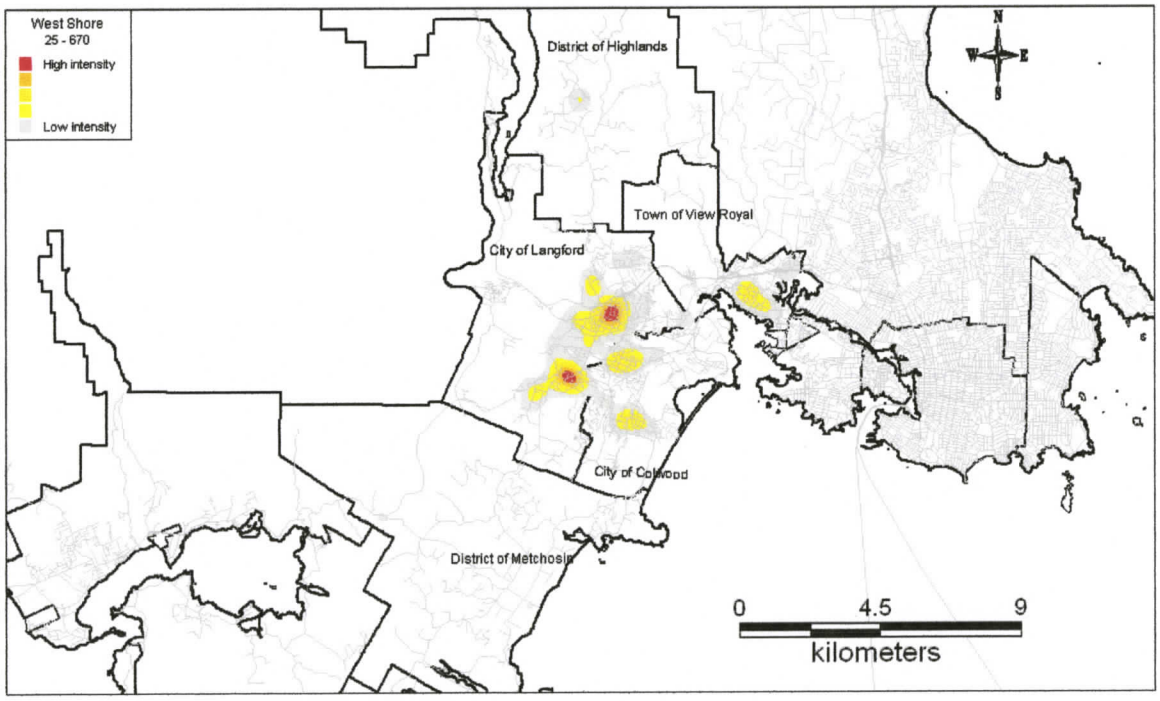


Figure II.25: Break and Enter Hot Spots West Shore 2004 (25m2 cell – 670m bandwidth).

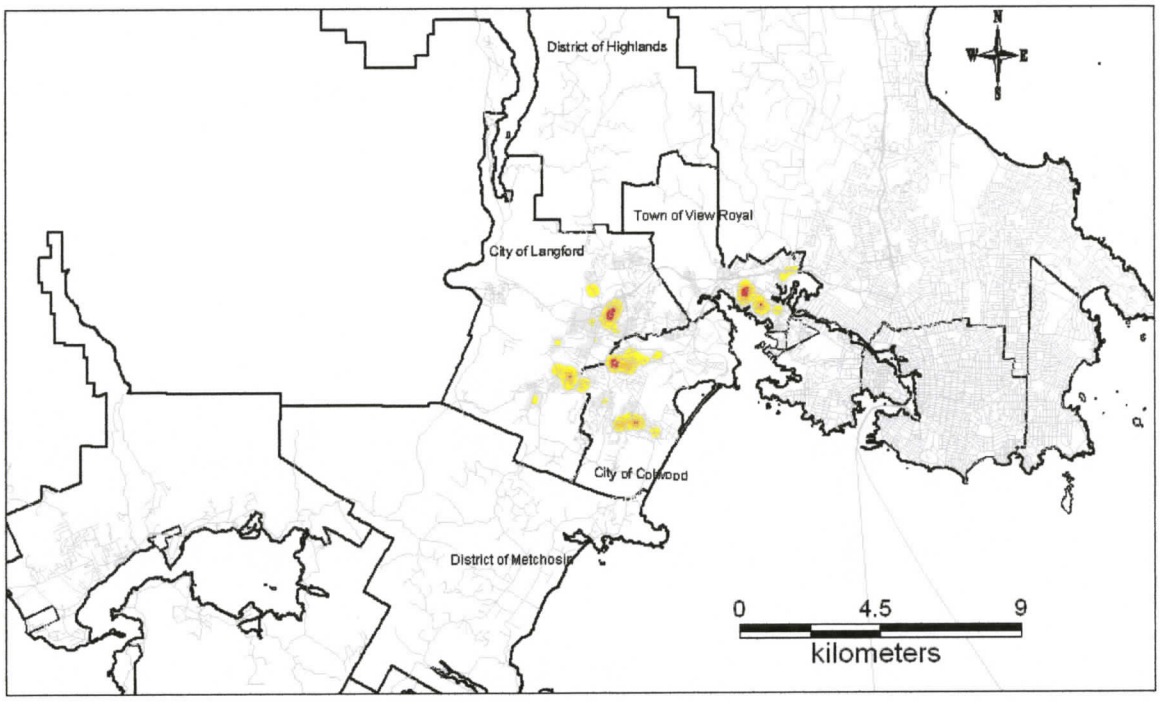


Figure II.26: Break and Enter Hot Spots West Shore (disaggregated) 2004 (25m2 cell – 400m bandwidth).

There are three less intense patterns evident, two in Colwood and one in View Royal. To explore these patterns further, the point data for View Royal, Langford and Colwood were separated out of the West Shore data set.

View Royal had 21 geo-coded events, Langford 89 and Colwood 28, totaling 138 burglaries. In figure: II.26 we see the two patterns in Langford are still present in the analysis of the disaggregated data. The two patterns in Colwood increase in intensity to hot spots. The View Royal pattern also evolves into two separate hot spots. The point patterns in View Royal and Colwood were smoothed out in the initial analysis due to the density of points concentrated in the Langford area. They did not emerge as hot spots until the data set was disaggregated. Pattern theory recognizes that patterns will vary at different levels of aggregation. This provides evidence that as events are aggregated to higher levels of resolution patterns decrease in importance. This is becomes even clearer at the regional level of analysis.

Sooke

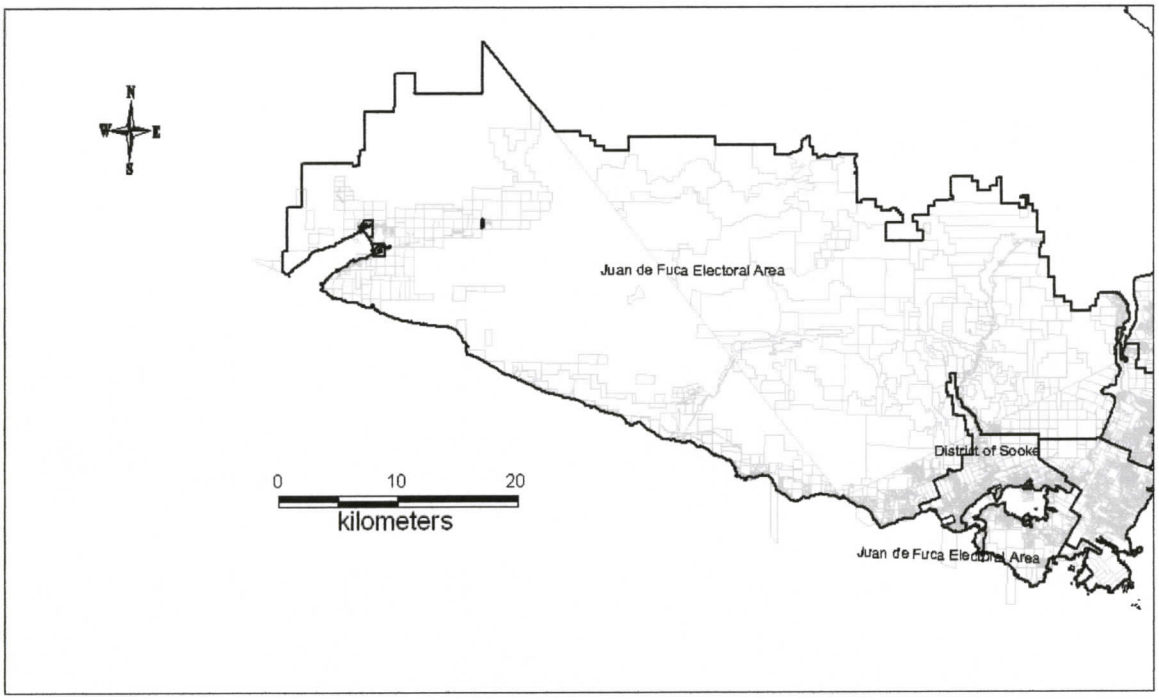


Figure II.27: Sooke District, Juan de Fuca, and City of Renfrew Lot Boundaries.

Sooke - Renfrew RCMP detachment provides police services to the Sooke District, Juan de Fuca ED and the City of Renfrew (Figure: II.27). Sooke District is classified as Sooke Municipal and the other areas are classified as Sooke Provincial. The break and enter data is aggregated into one file, Sooke - Renfrew. The majority of development is in the Sooke District and the immediate area surrounding the district.

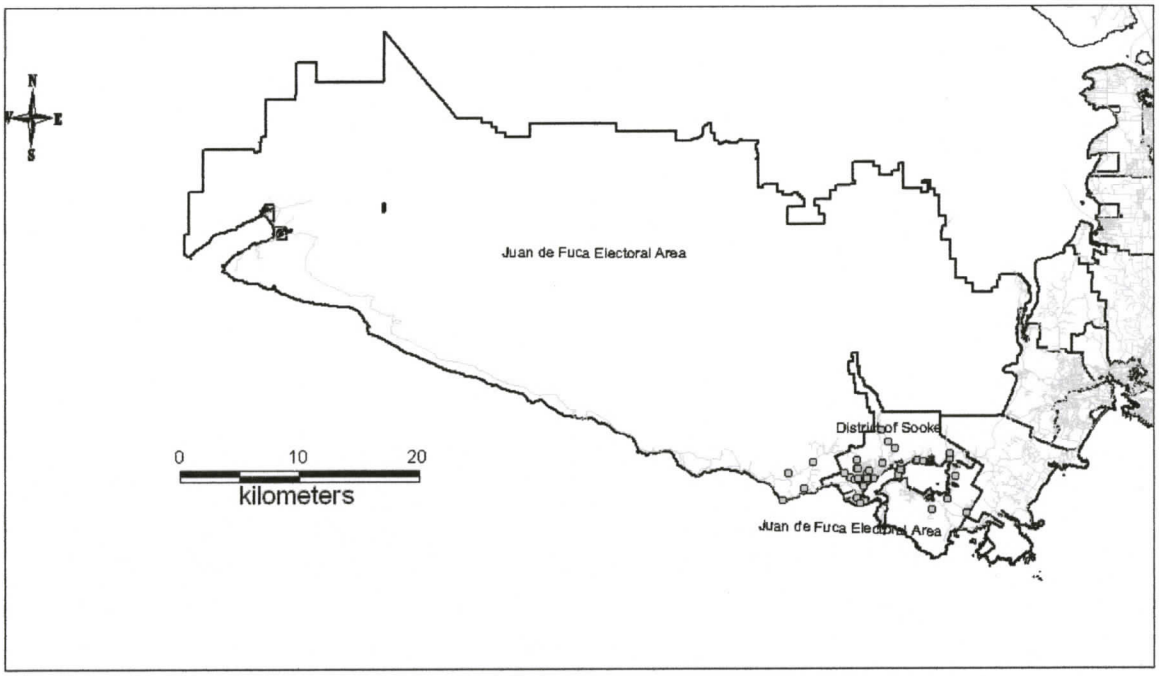


Figure II.28: Sooke 2004 Break and Enters with the road network .

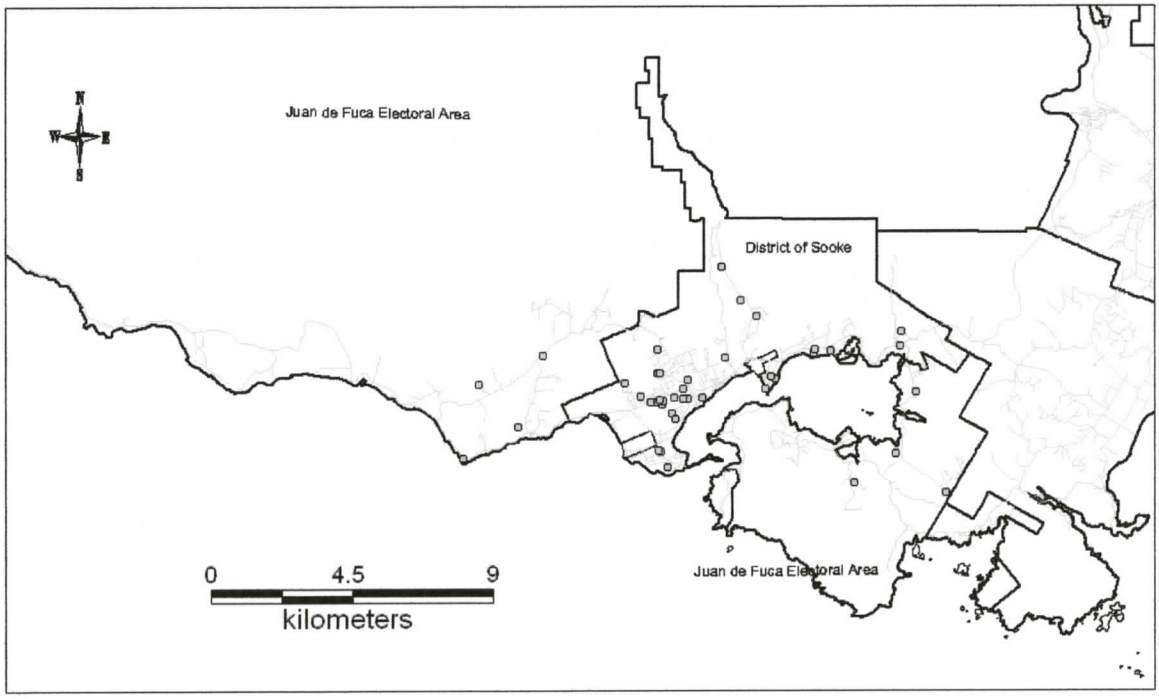


Figure II.29: Sooke District.

Sooke RCMP recorded 65 break and enters in 2004, 45 were geo-coded. The majority of residential burglaries occurred in and around the Sooke District (Figure: II.29).

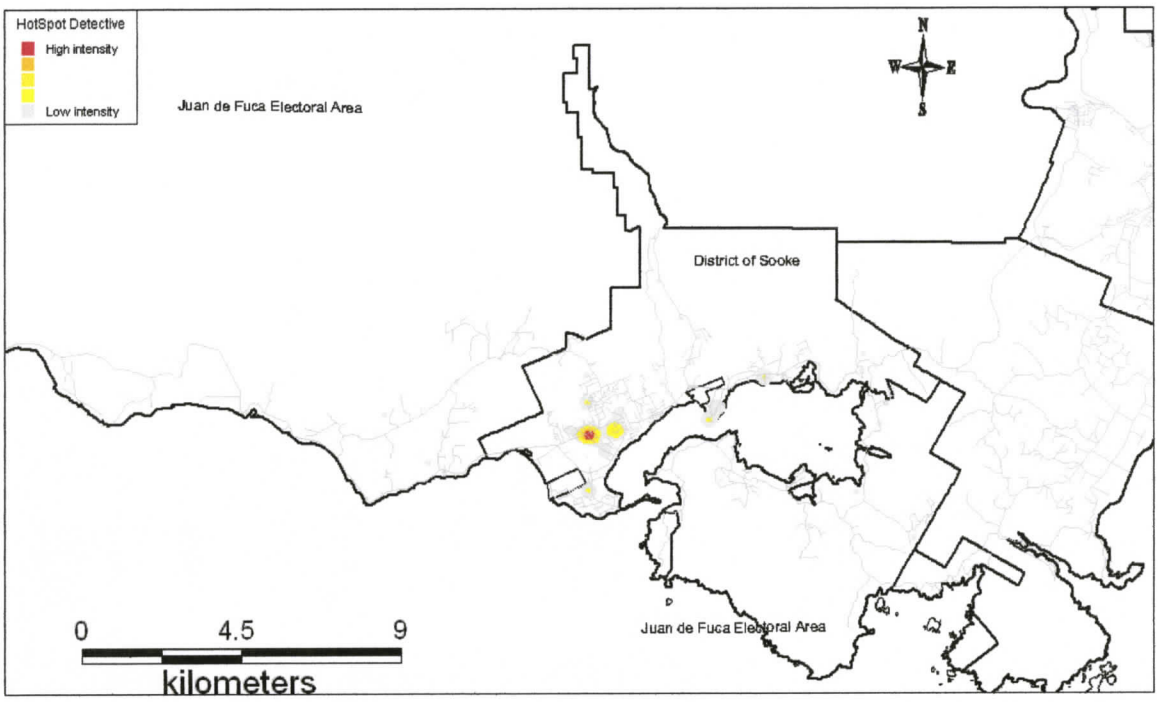


Figure II.30: Break and Enter Hot Spots Sooke 2004 (25m2 cell – 400m bandwidth).

At a 400 metre bandwidth (Figure: II.30), one hot spot emerges in the southwest part of the District. A less intense pattern is developing east of the hot spot. As the bandwidth increase to 600 metres (Figure: II.31) the hot spot enlarges and is blending into the pattern to the east. At a 670 metre bandwidth (Figure: II.32), the hotspot is larger and integrated with the adjoining pattern to the east.

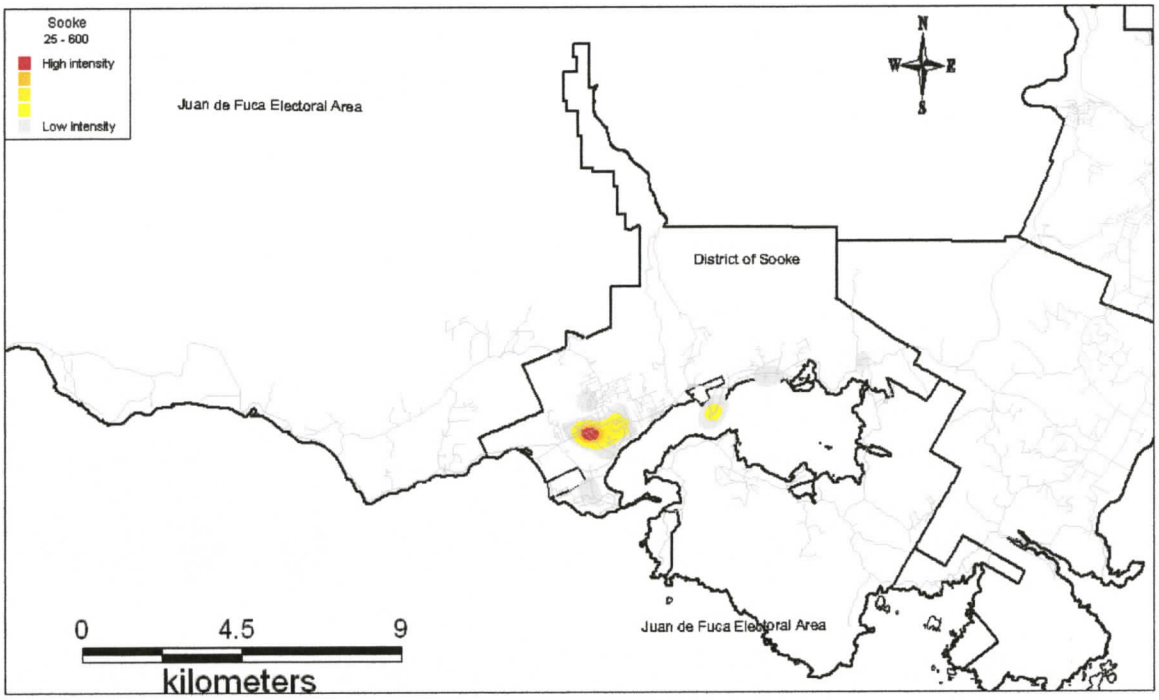


Figure II.31: Break and Enter Hot Spots Sooke 2004 (25m2 cell – 600m bandwidth).

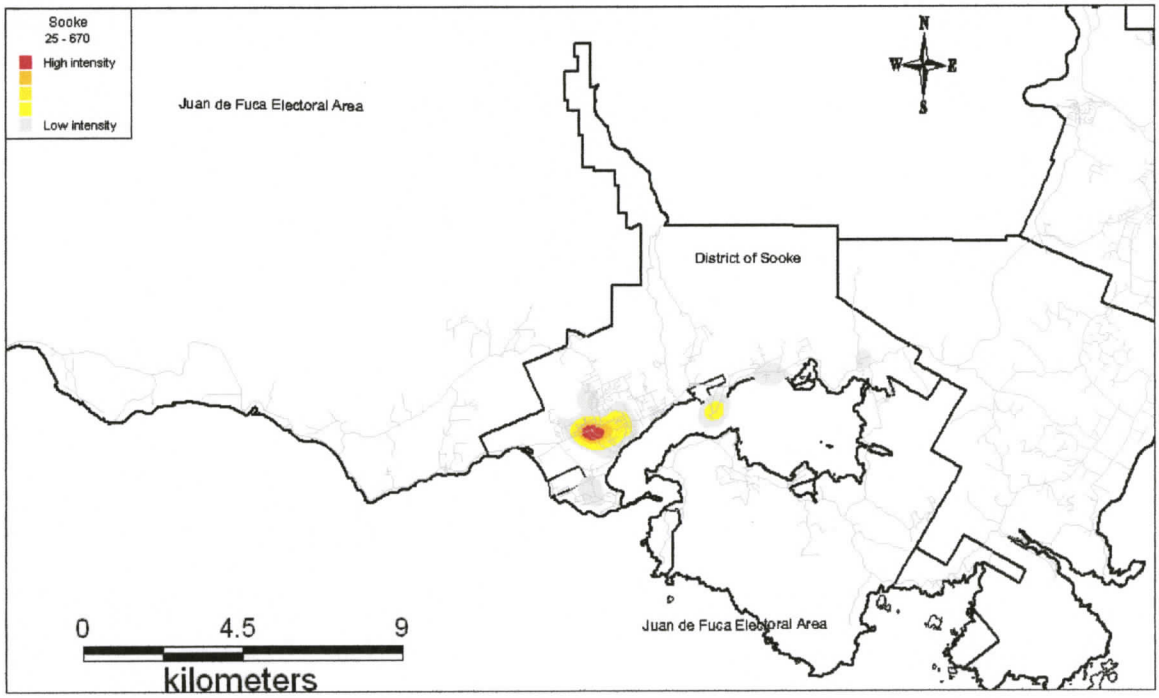


Figure II.32: Break and Enter Hot Spots Sooke 2004 (25m2 cell – 670m bandwidth).

II.2 Cluster Hunter

Central Saanich did not generate any circles meeting the above criteria, while Sidney – North Saanich had 2 circles at 400m each (Table II.1). In Oak Bay circles were discovered at each radius, 7 at 400m, 3 at 500m, and 4 at 600m. In Saanich the number of circles increased substantially, with 123 at 400m, 113 at 500m and 89 at 600m. Victoria had the highest number of circles with 143 at 400m, 113 at 123m and 102 at 600m. West Shore had 66 circles at 400m, 26 circles at 500m and 27 circles at 600m. Sooke

	# of Circles Created at Specified Radius			
Municipality	400m	500m	600m	Total
Sidney N. Saanich	2	0	0	2
Central Saanich	0	0	0	0
Oak Bay	7	3	4	14
Saanich	123	113	89	325
Victoria	143	123	102	368
West Shore	66	26	27	119
Sooke	8	9	12	29

Table II.1: Number of Circles Generated by GAM

Generally, GAM results matched those identified with the HotSpot Detective. The circles covered all intensity levels compiled by the Hot Spot Detective. Remember that the two methods of analysis identify clusters in different ways. The kernel density function takes a specific point and looks at its proximity to adjacent points within a pre-define distance. A value is assigned to every point; higher values are assigned to those points closer to the point of interest, with values decreasing for adjacent points located farther away. GAM, on the other hand, compares the number of observed events, within a specified distance, which might be expected, given the underlying population at risk. The resultant patterns will vary due to the different methods.

Comparison of Visualizations

Sidney North Saanich

The GAM coverage for Sidney was combined with the Sidney kernel density coverage of 25m^2 cell – 400m bandwidth. The two GAM circles identified in Table II.1 are located in the Town of Sidney over a hot spot with a second level intensity rating. The circles are located on a north east/south west axis; in combination, they almost cover all four levels of the hot spot. A higher intensity hotspot is located in Sidney's residential area to the south.

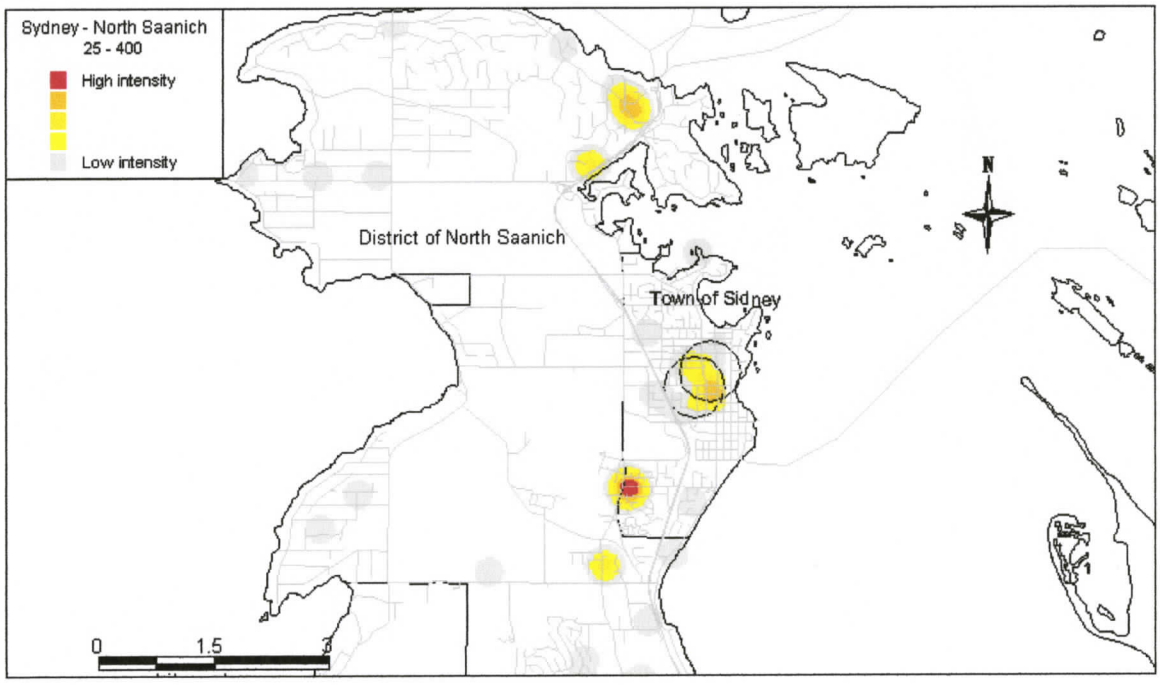


Figure II.33: Sidney – North Saanich GAM Results at 400m.

Saanich

Saanich GAM covers for 400m metres (Figure II.34) and 500m (Figure II.35) were layered onto the kernel density coverage of 25m^2 cell – 400m bandwidth (Figure

II.36). The GAM 600m coverage was over laid onto the kernel density coverage of $25m^2$ cell – 670m bandwidth (Figure II.36).

In Saanich, the preponderance of circles generated at 400m cover hot spots of at all levels intensity. There are low-level areas missed by the GAM results. As the circle radius increases, the circles tend to concentrate in the southwest portion of the municipality.

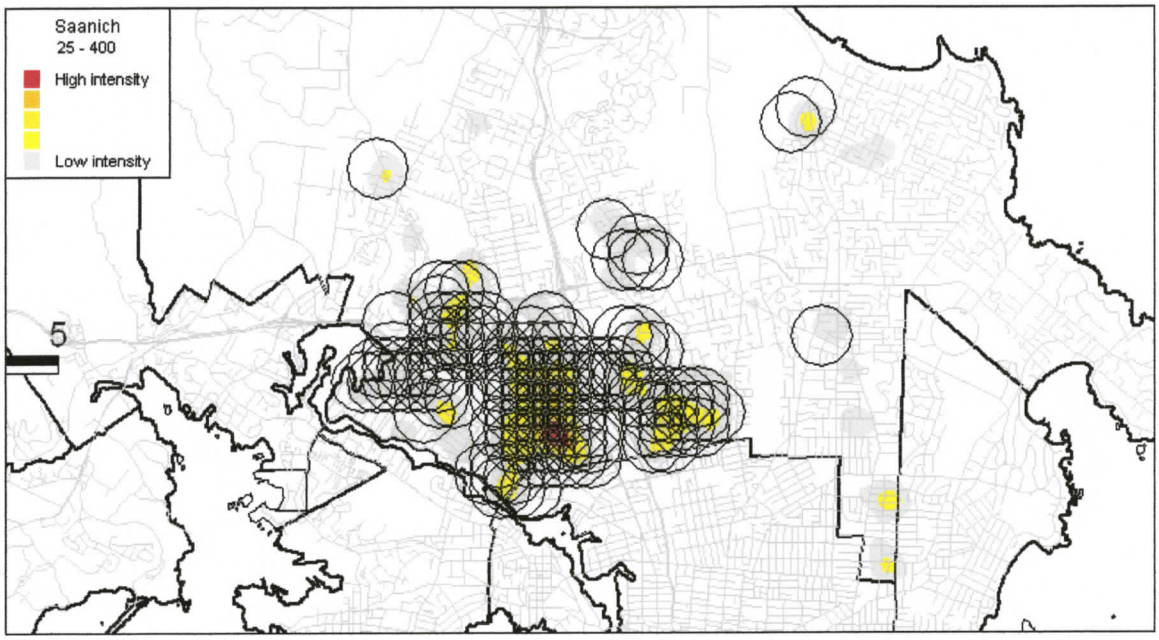


Figure II.34: Saanich GAM Results with 400m circles.

Due to the high number of circles, the layer looks cluttered. This was one of the original criticisms of the GAM circle results, which lead to the incorporation of the Epanechnikov kernel technique to create a smooth raster surface (Turton, 1998).

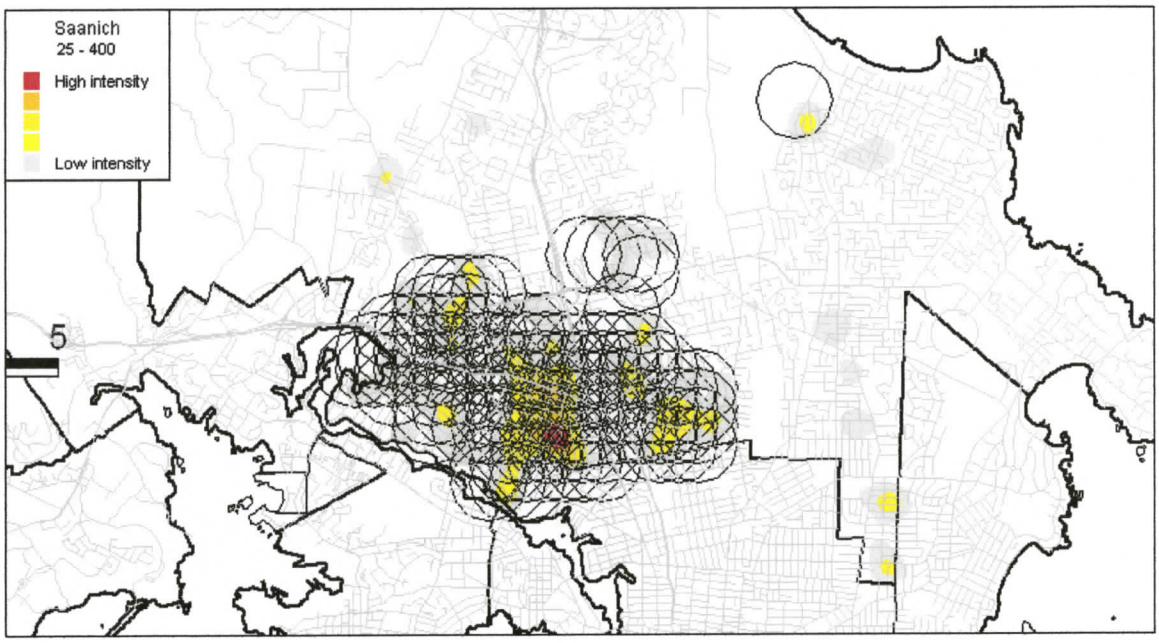


Figure II.35: Saanich GAM Results with 500m circles.

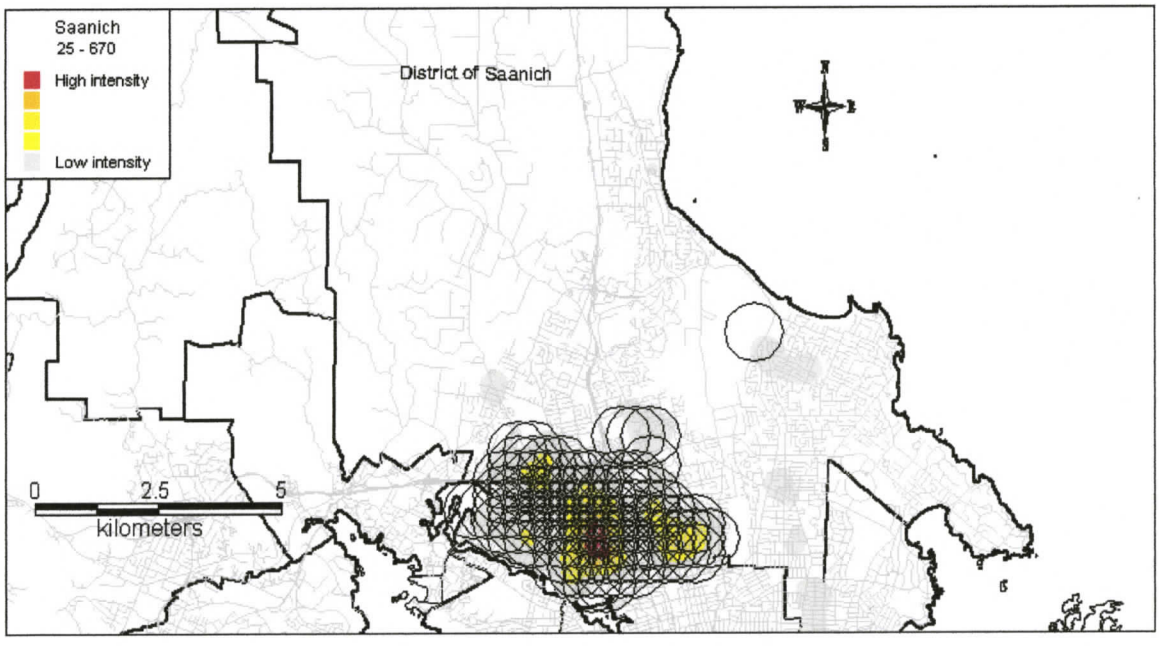


Figure II.36: Saanich GAM Results with 600m circles.

Oak Bay

The GAM layers for 400m and 500m were placed over the kernel intensity layer of $25m^2$ – 400m bandwidth (Figure II.37 – II.39). The GAM 600m layer was combined

with the kernel intensity layer of $25m^2$ – 720m bandwidth (Figure II.39). In Oak Bay, as in the other jurisdictions, the areas of interest identified by GAM coincide with the areas identified as high to low hot spots. However, several areas of lesser intensity were not exposed as areas of interest by GAM.

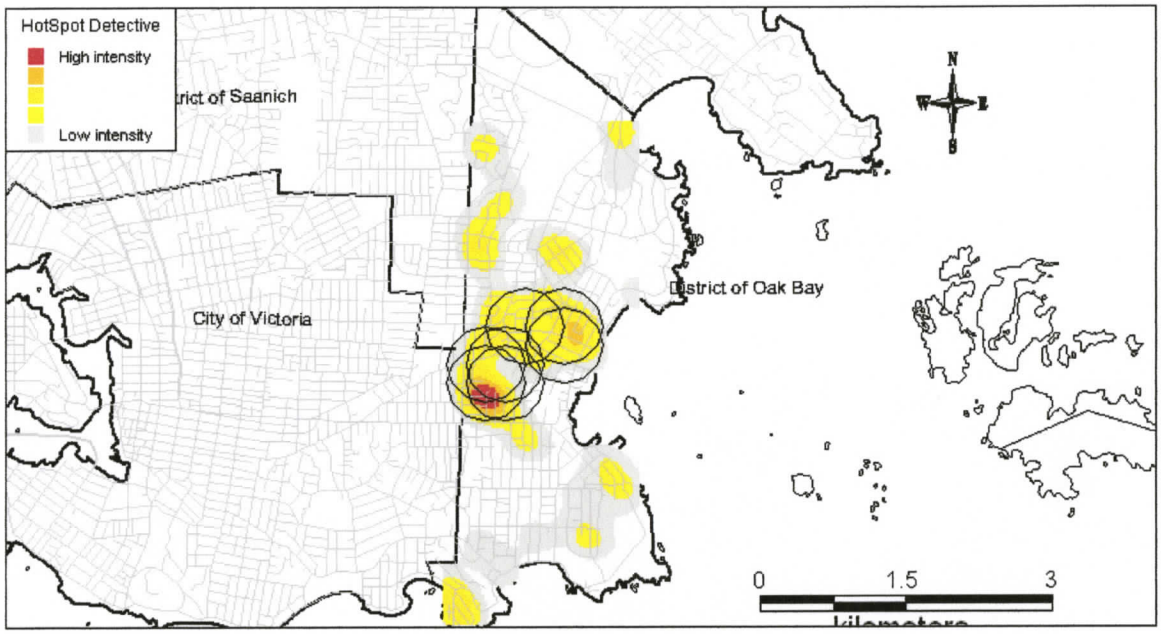


Figure II.37: Oak Bay GAM Results with 400m circles.

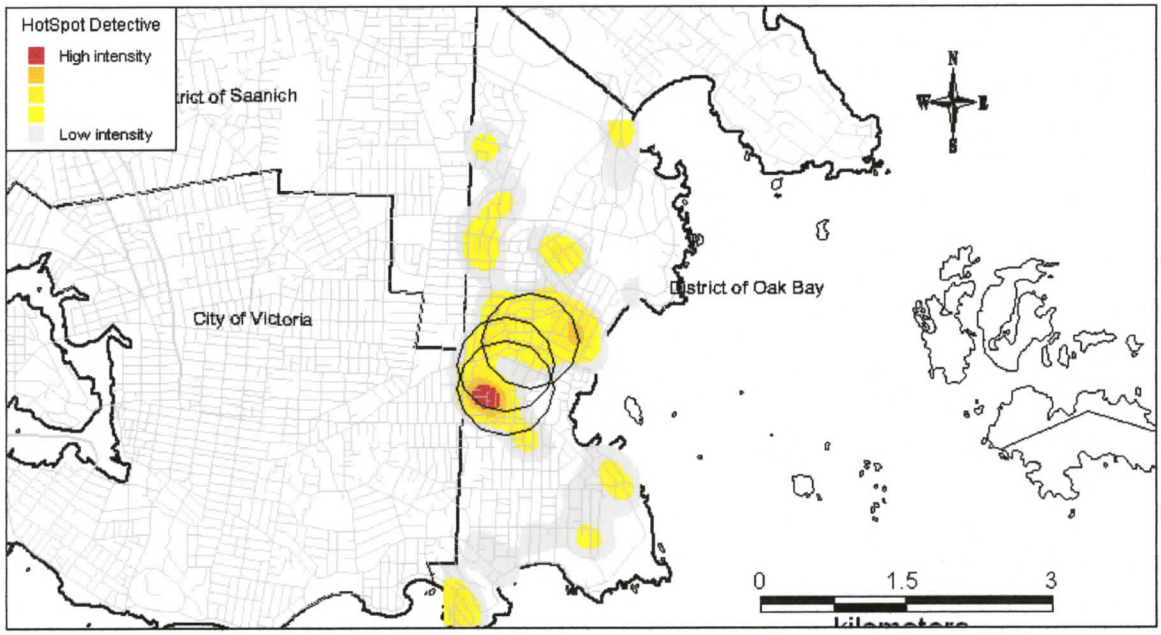


Figure II.38: Oak Bay GAM Results with 500m circles.

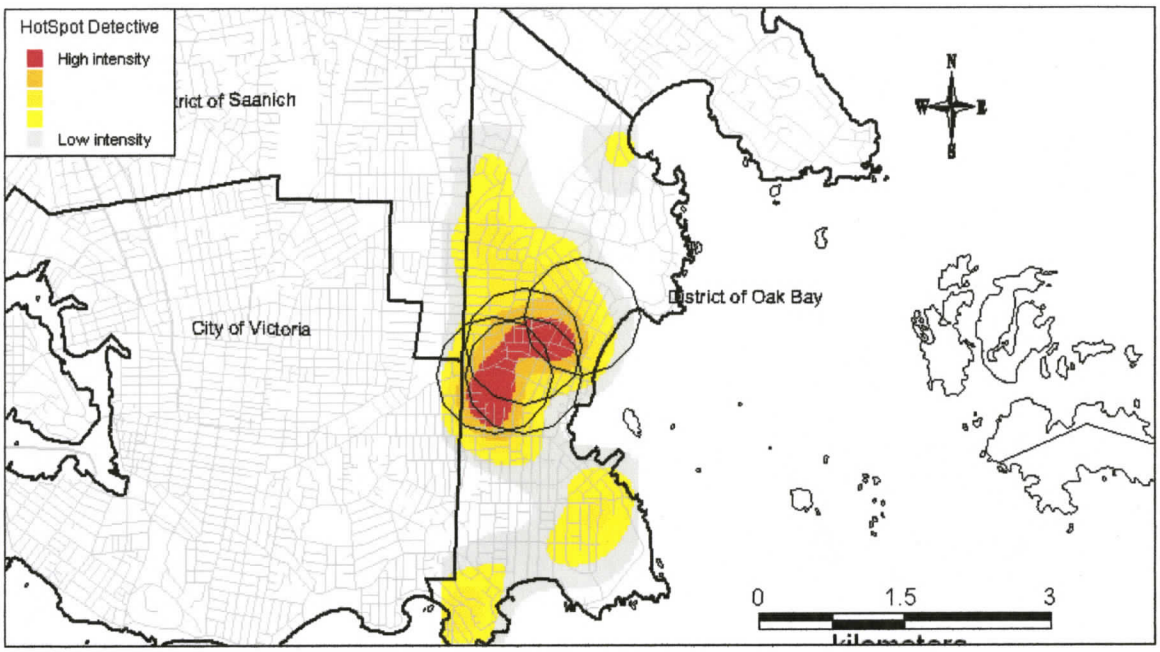


Figure II.39: Oak Bay GAM Results with 600m circles.

West Shore

The GAM circles were placed over the $25m^2$ – 400m bandwidth intensity coverage. In West Shore, the GAM circles covered both high intensity hot spots and the surrounding lesser intensity areas located in Langford along the Colwood border (Figures II.40 – II.42). Circles at each radius encompassed a lesser intensity hot spot in the View Royal area, however, only one hot spot, located in Colwood, was revealed as an area of interest by GAM at a radius 400m (Figure II.40 and II.43). The GAM results did not acknowledge the remaining lower level hot spot, located in the southern part of the municipality, at any radius.

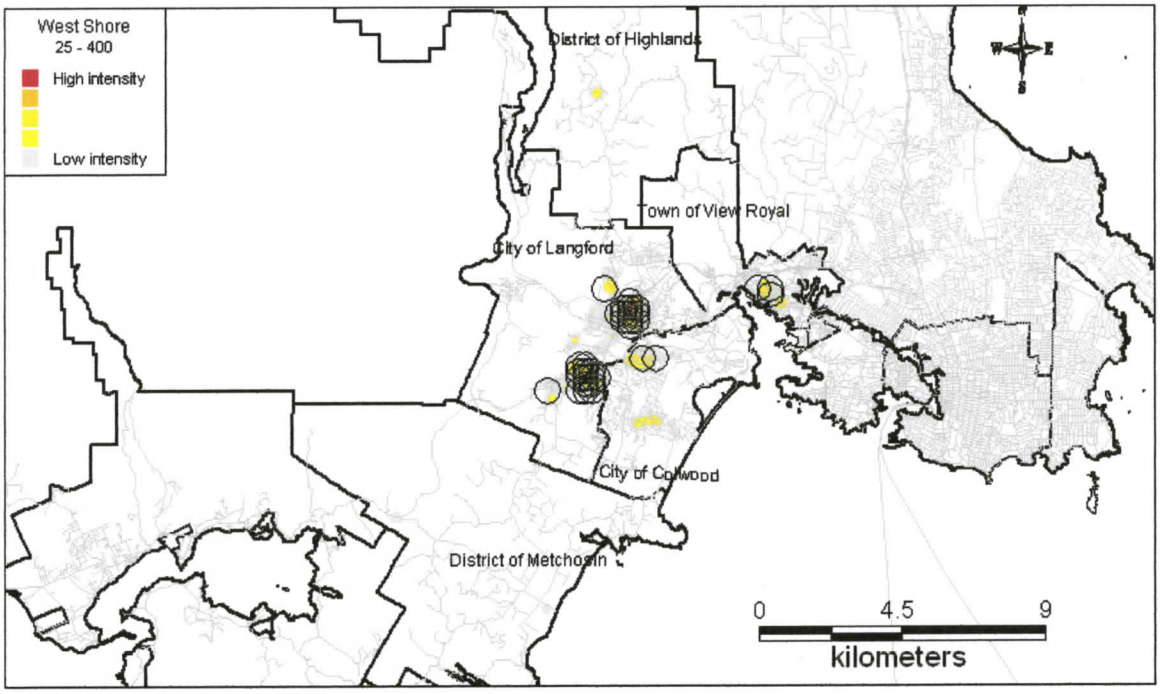


Figure II.40: West Shore GAM Results with 400m circles.

The circles generated by GAM at radii 500m and 600m did not identify either of the hot spots in Colwood (Figures II.41, II.42, II.44, and II.45).

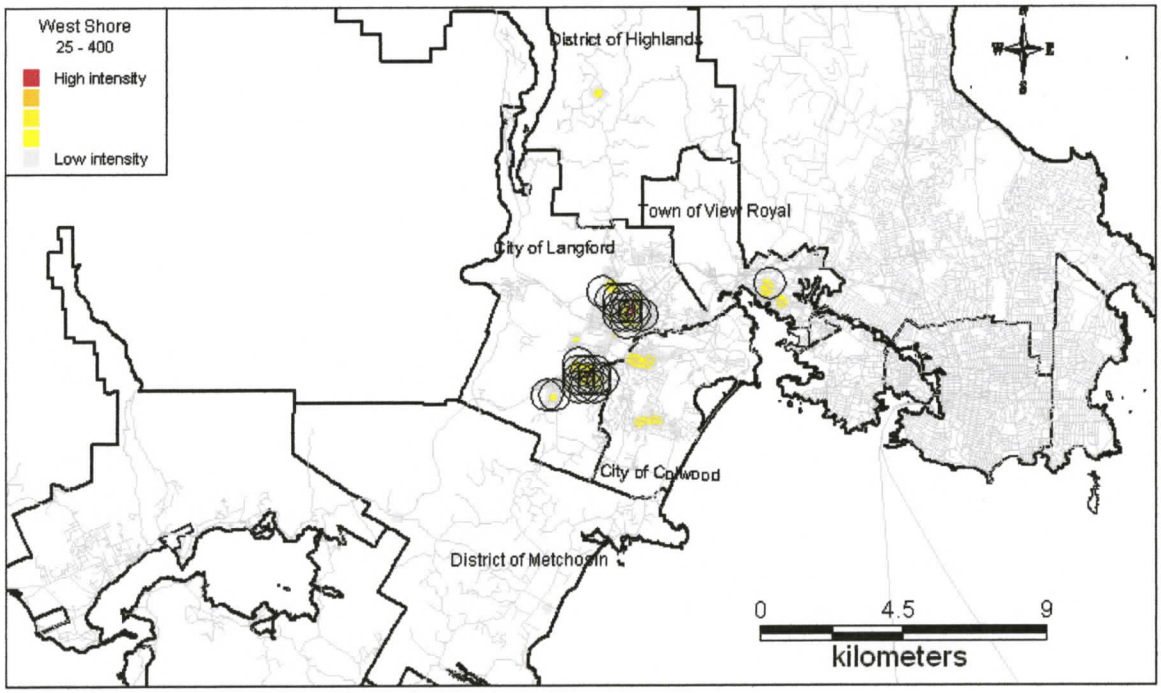


Figure II.41: West Shore GAM Results with 500m circles.

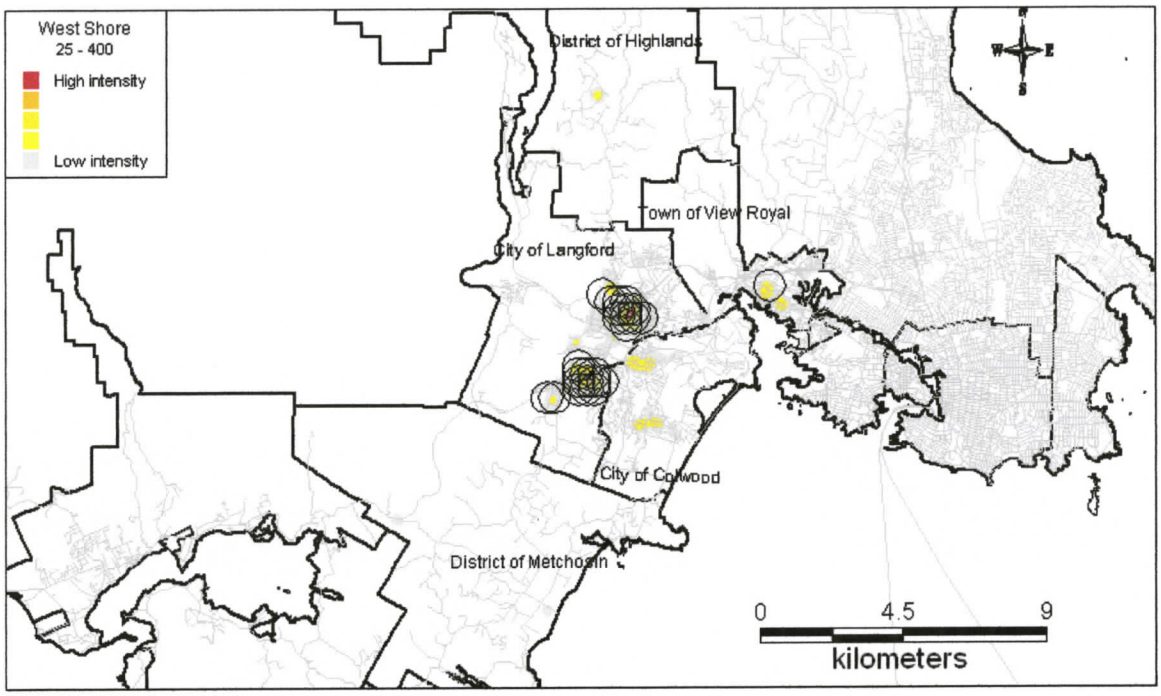


Figure II.42: West Shore GAM Results with 600m circles.

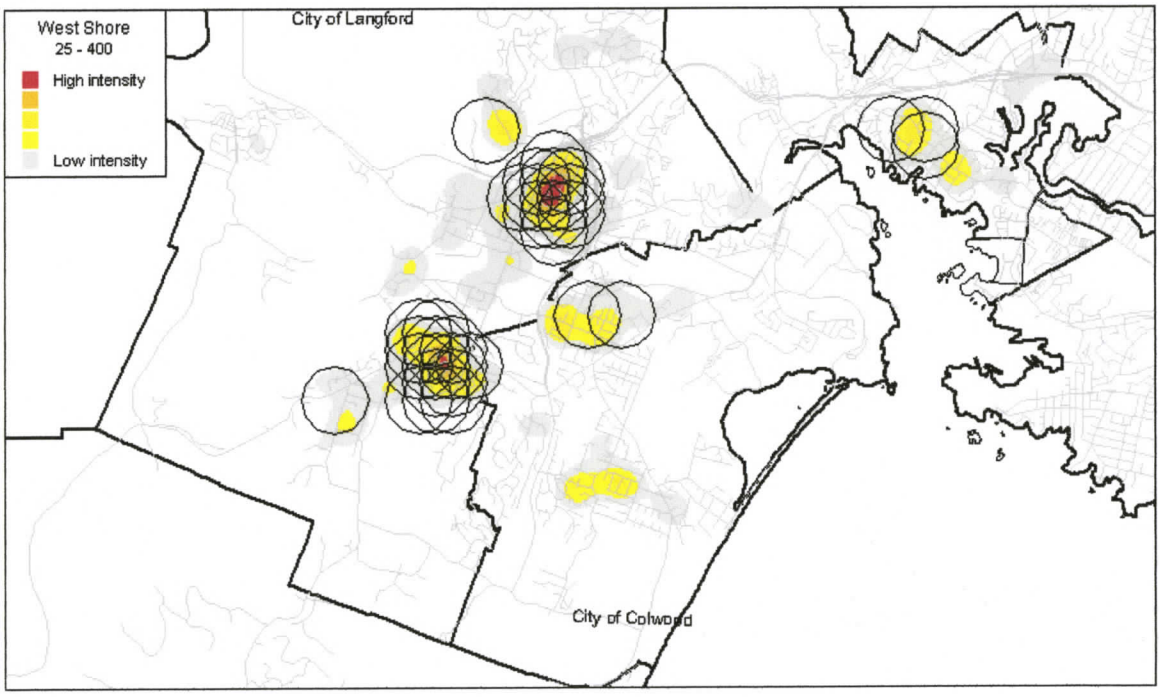


Figure II.43: Zoom in View West Shore GAM Results with 400m circles.

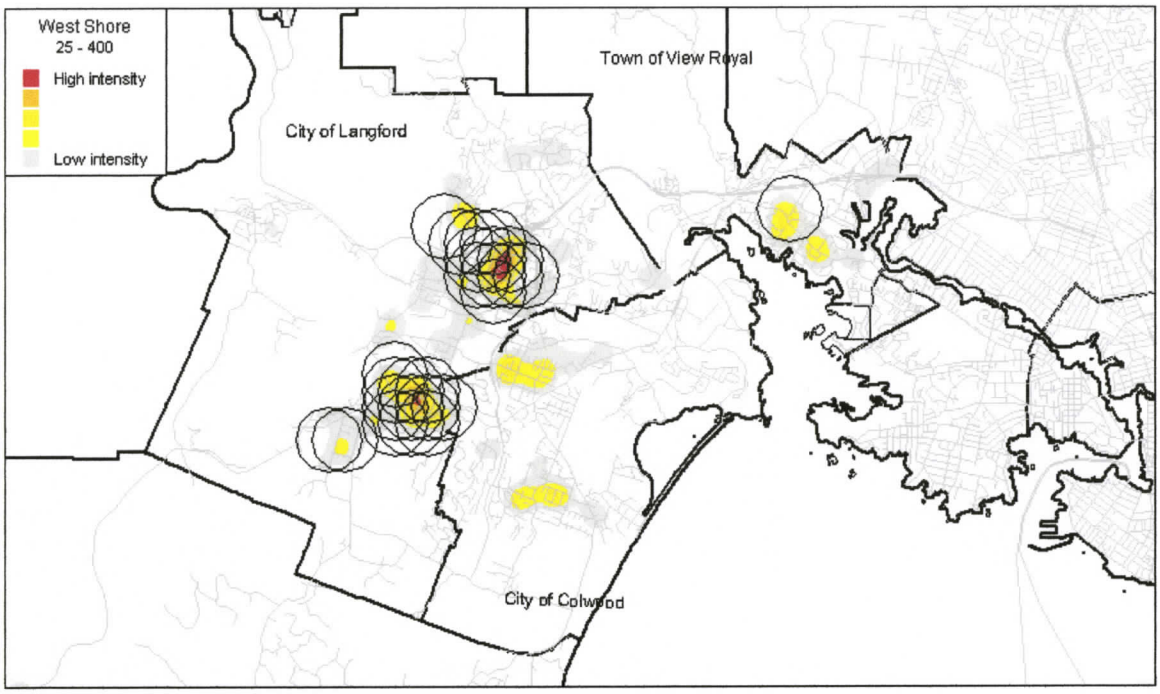


Figure II.44: Zoom in View West Shore GAM Results with 500m circles

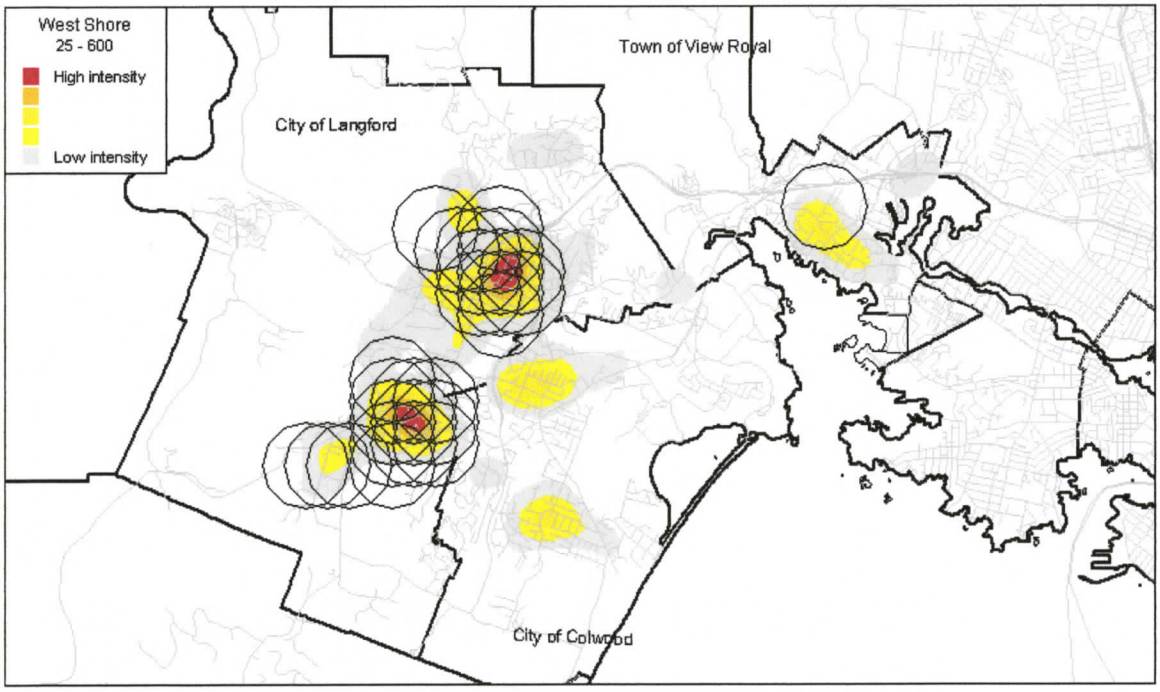


Figure II.45: Zoom in View West Shore GAM Results with 600m circles

GAM failed to recognize the low intensity hot spot in the Highlands district.

Sooke

The Sooke GAM results were placed over the $25m^2$ – 400m bandwidth coverage.

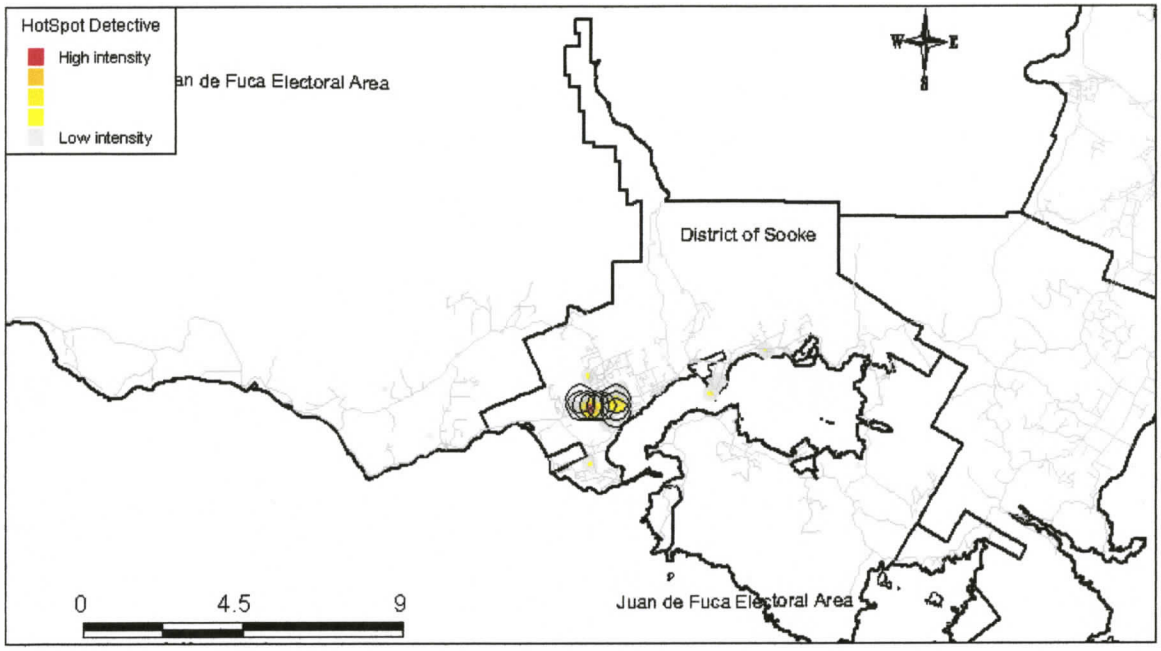


Figure II.46: Sooke GAM Results with 400m circles

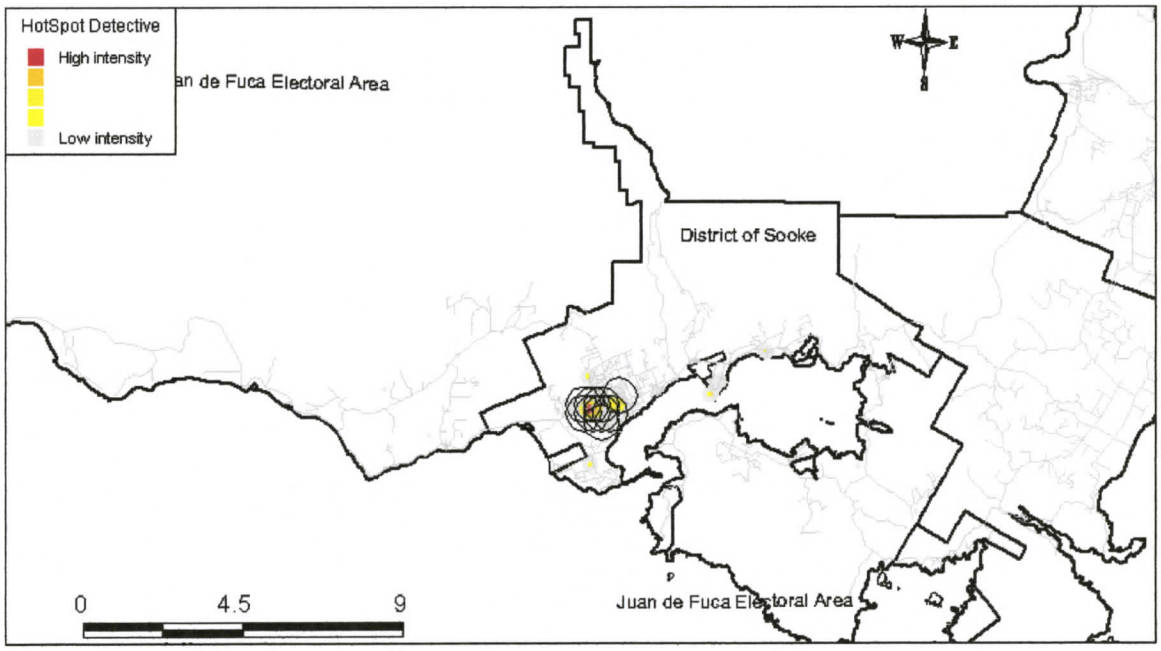


Figure II.47: Sooke GAM Results with 500m circles

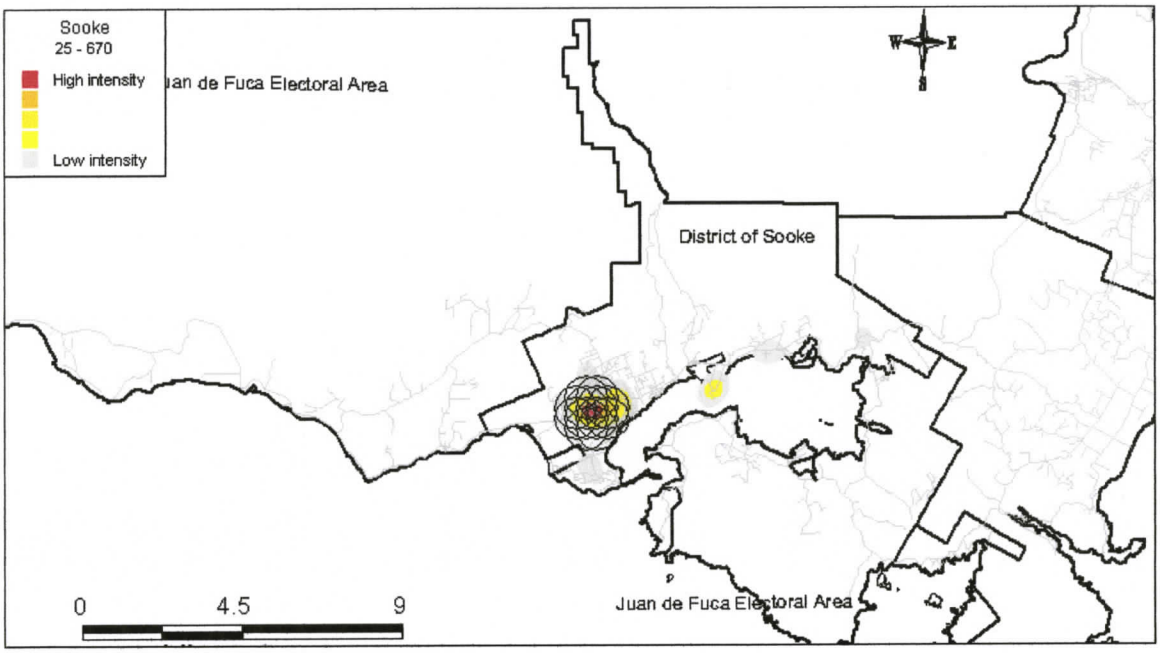


Figure II.48: Sooke GAM Results with 600m circles

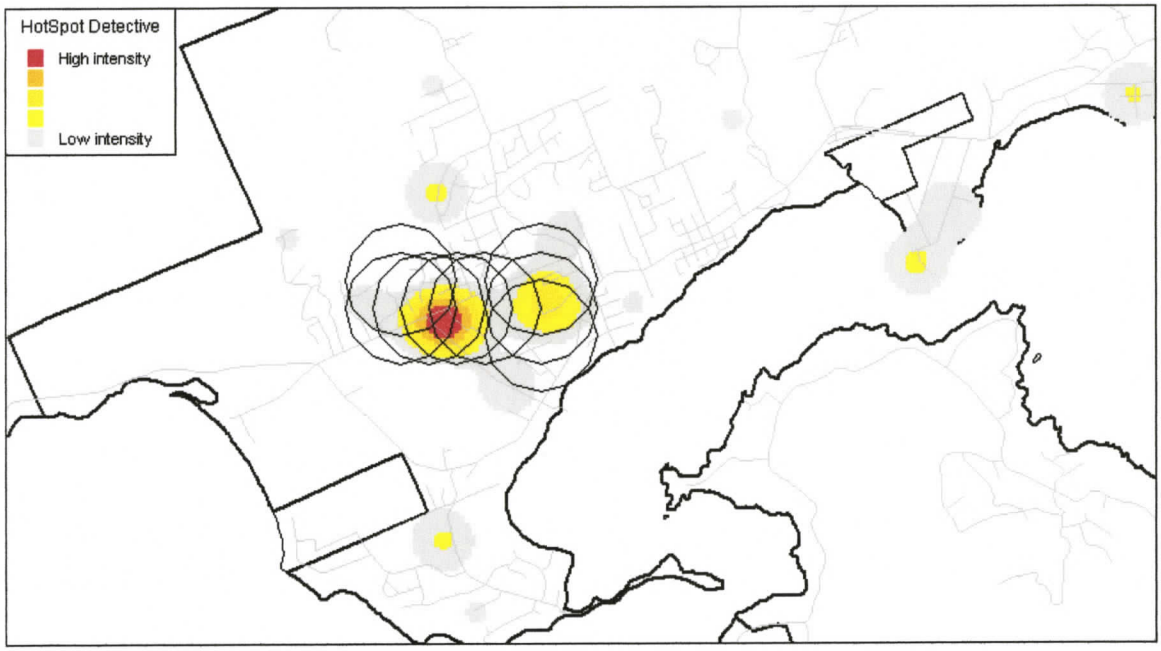


Figure II.49: Zoom in View Sooke GAM Results with 400m circles

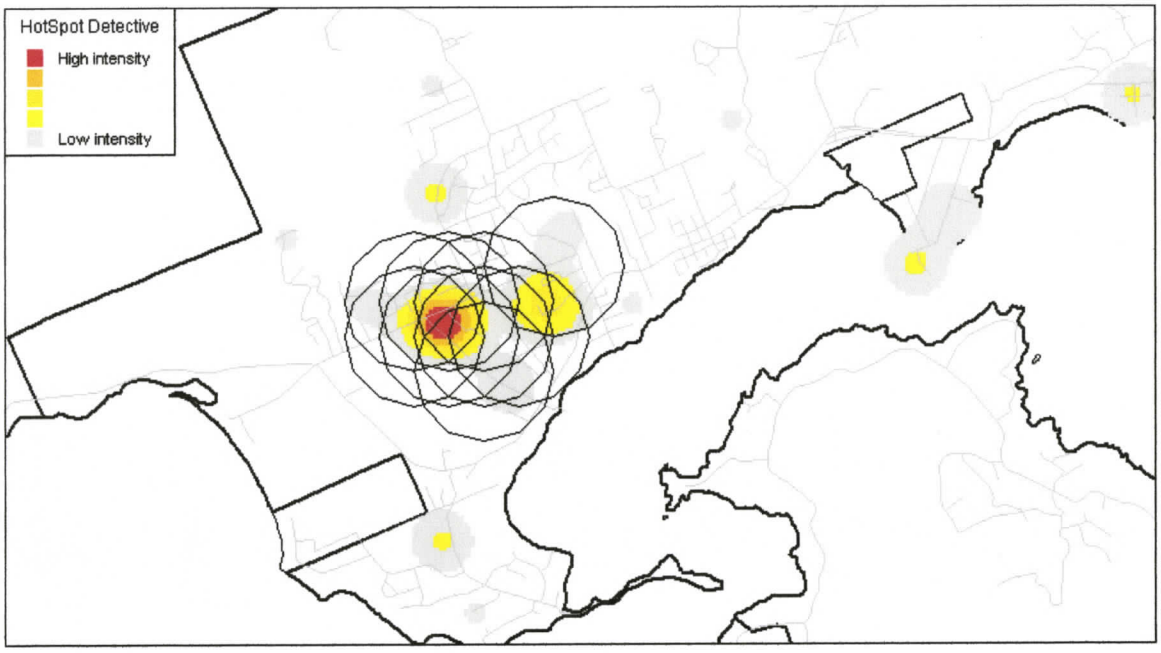


Figure II.50: Zoom in View Sooke GAM Results with 500m circles

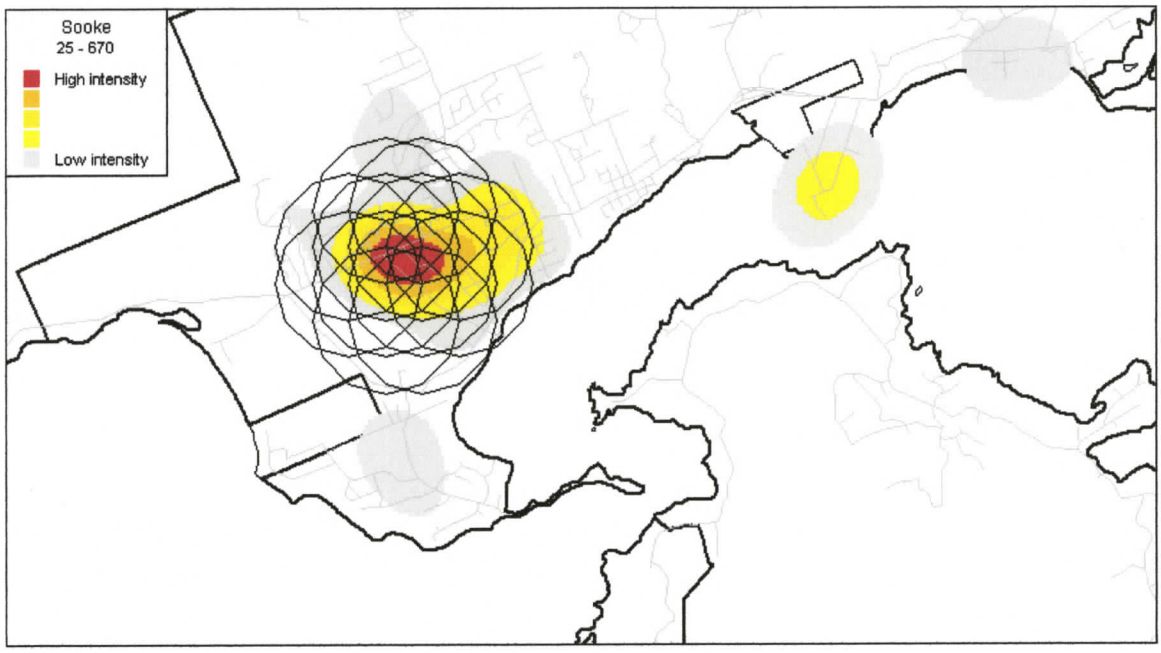


Figure II.51: Zoom in View Sooke GAM Results with 600m circles

The GAM circles are concentrated in the southwest portion of the municipality. The GAM routine, failed to identify several low intensity hot spots located in other areas of the municipality.

II.3 Hotspots

How well do hot spots identify high incident areas? To answer this question the relationship between hot spot area and break and enter was examined. A number of ratios were calculated, the ratio of hot spot area to total municipal area, average hot spot area, the ratio of break and enters, found within the hot spots, to total break and enters, and the ratio of break and enters to total hot spot area.

Sidney – North Saanich

In Sidney – North Saanich three (3) to five (5) hot spots were identified. The average size of the hot spot ranges from 0.04 to 0.19 km^2. At a bandwidth of 400 metres the most intense level of the hot spot activity identified 8% of the burglaries in only 0.6 % of the total area of the municipality. This accounted for 3 of the 37 burglaries geo-coded. If all three levels of the hot spot are included, 35% of the break and enters are captured in 4% of the municipality. This number increases as the bandwidth is enlarged, in other words, as we enlarge the bandwidth to 570 metres and then to 670 metres the number of events captured increases with only a minor increase in municipal area. At a bandwidth of 570 metres, between twenty two percent (22%) and thirty-eight (38%), or between 1/5 and 1/3 of all the break-ins in the municipality are contained in only 3% to 7% of the municipality. In other words, between 8 and 14 of the 37 burglaries geo-coded were found in three to five hot spots. At 670 metres between 19% and 38% of the break-ins were captures in 4% to 8% of the municipality. These figures provide basic descriptive information about the hot spot. It leads one to believe that the best results are obtained at the higher bandwidths, but this is not the case.

Another way to assess the effectiveness of the hot spot is to examine the ratio of break and enters to the number of hot spots. A concentration of burglaries in a limited quantity of hot spots is easier to respond to than the same number of break and enters scattered out amongst a number of hot spots. At 570 metres, either the same number or more burglaries are captured in less space than 670 metres. On the face of it 570 metres is as efficient a bandwidth as 670 metres. However, when we examine the ratio of burglaries per hot spots generated, 3 hot spots developed at 670 metres level 3 compared to 5 hot spots at 570 metres level 3. At 670 metres, the number of burglaries per hot spot is 4.7, while it is 2.9 at 570 metres. The total area of the hot spots differ slightly, 0.56 km^2 versus 0.46 km^2 respectively. However, because there are fewer hot spots there are fewer areas to address. It would appear that a bandwidth of 670 metres is more efficient than 570 metres.

2004	Hot Spot level of Intensity		
25/400	Level 1	Level 2	Level 3
Number of Hot Spots	1	3	5
# HS cells	69	341	782
Hot Spot Area Sq Km	0.04	0.17	0.28
Average HS area Sq Km	0.04	0.06	0.06
B and E In Level	3	9.00	13.00
% of Muni	0.6%	2.4%	3.9%
% Of B and E	8.1%	24.3%	35.1%
Ratio B and E to HS Area	0.07	0.05	0.05
Ratio B and E to #HS	3.0	3.0	2.6
B and E - HAS	0.21	0.16	0.12
25/570			
Number of Hot Spots	3	3	5
# HS cells	387	986	1768
Hot Spot Area Sq Km	0.24	0.37	0.49
Average HS area Sq Km	0.08	0.12	0.10
B and E In Level	8	11.00	14.00
% of Muni	3.4%	5.2%	6.8%
% Of B and E	21.6%	29.7%	37.8%
Ratio B and E to HS Area	0.03	0.03	0.03
Ratio B and E to #HS	2.7	3.7	2.8
B and E - HAS	0.09	0.11	0.08
25/670			
Number of Hot Spots	3	3	3
# HS cells	397	1192	2086
Hot Spot Area Sq Km	0.25	0.75	1.30
Average HS area Sq Km	0.08	0.25	0.43
B and E In Level	7	11.00	14.00
% of Muni	3.5%	10.4%	18.3%
% Of B and E	18.9%	29.7%	37.8%
Ratio B and E to HS Area	0.03	0.01	0.01
Ratio B and E to #HS	2.3	3.7	4.7
B and E - HAS	0.07	0.05	0.05

Table II.2: Sidney – North Saanich Relationship of break and enter to hot spot (HS) Area

Another method to determine hot spot efficiency is to examine the ratio of break and enter to hot spot area. The highest ratios are found at all three levels at the 400m bandwidth (Table II.2). At the other bandwidths the ratios vary from a low of 0.022 (670m bandwidth - level 2) to a high of 0.033 (570m bandwidth - level 1).

These two measures present results from two extremes. It is the nature of the measures that sets them apart. The first is concerned with the number of hotspots and does not consider area as an important factor. The second is not concerned with the

number of hot spots only with the total area of the hot spots. A third measures tries to overcome this extreme by taking the ratio of break and enter to hot spot area (Table II.2: B AND E -HAS) and multiplying it by the ratio of break and enter to number of hot spots. The most efficient bandwidth levels are found at 400 metres level 1, 2 and 3. The difference with this measure is that it identifies bandwidths 570 metres level 1 and bandwidth 670 metres level 3 as important. From a strategic perspective these three measures in combination could help decision makers determine the location and the kind of resources that should be deployed to address the concentrations of burglaries.

Central Saanich

Twenty three break and enters were geo-coded in Central Saanich. There was a wide variation in the number of hot spots generated at the different bandwidths. With bandwidths of 400 metres and 500 metres, at the third level of intensity there were 18 and 16 hot spots respectively. They only identified 1.3 and 1.4 burglaries per hot spot respectively. These two levels were not very efficient in identifying hot spots, in fact, the majority of level 3 hot spots consisted of a single point.

Excluding level 3 outcomes at bandwidths 400m and 500m provides more meaningful results. The number of hot spots ranged from 2 to 5, capturing between 9% (2) (400 – level 1) and 52% (12) (670m – Level 3) of the break and enters. The total area of the municipality where the hotspots were located varied between 0.1% (400 – level 1) and 3.6% (670m – Level 3). The hot spots averaged in size between .02 km^2 (450m – level 1) and .45 km^2 (670m – level 3).

The ratio of break and enter to hot spots area ranged from 0.01 to 0.05. The ratio of break and enter to number of hot spots varied from 1 to 3. The combined measure B

AND E – HAS illustrated little variation in rates ranging from a low of 0.02 to a high of 0.05.

2004	Hot Spot Intensity		
25/400	Level 1	Level 2	level 3
Number of Hot Spots	1	2	5
# HS cells	90	259	1089
Hot Spot Area Sq Km	0.06	0.11	0.52
Average HS Area km^2	0.06	0.05	0.10
B and E In Level	3	6	17
% of Muni	0.3%	0.6%	3.2%
% Of B and E	6.1%	12.2%	34.7%
Ratio B and E to HS Area	0.05	0.06	0.03
Ratio B and E to #HS	3	3	3
B and E - HAS	0.16	0.17	0.11
25/670	Level 1	Level 2	level 3
Number of Hot Spots	2	1	2
# HS cells	726	1697	3544
Hot Spot Area Sq Km	0.45	1.06	2.22
Average HS Area km^2	0.23	1.06	1.11
B and E In Level	4	17	27
% of Muni	2.8%	6.5%	13.5%
% Of B and E	8.2%	34.7%	55.1%
Ratio B and E to HS Area	0.01	0.02	0.01
Ratio B and E to #HS	2	17	14
B and E - HAS	0.02	0.27	0.16
25/720	Level 1	Level 2	level 3
Number of Hot Spots	1	1	2
# HS cells	892	1873	3922
Hot Spot Area Sq Km	0.56	1.17	2.45
Average HS Area km^2	0.56	1.17	1.23
B and E In Level	5	18	26
% of Muni	3.4%	7.2%	15.0%
% Of B and E	10.2%	36.7%	53.1%
Ratio B and E to HS Area	0.01	0.02	0.01
Ratio B and E to #HS	5	18	13
B and E - HAS	0.04	0.28	0.14

Table II.3: Central Saanich Relationship of break and enter to hot spot (HS) Area

Saanich

Three hundred and sixty three (363) break and enters were geo-coded in Saanich. At all bandwidths intensity levels 1 and 2 had one hot spot, level 3 had 2 hot spots (Table

II.4). The average area of the hot spots varied from 0.08 km^2 to 0.55 km^2. The hot spots covered between 0.1% (400m – level 1) and 1% (1000m – level 3) of the municipality. The percent of break-ins captured varied from 1.4% (400m – level 1) to 20.1% (1000m – level 3). In general, 1/5 of all the break-ins were captured at level 3 bandwidth 1000 metres in 1.11 km^2 of the municipality.

The highest number of break-ins per hot spots was 46 (12.7%) at level 2 intensity - 1000m bandwidth. With a bandwidth of 670m and level two intensity, there were 37 (10.2%) break-ins captured in one hot spot. At a bandwidth of 1000m and level two intensity, there were 73 (20.1%) burglaries recorded in two separate hot spots, or 37 break-ins per hot spot.

In contrast the highest ratio of break and enter to hot spot area 0.103 was at a bandwidth of 400m with a level 3 intensity where 52 burglaries were counted in two hot spots. The next highest area, with a ratio of 0.096, where thirty-seven break-ins were located in one hot spot in level 2 at 670 metre bandwidth. Level 2 – 1000 metre bandwidth had the highest B AND E – HAS rate of 3.61 followed by 3.54 at level 2 - 670 metre bandwidth. It would appear that Level 2 – 1000 metre bandwidth is the most efficient bandwidth given the area of the hot spot, the number of hot spots, and the number of break-in located in the hot spot.

2004	Hot Spot Intensity		
25/400	Level 1	Level 2	Level 3
Number of Hot Spots	1	1	2
# HS cells	130	553	1361
Hot Spot Area Sq Km	0.08	0.26	0.51
Average HS Area km^2	0.08	0.26	0.25
B and E In Level	5	25	52
% of Muni	0.1%	0.2%	0.5%
% Of B and E	1.4%	6.9%	14.3%
Ratio B and E to HS Area	0.06	0.09	0.10
Ratio B and E to #HS	5	25	26
B and E - HAS	0.31	2.36	2.68
25/670	Level 1	Level 2	Level 3
Number of Hot Spots	1	1	2
# HS cells	467	1086	2177
Hot Spot Area Sq Km	0.29	0.39	0.68
Average HS Area km^2	0.29	0.39	0.34
B and E In Level	17	37	59
% of Muni	0.3%	0.3%	0.6%
% Of B and E	4.7%	10.2%	16.3%
Ratio B and E to HS Area	0.06	0.10	0.09
Ratio B and E to #HS	17	37	29.5
B and E - HAS	0.99	3.54	2.55
25/1000	Level 1	Level 2	Level 3
Number of Hot Spots	1	1	2
# HS cells	688	1625	3394
Hot Spot Area Sq Km	0.43	0.59	1.11
Average HS Area km^2	0.43	0.59	0.55
B and E In Level	21	46	73
% of Muni	0.4%	0.5%	1.0%
% Of B and E	5.8%	12.7%	20.1%
Ratio B and E to HS Area	0.05	0.08	0.07
Ratio B and E to #HS	21	46	36.5
B and E - HAS	1.03	3.61	2.41

Table II.4: Saanich Relationship of break and enter to hot spot (HS) Area

Victoria – Esquimalt

Six hundred and sixty-three break and enters were geo-coded in Victoria – Esquimalt. This number is very interesting since it is almost twice as many burglaries as the next municipality. Victoria – Esquimalt is the second smallest area (combined) in the region next to Oak Bay.

2004	Hot Spot Intensity		
25/400	Level 1	Level 2	Level 3
Number of Hot Spots	1	1	3
# HS cells	24	59	166
Hot Spot Area Sq Km	0.02	0.02	0.07
Average HS Area km^2	0.02	0.02	0.02
B and E In Level	23	28	51
% of Muni	0.04%	0.07%	0.20%
% Of B and E	3.5%	4.2%	7.7%
Ratio B and E to HS Area	1.53	1.28	0.76
Ratio B and E to #HS	23	28	17
B and E - HAS	35.27	35.84	12.96
25/530	Level 1	Level 2	Level 3
Number of Hot Spots	1	2	3
# HS cells	218	627	2513
Hot Spot Area Sq Km	0.14	0.26	1.18
Average HS Area km^2	0.14	0.13	0.39
B and E In Level	29	44	139
% of Muni	0.4%	0.8%	3.5%
% Of B and E	4.4%	6.6%	21.0%
Ratio B and E to HS Area	0.21	0.17	0.12
Ratio B and E to #HS	29	22	46
B and E - HAS	6.17	3.79	5.46
25/670	Level 1	Level 2	Level 3
Number of Hot Spots	1	2	2
# HS cells	415	1812.00	4683.00
Hot Spot Area Sq Km	0.26	0.87	1.79
Average HS Area km^2	0.26	0.44	0.90
B and E In Level	37	94	190
% of Muni	0.8%	2.6%	5.4%
% Of B and E	5.6%	14.2%	28.7%
Ratio B and E to HS Area	0.14	0.11	0.11
Ratio B and E to #HS	37	47	95
B and E - HAS	5.28	5.06	10.06

Table II.5: Victoria – Esquimalt Relationship of break and enter to hot spot (HS) Area

The clusters identified by the hot spots contain a minimum of 4% (23 burglaries) to a maximum of 29% (190 burglaries) of the total break and enters for 2004. The largest bandwidth/level combination is limited to just 5% of the total area of the municipality. The 400 metre bandwidth has the highest break and enters to area ratio. There is not a great deal of variation of break and enters per hot spot until higher bandwidth/level

combinations are attained. At these levels 14% to 29% of burglaries are captured in a very small proportion of the total municipal area.

Oak Bay

Forty-nine break and enters were geo-coded in Oak Bay in 2004. A maximum of five hot spots were identified at the different bandwidth/level combinations (Table II.6). The hot spots captured between 6.1% and 53.1% of the total number of break and enters located in the municipality. The area of the hot spots varied from 0.3% to 15% of the municipality. Level 2 of bandwidth 670 metres (17) and 720 metres (18) had the highest count of break-ins within 7.2% of the municipality. These same two levels showed the highest levels of burglaries per hot spot to hot spot area.

2004	Hot Spot Intensity		
25/400	Level 1	Level 2	level 3
Number of Hot Spots	1	2	5
# HS cells	90	259	1089
Hot Spot Area Sq Km	0.06	0.11	0.52
Average HS Area km^2	0.06	0.05	0.10
B and E In Level	3	6	17
% of Muni	0.3%	0.6%	3.2%
% Of B and E	6.1%	12.2%	34.7%
Ratio B and E to HS Area	0.05	0.06	0.03
Ratio B and E to #HS	3	3	3
B and E - HAS	0.16	0.17	0.11
25/670	Level 1	Level 2	level 3
Number of Hot Spots	2	1	2
# HS cells	726	1697	3544
Hot Spot Area Sq Km	0.45	1.06	2.22
Average HS Area km^2	0.23	1.06	1.11
B and E In Level	4	17	27
% of Muni	2.8%	6.5%	13.5%
% Of B and E	8.2%	34.7%	55.1%
Ratio B and E to HS Area	0.01	0.02	0.01
Ratio B and E to #HS	2	17	14
B and E - HAS	0.02	0.27	0.16
25/720	Level 1	Level 2	level 3
Number of Hot Spots	1	1	2
# HS cells	892	1873	3922
Hot Spot Area Sq Km	0.56	1.17	2.45
Average HS Area km^2	0.56	1.17	1.23
B and E In Level	5	18	26
% of Muni	3.4%	7.2%	15.0%
% Of B and E	10.2%	36.7%	53.1%
Ratio B and E to HS Area	0.01	0.02	0.01
Ratio B and E to #HS	5	18	13
B and E - HAS	0.04	0.28	0.14

Table II.6: Oak Bay Relationship of break and enter to hot spot (HS) Area

West Shore

West Shore, similar to Sidney – North Saanich, is a compilation of municipalities. Four municipalities make up West Shore RCMP detachment, two of the municipalities, Highlands and Metchosin, are rural in nature and sparsely populated. Colwood and Langford, on the other hand, contain the majority of commercial activity and residential development. The area of all four municipalities was included in the hot spot analysis.

However, the majority of residential burglaries are found in Langford, Colwood and View Royal areas (Table: II.7).

2004	Hot Spot Intensity		
25/400	Level 1	Level 2	Level 3
Number of Hot Spots	2	2	3
# HS cells	135	421	1138
Hot Spot Area Sq Km	0.08	0.18	0.45
Average HS Area km^2	0.04	0.09	0.15
B and E In Level	8	14	32
% of Muni	0.04%	0.1%	0.2%
% Of B and E	4.8%	8.3%	19.0%
Ratio B and E to HS Area	0.09	0.08	0.07
Ratio B and E to #HS	4	7	11
B and E - HAS	0.38	0.55	0.76
25/600	Level 1	Level 2	Level 3
Number of Hot Spots	2	2	5
# HS cells	399	1016	2445
Hot Spot Area Sq Km	0.25	0.39	0.89
Average HS Area km^2	0.12	0.19	0.18
B and E In Level	11	20	33
% of Muni	0.13%	0.2%	0.5%
% Of B and E	6.5%	11.9%	19.6%
Ratio to B and E to HS Area	0.04	0.05	0.04
Ratio B and E to #HS	6	10	7
B and E - HAS	0.24	0.52	0.24
25/670	Level 1	Level 2	Level 3
Number of Hot Spots	2	2	5
# HS cells	524	1292	3106
Hot Spot Area Sq Km	0.33	0.48	1.13
Average HS Area km^2	0.16	0.24	0.23
B and E In Level	13	22	40
% of Muni	0.17%	0.2%	0.6%
% Of B and E	7.7%	13.1%	23.8%
Ratio to B and E to HS Area	0.04	0.05	0.04
Ratio B and E to #HS	7	11	8
B and E - HAS	0.26	0.50	0.28

Table II.7: West Shore Relationship of break and enter to hot spot (HS) Area

This creates a concern since the combination of municipalities forms a large region, which tends to distort the hot spot area as a percent of the total municipal areas.

There were 168 burglaries geo-coded in the West Shore area for 2004. Two to five hot spots were created at the different bandwidth/level groupings. The results reveal

that an area of 0.04% to 0.6% of the municipalities contained 5% to 24% of the total number of break and enters. The 400 metre bandwidth levels have the highest ratio of burglaries to area. Two bandwidths, 400m level 3 and 670m level 2 had the highest ratio of burglaries to number of hot spots with 11 each.

Sooke

The Sooke district and region consist of such a vast region that this analysis was not conducted. The results would have been distorted due to the large area in contrast to the high concentration of burglaries in a small proportion of the region.

II.4 Changes Over Time

It is clear from the previous results that hot spots identify areas where there are high concentrations of burglaries within a limited proportion of the municipalities. To this point only one year has been examined, the question arises are these findings consistent over time? To answer this percent of total break and enters and percent of municipal area are compared over three year intervals.

Sidney – North Saanich

The extreme bandwidths identified hot areas in less than 14% of the total area of the two municipalities. At minimum, the lowest bandwidth/level combination identified on average 10% of the burglaries over the three-year period. The maximum levels captured an average of 42% of the burglaries during the three years.

Percent of Municipal Area				Percent of B and E			
25/400	Level 1	Level 2	Level 3	25/400	Level 1	Level 2	Level 3
2004	0.6%	2.4%	3.9%	2004	8.1%	24.3%	35.1%
2001	0.8%	0.9%	1.3%	2001	13.6%	13.6%	31.8%
1998	0.4%	0.9%	2.7%	1998	9.1%	30.3%	51.5%
25/570	Level 1	Level 2	Level 3	25/570	Level 1	Level 2	Level 3
2004	3.4%	5.2%	6.8%	2004	21.6%	29.7%	37.8%
2001	1.5%	1.7%	2.3%	2001	18.2%	22.7%	27.3%
1998	3.9%	6.6%	13.6%	1998	15.2%	27.3%	54.5%
25/670	Level 1	Level 2	Level 3	25/670	Level 1	Level 2	Level 3
2004	3.5%	7.0%	7.8%	2004	18.9%	29.7%	37.8%
2001	1.9%	2.4%	3.5%	2001	18.2%	22.7%	31.8%
1998	5.2%	8.1%	13.4%	1998	18.2%	33.3%	57.6%

Table II.8: Sidney–North Saanich Hot Spot Size and Percent of Break and Enter Over Three Year Intervals.

Central Saanich

The size of the hot spots in proportion to total municipal area remains small over time. The hot spots capture a minimum of 9% of the break-ins at the lowest bandwidth/level combination. There is, however, a noticeable variation in the percent of burglaries identified between the three years.

Percent of Municipal Area				Percent of B and E			
25/400	Level 1	Level 2	Level 3	25/400	Level 1	Level 2	Level 3
2004	0.1%	0.5%	1.2%	2004	8.7%	17.4%	100.0%
2001	0.1%	0.3%	0.5%	2001	23.5%	23.5%	64.7%
1998	0.1%	0.3%	1.1%	1998	9.1%	12.1%	33.3%
25/500	Level 1	Level 2	Level 3	25/500	Level 1	Level 2	Level 3
2004	0.3%	1.0%	2.2%	2004	13.0%	34.8%	100.0%
2001	0.2%	0.5%	1.1%	2001	23.5%	23.5%	70.6%
1998	0.2%	0.6%	1.4%	1998	9.1%	12.1%	39.4%
25/670	Level 1	Level 2	Level 3	25/670	Level 1	Level 2	Level 3
2004	0.3%	1.6%	3.6%	2004	13.0%	34.8%	52.2%
2001	0.6%	1.4%	2.5%	2001	23.5%	23.5%	41.2%
1998	0.4%	0.9%	2.0%	1998	9.1%	18.2%	39.4%

Table II.9: Central Saanich Hot Spot Size And Percent of Break and Enter Over Three Year Intervals.

Saanich

In Saanich the total hot spot area never exceeds 2.4% of the municipality over the three time periods. On average, 5, 11 and 19% of the annual municipal burglaries were captured in the corresponding hot spot levels over the three year period.

Percent of Municipal Area				Percent of B and E			
25/400	Level 1	Level 2	Level 3	25/400	Level 1	Level 2	Level 3
2004	0.1%	0.2%	0.5%	2004	1.4%	6.9%	14.3%
2001	0.1%	0.1%	0.2%	2001	4.6%	6.3%	9.3%
1998	0.1%	0.1%	0.3%	1998	3.5%	6.0%	13.1%
25/670	Level 1	Level 2	Level 3	25/670	Level 1	Level 2	Level 3
2004	0.3%	0.3%	0.6%	2004	4.7%	10.2%	16.3%
2001	0.4%	0.8%	1.4%	2001	7.1%	15.8%	26.2%
1998	0.2%	0.3%	0.6%	1998	5.4%	9.3%	19.1%
25/1000	Level 1	Level 2	Level 3	25/1000	Level 1	Level 2	Level 3
2004	0.4%	0.5%	1.0%	2004	5.8%	12.7%	20.1%
2001	0.5%	0.9%	2.4%	2001	4.1%	13.4%	29.7%
1998	0.4%	0.5%	1.2%	1998	7.9%	14.2%	24.8%

Table II.10: Saanich Hot Spot Size and Percent of Break and Enter Over Three Year Intervals.

Oak Bay

The largest area hot spot coverage did not exceed 15% of the municipality (Table II.11: year 2004; 25/720 - level 3). Fifty three percent of the break ins were captured in this area. Even the lowest levels of resolution encompassed up to 35% (25/400, Level 3) of the residential burglaries within 3.2% of the municipality.

Percent of Municipal Area				Percent of B and E			
25/400	Level 1	Level 2	Level 3	25/400	Level 1	Level 2	Level 3
2004	0.3%	0.6%	3.2%	2004	6.1%	12.2%	34.7%
2001	0.3%	1.0%	2.6%	2001	8.5%	18.6%	28.8%
1998	0.4%	1.0%	2.9%	1998	5.3%	9.2%	26.3%
25/670	Level 1	Level 2	Level 3	25/670	Level 1	Level 2	Level 3
2004	2.8%	6.5%	13.5%	2004	8.2%	34.7%	55.1%
2001	2.5%	6.3%	11.3%	2001	18.6%	32.2%	52.5%
1998	1.4%	3.8%	7.0%	1998	13.2%	26.3%	35.5%
25/720	Level 1	Level 2	Level 3	25/720	Level 1	Level 2	Level 3
2004	3.4%	7.2%	15.0%	2004	10.2%	36.7%	53.1%
2001	2.6%	7.1%	12.1%	2001	23.7%	33.9%	52.5%
1998	1.6%	4.3%	7.8%	1998	13.2%	27.6%	36.8%

Table II.11: Oak Bay Hot Spot Size and Percent of Break and Enter Over Three Year Intervals.

Victoria[3]

The higher levels of resolution identified a substantial percentage of break and enters within a limited amount of space (Table II.12). The amount of area never exceeds 10% of the municipality, yet the number of burglaries captured surpasses 35% in that same year. Even at low resolutions, in excess of 4% of the break and enters are identified by the hot spots. At the high end of the low resolutions a minimum of 10% of the break ins are contained within the hot spots.

Victoria Percent of Municipal Area				Victoria Percent of BE			
25/400	Level 1	Level 2	Level 3	25/400	Level 1	Level 2	Level 3
2004	0.3%	0.3%	1.2%	2004	4.4%	5.3%	9.9%
2001	0.9%	1.3%	3.4%	2001	7.7%	15.0%	27.6%
1998	0.3%	1.4%	4.3%	1998	4.3%	10.6%	29.0%
25/530	Level 1	Level 2	Level 3	25/530	Level 1	Level 2	Level 3
2004	0.6%	1.1%	5.0%	2004	5.3%	8.3%	25.7%
2001	1.6%	3.6%	6.6%	2001	10.3%	17.8%	34.5%
1998	1.3%	4.4%	9.7%	1998	9.9%	22.2%	39.7%
25/670	Level 1	Level 2	Level 3	25/670	Level 1	Level 2	Level 3
2004	1.1%	3.7%	10.3%	2004	6.8%	17.6%	35.8%
2001	2.2%	3.6%	8.1%	2001	13.4%	24.5%	44.4%
1998	2.3%	4.5%	7.9%	1998	9.6%	26.3%	43.4%

Table II.12: Victoria Hot Spot Size and Percent of Break and Enter Over Three Year Intervals.

[3] Victoria and Esquimalt data were separated to examine the results at the municipal level.

Esquimalt

In Esquimalt, the lowest levels in each bandwidth identified less than 5% of the municipality as a hot spot in any one of the three years (Table II.13). Within this 5% area, between 8 and 21% of the burglaries were located. As the bandwidth increases the number of break and enters captured increases. Less than15.4 percent of the municipality, at the largest bandwidth and level contain hot spots, yet the hot spots identify up to 81% of the burglaries.

Esquimalt Percent of Municipal Area				Esquimalt Percent of B and E			
25/400	Level 1	Level 2	Level 3	25/400	Level 1	Level 2	Level 3
2004	2.3%	3.9%	7.9%	2004	18.6%	39.8%	64.4%
2001	1.3%	3.0%	6.6%	2001	14.9%	37.2%	60.6%
1998	0.6%	2.4%	6.0%	1998	8.3%	22.2%	45.4%
25/530	Level 1	Level 2	Level 3	25/530	Level 1	Level 2	Level 3
2004	1.6%	6.2%	8.7%	2004	9.3%	38.1%	68.6%
2001	1.3%	4.4%	9.7%	2001	10.6%	36.2%	70.2%
1998	1.2%	6.8%	9.9%	1998	8.3%	35.2%	63.0%
25/670	Level 1	Level 2	Level 3	25/670	Level 1	Level 2	Level 3
2004	2.9%	7.7%	9.8%	2004	13.6%	49.2%	71.2%
2001	2.2%	7.7%	13.1%	2001	12.8%	45.7%	80.9%
1998	5.1%	10.5%	15.4%	1998	21.3%	53.7%	75.9%

Table II.13: Esquimalt Hot Spot Size and Percent of Break and Enter Over Three Year Intervals.

West Shore

In Table II.14, we see similar results that surfaced in other parts of the CRD. The hot spot area in West Shore never surpasses 1.1% of the sub-region. The hot spots identify between 3% and 29.2% of the break and inters in the region.

Percent of Municipal Area				Percent of B and E			
25/400	Level 1	Level 2	Level 3	25/400	Level 1	Level 2	Level 3
2004	0.04%	0.1%	0.2%	2004	4.8%	8.3%	19.0%
2001	0.03%	0.1%	0.3%	2001	3.3%	5.4%	15.0%
1998	0.11%	0.4%	0.5%	1998	3.1%	13.0%	20.5%
25/600	Level 1	Level 2	Level 3	25/600	Level 1	Level 2	Level 3
2004	0.04%	0.1%	0.2%	2004	6.5%	11.9%	19.6%
2001	0.03%	0.1%	0.3%	2001	4.6%	11.7%	25.8%
1998	0.11%	0.4%	0.6%	1998	3.1%	13.0%	20.5%
25/670	Level 1	Level 2	Level 3	25/670	Level 1	Level 2	Level 3
2004	0.17%	0.2%	0.6%	2004	7.7%	13.1%	23.8%
2001	0.22%	0.3%	1.1%	2001	5.4%	12.9%	29.2%
1998	0.11%	0.4%	0.6%	1998	3.1%	13.8%	20.9%

Table 11.14: West Shore Hot Spot Size and Percent of Break and Enter Over Three Year Intervals.

We have observed that a limited area may contain a substantial proportion of the break and enters. The Kruskal-Wallis test (Earickson, 1994; McGrew Jr. & Monroe, 1993) was employed to determine if the area captured in the hot spots varies significantly between the three time periods. The number of cells in each hot spot was used as a surrogate for the percentage of area contained within hot spots. The number of hot spot cells within the three levels at each bandwidth is compared across the three year period. For example, level 1, 2, and 3 for bandwidth 400 are compared across year 1, 2 and 3. The same test was applied to the number of break and enters captured at each level over the three year period

# HS Cells In Level Yr 1-3	H Value		
Municipality	Level 1	Level 2	Level 3
Sidney N. Saanich	1.16	1.16	1.42
Central Saanich	0.09	1.07	5.5
Saanich	1.69	0.8	1.87
Oak Bay	1.16	0.62	1.69
Victoria	2.49	5.96*	0.27
Esquimalt	1.69	0.62	0.09
West Shore	0.62	1.16	1.87
* Critical value: 0.05, H = 5.6			

Table II.15: Kruskal Wallis Results for the number of Hot Spot Cells in each level.

In table II.15 we see that the hot spot area did not vary significantly between the three time periods for all areas except Victoria. One or more of the Victoria level 2 samples was different from the other samples. However, the levels 1 or 3 samples did not vary between year one and three.

Break and Enter 1998 to 2004

Municipality	H Value	
	400 Lvl 1 to 3	670 Lvl 1 to 3
Sidney N. Saanich	6.078	10.754
Central Saanich	-0.103	-10.91
Saanich	3.927	2.6
Oak Bay	3.202	2.586
Victoria[1]	2.626	3.058
Esquimalt[1]	3.824	0.906
West Shore	1.221	1.195
* Critical value: 0.05, X^2 12.59 at 6 *df*		

[1]Yr 2003 Victoria & Esquimalt not included - Critical value: 0.05, X^2 11.07 at 5*df*

Table II.16: Kruskal Wallis results for the number of Break and Enters in each level.

The break and enters were aggregated by bandwidth and level and compared across the seven year study period using the Kruskal Wallis test. It is evident that the break and enters identified do not change significantly through the study period (Table II.16). There seems to be a fairly consistent size of hot spots and number of break and enters identified over time. It would appear that hot spots capture similar numbers of break and enters over time.

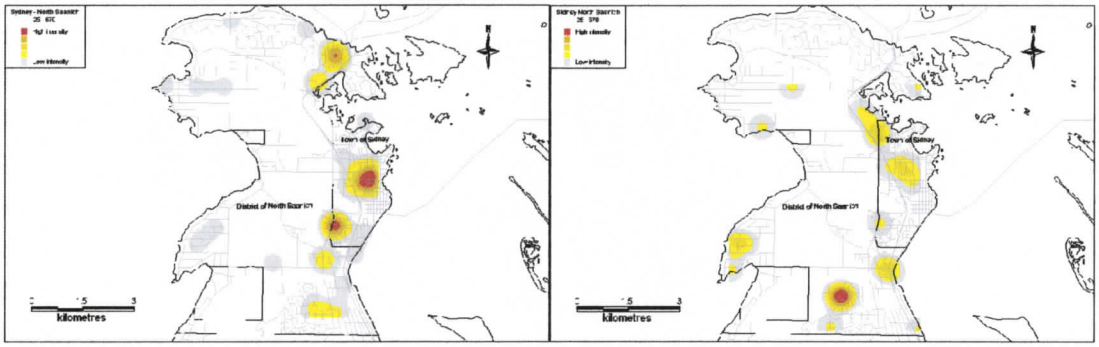
Appendix III: Stability and Variation of Patterns over Time

III.1 Hotspots

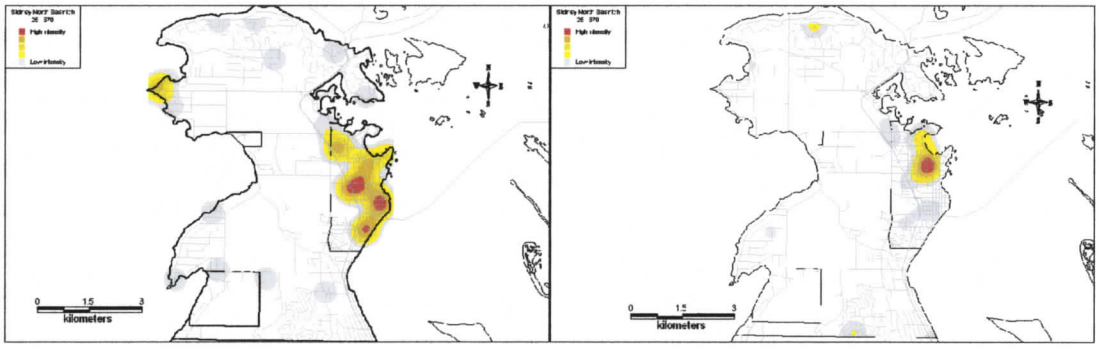
Annual Variation

Do patterns in the CRD vary or remain constant over time? For the purpose of this inspection, a hot spot bandwidth of 670 meters is used. Annual patterns for each municipality for the seven-year study period will be examined. A further examination of seasonal patterns is conducted for West Shore, Victoria and Saanich.

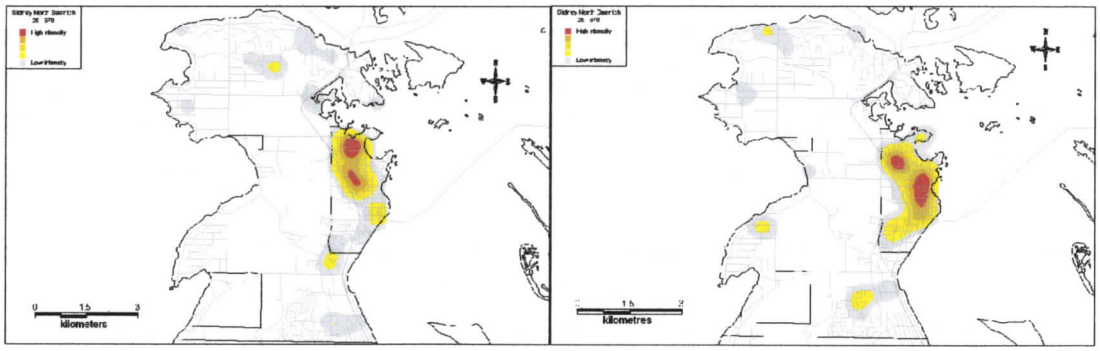
Sidney North Saanich



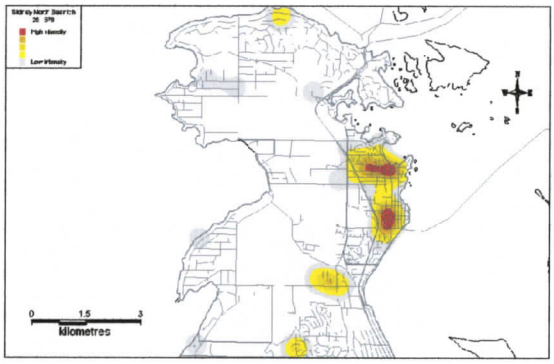
a. 2004 b. 2003



c. 2002 d. 2001



e. 2000 f. 1999



g. 1998

Figure III.1: Break and Enter Sidney - North Saanich (25m2 cell – 670m bandwidth).

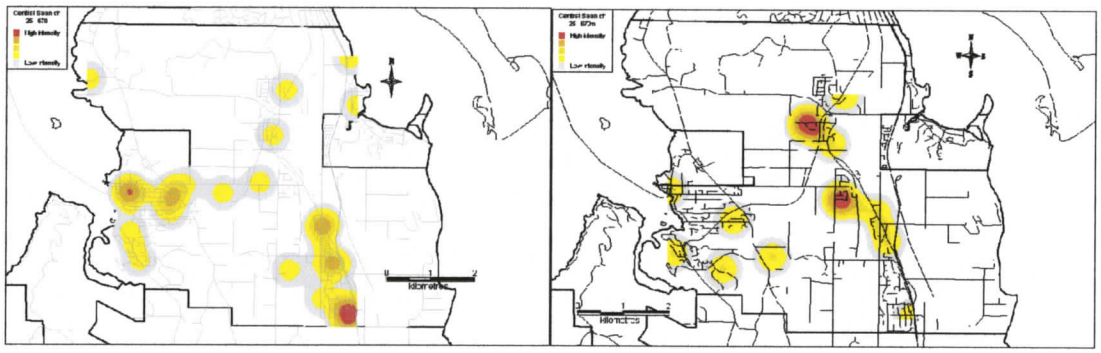
Examining Sidney - North Saanich for seven year period shows that the hot spots lie predominately in Sidney where the central business district for the area, is located in the centre of the diagram on the east side. Figure III.1b identifies the only occasion where a hot spot is located outside Sidney. The northern portion of Sidney shows a stable pattern over time of hot spot activity at the highest levels of intensity. In 2003 there is a hot spot, but it is at a low activity level. The southern part of the township has similar activity, but not consistent and with the same level of intensity over time as the northern pattern.

Police identified a number of nodes and roadways located in or near the hot spots. For example, the southern hot spot contains a McDonald's restaurant, Seven eleven convenience store, and skate board park, which are located on or near Beacon Ave. Beacon Ave is one of the main streets/pathways, which includes most of the commercial activity in the Township. There is a well know pier and walkway located Off Beacon Ave and Bevan Ave.

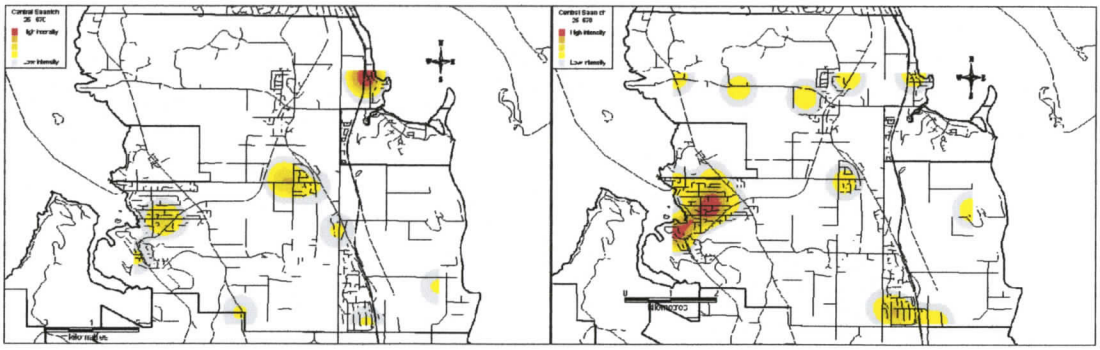
The northern hot spot has the major high school located nearby. Two nearby parks were mentioned as secondary landmarks, Blue Heron Park and Lillian Hoffar Park. Resthaven Dr was described as a main (local level) roadway traversing the area. MacDonald Park Rd was identified as a secondary route through the area.

These are a few, but not all of nodes, landmarks and pathways police identified. Both hot spots are near or engulf key spatial attributes common in forming an individual's activity space or operational area used by offenders to commit their break and enters.

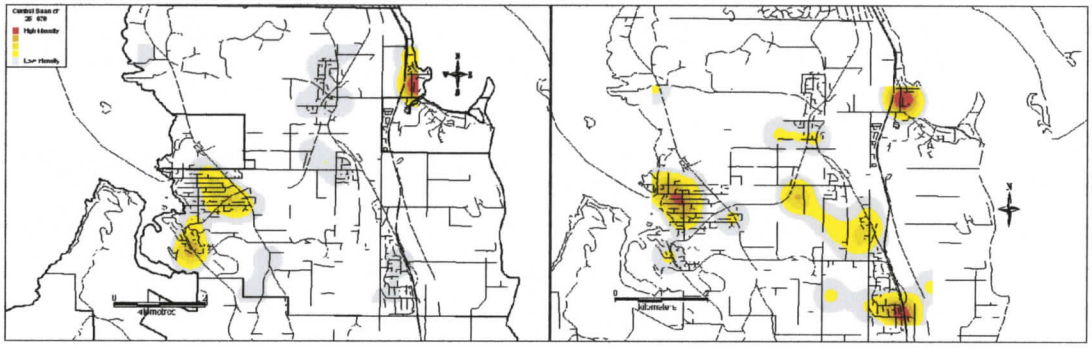
Central Saanich



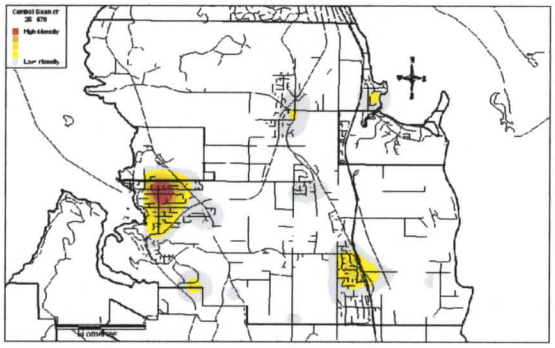
a. 2004 b. 2003



c. 2002 d. 2001



e. 2000 f. 1999



g. 1998

Figure III.2: Break and Enter Central Saanich (25m2 cell – 670m bandwidth).

There are less stable hot spot patterns in Central Saanich. One pattern appears to be in the Brentwood Bay area on the west side – centre portion of the municipality. The levels of intensity vary over the seven year period. Another area is located in the north

east portion of the municipality. It appears in six of the seven years at varying levels of intensity. A final pattern is evident in the residential developments along the Pat Bay Hwy. They vary in size and intensity but they appear consistent over time. Townsley and Pease (2002) have pointed out that when the number of incidences is low hot spots tend to be volatile. Caution should be exercised with interpreting the Central Saanich patterns; due to the small number of events.

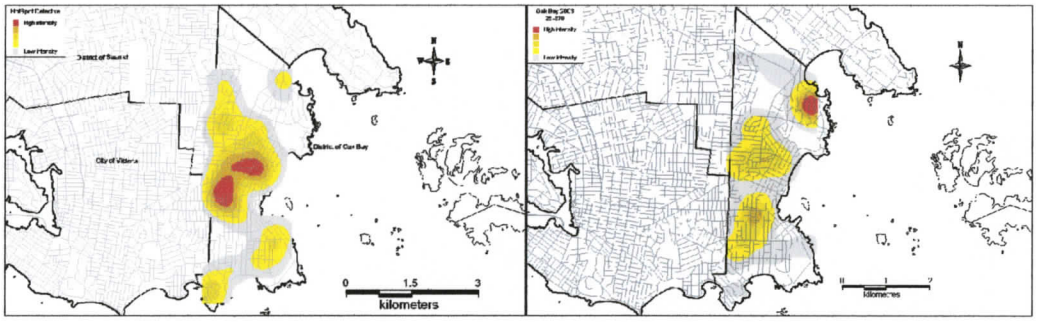
The hot spot located on the west side of the municipality in the Brentwood Bay area has several key nodes identified by Police. The Brentwood Bay Ferry and Trafalgar Square were mentioned as major nodes in the municipality. Brentwood Bay Ferry is a small commuter ferry shuttling vehicles from the Saanich peninsula across Saanich Inlet to Mill Bay. The ferry is used as an alternative to driving over the Malahat mountain pass. Trafalgar Square is a strip mall located on the east side of the hot spot. It provides a number of consumer services to the area. The Brentwood bay marina was revealed as a secondary node. This is a large marina containing a number of docks and facilities to service small water crafts. The Brentwood Bay Inn was mentioned as a secondary node, it is a luxurious hotel, pub and dinning facility located on Brentwood Bay.

Butchart Gardens is considered a major landmark in the area. It is located out of the hot spot, but only a short distance to the south. Finally, West Saanich Rd. and Wallace Dr. are two major roadways that border the hot spot on both the south and east side. Many of these attributes mentioned by police are located on the west side of the municipality with close proximity to this hot spot.

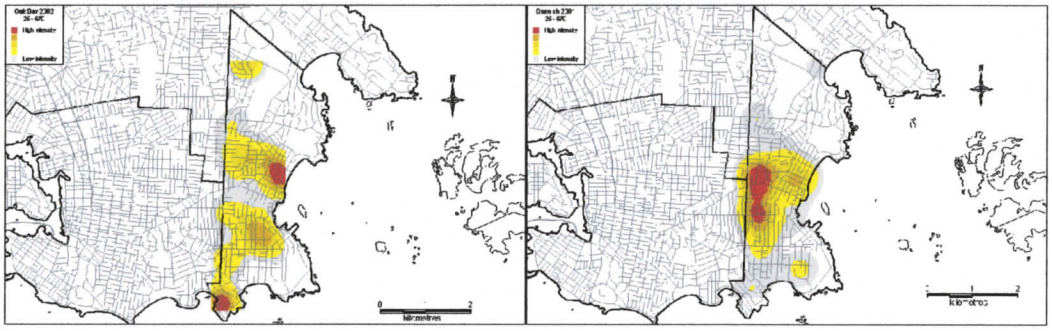
The hot spot located in the north east portion of the municipality is anchored by several different spatial attributes. It is close to the Pat Bay Hwy, a primary roadway and

the Lochside trail, a secondary pathway. The James Island wharf found in this area is considered a secondary node. The southern hot spot borders the Pat Bay Hwy, a primary roadway traveling north to south through the municipality. Tanner Ridge hill, located above this hotspot was mentioned as a primary landmark in the south. Again, it is evident that hot spots in Central Saanich are anchored by primary and secondary spatial attributes commonly used by non offenders and quite possibly by offenders in developing their activity spaces.

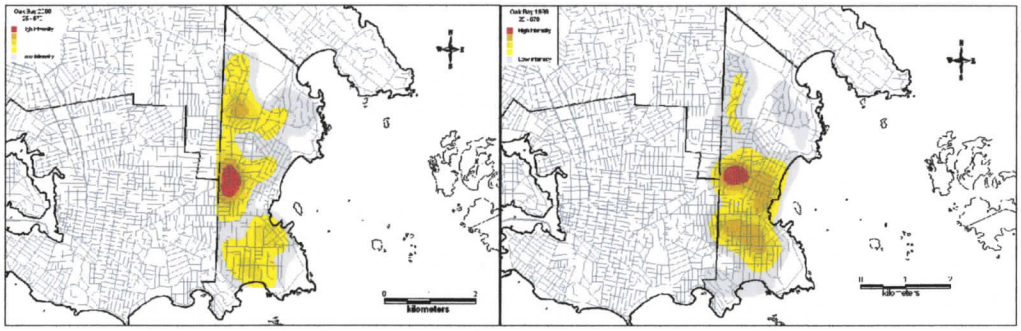
Oak Bay



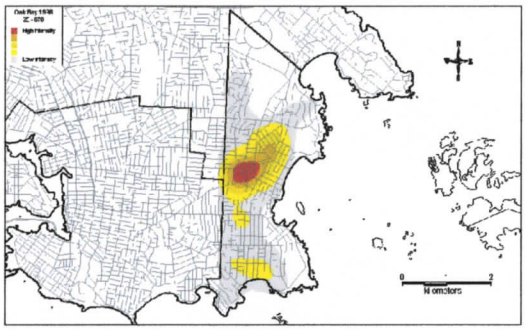
a. 2004 b. 2003



c. 2002 d. 2001



e. 2000 f. 1999



g. 1998

Figure III.3: Break and Enter Oak Bay (25m2 cell – 670m bandwidth).

Oak Bay patterns at first glance appear more dispersed over time, similar to what we saw with Central Saanich. However, on closer inspection two patterns surface in the center west portion of the municipality. The patterns range from high to moderate intensity through out the years. Both patterns straddle major road ways identified by police, Oak Bay Ave and Cadboro Bay Ave. Oak Bay Ave has an east/west orientation, while Cadboro Bay Ave located to the north takes a north/east – south/west orientation. Cadboro Bay Ave, Fort Street, and Foul Bay Rd, all prominent roadways, meet at a junction occupied with commercial offices and retail shopping. This strip mall environment was classified by police as a major activity centre. One of the corners is occupied by major grocery store and one of two regional government specialty liquor

stores. Police pointed out that Oak Bay Ave travels through the Central Business district of Oak Bay described as a major node of activity.

On Cadboro Bay Ave, just east of the municipal border (Foul Bay Ave) there is a large middle – senior school. This is one of the largest schools in the area noted by police as a significant landmark within the municipality. It is interesting that the Cadboro Bay Ave hot spot is located on and around this school. Felson (2002) has noted the importance of schools, the routes to and from and the crime patterns generated in and around them. This is a strong and enduring pattern with a high level of intensity in five out of the seven years and a lower intensity in the remaining two years. Within close proximity to the school is the Oak Bay Recreation centre. Police point out that this location is a principal node in Oak Bay. In fact, it is used not only by residents of Oak Bay, but residents in Victoria and Saanich.

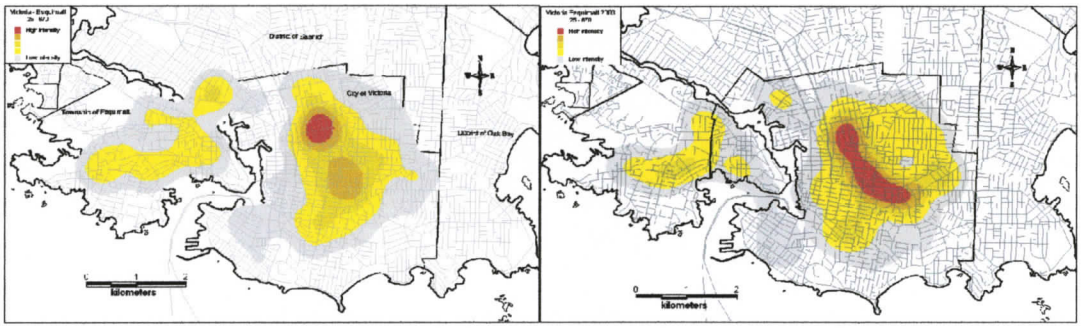
In 2003 an intense pattern emerges in the Uplands area. This pattern is repeated in 2004 but the intensity has diminished. Uplands is on of the most affluent neighbourhoods in the CRD. Police mentioned it is a well known landmark within the municipality. It is an older neighbourhood originally developed in the early 1920s, with the specific intention of attracting wealthy homeowners. Uplands borders to major streets mentioned by police, the first Cadbora Bay Ave and the second Lansdowne Rd. Lansdowne is the continuation of Hillside Ave, which begins in the north part of the City of Victoria. Hillside travels east through Victoria, Saanich, where it changes to Lansdowne Rd and culminates in Uplands, Oak Bay.

Oak Bay's break and enters appear to concentrate along the border where the three municipalities of Saanich, Victoria and Oak Bay meet. One of the officers

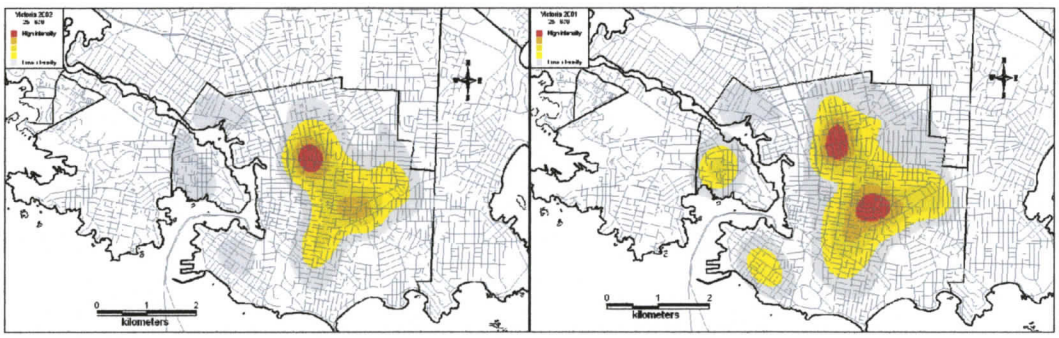
interviewed for this research commented that most of the offenders came into Oak Bay from Victoria and Saanich. Research about insiders and outsiders tends to supports this contention (Brantingham & Brantingham, 1993a). Offenders from the outside who are unfamiliar with a neighbourhood will only venture a short distance into it to commit an offence using major roads emanating from common activity centres.

Oak Bay Police mentioned several other features they felt were meaningful places (i.e., spatial identifiers) within the municipality, the University of Victoria, Camosun College, Carnarvon Park, Windsor Park, and Gonzales Beach. They identified less common but important roadways and paths, Granite Rd, McNeil Rd and the Bowker Creek path/trail network. These attributes, along with those mentioned above exist in or near the major hot spots found in the municipality.

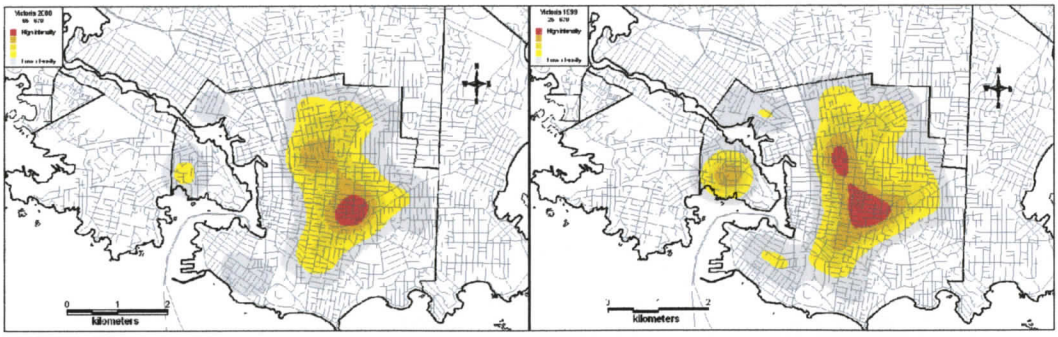
Victoria Esquimalt



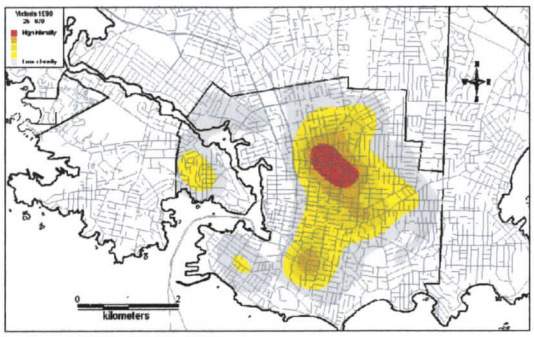
a. Victoria Esquimalt 2004 b. Victoria Esquimalt 2003



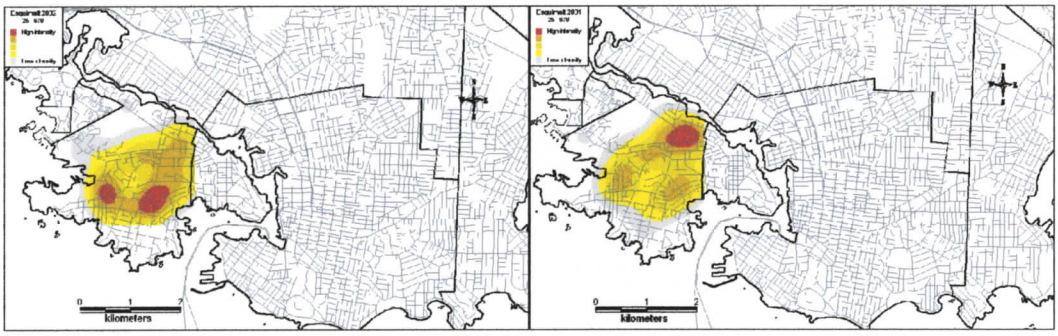
c. Victoria 2002 d. Victoria 2001



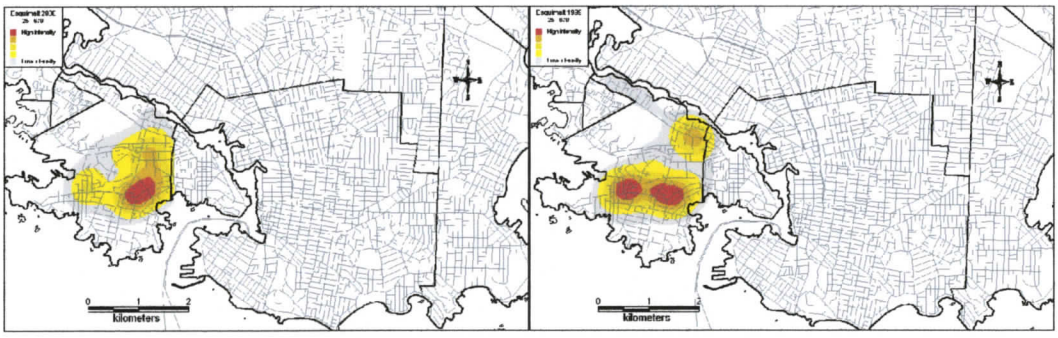
e. Victoria 2000 f. Victoria 1999



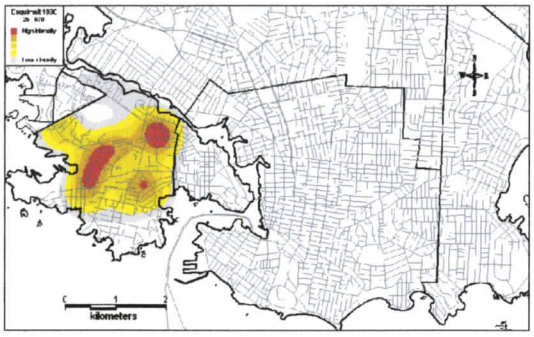
g. Victoria 1998



h. Esquimalt 2002 i. Esquimalt 2001



j. Esquimalt 2000 k. Esquimalt 1999



1. Esquimalt 1998

Figure III.4: Break and Enter Victoria and Esquimalt (25m2 cell – 670m bandwidth)..

In Victoria two prominent patterns of activity appear, they vary slightly in intensity, at one point they are joined. One hot spot is located in the North West and the other is just south in the centre of the municipality. Two other minor patterns show up in Vic West and the James Bay area. They are low intensity hot spots, with the exception of Vic West in 1999 and James Bay in 1998.

Of the two intense patterns, the northern hot spot is located in the area bounded by Hillside Ave to the north, Blanshard St to the west, Cook St to the east and Queens St to the south. Police identified the first three streets as important routes found within the city. This area contains low income housing, apartment buildings, and moderate priced single family residences. Police pointed out that a large government housing project known as the Blanshard Courts is located in this area. Research (Ackerman, 1998; Allen, 1996; Bowers & Hirschfield, 1999; Byrne, 1986; Hsieh & Pugh, 1993; Sampson & Laub, 1993) has demonstrated that crime tends to congregate in have not or low income areas. Areas with a high proportion of disrupted families, where there is a high mobility rate, neighbourhoods with low social cohesion or disorganization.

Cook St., Quadra St. and Blanshard St. are all major north/south routes in and out of the city. Bay St and Hillside St. serve as major east west connectors. The area west of Blanshard St. is mainly commercial with limited residential premises. Police considered each one of these routes a major roadway within the municipality.

Police identified several landmarks and nodes found within this hot spot or bordering it. There are a number of shopping locations, the Mayfair Mall, Hillside Mall, Canadian Tire Store London Drugs (strip mall Yates St and Vancouver St). One of the regions hospital complexes, the Jubilee Hospital is located at Fort St and Richmond Rd. A small military building, the Bay St Armory is on Bay St at Blanshard St. Humber Green Intersection is a large vehicle exchange where several major roadways, Hillside Ave, Douglas St, Gorge Rd and Government St converge. The Quadra St Village with a Macs convenience store, Money Mart loans, the Roxie theatre, and several other retail and commercial enterprises is located on the west side of the hot spot. Central Park is found to the south west of the hot spot. It has a number of recreation facilities located in the park. There are two schools Quadra elementary school to the north and S J Willis Adult learning School in the south west.

The second area in the south centre contains a mixture of older housing built through the early 1900's. Many of the houses have had conversions to accommodate one or more suites. Victoria senior high school is located near the centre of this hot spot. In the area of Fernwood Rd. and Gladstone Ave there are a cluster of buildings which create a small community centre. Police suggested this location constitutes a prominent activity centre. Shops, offices, a live theatre, a restaurant and other commercial businesses inhabit

this small area. In the offender interviews, one subject pointed out that there is an office in this area which distributes methadone to addicts.

Pandora St. and Fort St. lie to the south of this hot spot both are major east west arterial routes. Bay St. lies on the north and Cook St. is on the west side of the pattern. Fernwood Rd, a secondary route cuts through the centre of the hot spot. Primary and secondary routes offer easy access for offenders who fit in heavily trafficked areas, who move about comfortably through neighbourhoods where they do not stand out.

Police identified a number of other nodes and landmarks found near or in this hot spot. Pioneer Park (Quadra St/Meares St), View Towers apartments, Cook St Village, Open Door (Pandora St and Quadra St), the Music Academy (Pandora St and Quadra St), Cridge Centre, Island Farms Dairy, the Save on Foods Memorial Arena and Stadacona park. Police mentioned several primary and secondary roadways which are not mentioned above they include, Johnson St, Caledonia Ave, View St, and Shelbourne St.

The minor hot spot located in Vic West has a few notable features mentioned by police. Vic West Park skate board rink is located in 200 block of Esquimalt Rd. Banfield park just to the north west of the hot spot was mentioned as node of activity. The Johnson St Bridge and the Bay St Bridge are both considered landmarks. These bridges convey traffic from downtown Victoria through Vic West into Esquimalt, View Royal and the Western Communities. The hot spot is contains several primary and secondary roads, Tyee Rd, Skinner St, Old Esquimalt Rd, Esquimalt Rd, and the Galloping Goose Trail.

Esquimalt

Esquimalt has three distinct patterns that seem to persist over time. The patterns range in intensity from moderate to high. After 2002, when the Victoria and Esquimalt

amalgamated, we see the Esquimalt patterns are less prominent, but it is clear the patterns straddle the municipal boundary. This is further, evidence that patterns are not constrained by symbolic boundaries such as municipal borders.

Prior to 2003, the patterns in Esquimalt are more pronounced. Patterns are evident in the northeast, centre east and centre west. The northeast pattern is generally located in the area bounded by Craigflower Rd. on the north, Colville Rd. on the south, Lampson St. on the west and the Victoria/Esquimalt boundary on the east. Craigflower Rd. is a main arterial route that connects into the Old Island Hwy. It is one of two routes, which moves traffic in/out of the City of Victoria into the Western Communities. Lampson St. is continuation of Tillicum Rd. Tillicum Rd. connects Esquimalt to Saanich via a bridge crossing the Gorge Waterway. Tillicum Rd. is a major connector route moving traffic from Saanich and Victoria into Esquimalt and the Western communities. The police felt that each of these roads represented major paths within the municipality.

The area is a mixture of single residential properties, apartment building, with some small retail premises. The housing is medium to low income, with some more expensive housing along the Gorge waterway. The main senior high school is located close by.

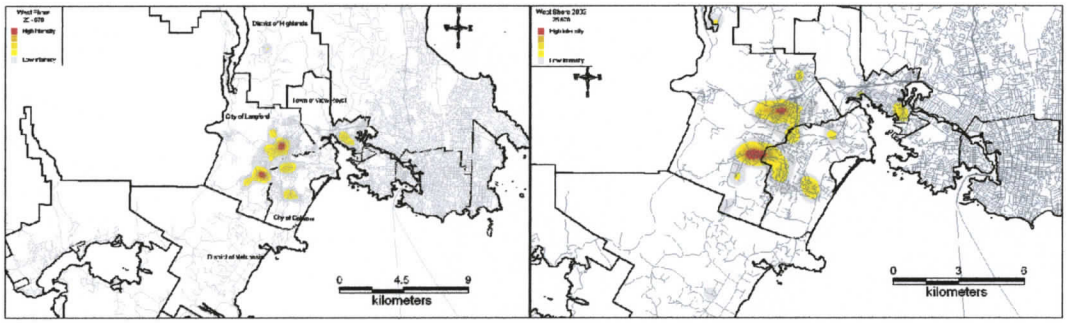
The centre/east hot spot is generally located between Old Esquimalt Rd on the north and Lyall St. on the south. Lampson St. is on the west and Head St is on the east side. This area consists of lower to medium income apartments and housing. There are a number of small businesses located on Old Esquimalt Rd and Esquimalt Rd.

The final pattern is located in the area of Esquimalt Rd. and Admirals Rd. the Pacific Region Fleet Department of National Defense base is located within close

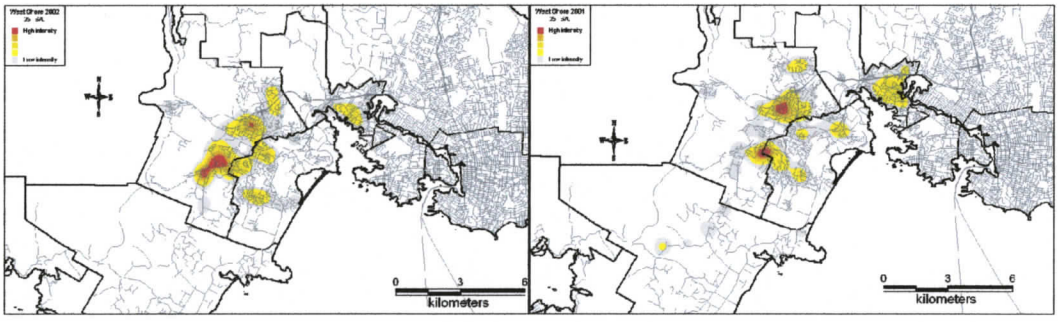
proximity to this pattern. Admirals Rd. is a major connector route accessing Saanich and the Western communities. There are strip mall businesses on Esquimalt Rd and Admiral Rd at their juncture. There is a community centre and the Municipal hall between these two east/west hot spots. The area has a high volume of pedestrian traffic along Esquimalt Rd.

It is likely that the hot spots located in the south of Esquimalt exhibit the similar characteristics found in Victoria's north pattern. Strip mall services along the main street. Low rent apartments are found within close proximity to the main roads.

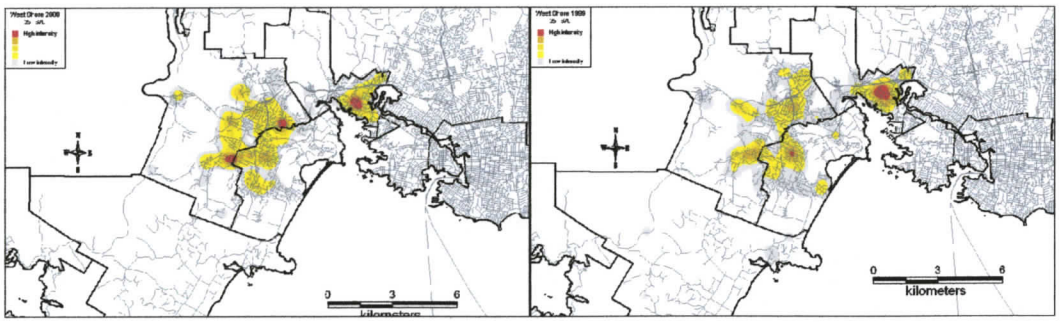
West Shore



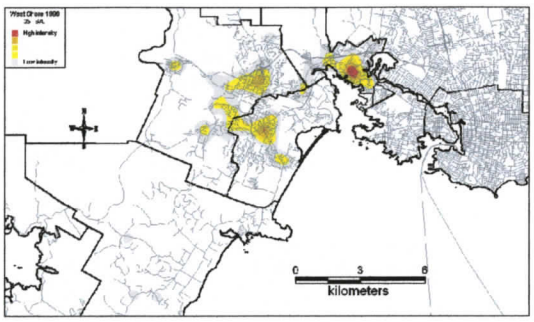
a. 2004 b. 2003



c. 2002 d. 2001



e. 2000 f. 1999



g. 1998

Figure III.5: Break and Enter West Shore (25m2 cell – 670m bandwidth).

Several hot spots are evident over the seven year period. There are three locations that have moderate to high intensity patterns present over the course of the study period. The first is in View Royal straddling the Old Island Hwy near the Esquimalt View Royal boundary. The Pattern was strong from 1998 to 2000, from that point the pattern becomes less prominent. It still persists through 2001 on, but at a low level of intensity.

Another pattern emerges in the north portion of Langford. The hot spot is bounded by the Trans Canada Hwy, Veterans Memorial Way and Goldstream Ave. All three routes are major commuter routes for the Western Communities and beyond. This area contains numerous strip malls which border the roadways.

The third pattern is evident in the southern portion of Langford. The hot spot is centered in the area of Sooke Rd and Jacklin Rd. Sooke Rd is a major connector route through the Western Communities to Sooke. Jacklin Rd. is a secondary route.

The two patterns in Langford become prominent from 1999 on. The hot spots are seen to flow back and forth across the Colwood/Langford municipal boundary. There is a high concentration of commercial activity in both these areas. Many small businesses offering a variety of services border the major roadways.

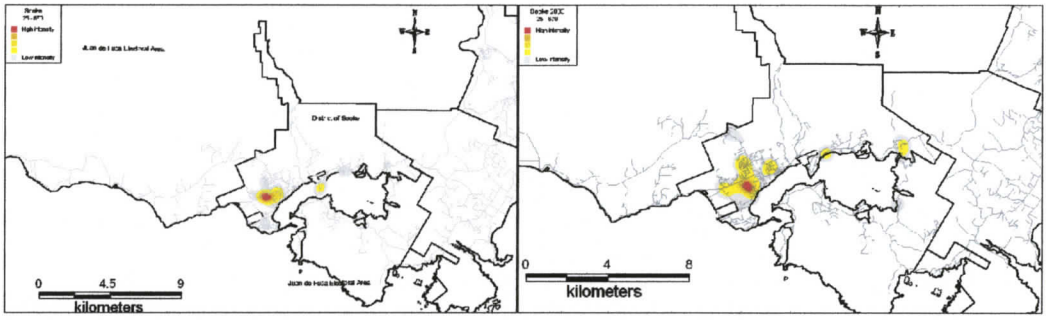
Police felt there were a number of primary and secondary nodes or places were there is the opportunity for elevated public interaction. They named the RCMP station in West Shore, Tim Horton's in Langford, Colwood Corners, Royal Roads University which sits on the ground of Hately Park, Can West Mall, Juan de Fuca Recreation Centre, a convenience store across from Wishart School, the skate board park, Veterans Memorial Park, Six mile house, Four Mile house, Glen Lake Inn, Juan de Fuca bus exchange near the Juan de Fuca Recreation Centre, Costco, Thetis Lake, Langford Lake, and Rogers video (across from Can West Mall).

Many Landmarks were spoken of in the police interviews. Bear Mountain, VGH, McCallum/Millstream (big box stores – Costco, Home Depot, etc.), Hately Park, Colwood overpass, Blue Pearl nightclub (Goldstream and Veterans Way), Tim Hortons (Goldstream), Esquimalt Lagoon, Fort Rod Hill, Belmont High School and Triangle Mountain.

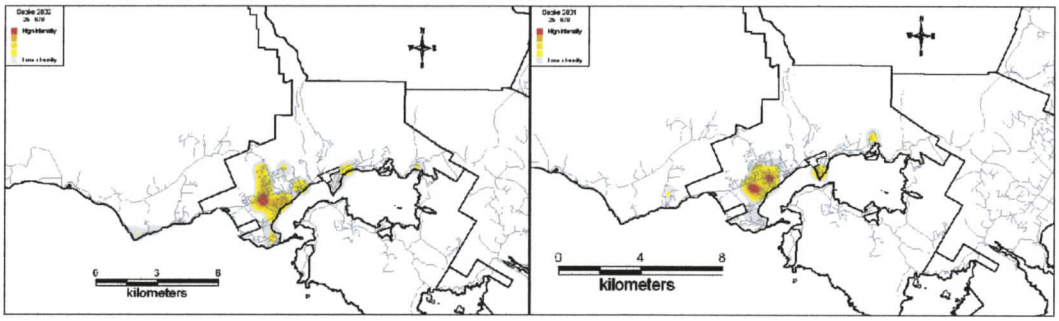
The primary and secondary road and paths that came to mind for many of the subjects included, Veterans Memorial Way, the Langford Municipal Hall, Goldstream Rd, Sooke Rd, Old Island Hwy, Trans Canada Hwy, Metchosin Rd, Helmcken Rd,

Galloping Goose Trail, Kelly Rd, Admirals Rd, Jacklin Rd, Rocky Point Rd, and Ocean Blvd.

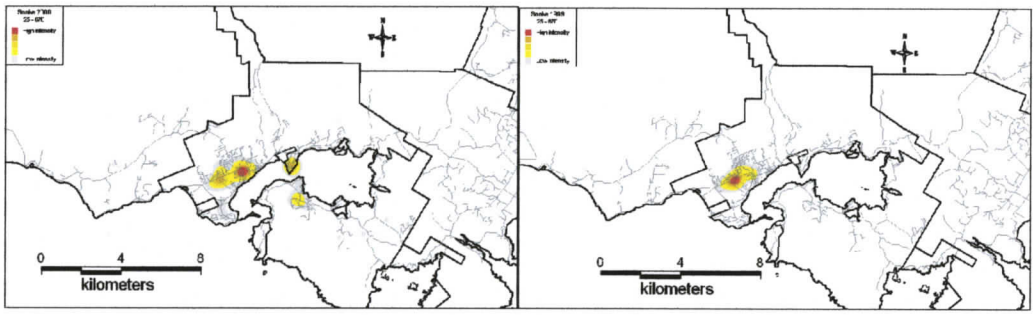
Sooke



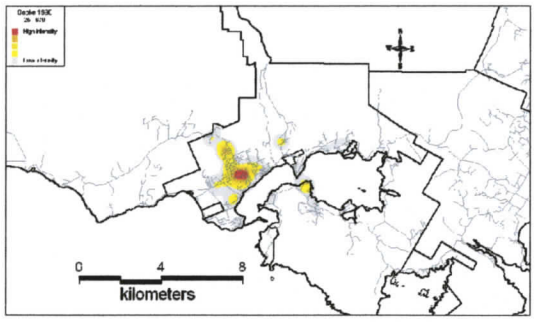
a. 2004 b. 2003



c. 2001 d. 2000



e. 2000 f. 1999



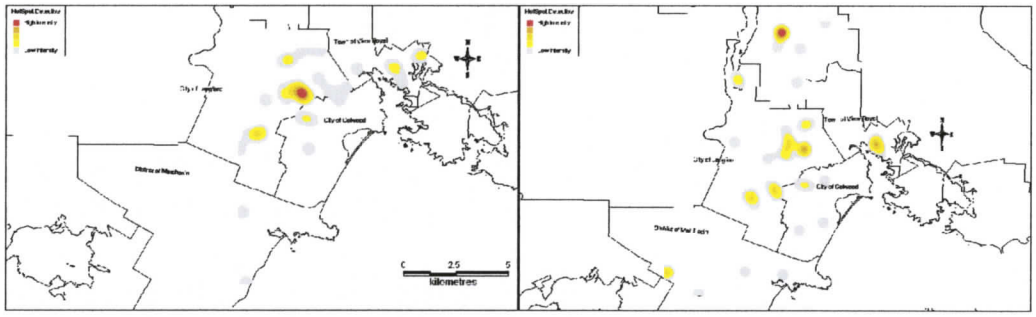
g. 1998

Figure III.6: Break and Enter Sooke (25m2 cell – 670m bandwidth).

One prominent area exists in the District of Sooke. It is bounded by Sooke Rd./Otter Point Rd. intersection in the north east and Maple Ave. in the south west. Grant Rd. and West Coast Rd. form rough north – south boundaries for the pattern. Over the course of the study period between one and two patterns fade in and out. This area is contains the main business/service centre of Sooke. Sooke Rd. is the main route moving commuters into and out of the Western Communities and the Core municipalities.

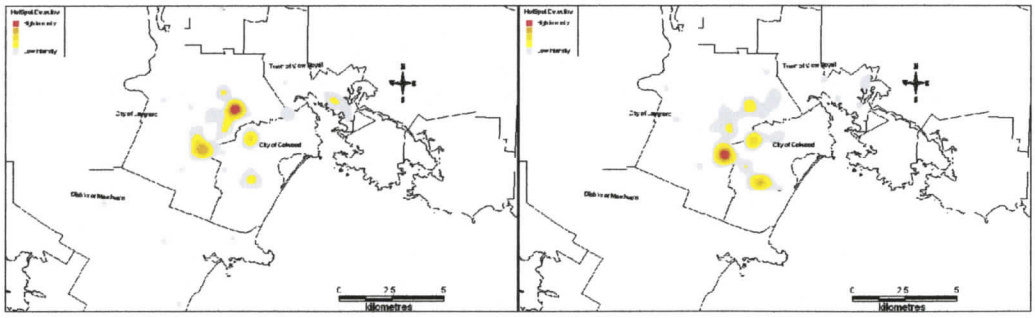
Seasonal Variation

West Shore



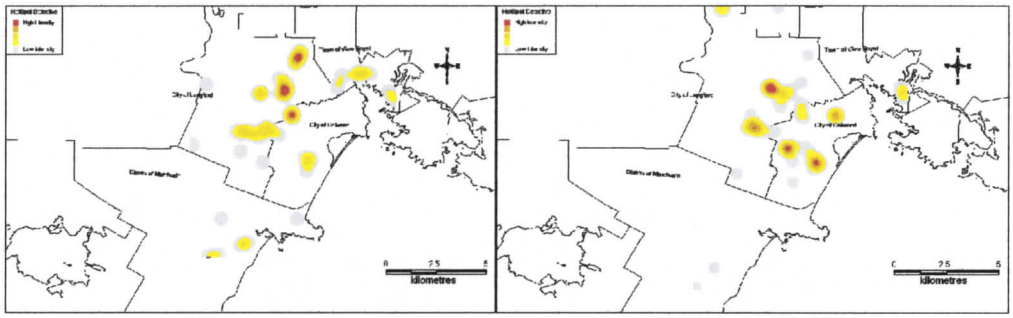
a. winter

b. spring

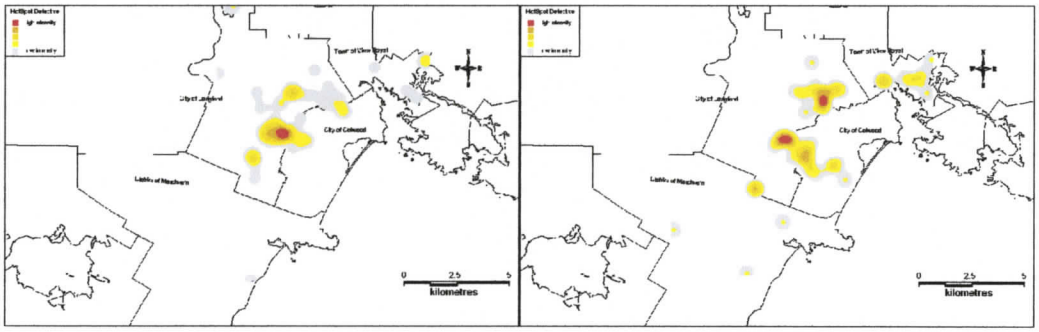


c. summer d. fall

Figure III.7: 2004 Seasonal Variation West Shore.

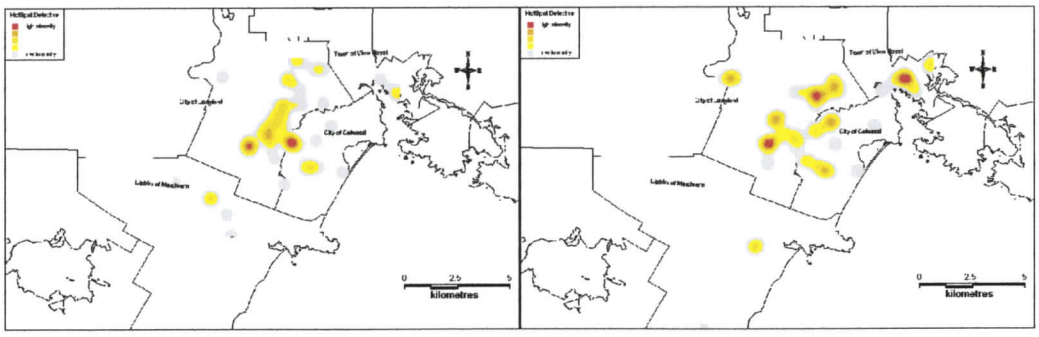


a. winter b. spring

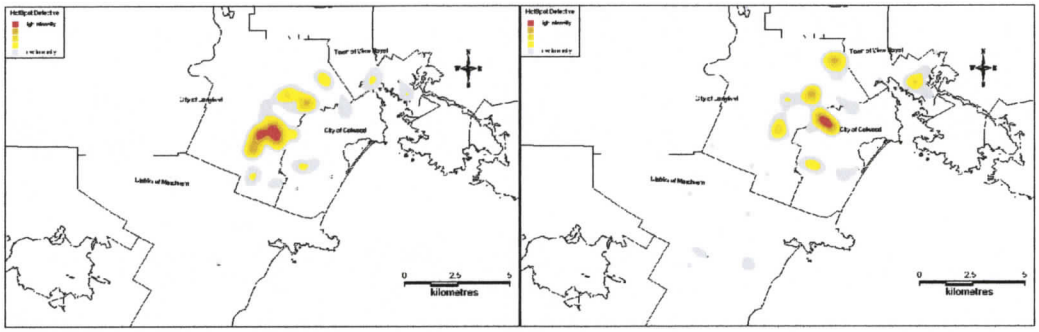


c. summer d. fall

Figure III.8: 2003 Seasonal Variation West Shore.

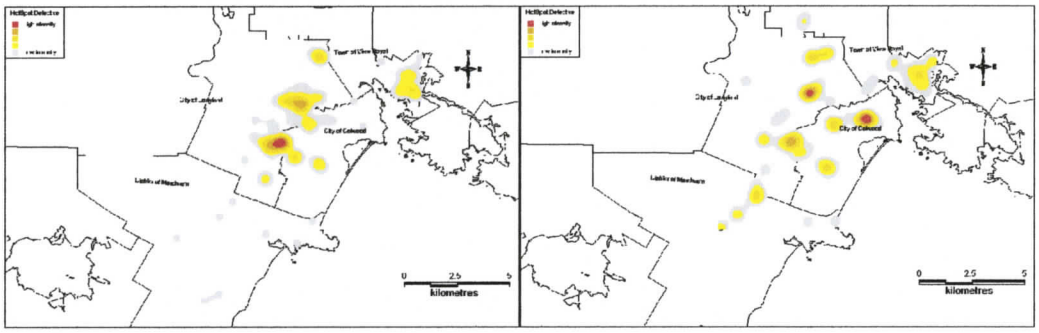


a. winter b. spring

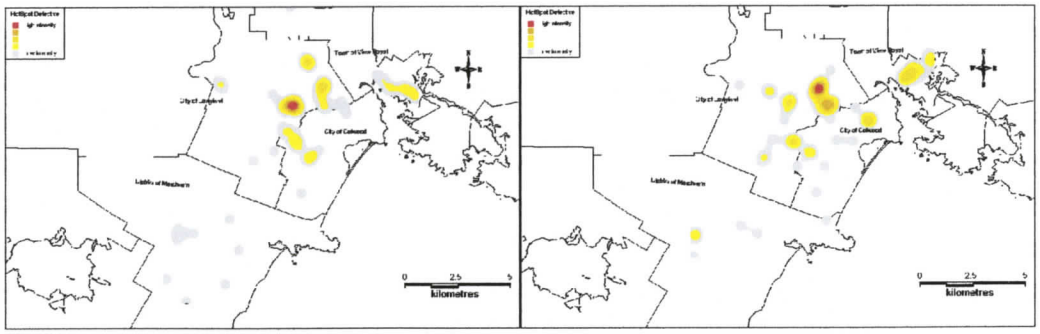


c. summer d. fall

Figure III.9: 2002 Seasonal Variation West Shore.

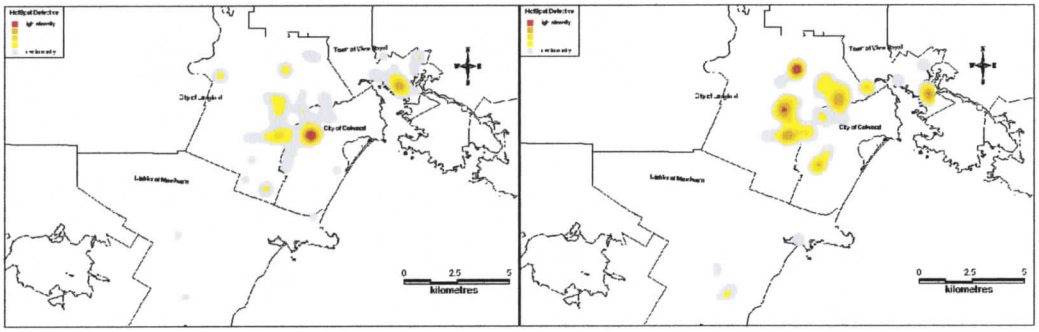


a. winter b. spring

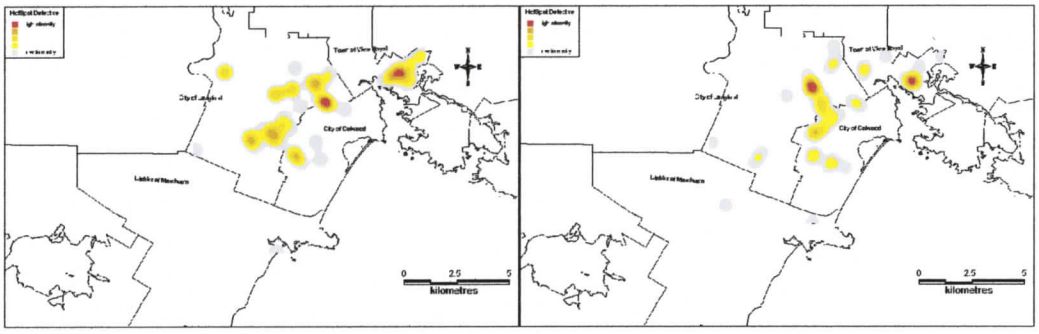


c. summer d. fall

Figure III.10: 2001 Seasonal Variation West Shore.

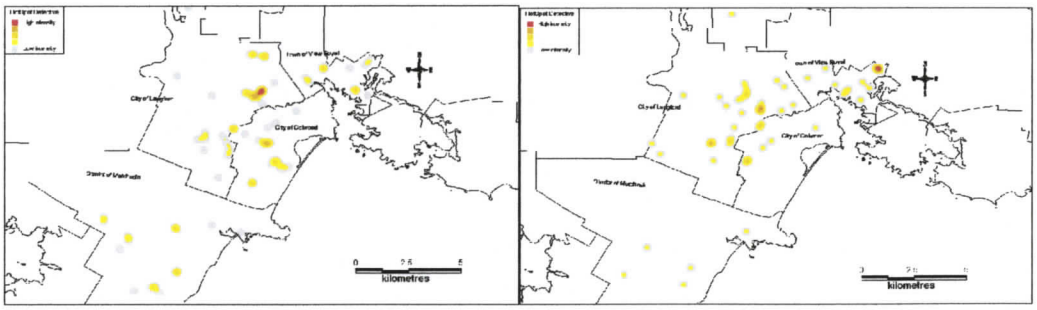


a. winter b. spring

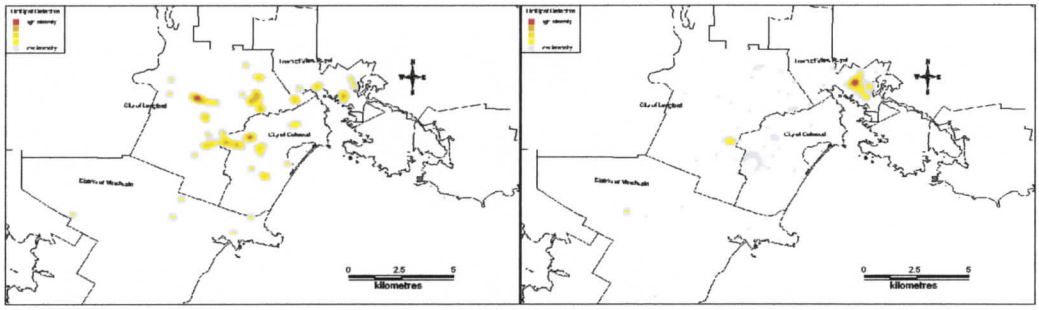


c. summer d. fall

Figure III.11: 2000 Seasonal Variation West Shore.

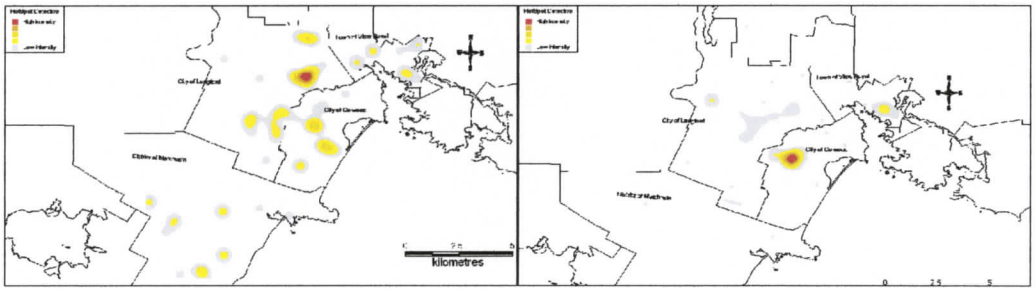


a. winter b. spring

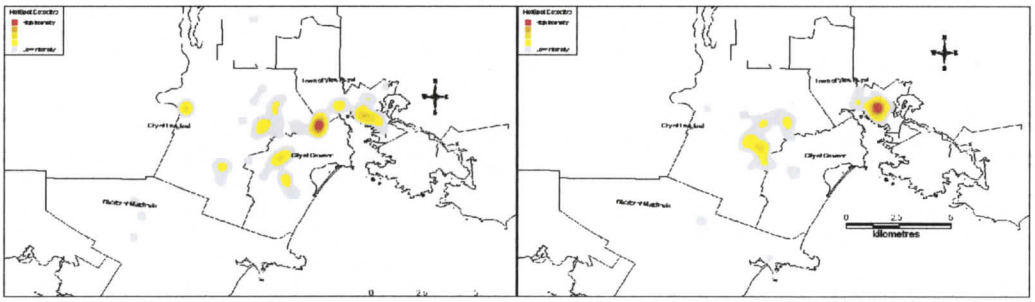


c. summer d. fall

Figure III.12: 1999 Seasonal Variation West Shore.



a. winter b. spring



c. summer d. fall

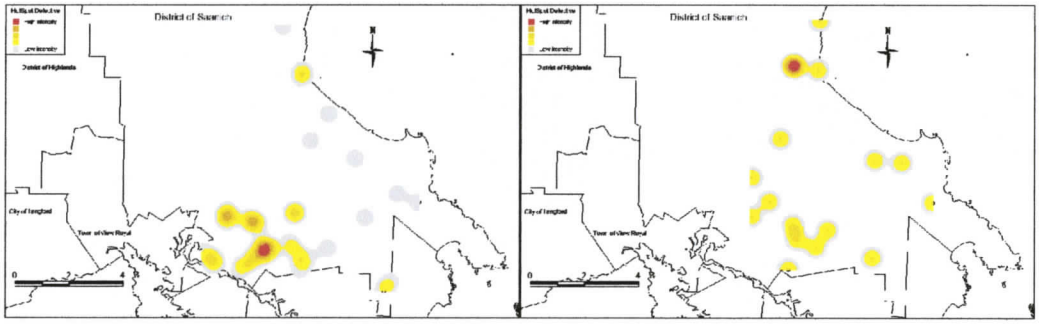
Figure III.13: 1998 Seasonal Variation West Shore.

Two observations flow from the seasonal hot spots. A seasonal variation reveals that similar patterns persist in West Shore over time. Annual patterns virtually mirror those observed through the seasons. Seasonal Hot spots vary in intensity, but they form very similar patterns to those found on an annual basis. Second, a closer inspection of the Seasonal data clearly shows patterns transcend municipal borders.

Monthly Variation

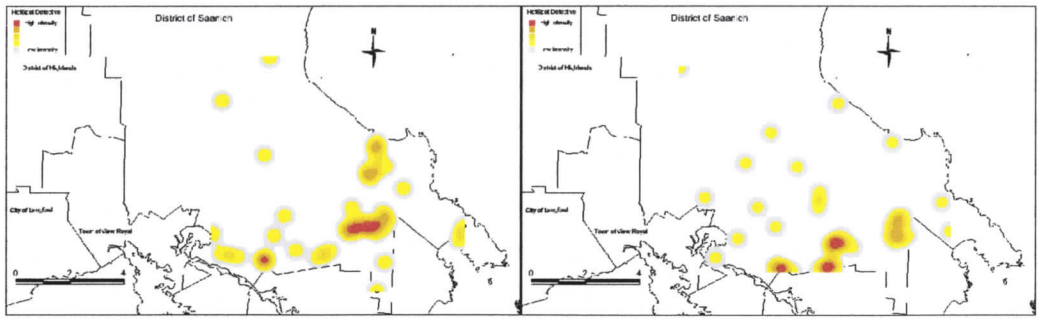
Saanich

Seasonal variations were investigated in West shore to ascertain if there was some consistency between annual patterns and seasonal patterns. While the lower number of break and enters in West Shore prevented a monthly comparison. The higher volume of criminal events in Saanich and Victoria/Esquimalt did. The data for 2003 and was disaggregated into months for the purposes of this examination.



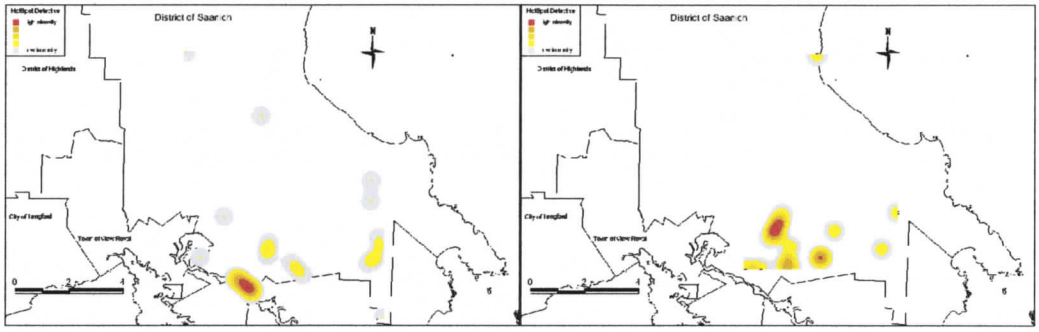
a. January

b. February



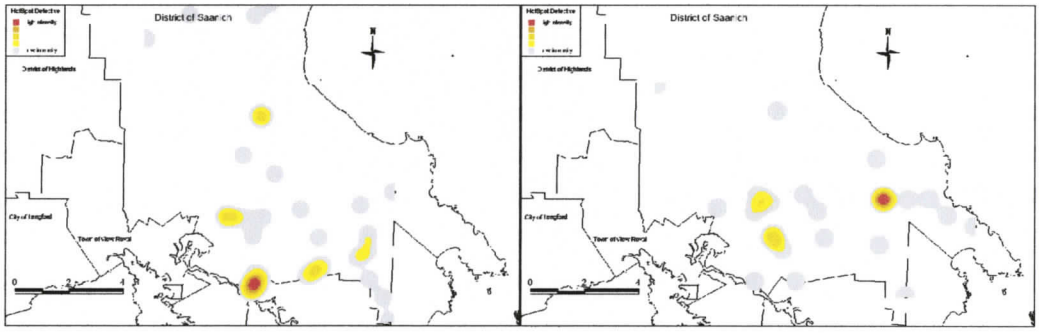
c. March

d. April



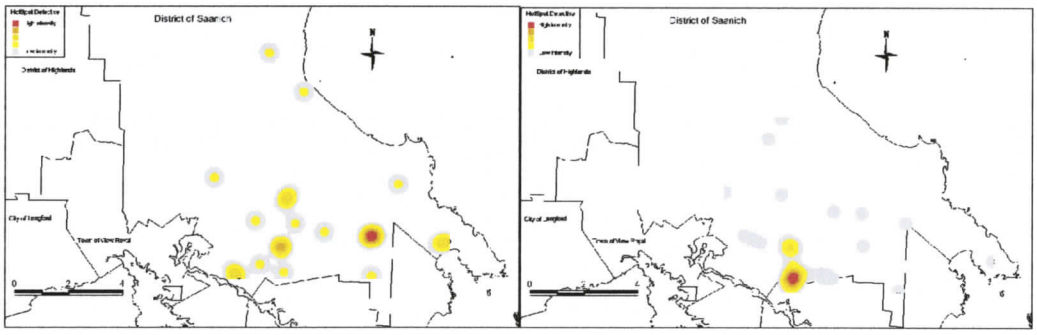
e. May

f. June



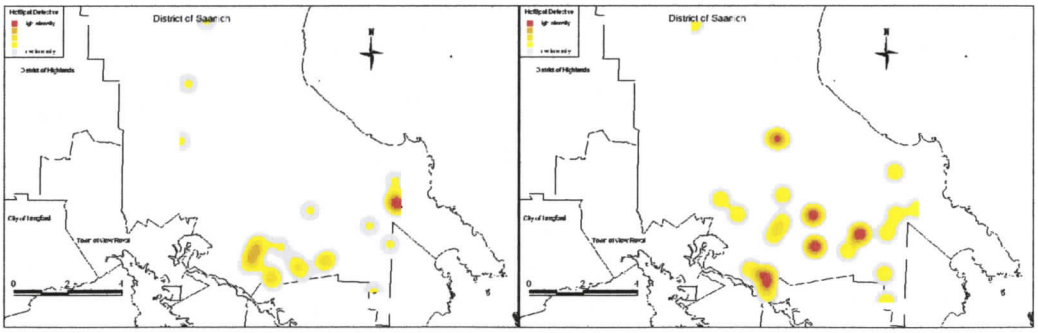
g. July

h. August



i. September

j. October

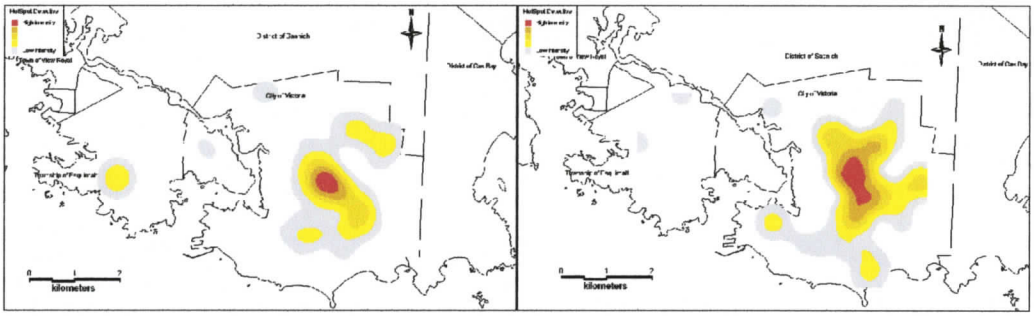


k. November l. December

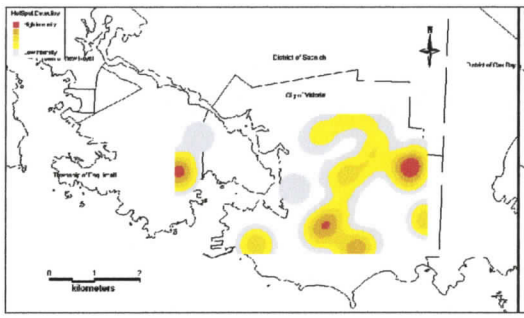
Figure III.14: 2003 Monthly Variations in Saanich.

A visual inspection shows that the two hot spots identified in the annual patterns remain active during most of the months. There is a higher degree of activity evident in the north and east side of the municipality. Smaller patterns tend to arise at a number of different locations through out the southern half of the municipality. This would be expected since patterns change at different geographical scale as well as at different temporal resolutions.

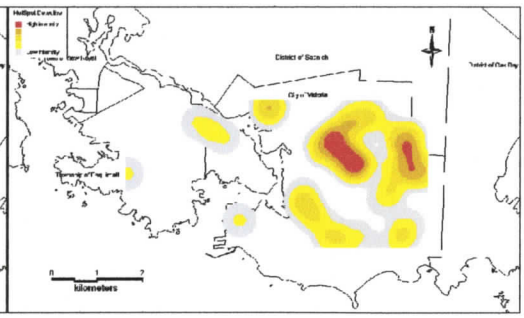
Victoria Esquimalt



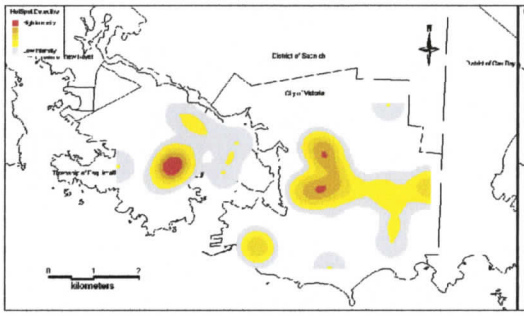
a. January b. February



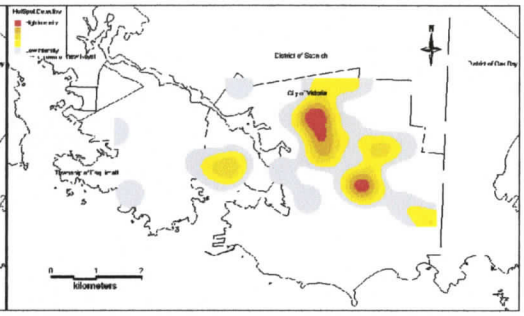
c. March



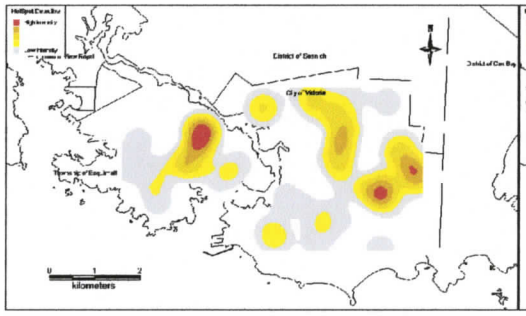
d. April



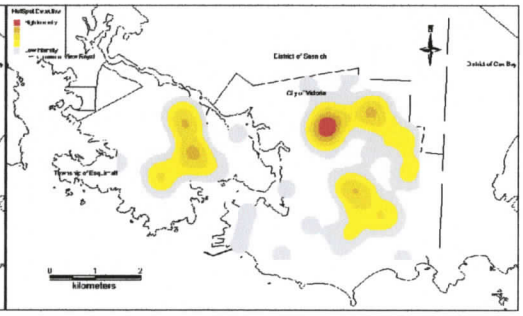
e. May



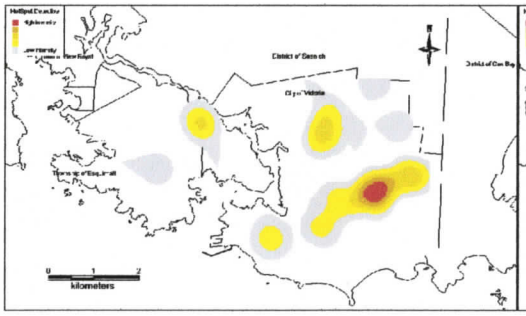
f. June



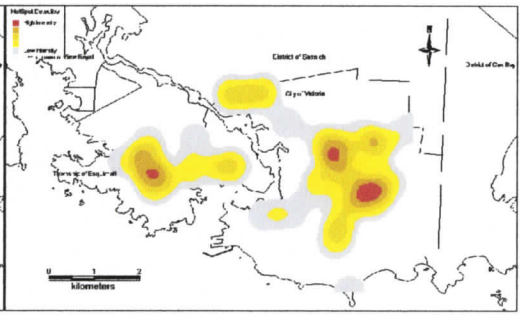
g. July



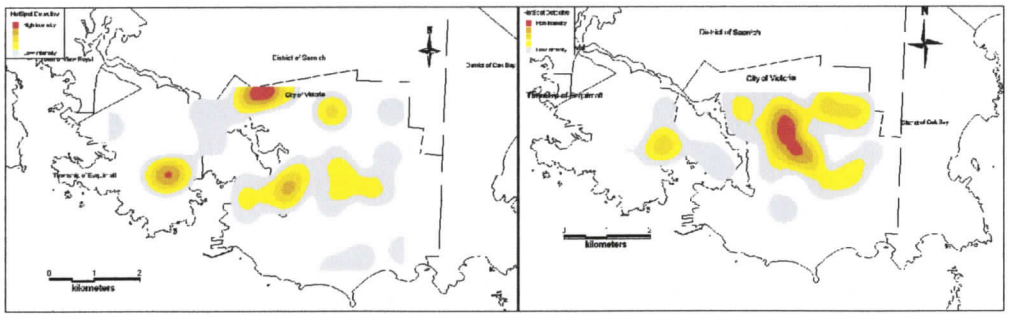
h. August



i. September



j. October



k. November l. December

Figure III.15: 2003 Monthly Variations in Victoria Esquimalt.

In Victoria/Esquimalt the centre pattern is consistent through out the year. The pattern to the northwest is present with the exception of January. The patterns observed in Esquimalt are similar with some variation. What is clear is that the annual patterns resemble patterns visible on a monthly basis.

III.2 Temporal Variation

Hourly Changes

Central Saanich

Central Saanich had a limited number of events in each year of the temporal study, in fact only 129 break and enters were suitable for this analysis. There were a high number of entries where the times to and from were the same. This is an indication of an in progress event, for example, a silent alarm activation, or a homeowner surprising a burglar in the act. The alternative explanation is that there was an error in the data entry. It was difficult to determine which case was true with the limited information available. Unfortunately, time prohibited further investigation.

CENTRAL SAANICH PERCENT OF HOURLY B & E													
Hour	2004		2003		2002		2001		2000		1999		AVG
0000-0059	0	0%	0	1%	2	9%	1	8%	2	7%	1	3%	5%
0100-0159	1	4%	1	4%	0	3%	0	2%	1	2%	1	3%	3%
0200-0259	0	0%	1	4%	0	3%	0	2%	1	2%	1	3%	2%
0300-0359	2	8%	0	2%	0	3%	0	2%	1	2%	2	7%	3%
0400-0459	2	8%	0	2%	0	3%	0	2%	1	2%	1	4%	3%
0500-0559	0	0%	0	2%	0	3%	0	2%	1	2%	1	4%	2%
0600-0659	0	0%	0	2%	0	3%	0	2%	1	2%	1	4%	2%
0700-0759	0	0%	1	8%	1	3%	0	2%	1	3%	1	3%	3%
0800-0859	0	0%	0	3%	1	5%	0	2%	1	2%	1	4%	3%
0900-0959	2	8%	0	3%	1	7%	1	8%	1	3%	1	5%	6%
1000-1059	3	12%	2	9%	1	7%	1	3%	1	3%	1	5%	7%
1100-1159	1	5%	1	3%	1	7%	1	3%	1	3%	2	7%	4%
1200-1259	0	1%	1	5%	1	5%	2	10%	2	8%	3	9%	6%
1300-1359	2	9%	1	5%	1	5%	3	16%	1	3%	2	8%	8%
1400-1459	1	5%	3	15%	1	5%	1	5%	2	9%	1	5%	8%
1500-1559	1	5%	2	9%	2	11%	0	3%	2	9%	1	5%	7%
1600-1659	1	5%	0	2%	0	2%	1	6%	1	5%	1	3%	4%
1700-1759	2	8%	0	3%	0	2%	1	6%	2	9%	1	2%	6%
1800-1859	0	0%	0	3%	0	2%	1	3%	1	4%	1	2%	2%
1900-1959	2	8%	0	2%	0	2%	1	3%	1	3%	2	7%	4%
2000-2059	0	0%	0	2%	0	1%	1	3%	0	2%	1	3%	2%
2100-2159	0	0%	0	1%	0	1%	0	2%	1	7%	1	3%	2%
2200-2259	2	8%	2	12%	1	7%	0	2%	0	2%	1	2%	6%
2300-2359	2	8%	0	0%	0	1%	0	1%	0	2%	0	1%	2%
Total	27.0	100%	18	100%	17	100%	18	100%	22	100%	27	100%	100%

Table III.1: Central Saanich Hourly distribution of B and E (B &E)

The majority of break and enters in Central Saanich occur during the daytime tapering off into the evening. A small percentage occurs during the early morning hours (Table III.1). When data are averaged over the six year period, the tempo of burglary is clearer (Figure III.17). Residential burglary frequency starts to rise at approximately 6:00 AM, peaking in the early afternoon around 3:00 PM, declining in volume until 9:00 Pm. At 10:00 PM a second

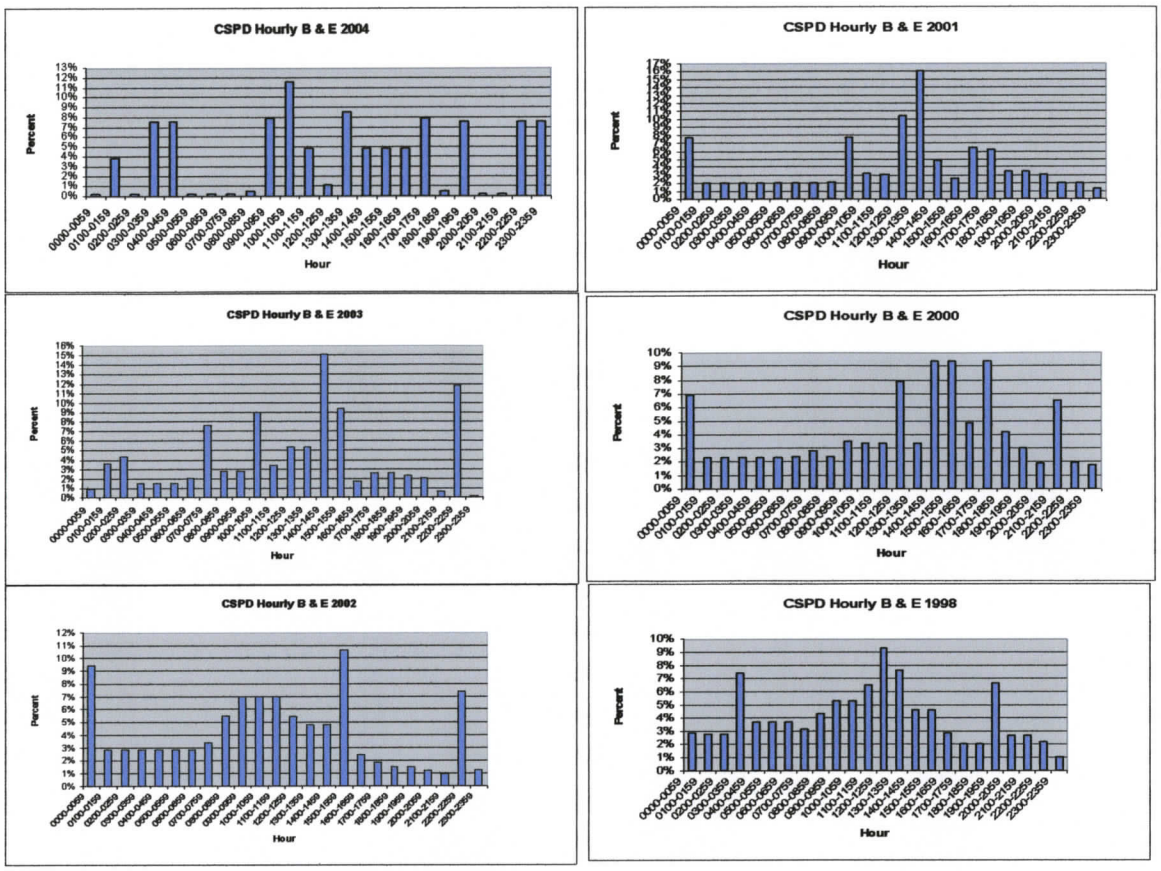


Figure III.16: Hourly distribution of break and enter in Central Saanich.

pattern emerges spanning late evening into the early hours of the morning culminating at approximately 5:00 AM.

To examine the daily rhythm of break and enter, the 24 hour day was broken down into quarters (Felson & Poulsen, 2003). Felson et al.(2003) suggested the first period commence in the daytime, where it appears break and enter begins its rise. This period coincided with 6:00 AM in the CRD data. In this examination each quarter consisted of blocks of six hours. Table III.2 shows the periodic breakdown.

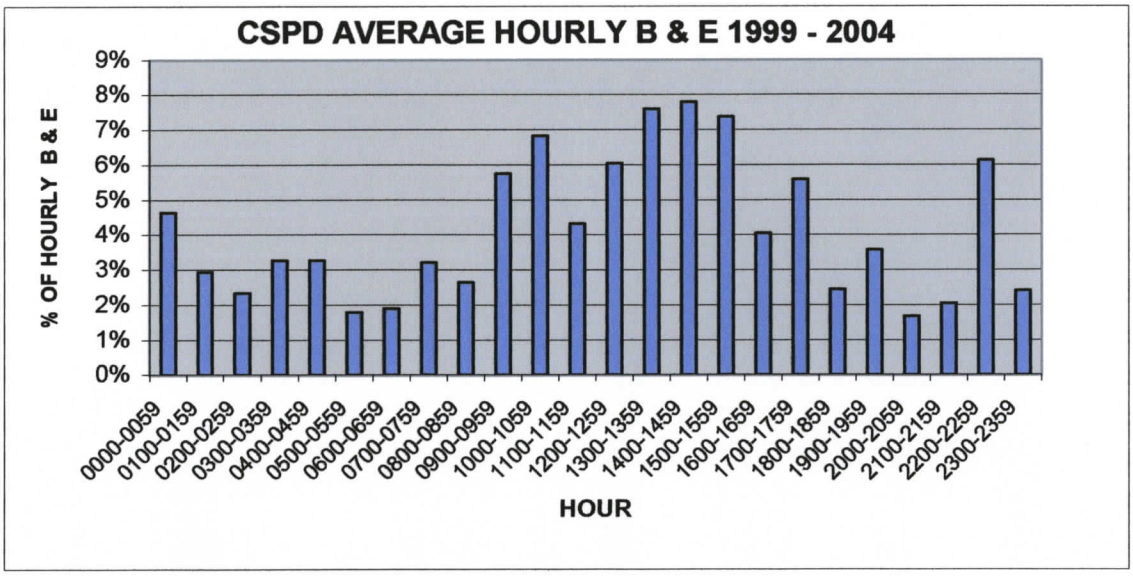


Figure III.17: Average Hourly distribution of Central Saanich B and E (B & E) from 1999 - 2004.

Period	Description
0600-1159	Morning
1200-1759	Afternoon
1800-2359	Evening
2400-0559	Early Morning

Table III.2: Quarterly breakdown

From a review of Figure III.17, it is clear that the afternoon period consistently had the highest burglary activity, with the one exception occurring in 2002. The next period of high activity is found in the morning hours of 6:00 AM to 11:59 AM. There is only one year, 2000, where this pattern was altered. The evening and early morning had varying activity. From 1999 to 2002 the early morning hours witnessed a higher than average activity than the evening hours. This pattern reversed where evening break and enters in 2003 and 2004 were higher than those in the early morning hours.

CSPD PERIODIC DAILY PATTERN OF B & E							
	2004	2003	2002	2001	2000	1999	
Period	% B & E	% B& E	% B& E	% B& E	% B& E	% B& E	Avg
0600-1159	25%	28%	33%	20%	18%	28%	25%
1200-1759	32%	39%	30%	47%	44%	31%	37%
1800-2359	23%	20%	14%	15%	19%	17%	18%
2400-0559	19%	13%	24%	18%	19%	23%	19%
Total	100%	100%	100%	100%	100%	100%	100%

Table III.3: Periodic Pattern of Daily B and E (B &E) in Central Saanich

Over the course of the six years the day time period of morning and afternoon accounted for about 60% of the break and enters in Central Saanich (Table III.3). If evening is included approximately 80% of all break and enters occur in the daytime and evening periods. Only a small amount of burglaries, in most cases less that 1/5 occur in the early hours of the morning. However, there are three years 2002, 2001 and 1999 where early morning break and enter exceeded evening activity. The daytime results seem consistent with prior research on this topic (Cromwell, Olson et al., 1991; Shover, 1991; Waller & Okihiro, 1978).

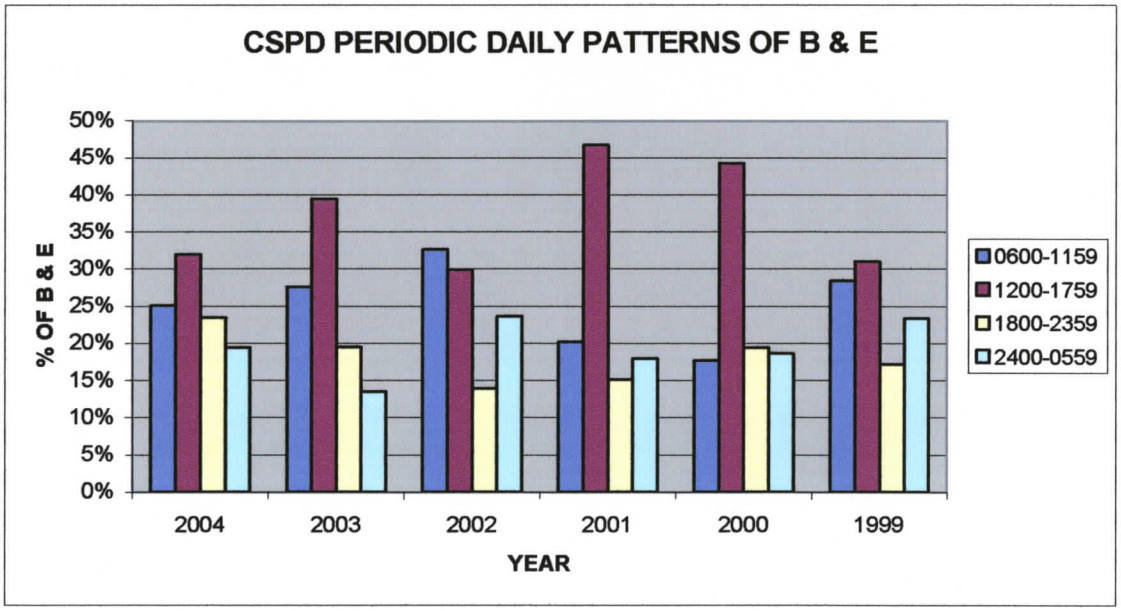


Figure III.18: Periodic Patterns of B and E (B &E) in Central Saanich.

One interesting detail that stands out in Central Saanich, when data is averaged over the six years, the proportion of early morning offending (2400 hrs to 0559 hrs) minimally exceeds the number of evening (1800 hrs to 1159 hrs) events 19% versus 18%. This is somewhat inconsistent with prior research were early morning activity is typically lower than other periods of the day.

Saanich

There were 2163 break and enters over the five years suitable for analysis. Break and enter dominates the daytime hours in Saanich, peaking around 1:00 PM to 2:00 PM, tapering off in the late night early hours of the morning. The early morning activity is minimal and mainly flat with some indication of a small increase in activity around 2:00 AM or 3:00 AM.

These patterns become clearer when the hourly figures are averaged over the study period. Figure III.20 shows that burglaries start to rise at approximately 7:00 AM peaking at 2:00 PM in the afternoon. The activity begins a steady decline terminating at approximately 1:00 AM. A much smaller second pattern commences at approximately 1:00 AM to 2:00 AM peaking between 3:00 AM to 4:00 AM, ending at about 6:00 AM.

SAANICH PERCENT OF HOURLY B & E												
Hour	2004	2003		2002		2001		2000		1999		AVG
0000-0059		10	3%	9	2%	11	3%	9	2%	20	4%	3%
0100-0159		9	3%	8	2%	13	3%	12	2%	9	2%	2%
0200-0259		6	2%	14	3%	13	3%	11	2%	16	3%	3%
0300-0359		12	4%	10	3%	10	3%	13	3%	13	3%	3%
0400-0459		8	2%	8	2%	9	2%	13	2%	12	2%	2%
0500-0559		7	2%	6	2%	8	2%	16	3%	9	2%	2%
0600-0659		10	3%	9	2%	6	2%	10	2%	8	1%	2%
0700-0759		5	2%	12	3%	10	3%	11	2%	17	3%	3%
0800-0859		11	3%	15	4%	14	3%	21	4%	18	4%	4%
0900-0959		13	4%	19	5%	19	5%	27	5%	31	6%	5%
1000-1059		14	4%	22	6%	22	6%	27	5%	27	5%	5%
1100-1159		22	7%	30	7%	25	6%	35	7%	27	5%	6%
1200-1259		18	5%	32	8%	23	6%	26	5%	38	7%	6%
1300-1359		25	7%	28	7%	23	6%	39	8%	36	7%	7%
1400-1459		27	8%	29	7%	33	8%	41	8%	41	8%	8%
1500-1559		21	6%	26	7%	22	5%	34	7%	35	7%	6%
1600-1659		21	6%	24	6%	22	6%	32	6%	26	5%	6%
1700-1759		15	4%	24	6%	16	4%	21	4%	21	4%	5%
1800-1859		16	5%	15	4%	17	4%	20	4%	20	4%	4%
1900-1959		15	4%	16	4%	15	4%	22	4%	25	5%	4%
2000-2059		14	4%	12	3%	17	4%	20	4%	17	3%	4%
2100-2159		11	3%	13	3%	18	5%	21	4%	14	3%	4%
2200-2259		13	4%	13	3%	17	4%	19	4%	15	3%	4%
2300-2359		11	3%	8	2%	15	4%	13	3%	16	3%	3%
Total		337	100%	402	100%	399	100%	515	100%	510	100%	100%

Table III.4: Saanich Hourly Distribution of B and E (B &E)

To assess the variability of the hourly distribution of break and enter, a chi square test was used on each individual year to determine if the distribution of events is similar across each hour of the day. The hourly distribution in each year demarcated significantly, $p < .0001$, from a uniform distribution of events.

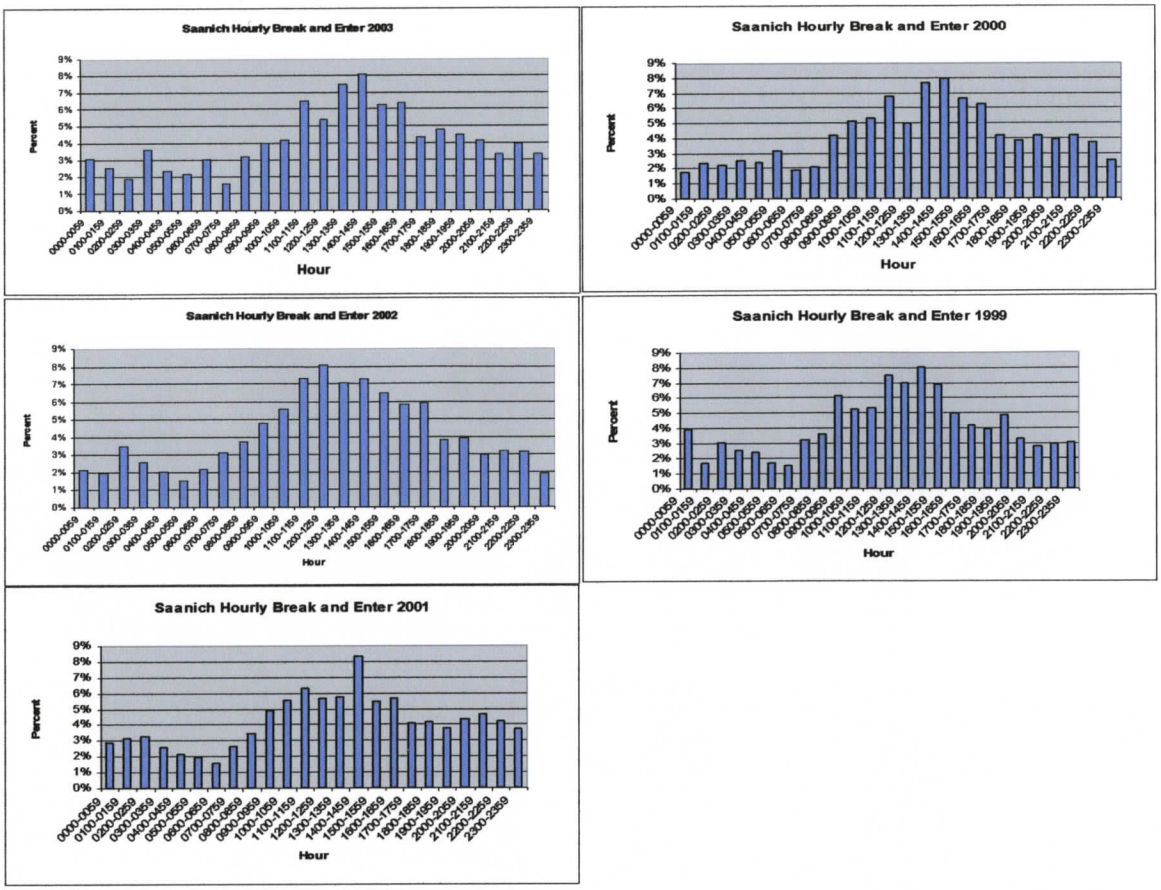


Figure III.19: Hourly Distribution of Break and Enter in Saanich.

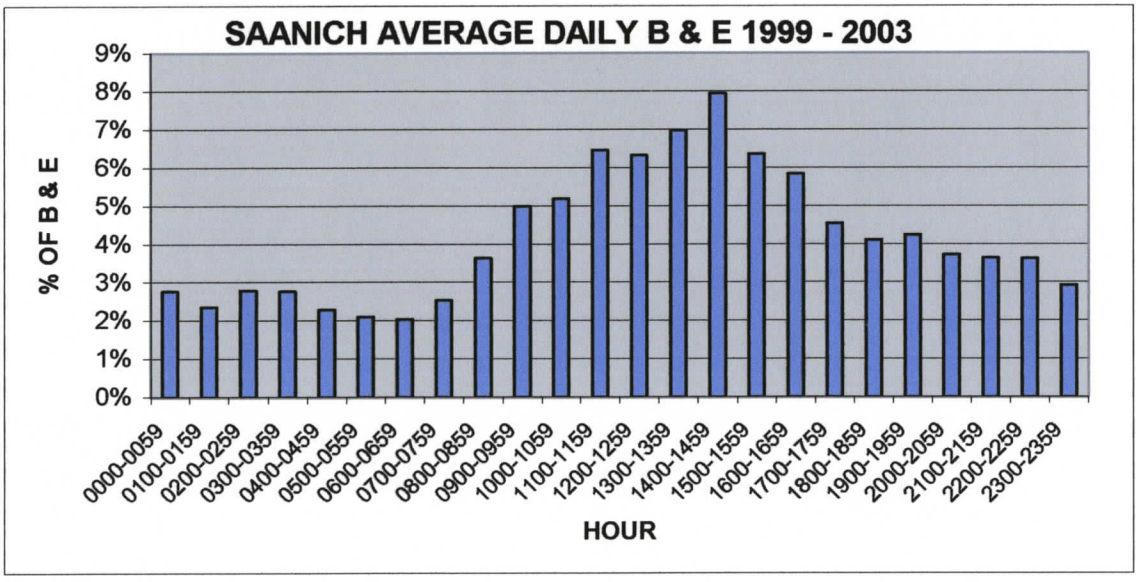


Figure III.20: Average Hourly Distribution of Saanich B and E (B &E) from 1999 – 2003.

The quarterly patterns illustrate that break and enter is a daytime problem with 60% or more of the burglaries occurring between 6:00 AM and 6:00 PM. The peak takes place in the afternoon with almost 40% of the break and enters occurring in this period (Table III.4). Maguire and Bennet (1982) in their research of UK burglaries, discovered that the peak daytime period was in the afternoon. Unlike Central Saanich early morning break and enter totals, consisting of about 15% of the burglaries, never exceeds

SPD PERIODIC DAILY PATTERN OF B & E							
	2004	2003	2002	2001	2000	1999	Avg
Period	%	%	%	%	%	%	
0600-1159		23%	27%	24%	25%	25%	25%
1200-1759		38%	41%	35%	38%	39%	38%
1800-2359		24%	19%	25%	22%	21%	22%
2400-0559		16%	14%	16%	14%	15%	15%
Total		100%	100%	100%	100%	100%	100%

Table III.5: Periodic Pattern of Daily B and E (B &E) in Saanich

those found in other time periods (Figure III.21). On average, 85% of the break and enters occurred between 6:00 AM and 12:00 PM.

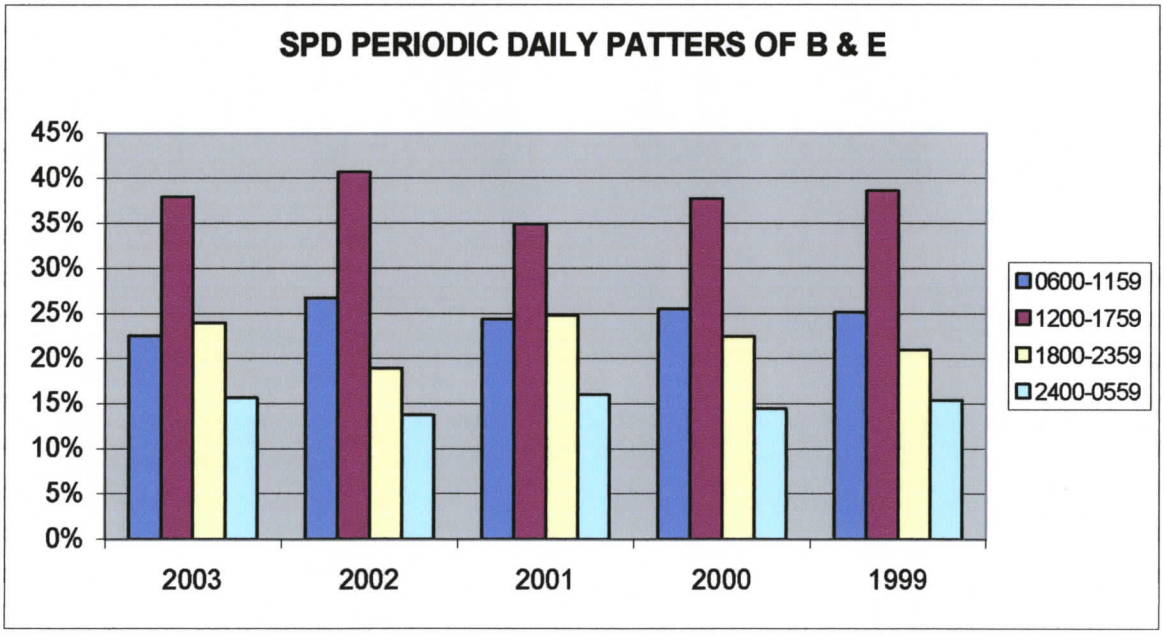


Figure III.21: Periodic Patterns of B and E (B &E) in Saanich.

Oak Bay

Oak Bay had a small number of events suitable for analysis. In all, there were 336 burglaries covering a period of six years from 1999 to 2004. Oak Bay exhibits similar patterns of offending activity witnessed in Saanich and Central Saanich. There is a consistent daytime elevation of events with burglaries beginning in the mid morning around 6:00 AM or 7:00 AM. They peak in the early afternoon around 2:00 PM and 3:00 PM. There was an exception to this observation, in 2003 there was a higher level of activity in the early morning hours than any other period of the day. Furthermore, break and enters hit a low point in the mid day, the opposite of observations for other years.

OAK BAY PERCENT OF HOURLY B & E													
Hour	2004		2003		2002		2001		2000		1999		AVG
0000-0059	2	3%	4	9%	2	6%	2	4%	3	5%	3	5%	5%
0100-0159	1	2%	3	6%	1	3%	1	2%	2	2%	1	2%	3%
0200-0259	1	2%	2	4%	1	3%	2	4%	3	4%	1	2%	3%
0300-0359	2	3%	3	6%	3	9%	1	2%	4	6%	2	3%	5%
0400-0459	1	2%	6	12%	1	3%	2	3%	2	3%	2	3%	4%
0500-0559	2	3%	2	3%	1	3%	2	3%	3	4%	1	2%	3%
0600-0659	1	2%	2	3%	1	3%	1	1%	2	3%	1	1%	2%
0700-0759	1	2%	2	3%	1	3%	1	2%	2	3%	1	2%	2%
0800-0859	2	3%	2	5%	1	3%	2	3%	2	2%	2	3%	3%
0900-0959	1	2%	2	4%	1	3%	3	5%	3	4%	2	3%	3%
1000-1059	5	9%	2	3%	1	4%	2	3%	3	4%	3	5%	5%
1100-1159	3	5%	2	4%	1	3%	3	5%	4	6%	5	8%	5%
1200-1259	3	5%	1	3%	2	6%	5	8%	4	6%	5	7%	6%
1300-1359	4	7%	1	2%	2	7%	5	8%	4	6%	5	8%	6%
1400-1459	3	5%	2	4%	3	8%	8	13%	6	9%	4	5%	7%
1500-1559	7	12%	2	4%	2	5%	5	8%	8	11%	5	7%	8%
1600-1659	5	9%	1	2%	1	4%	3	5%	4	5%	5	7%	5%
1700-1759	2	3%	1	2%	1	3%	4	6%	3	4%	5	7%	4%
1800-1859	5	9%	2	4%	1	5%	3	4%	1	2%	4	6%	5%
1900-1959	1	2%	1	3%	1	3%	2	4%	1	2%	2	3%	3%
2000-2059	3	5%	2	5%	1	3%	1	2%	3	4%	2	3%	4%
2100-2159	0	0%	2	3%	1	2%	1	2%	1	2%	2	3%	2%
2200-2259	1	2%	2	5%	1	2%	1	2%	1	2%	2	3%	2%
2300-2359	2	3%	2	3%	2	5%	1	1%	1	2%	1	2%	3%
Total	58	100%	48	100%	32	100%	60	100%		100%	70	100%	100%

Table III.6: Oak Bay Hourly Distribution of B and E (B &E)

Looking at average hourly rates for 1999-2004 (Figure III.23), there is more activity in the early morning hours than at night time. Break and enters start rising between 6:00AM and 7:00 AM, peaking at about 3:00 PM then descending to a low at approximately 9:00 PM. At about 10:00 PM there is another rise in activity which seems to peak at about 1:00 AM,

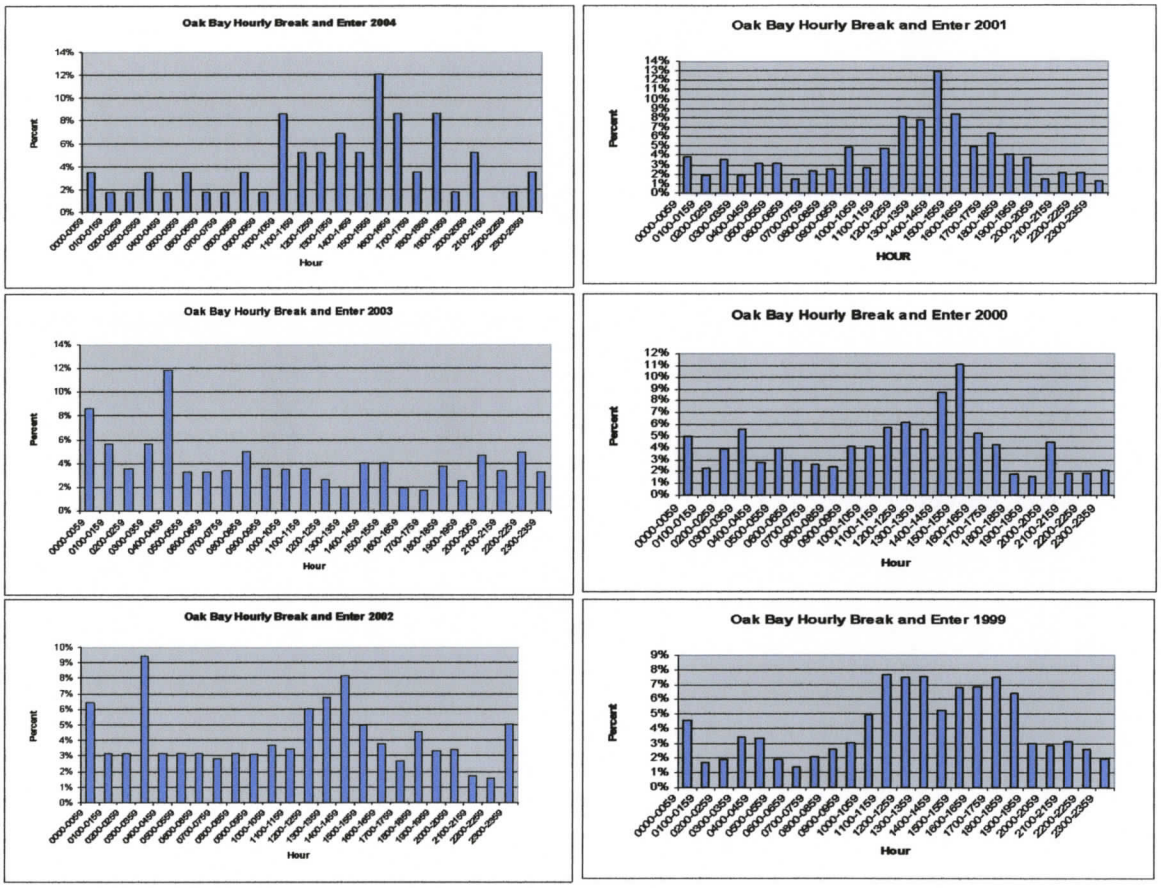


Figure III.22: Hourly Distribution of Break and Enter in Oak Bay.

culminating at approximately 2:00 AM. Between 2:00 AM and 3:00AM burglaries rise again, peaking at approximately 4:00 AM declining to 6:00 AM. This pattern emerging in late evening culminating in the early morning is somewhat similar to the pattern observed in Central Saanich. It is inconsistent with the patterns observed in the Saanich data.

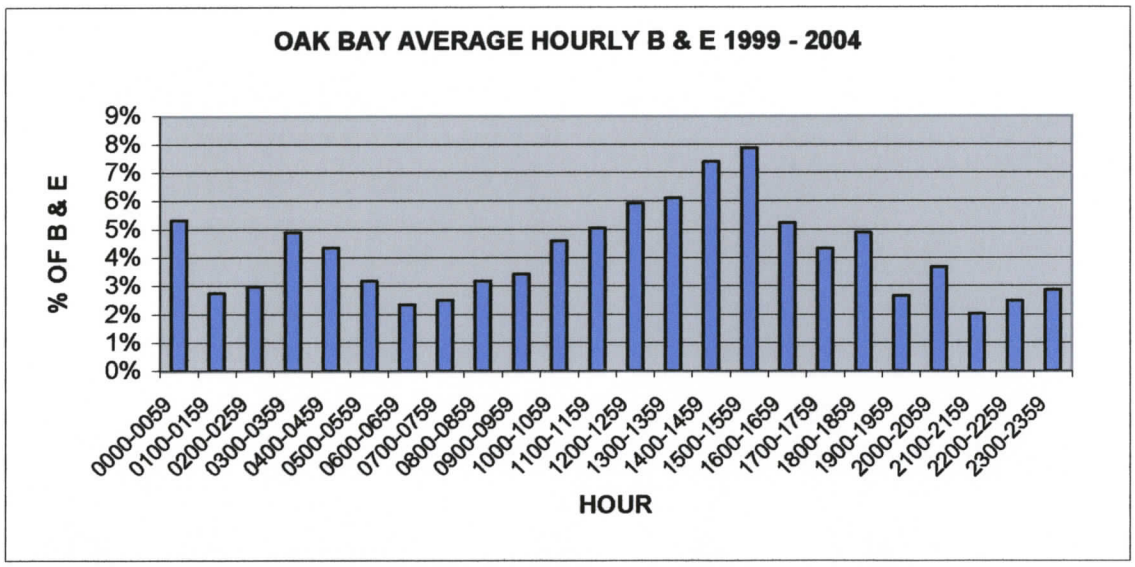


Figure III.23: Average Hourly Distribution of Oak Bay B and E (B &E) from 1999 – 2004.

OBPD PERIODIC DAILY PATTERNS OF B & E							
	2004	2003	2002	2001	2000	1999	
Period	%	%	%	%	%	%	Avg
0600-1159	22%	22%	19%	19%	22%	22%	21%
1200-1759	41%	16%	32%	49%	41%	41%	37%
1800-2359	21%	23%	20%	15%	14%	20%	19%
2400-0559	16%	39%	29%	18%	23%	17%	23%

Table III.7: Periodic Pattern of Daily B and E (B &E) in Oak Bay

When the data are aggregated into the four time periods (Table III.7), patterns fluctuate over the years. The afternoon (1200 hrs to 1759 hrs) is consistently the busiest period, with the exception of 2003. Break and enter remains a daytime event in all but two years, 2003 and 2002, more than 60% of the break and enters occurred between 06:00 hrs and 1800 hrs. In 2002 in excess of 50% of the burglaries occurred in the same time period. Over the span of the six years approximately 60% of the break and enters occurred in between 06:00 hrs and 1800 hrs. In excess of 75% occurred between 6:00 AM and 12:00 PM, while less than 25% occurred in the early morning hours. One interesting observation, even though early morning had 23% of the events over the six

year period, it exceeded the percentage of evening occurrences at 19%. This is unique, and would appear to be inconsistent with past research

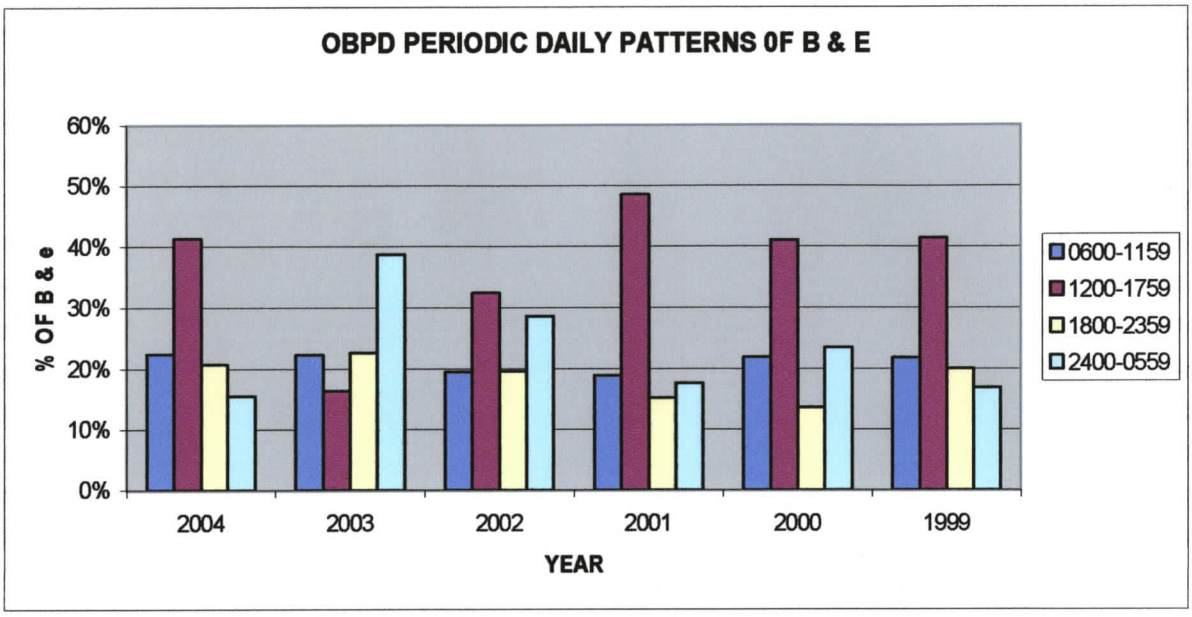


Figure III.24: Periodic Patterns of B and E (B &E) in Oak Bay.

In figure III.24 the early morning activity is clearly visible. In four of the six years (2003, 2002, 2001, 2000), the occurrence of break and enter between 12:00 PM and 6:00Am exceed the evening activity. In two years, 2002 and 2000, early morning events are higher than both daytime and evening occurrences. These results are similar to those found in Central Saanich, but inconsistent with those discovered in Saanich. These findings are contrary to what has been found in other research. There are several possibilities why this anomaly is present, the length of study period compared to shorter time frames of other studies, aberrations due to errors in data entry, or limitations due to the small number of events.

Daily Changes

Central Saanich

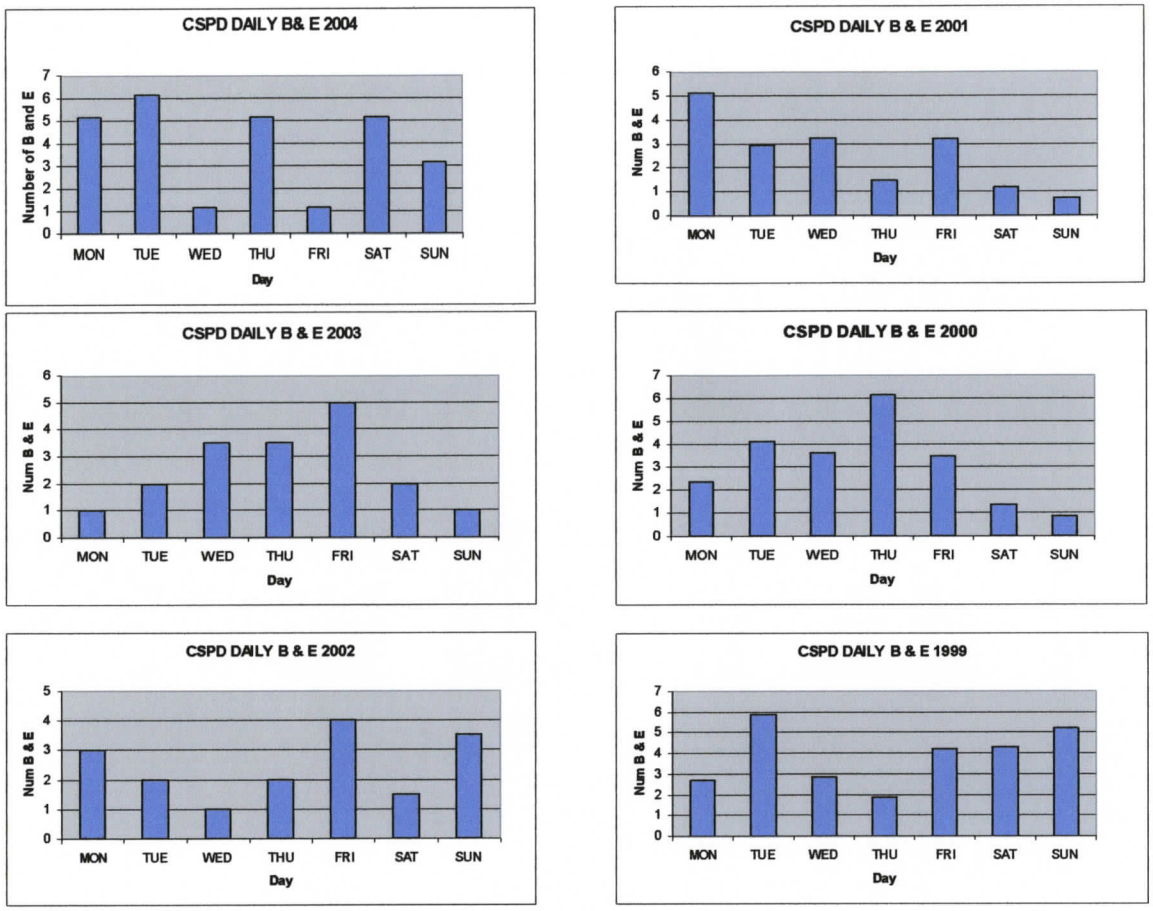


Figure III.25: Central Saanich Daily Patterns of Break and Enter .

Break and enter tends to be a weekday event, predominately occurring during the midweek. There are exceptions where some weekends and early weekdays show higher than normal levels of activity.

CENTRAL SAANICH DAILY BREAK AND ENTER													
Day	2004		2003		2002		2001		2000		1999		AVG
Monday	5	19%	1	6%	3	18%	5	29%	2	11%	3	10%	15%
Tuesday	6	23%	2	11%	2	12%	3	16%	4	19%	6	22%	17%
Wednesday	1	4%	4	19%	1	6%	3	18%	4	16%	3	11%	12%
Thursday	5	19%	4	19%	2	12%	2	8%	6	28%	2	7%	16%
Friday	1	4%	5	28%	4	24%	3	18%	4	16%	4	16%	17%
Saturday	5	19%	2	11%	2	9%	1	7%	1	6%	4	16%	11%
Sunday	3	12%	1	6%	4	21%	1	4%	1	4%	5	19%	11%
Total	27	100%	18	100%	17	100%	18	100%	22	100%	27	100%	100%

Table III.8: Central Saanich Daily Patterns of Break and Enter

When the data are combined for the six year period the extreme peaks and valleys are smoothed out and a clearer picture emerges. The key days of the week are Tuesday and Friday, however, Monday and Thursday are very close behind. Wednesday shows signs of a midweek pause. The weekend reveals the lowest level of activity.

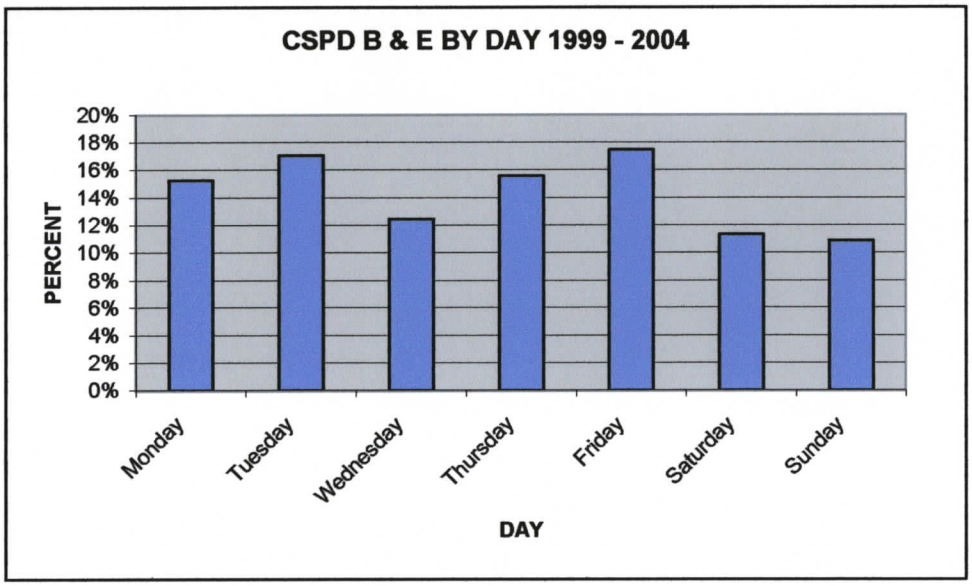


Figure III.26: CSPD Daily B and E (B &E) 1999 - 2004.

Figure III.26 shows the daily percentage of break and enter with the mean and one standard deviation around the mean. The mean number of burglaries per day was 14.3% with a standard deviation of 6.8%. The pattern exhibits a high amount of variability through the time series with no consistency in high or low patterns. Using a Kruskal-

Wallis test, we find break and enters do vary significantly by day of the week over the course of the study period, H = 13.13382, at 6 *df*, p = 0.04. This variation could be the result of the low number of events causing increased swings from one event to the next (Brantingham & Brantingham, 1984).

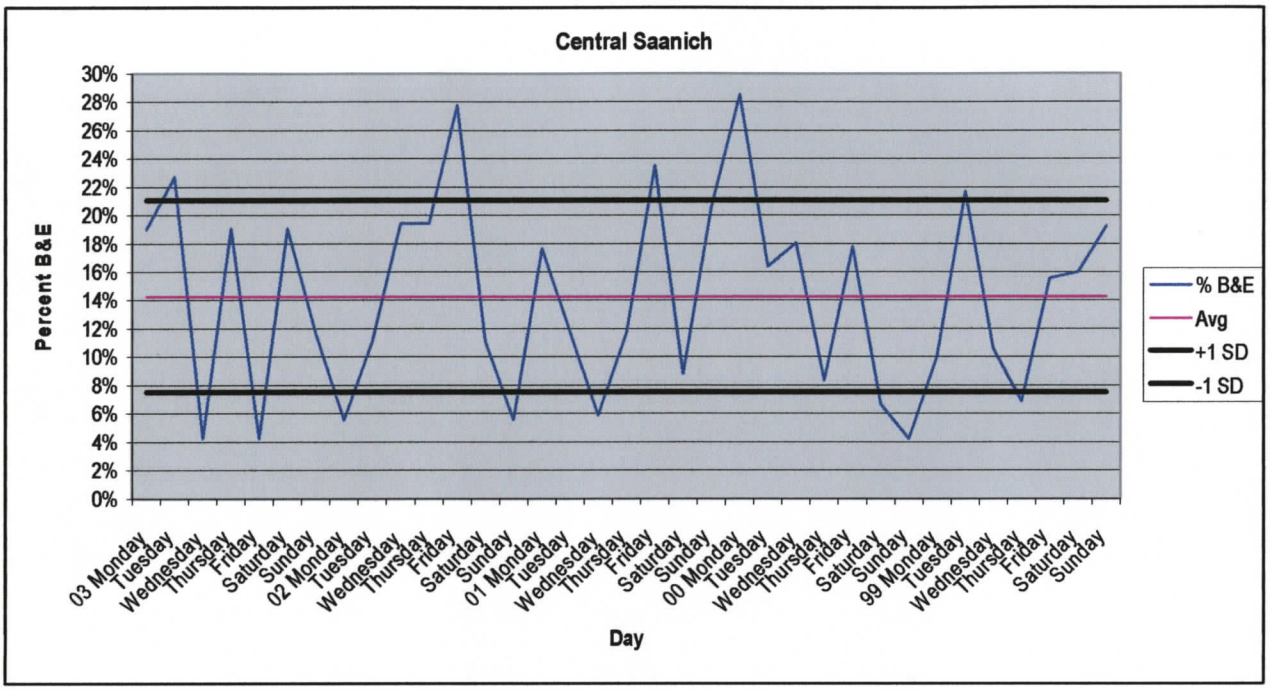


Figure III.27: CSPD Daily Variability 2003 to 1999 – Avg.: 14.3%, SD: 6.8%.

Saanich

There is some variability in daily patterns over the five years. In 2003 a forty-five percent (45%) of the activity occurred between Wednesday and Friday. In 2002, the first two days of the week experience 34% of the weekly burglaries, by Tuesday 48% of the weekly break and enters had occurred.

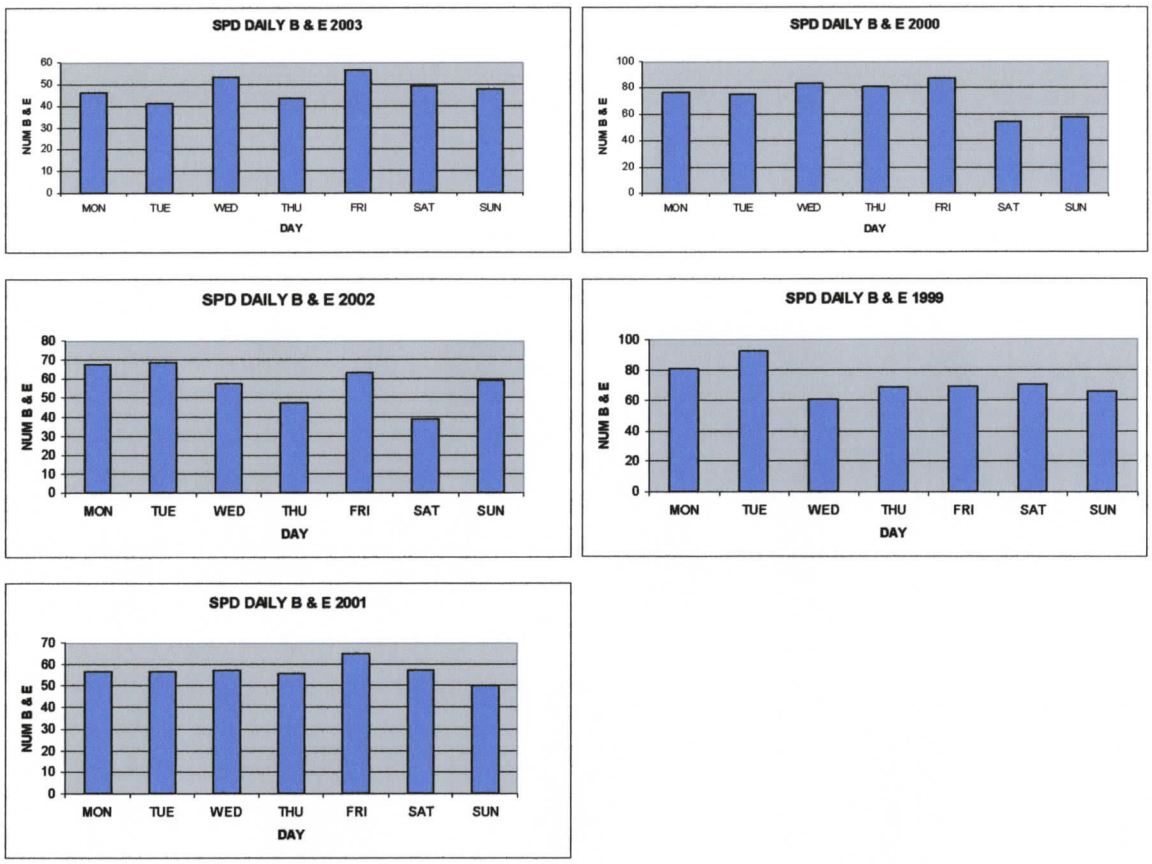


Figure III.28: Saanich Daily Patterns of Break and Enter .

SAANICH DAILY BREAK AND ENTER													
Day	2004		2003		2002		2001		2000		1999		AVG
Monday			46	14%	68	17%	57	14%	76	15%	81	16%	15%
Tuesday			41	12%	68	17%	57	14%	75	15%	93	18%	15%
Wednesday			53	16%	58	14%	57	14%	83	16%	61	12%	15%
Thursday			44	13%	47	12%	56	14%	81	16%	68	13%	14%
Friday			56	17%	63	16%	65	16%	87	17%	70	14%	16%
Saturday			49	15%	39	10%	57	14%	55	11%	71	14%	13%
Sunday			48	14%	59	15%	50	13%	57	11%	66	13%	13%
Total	0	0%	337	100%	402	100%	399	100%	515	100%	510	100%	100%

Table III.9: Saanich Daily Patterns of Break and Enter

Wednesday, Thursday and Friday experience 49% of the weekly burglaries in 2000. In 1999, forty-six percent of the break and enters occur between Monday to Wednesday. It is clear that residential burglary is a weekly phenomenon with about 75% of the incidents occurring between Monday and Friday.

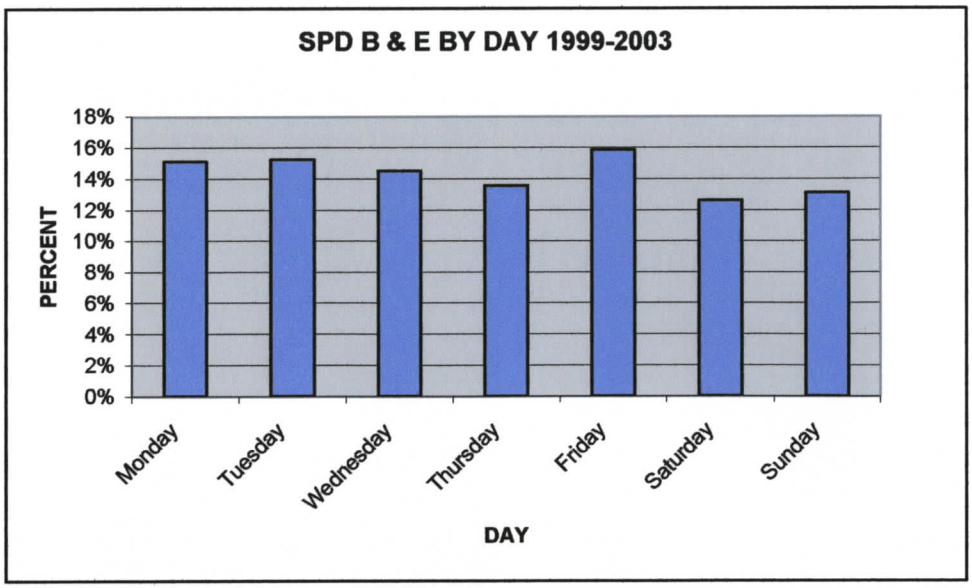


Figure III.29: SPD Daily B and E (B &E) 1999 - 2003.

When the data are explored over the five year period, Friday is the busiest day of the week. Monday to Wednesday have about the same proportion of activity. On Thursday there is a minor decline in the amount of activity, however by Friday the activity peaks, declining quickly into the weekly lows on Saturday and Sunday.

The variability in the Saanich data (Figure III.30) is less severe than found in Central Saanich. The mean number of burglaries per day was 14.3% with a standard deviation of 1.9%. Using a Chi square test we find that break and enter was uniformly distributed across the week, with the exception of 2002 and 2000 where patterns differed significantly from uniformity (2002: $X^2 = 12.44$, $p = 0.05$; 2000: $X^2 = 13.12$, $p = 0.04$). Using a Kruskal-Wallis test, we see residential burglary did not vary significantly by day of the week over the study period, $H = 4.9$, at 6 *df*, $p > 0.05$.

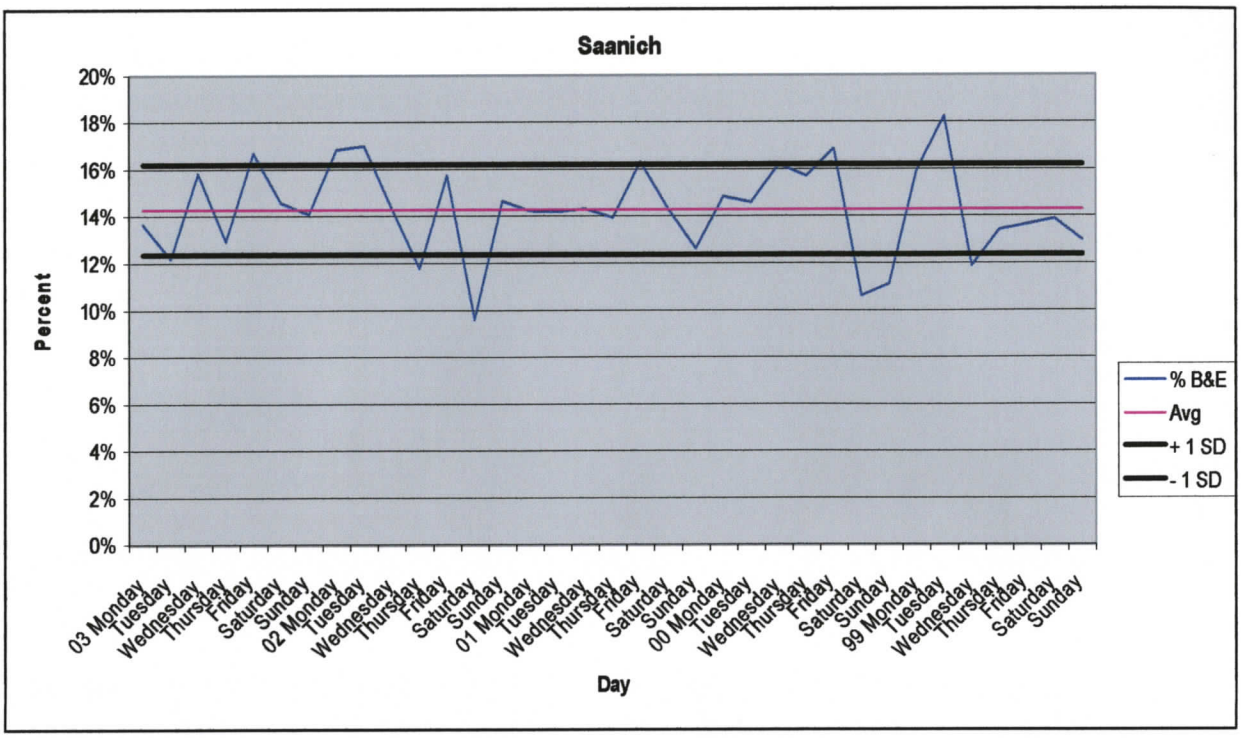


Figure III.30: Saanich Daily Variability 2003 to 1999 – Avg.: 14.3%, SD: 1.9%.

Oak Bay

Once again it is evident daily patterns are not constant over time, exhibiting different highs and lows through out the years. In 2004 the Monday (17%), Wednesday (17%) and Friday (19%) suffered 54% of the weekly break and enters. In 2003, again Monday (17%) and Wednesday (15%) were prominent days of the week combined with Saturday (18%) they experienced half (50%) of all the burglaries. In 2002 Tuesday (18%), Friday (24%) and Saturday (15%) had almost 2/3 (57%) of the break ins for the week. Friday alone constituted almost ¼ (24%) of the entire break and enters for the week. In 2001 over 2/3 (62%) of the break and enters occurred on Tuesday (19%), Thursday (23%) and Friday (20%). Friday had 1/5, while Thursday had almost a ¼ of the daily burglaries, totaling 43% of the weekday total. Monday (16%), Friday (19%) and

Sunday (17%) figures dominated the weekly break and enter tally in 2000. Approximately 2/3 of the break and enters occurred on Thursday (22%), Friday (22%) and Saturday (17%) in 1999. One clear pattern emerges, in all but one year (2003) Friday is a major factor in daily break and enters contributing between 20% and 25% of the weekly total.

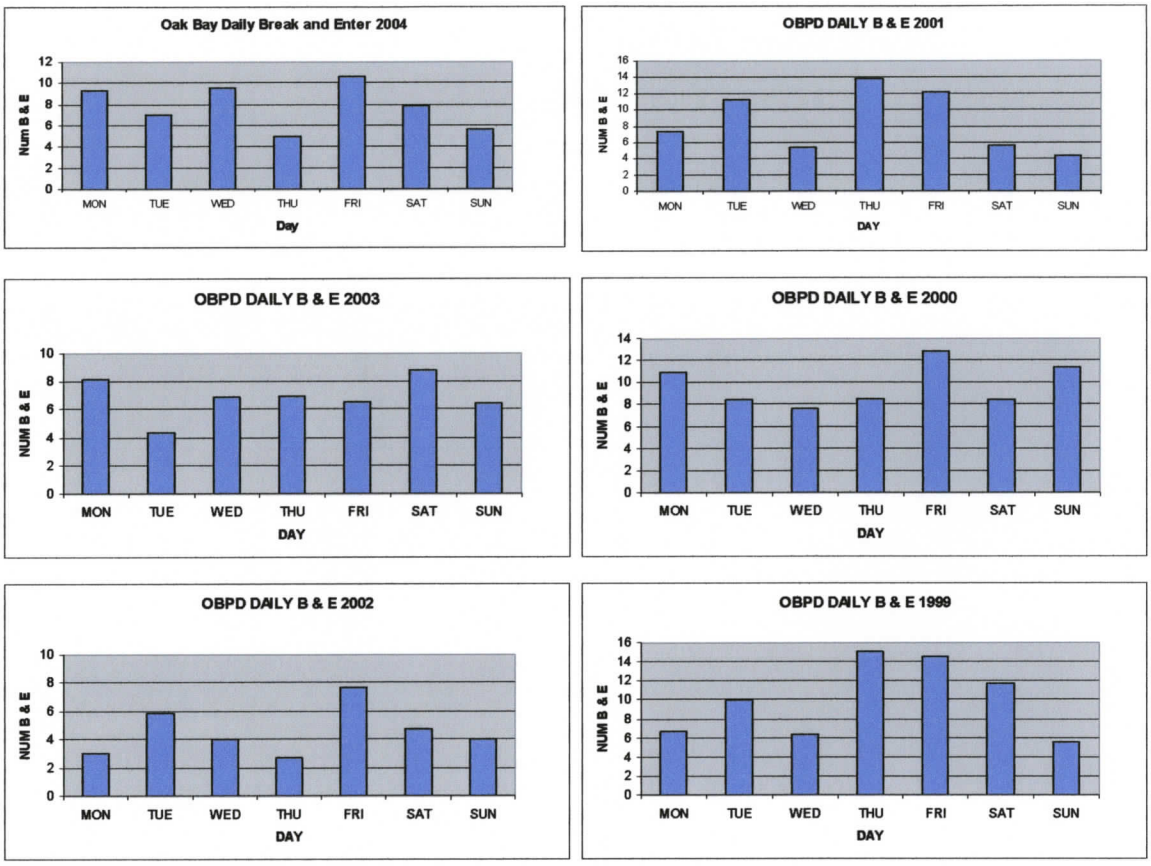


Figure III.31: Oak Bay Daily Patterns of Break and Enter .

When data are averaged over the six year period, Friday constitutes about 1/5 (19%) of the entire break and enters. Thursday is the next most active day of the week with 15%, while Monday, Tuesday and Saturday follow with 14% of the total break and enters (Table III.10).

OAK BAY DAILY BREAK AND ENTER													
Day	2004		2003		2002		2001		2000		1999		AVG
Monday	9	17%	8	17%	3	9%	7	12%	11	16%	7	10%	14%
Tuesday	7	13%	4	9%	6	18%	11	19%	8	12%	10	14%	14%
Wednesday	10	17%	7	14%	4	13%	5	9%	8	11%	6	9%	12%
Thursday	5	9%	7	15%	3	8%	14	23%	8	12%	15	22%	15%
Friday	11	19%	6	14%	8	24%	12	20%	13	19%	15	21%	19%
Saturday	8	14%	9	18%	5	15%	6	9%	8	12%	12	17%	14%
Sunday	6	10%	6	13%	4	13%	4	7%	11	17%	6	8%	11%
Total	55	100%	48	100%	32	100%	60	100%	68	100%	70	100%	100%

Table III.10: Oak Bay Daily Patterns of Break and Enter

Figure III.32 shows a pattern where burglaries starting on Wednesday reaching a peak on Friday and declining through Sunday. The lowest activity during the week is found on Sunday with only 11% of the weekly total of break and enters.

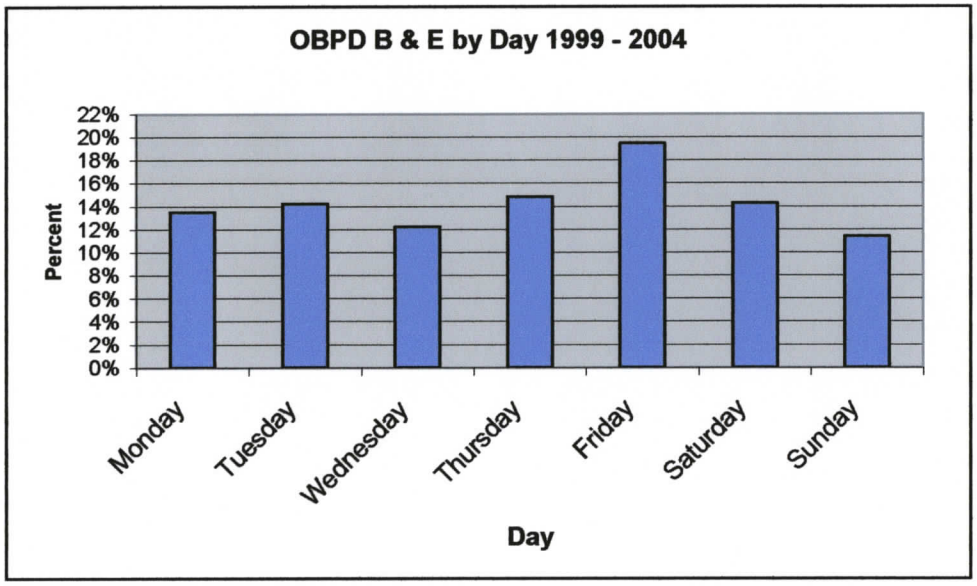


Figure III.32: Oak Bay Daily B and E (B &E) 1999 – 2004.

There is an increase in the deviation around the mean in the Oak Bay data. The average is 14.3% with a standard deviation of 4.5% indicating a higher degree of variability. However, in each year, over the course of the week, the number of daily events did not deviate significantly from a uniform distribution, X^2, $p > 0.05$.

Furthermore, using the Kruskal-Wallis test we see break and enter did not vary significantly by day of the week, $H = 7.721$, at 6 *df*, $p > 0.05$.

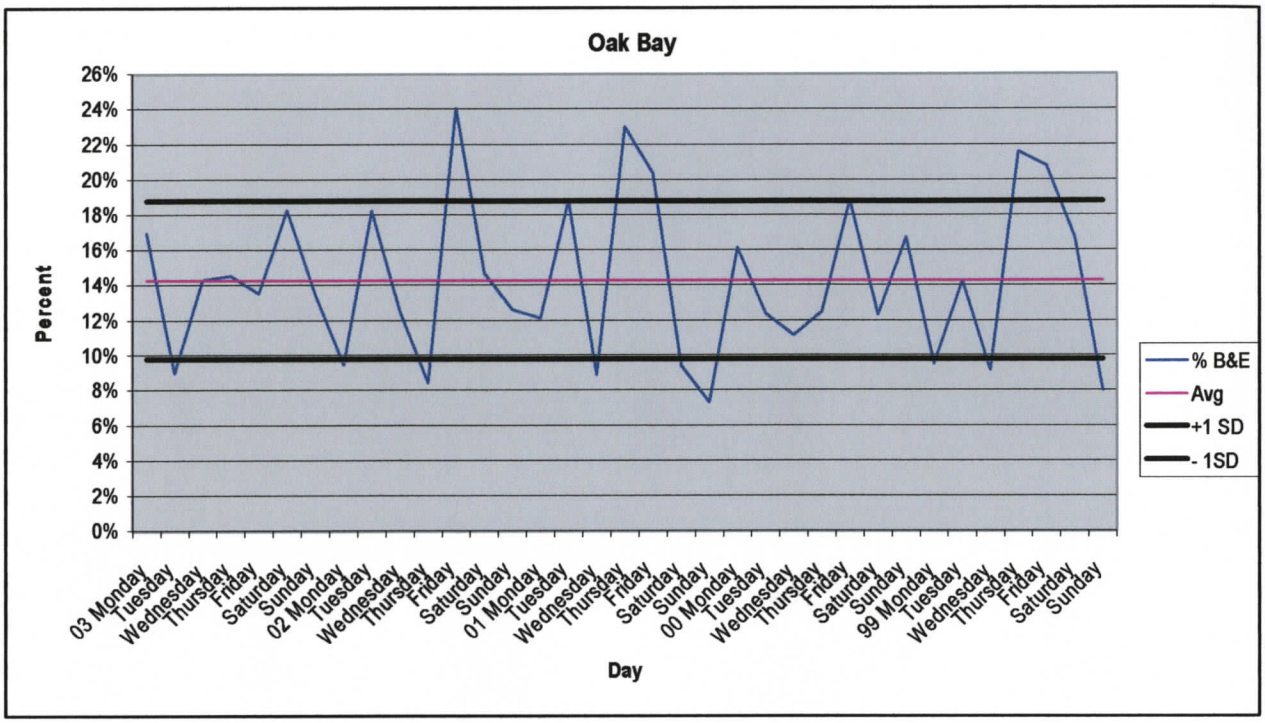


Figure III.33: Oak Bay Daily Variability 2003 to 1999 – Avg.: 14.3%, SD: 4.5%.

Monthly Changes

Central Saanich

It is clear that Central Saanich has a very minor break and enter problem. In fact there are months in our sample where there are no incidents of residential burglary reported to the police. In each year of the study there were between one and three months in our sample where police did not record a break and enter. In three of the six years three or more months did not record a single break and enter. It is important to remember that some events were excluded from this analysis due to incomplete time/date information.

This could explain the absence of events in some months, however, there is no doubt Central Saanich does not have a serious break and enter problem.

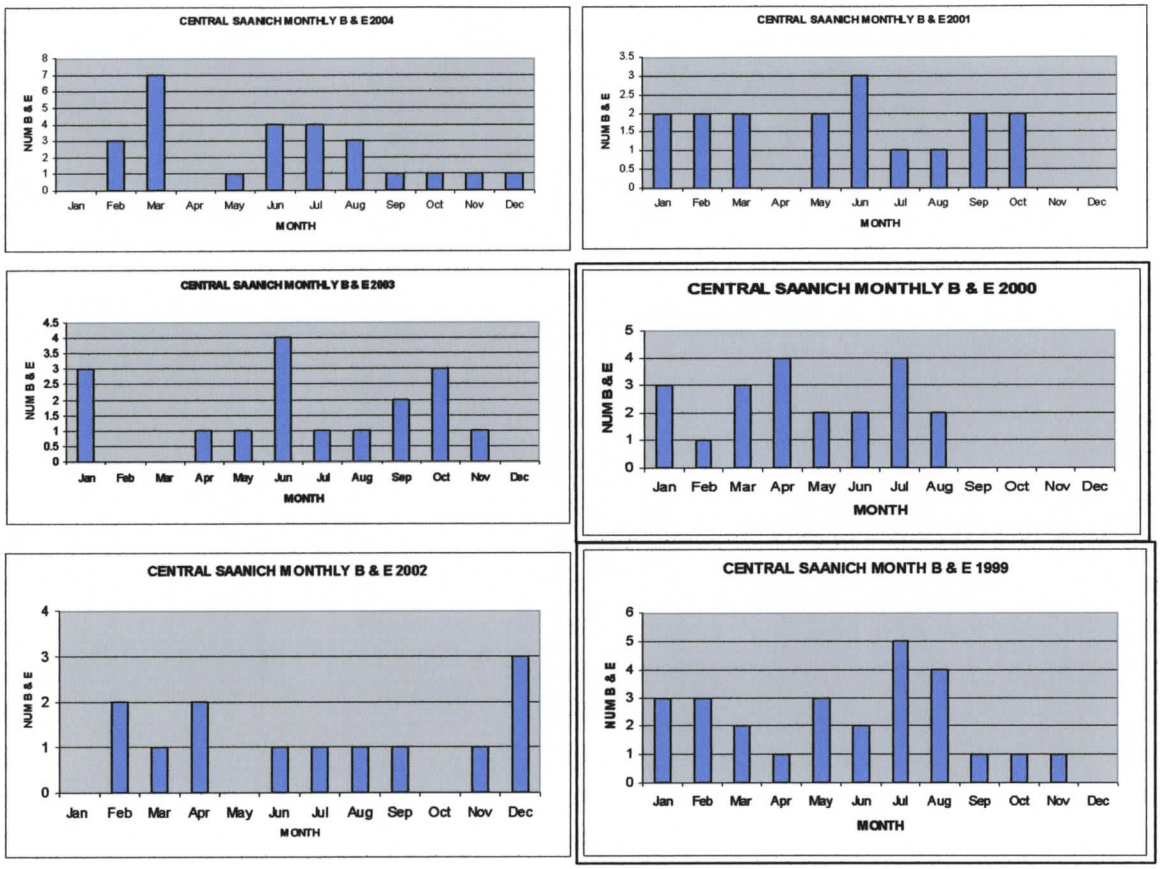


Figure III.34: Central Saanich Monthly Patterns of Break and Enter 1999 – 2004.

Central Saanich Monthly Break and Enter												
Month	2004		2003		2002		2001		2000		1999	
Jan	0	0%	**3**	**18%**	0	0%	2	12%	3	14%	3	12%
Feb	3	12%	0	0%	**2**	**15%**	2	12%	1	5%	3	12%
Mar	**7**	**27%**	0	0%	1	8%	2	12%	3	14%	2	8%
Apr	0	0%	1	6%	**2**	**15%**	0	0%	**4**	**19%**	1	4%
May	1	4%	1	6%	0	0%	2	12%	2	10%	3	12%
Jun	4	15%	**4**	**24%**	1	8%	**3**	**18%**	2	10%	2	8%
Jul	4	15%	1	6%	1	8%	1	6%	**4**	**19%**	**5**	**19%**
Aug	3	12%	1	6%	1	8%	1	6%	2	10%	**4**	**15%**
Sep	1	4%	2	12%	1	8%	2	12%	0	0%	1	4%
Oct	1	4%	**3**	**18%**	0	0%	2	12%	0	0%	1	4%
Nov	1	4%	1	6%	1	8%	0	0%	0	0%	1	4%
Dec	1	4%	0	0%	**3**	**23%**	0	0%	0	0%	0	0%
Total	26	100%	17	100%	13	100%	17	100%	21	100%	26	100%

Table III.11: Central Saanich Monthly Break and Enter. [1]

There is variability between the years, however, burglaries in Central Saanich occur mainly in the summer and early fall months. The summer months consistently have some level of activity. The other months are inconsistent with some years recording no break and enter in the winter, spring or fall months. For example, there were no burglaries in January or April 2004, nor were there any recorded in February, March, or December in 2003. In 2000 no break and enters were reported from September to December.

There are extreme periods where one month has a much higher frequency of events than other months. March of 2004 had in excess of 1/5 (27%) of the annual break and enters. Similar situations arose in June (24%) of 2003, December (23%) of 2002, June (18%) of 2001, April (19%) and July (19%) of 2000 and July (19%) of 1999 where each of these elevated months accounted for about 1/5 or more of the annual break and enters.

[1] Shaded numbers in the tables equal or exceed one standard deviation above the mean number of events for the year.

There were combinations of months that exceeded the average number of break and enter by one standard deviation generating 1/5 to ½ of the break and enter for the year. In 2004, 2003 and 2002, a disproportional number of the burglaries, more than fifty percent occurred in three months, or in a ¼ of the year. In 2000, four months accounted for 67% of the annual break and enters. There is a possibility that this is the result of a serial offender who strikes, commits a series of burglaries and moves on. Burglary is not a common event in Central Saanich, so such attacks immediately and disproportionately inflate the frequency of events.

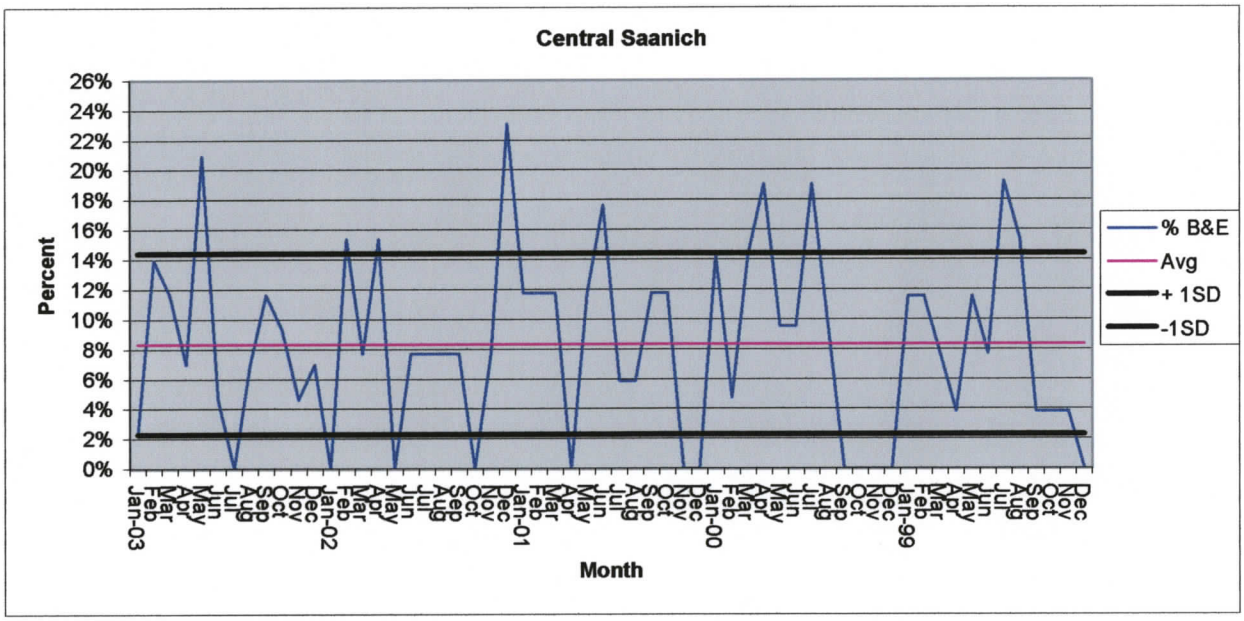


Figure III.35: Central Saanich Monthly Variability 2003 to 1999 – Avg.: 14.4%, SD: 6.1%.

Figure III.35 shows the monthly proportion of break and enter. The diagram includes the mean (14.4%) with one standard deviation around the mean (6.1%). Visually, we can see that the variation around the mean is quite distinct. Chi square and the Kruskal-Wallis tests were not conducted due to the low number of events.

Saanich

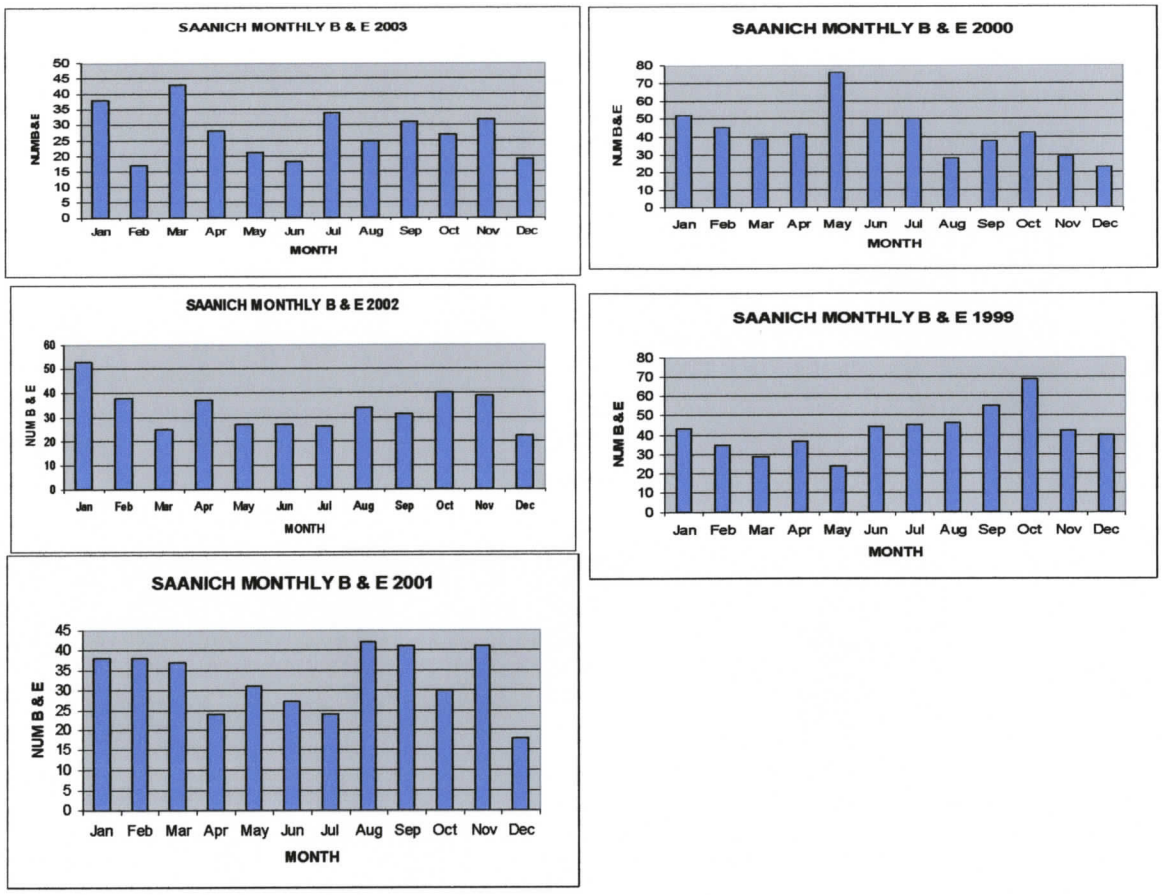


Figure III.36: Saanich Monthly Patterns of Break and Enter 1999 - 2004.

The winter and early fall are the most prevalent months for break and enter in Saanich (Figure III.36). There is some variation throughout the study period but this pattern seems consistent over time. For example, July 2003, August 2001, June/July 2002, had spikes in activity, otherwise the spring and early summer have lower levels of annual activity.

Saanich Monthly Break and Enter												
Month	2004		2003		2002		2001		2000		1999	
Jan	0	0%	**38**	**11%**	**53**	**13%**	38	10%	52	10%	43	8%
Feb	0	0%	17	5%	38	10%	38	10%	45	9%	35	7%
Mar	0	0%	**43**	**13%**	25	6%	37	9%	39	8%	29	6%
Apr	0	0%	28	8%	37	9%	24	6%	41	8%	37	7%
May	0	0%	21	6%	27	7%	31	8%	**76**	**15%**	24	5%
Jun	0	0%	18	5%	27	7%	27	7%	50	10%	44	9%
Jul	0	0%	34	10%	26	7%	24	6%	50	10%	45	9%
Aug	0	0%	25	8%	34	9%	**42**	**11%**	28	5%	46	9%
Sep	0	0%	31	9%	31	8%	**41**	**10%**	38	7%	**55**	**11%**
Oct	0	0%	27	8%	40	10%	30	8%	42	8%	**69**	**14%**
Nov	0	0%	32	10%	39	10%	**41**	**10%**	29	6%	42	8%
Dec	0	0%	19	6%	22	6%	18	5%	23	4%	40	8%
Total	0	0%	333	100%	399	100%	391	100%	513	100%	509	100%

Table III.12: Saanich Monthly Break and Enter.

Again we observe one to three months in each year that account for higher levels of activity than in other months (Table III.12). Yet, there appears to be less variability between the months. They exceed the average number of occurrences by one standard deviation. However, these exceptions are not as extreme as the months found in Central Saanich. The months capture between 13% (January 2002) and 31% (August, September and November 2001) of the respective annual total of break and enter. These months fall either in the winter or in the late summer/fall of the year, with one exception with, May of 2000. There is no consistency with month over month patterns - they tend to vary from year to year.

Figure III.36 shows the monthly proportion of break and enter. The average monthly percentage is 8.3% with a standard deviation of 2.3%. It is evident that there are a number of months that exceed one standard deviation around the mean. As we observed some months have much higher values than others. A chi square test was used to determine if burglary is uniformly distributed across the year. What was found is that

break and enter vary significantly over the course of the year with $p < 0.05$. Therefore, within each year there are months that have highs or lows that are much different from what would be expected if monthly values were uniformly distributed across the year.

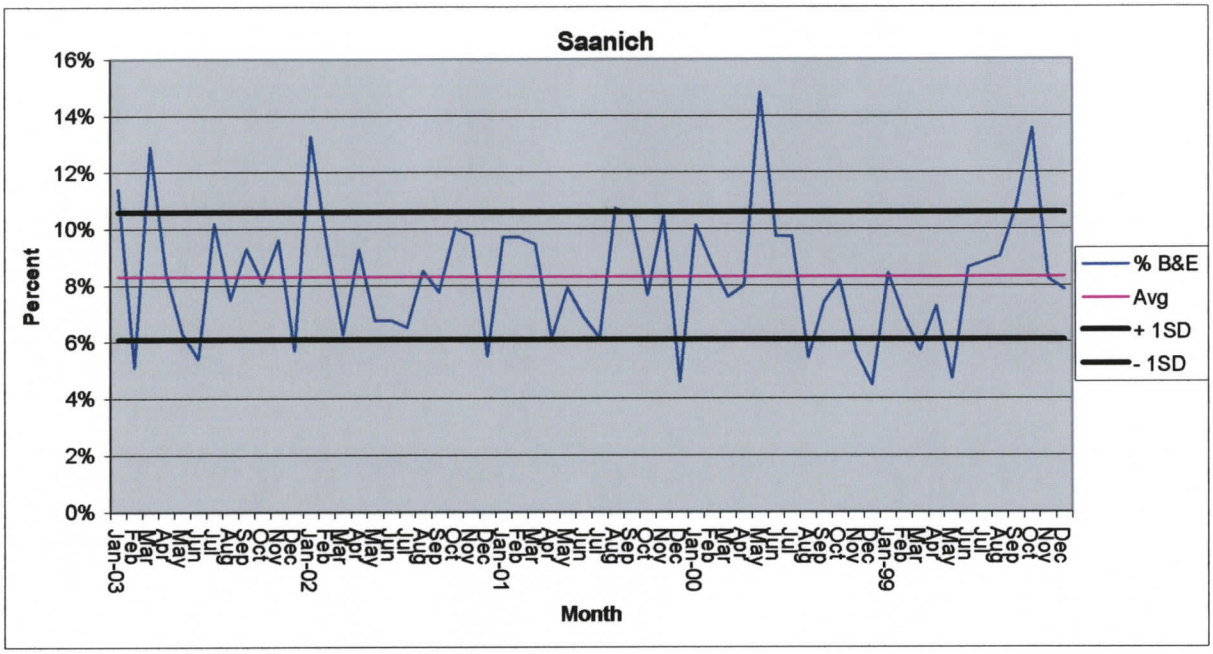


Figure III.37: Saanich Monthly Variability 2003 to 1999 – Avg.: 8.3%, SD: 2.3%.

We have seen that break and enter is not dispersed uniformly throughout individual years. The question that follows, is the average monthly activity over the five years similar? A Kruskal-Wallis test was used to assess year over year monthly variability. There was no significant variation, $H = 13.24$ with 11 *df*, $p = .29$, in other words, the averages of the combined monthly activity did not vary disproportionately over the five year period.

Oak Bay

There is a real mix of monthly activity over the course of the six years (Figure III.38). July of 2003 and August of 2002 had no reported break and enters in the sample. There were a number of months throughout the study period that exceeded the average annual break and enter by one standard deviation. These months made up a disproportionate amount of the annual break and enter total. January (17%), and August (20%) accumulated 37% of the break and enters for 2004 (Table III.13). In 2003 February (14%), and May (21%) were the most eventful months totaling 37% of the break and enters for that year. October (20%) and December (17%) totaled 17% % of the burglaries in 2002. April (12%), August (16%), and October (14%) suffered 42% of the break and enters in 2001. The year 2000 saw one month with an extreme proportion of annual break and enters with July reaching 30 %, combined with June (19%) these two months accounted for 49% of the annual burglaries. In 1999, February (14%), and Oct (17%), accrued 31% of the annual break and enters. These months accumulated 30% or more of the break and enters for there respective year, essentially, in every year two months or 1/6 of the year suffered 1/3 of the annual break and enter. Yet, there is no consistency between the years in terms of exceptional months. They vary over the study period, sometimes occurring

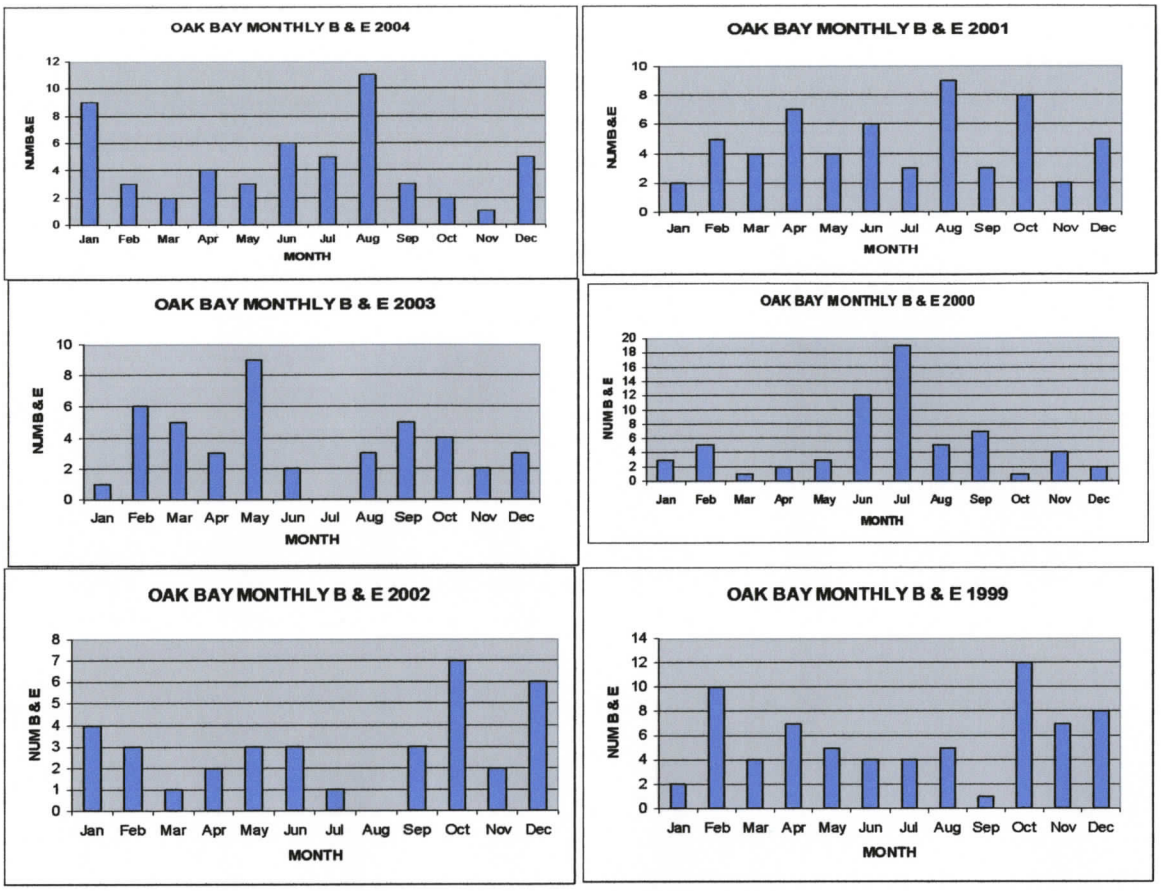


Figure III.38: Oak Bay Monthly Patterns of Break and Enter 1999 – 2004.

within close proximity to one another, at other times occurring several months apart.

Oak Bay Seasonal Break and Enter												
Month	2004		2003		2002		2001		2000		1999	
Jan	**9**	**17%**	1	2%	4	11%	2	3%	3	5%	2	3%
Feb	3	6%	**6**	**14%**	3	9%	5	9%	5	8%	**10**	**14%**
Mar	2	4%	5	12%	1	3%	4	7%	1	2%	4	6%
Apr	4	7%	3	7%	2	6%	**7**	**12%**	2	3%	7	10%
May	3	6%	**9**	**21%**	3	9%	4	7%	3	5%	5	7%
Jun	6	11%	2	5%	3	9%	6	10%	**12**	**19%**	4	6%
Jul	5	9%	0	0%	1	3%	3	5%	**19**	**30%**	4	6%
Aug	**11**	**20%**	3	7%	0	0%	**9**	**16%**	5	8%	5	7%
Sep	3	6%	5	12%	3	9%	3	5%	7	11%	1	1%
Oct	2	4%	4	9%	**7**	**20%**	**8**	**14%**	1	2%	**12**	**17%**
Nov	1	2%	2	5%	2	6%	2	3%	4	6%	7	10%
Dec	5	9%	3	7%	**6**	**17%**	5	9%	2	3%	8	12%
Total	54	100%	43	100%	35	100%	58	100%	64	100%	69	100%

Table III.13: Oak Bay Monthly Break and Enter.

The average percentage of break and enters per month over the six years was 8.3% with a standard deviation of 5.6%. A Chi square test was not used due to the low number of entries in some months. The break and enters in Oak Bay did not vary significantly by month over the six years, Kruskal-Wallis H = 7.83, *df* 11, p = 0.73.

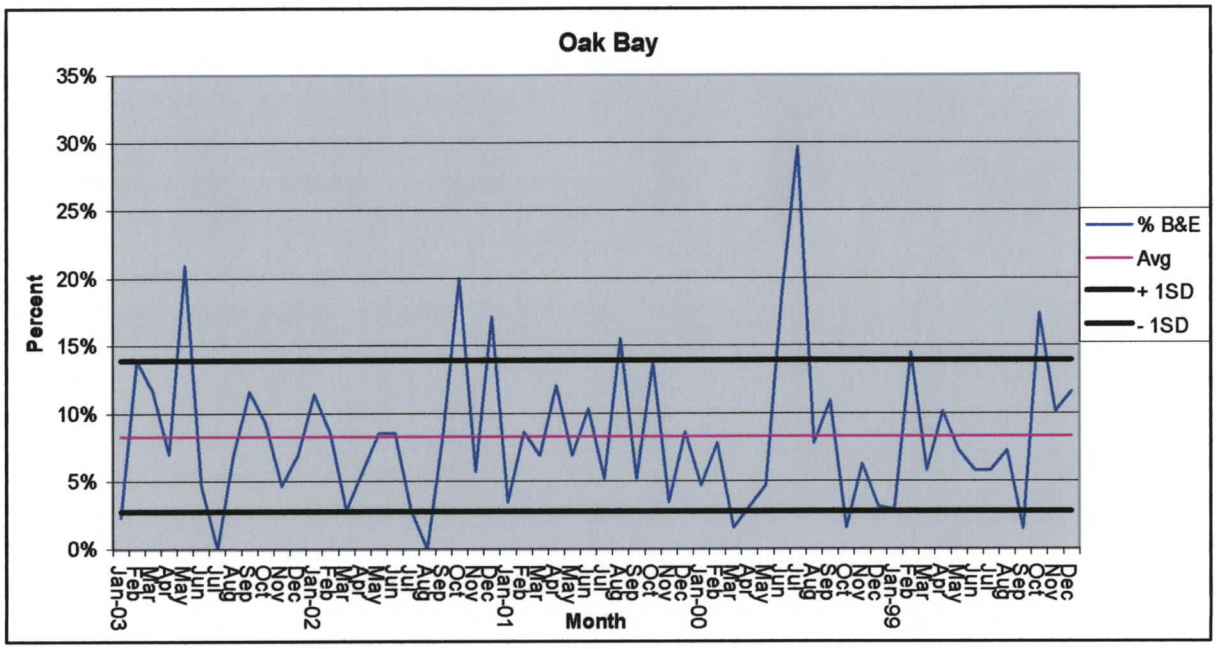


Figure III.39: Oak Bay Monthly Variability 2003 to 1999 – Avg.: 8.3%, SD: 5.6%.

Victoria/Esquimalt

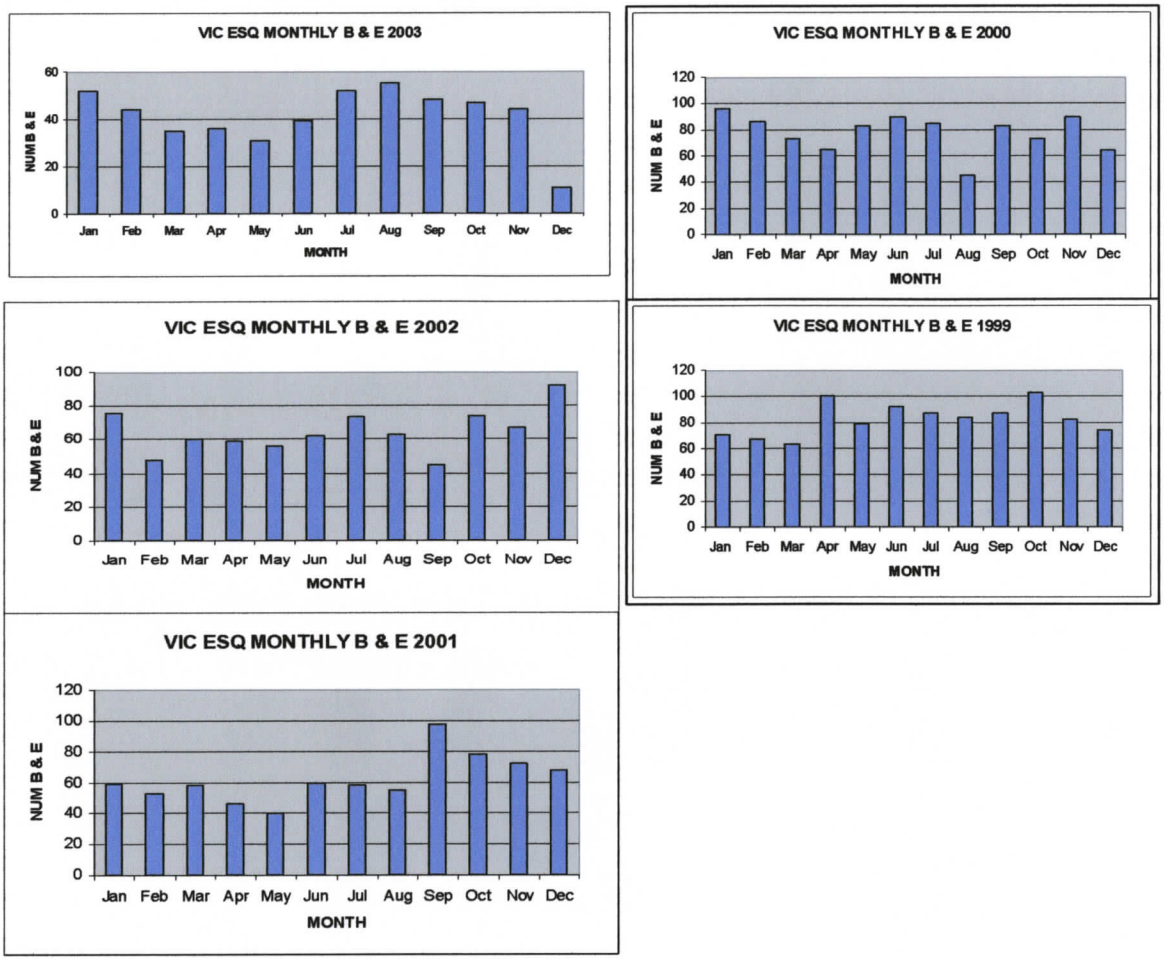


Figure III.40: Victoria/Esquimalt Monthly Patterns of Break and Enter 1999 – 2004.

Again the monthly patterns are not normally distributed within the year, nor are patterns consistent between the years. In 2003 there was a peak in activity in January and again in August. In 2002, activity reached a peak in January, July, October and December. The momentum from January through August was relatively flat in 2001, climaxing in September and declining through December. The year 2000 witnessed three peaks in January, June and December, while activity peaked in April, June and October of 1999.

Victoria Esquimalt Monthly Break and Enter												
Month	2004		2003		2002		2001		2000		1999	
Jan	0%		**52**	**11%**	**76**	**10%**	59	8%	**96**	**10%**	71	7%
Feb	0%		44	9%	48	6%	53	7%	86	9%	67	7%
Mar	0%		35	7%	60	8%	58	8%	73	8%	63	6%
Apr	0%		36	7%	59	8%	46	6%	65	7%	**100**	**10%**
May	0%		31	6%	56	7%	40	5%	83	9%	79	8%
Jun	0%		39	8%	62	8%	60	8%	**90**	**10%**	92	9%
Jul	0%		**52**	**11%**	73	9%	58	8%	85	9%	87	9%
Aug	0%		**55**	**11%**	63	8%	55	7%	45	5%	84	8%
Sep	0%		48	10%	45	6%	**98**	**13%**	83	9%	87	9%
Oct	0%		47	10%	**74**	**10%**	**78**	**10%**	73	8%	**103**	**10%**
Nov	0%		44	9%	67	9%	72	10%	**90**	**10%**	82	8%
Dec	0%		11	2%	**92**	**12%**	68	9%	64	7%	74	7%
Total	0	0%	494	100%	775	100%	745	100%	933	100%	989	100%

Table III.14: Victoria Esquimalt Monthly Break and Enter.

The data exhibits a limited number of months with higher than average activity. January (11%), July (11%) and August (11%) comprised 1/3 or 33% of the break ins for 2003. In 2002 January (10%), October (10%) and December (12%) accounted for 32% of the burglaries. Twenty-three percent of the break and enters occurred in September (13%) and October (10%) of 2001. In 2000, thirty percent of the burglaries were accumulated in January (10%), June (10%) and November (10%). Twenty percent of the burglaries in 1999 occurred in April (10%) and October (10%). All of these months were one standard deviation above the average activity for the year. None of the months consistently repeated this behavior through the full five years of data. However, January and December did have levels which exceeded one standard deviation above the average in three (non consecutive) years out of the five years under examination. In every year, burglary did not form uniform patterns, with significant Chi square values at $p < 0.05$. Monthly averages varied significantly over the five years Kruskal-Wallis $H = 22.26$, 11 *df*, $p = 0.02$.

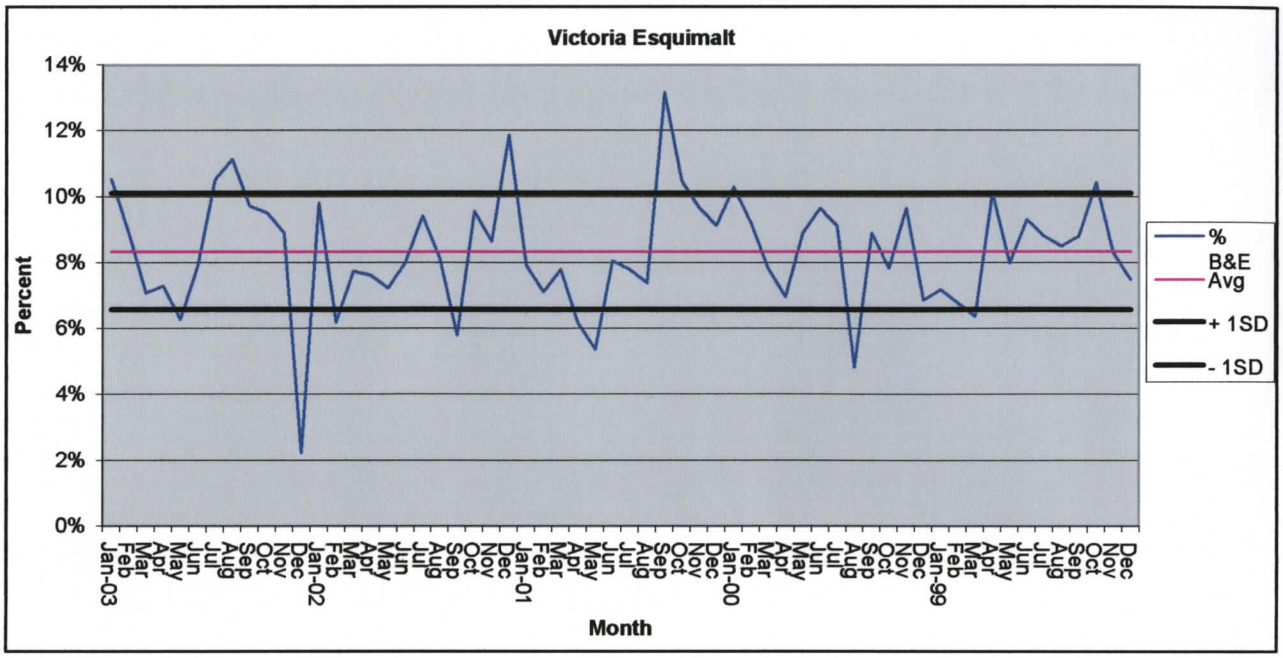


Figure III.41: Victoria/Esquimalt Monthly Variability 2003 to 1999 – Avg.: 8.3%, SD: 1.8%.

Seasonal Changes

Central Saanich

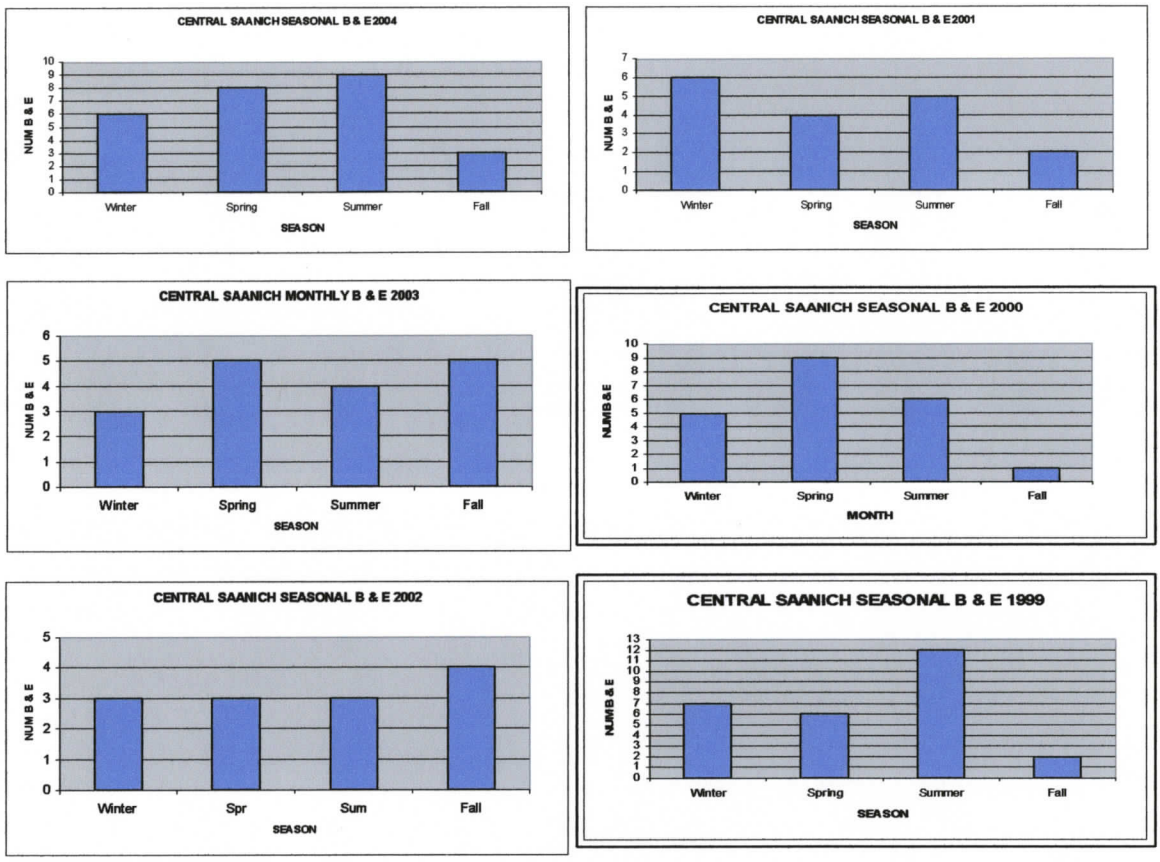


Figure III.42: Central Saanich Seasonal Patterns.

Annual seasonal patterns are inconsistent over the study period (Figure III.42). In 2004 the spring and summer received the majority of activity (Table III.15). Spring and Fall suffered the bulk of occurrences in 2003. Winter in 2002 was somewhat higher than the remaining seasons, which had the same proportion of burglaries. Winter in 2001, spring in 2000 and summer in 1999 had in excess of a 1/3 of the annual break and enter. There is no significant seasonal variation within each year (X^2 test, $p > 0.05$), or across the six year study period (Kruskal-Wallis test, $p > 0.05$). When the data is aggregated

over the six year period, break and enter rises in winter peaking in the summer and falls dramatically through the fall (Figure III.43).

Central Saanich Seasonal Break and Enter												
Season	2004		2003		2002		2001		2000		1999	
Winter	6	23%	3	18%	3	23%	6	35%	5	24%	7	26%
Spring	8	31%	5	29%	3	23%	4	24%	9	43%	6	22%
Summer	9	35%	4	24%	3	23%	5	29%	6	29%	12	44%
Fall	3	12%	5	29%	4	31%	2	12%	1	5%	2	7%
Total	26	100%	17	100%	13	100%	17	100%	21	100%	27	100%

Table III.15: Central Saanich Seasonal Break and Enter

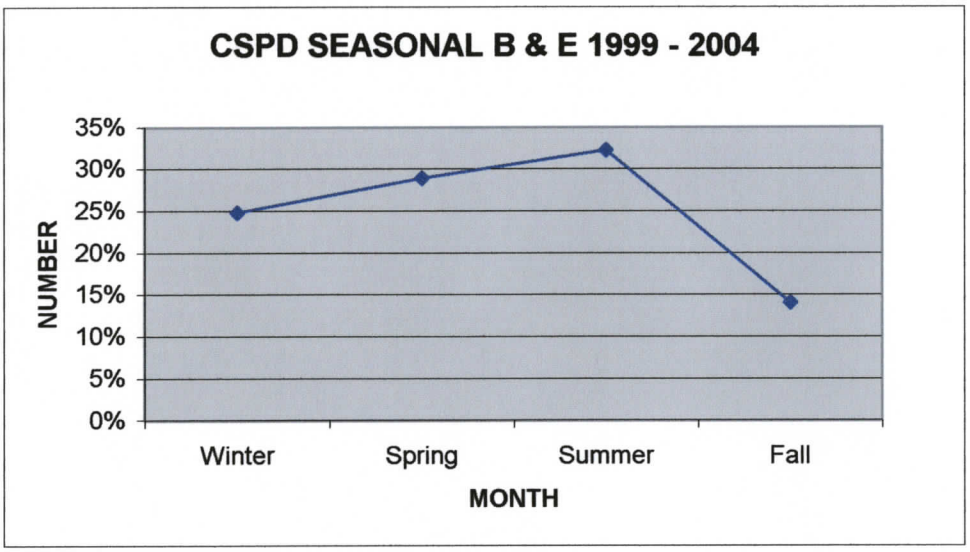


Figure III.43: Central Saanich B and E (B &E) Combined Seasonal Patterns 1999 - 2004.

Saanich

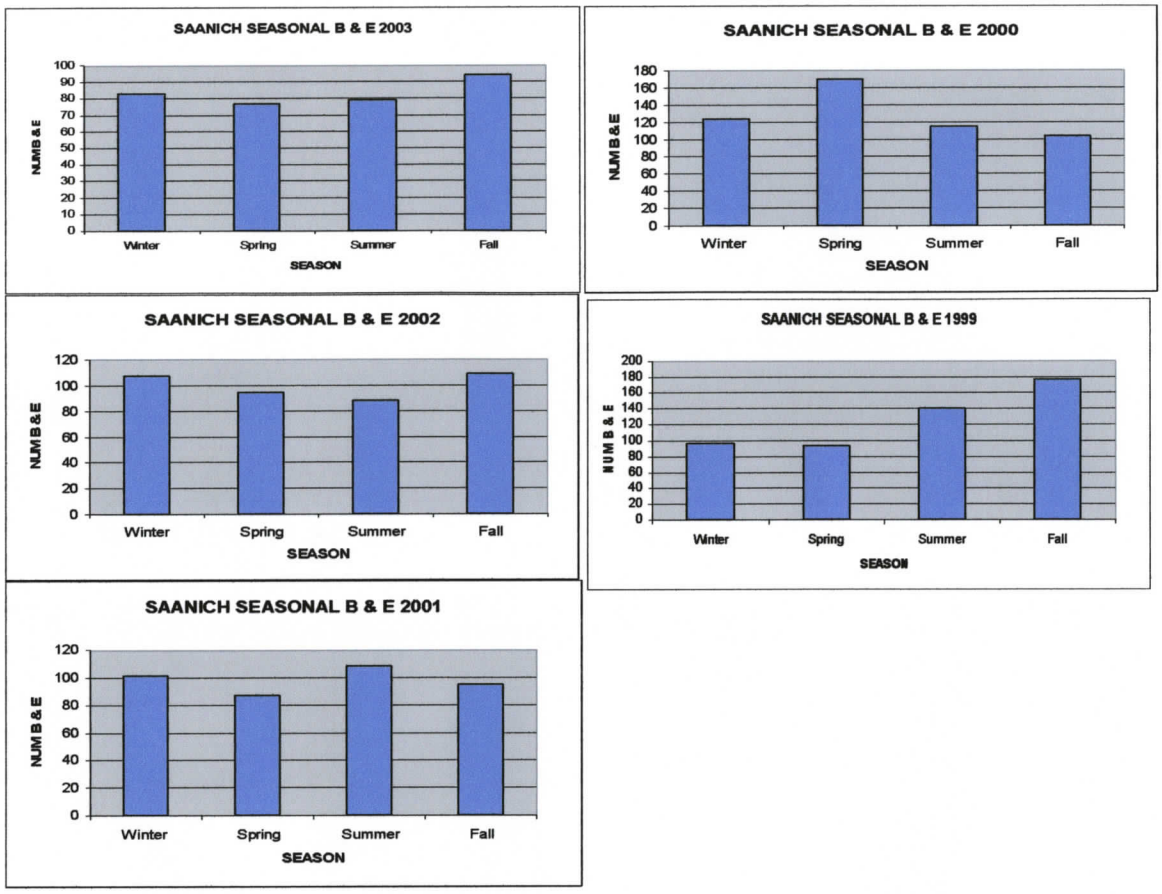


Figure III.44: Saanich Seasonal Patterns.

Saanich Seasonal Break and Enter												
Season	2004		2003		2002		2001		2000		1999	
Winter		0%	83	25%	107	**27%**	101	26%	124	24%	97	19%
Spring		0%	77	23%	95	24%	87	22%	170	**33%**	94	18%
Summer		0%	79	24%	88	22%	108	**28%**	115	22%	141	28%
Fall		0%	94	**28%**	109	**27%**	95	24%	104	20%	177	**35%**
Total	0	0%	333	100%	399	100%	391	100%	513	100%	509	100%

Table III.16: Saanich Seasonal Break and Enter

From 2003 to 2001 the distribution of break and enter varied little between the seasons, ranging within six percent from the low to high (Table III.16). In the preceding years a greater imbalance occu.rred between the seasons. One season in each year had a third or more of the annual break and enters, 2000 with 33% and 1999 with 35% (Table

III.16). When the data is aggregated events rise through the winter, spring, summer and peak in the fall.

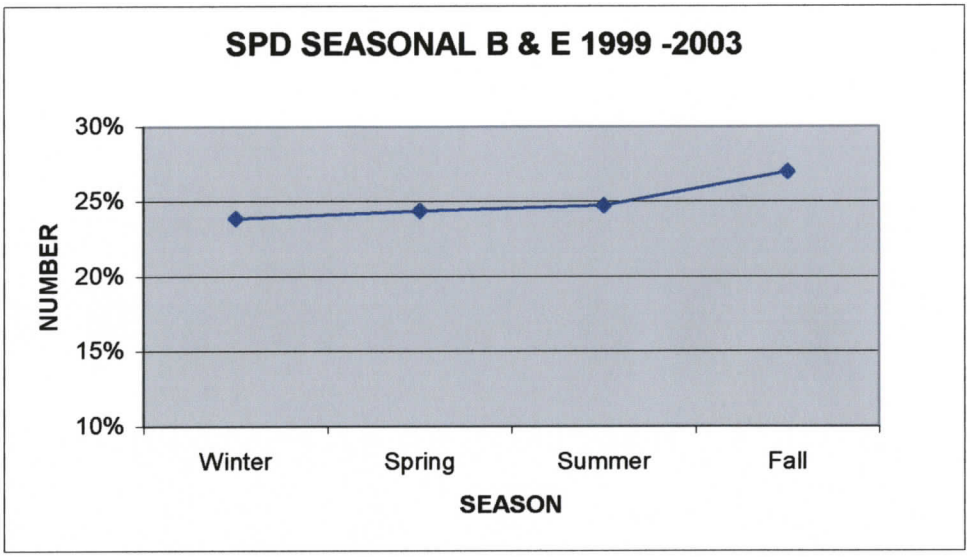


Figure III.45: Saanich B and E (B &E) Combined Seasonal Pattern 1999 - 2003.

The combined Saanich pattern is quite different from the Central Saanich pattern. Summer was the high activity seasons in Central Saanich compared to the fall in Saanich.

In 2003, 2002 and 2001 there was no significant seasonal variation, in other words, the distribution of break and enters was similar across the seasons for each year. However, 2000 and 1999 differed significantly from a uniform distribution indicating seasonal variation through each individual year with X^2 values equaled 19.686 and 36.815 respectively with $p < 0.05$. When the five years of data is aggregated and a Kruskal-Wallis test is applied to determine if the seasonal averages vary, we find that there is no significant difference between seasons, $X^2 = .35$, with 3 *df*, $p = .95$. Annually, there is some evidence of distinctive seasonal patterns (2000 and 1999), but as the level of resolution is lowered the variation is less evident.

Oak Bay

In figure III.46 we observe that summer and fall are prominent seasons of activity over the six years of data. The summer of 2004 and the fall of 1999 suffered more than 1/3 (37% in 2004 and 39% in 1999) of the annual break and enter (Table III.17). However, the fall of 2002 and the summer of 2000 exhibited the most extreme activity with both seasons accounting for approximately 50% or more of the annual burglary activity (46% in 2002 and 53% in 2000). Winter and spring were dominant months in 2003, while spring, summer and fall exhibited consistent seasonal activity.

There are clearly seasons that display high levels of activity. In an effort to uncover disproportionate activity, a Chi square test was utilized to examine the annual seasonal distribution of events. In the six years, three years were found to have a significantly dissimilar distribution across the seasons. The years 2002, 2000 and 1999 all had Chi square values that were significant at $p < 0.05$.

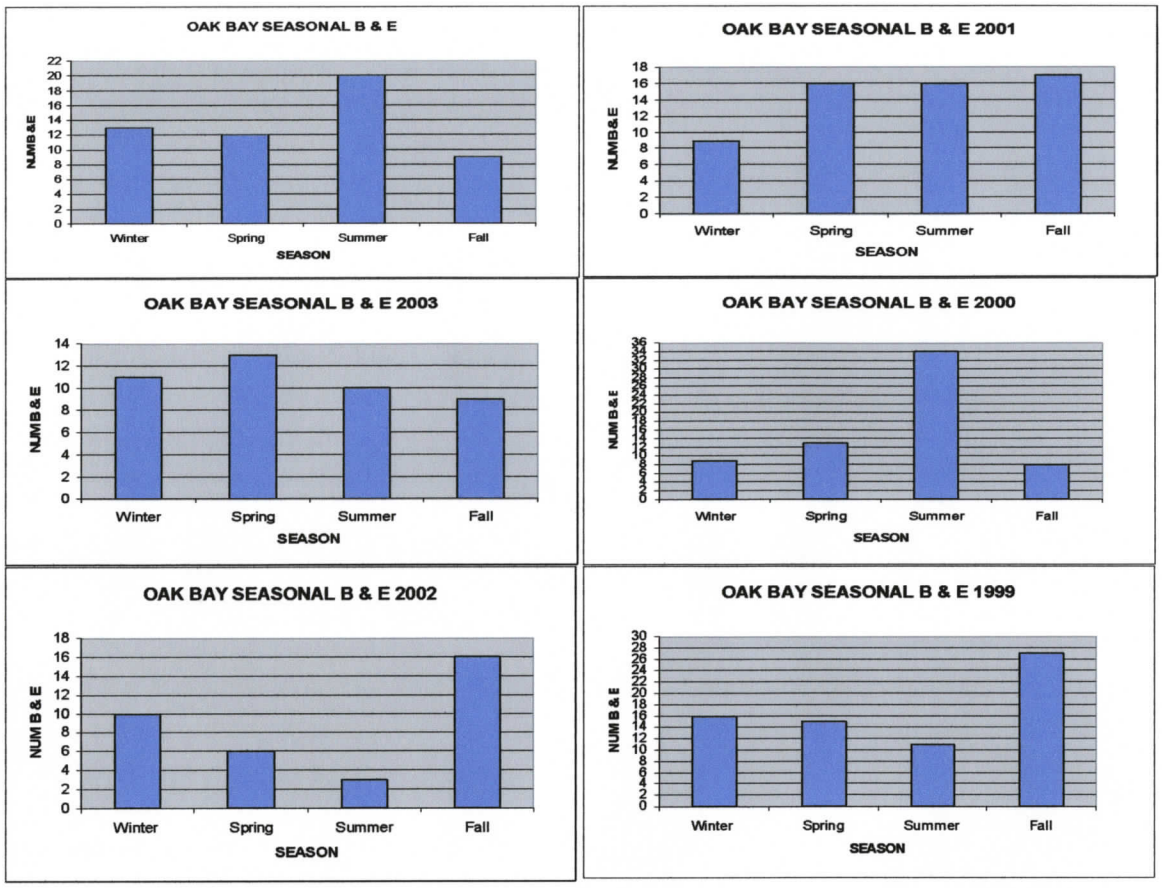


Figure III.46: Oak Bay Seasonal Patterns.

Oak Bay Seasonal Break and Enter												
Season	2004		2003		2002		2001		2000		1999	
Winter	13	24%	11	26%	10	29%	9	16%	9	14%	16	23%
Spring	12	22%	13	30%	6	17%	16	28%	13	20%	15	22%
Summer	20	37%	10	23%	3	9%	16	28%	34	53%	11	16%
Fall	9	17%	9	21%	16	46%	17	29%	8	13%	27	39%
Total	54	100%	43	100%	35	100%	58	100%	64	100%	69	100%

Table III.17: Oak Bay Seasonal Break and Enter

When the seasonal data is aggregated over the six years we observe that the high break and enter season occurs in the summer months (Figure III.47). Events rise through winter and spring cresting in the summer months falling off slightly in the fall. The summer – fall activity witnessed in the individual years strongly influences the aggregated data. To examine if there is a unique seasonal pattern over the study period, a

Kruskal-Wallis test was applied to determine if the seasonal averages vary, we find that there is no significant difference between seasons, $X^2 = .35$, with 3 *df*, p = .95.

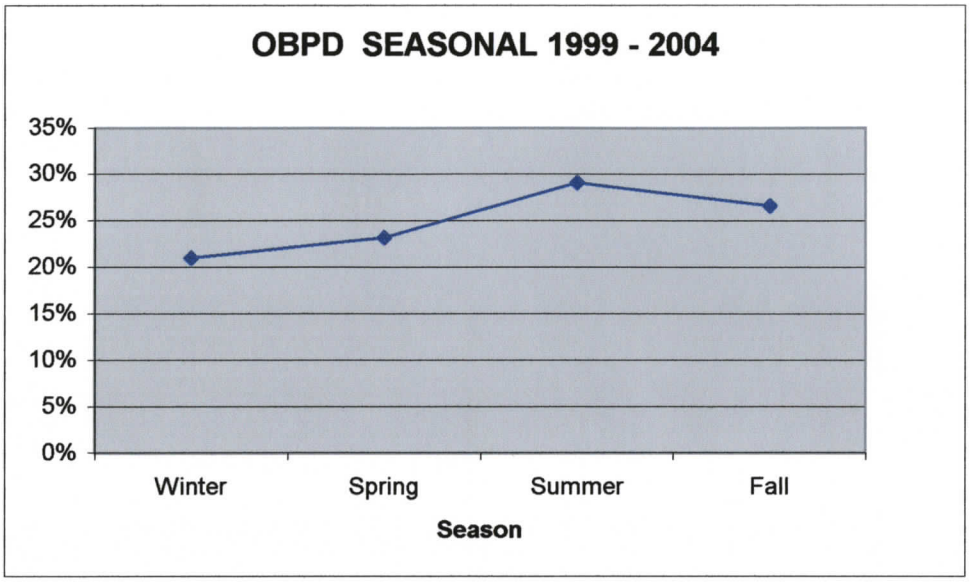


Figure III.47: Oak Bay B and E (B &E) Combined Seasonal Patterns 1999 - 2004.

We see that the Oak Bay pattern is more reflective of the Central Saanich seasonal distribution than the one found in Saanich. However, the extreme fall of events in Central Saanich is not evident in the Oak Bay data set. In fact fall in Oak Bay is the second busiest period, while in Central Saanich it is the slowest season.

Victoria Esquimalt

In figure III.48, we can see that each year has slightly different patterns of seasonal activity. Fall plays an important role leading 2002, 2001 and 1999 as the most active season. Winter in 2000 and summer in 2003 exhibited the highest seasonal activity. In table III.18 we see that in three years one season had about 1/3 third of the annual activity, fall 2000 (32%), fall 2001 (34%) and winter of 2000 (31%).

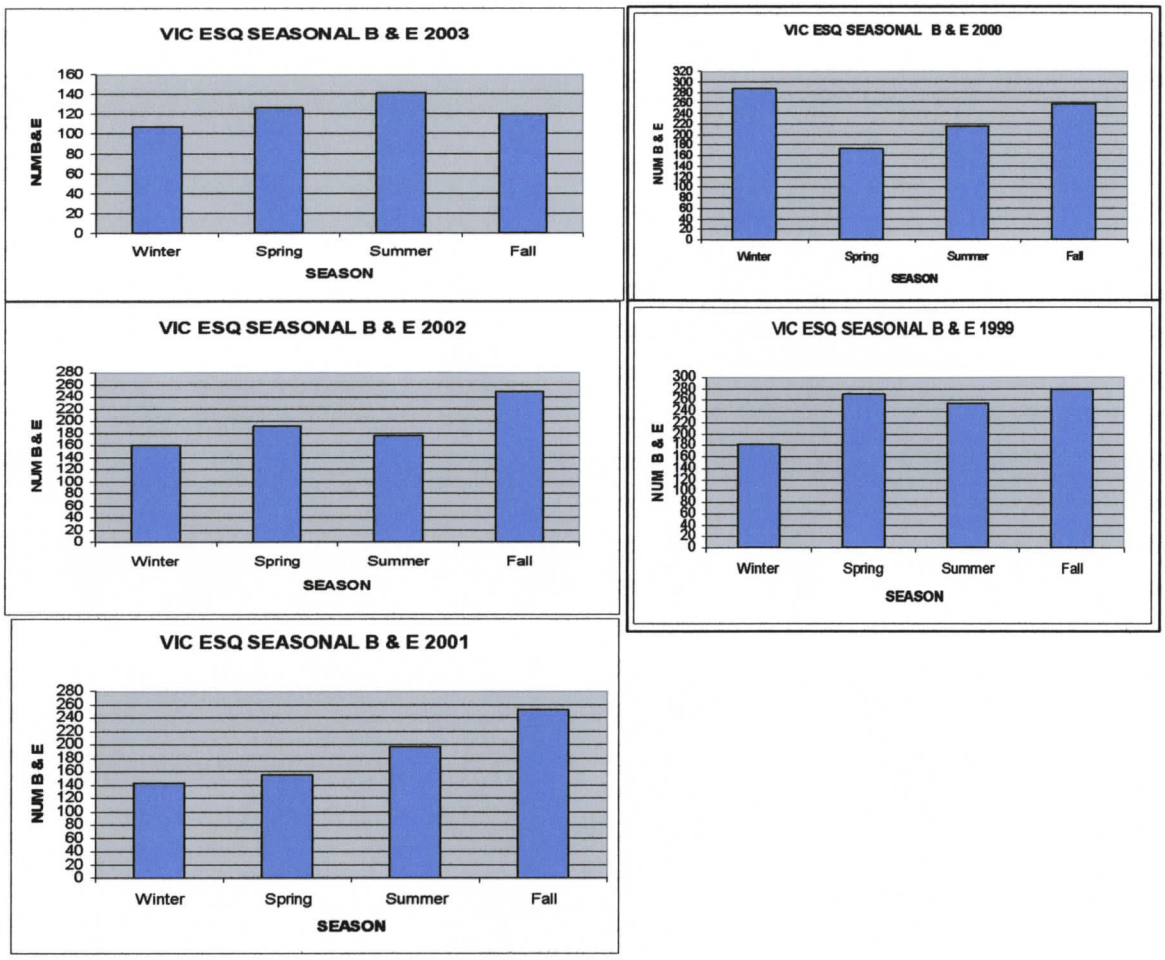


Figure III.48: Victoria Esquimalt Seasonal Patterns.

The Chi square test was applied to each year to determine if the distribution of events was uniformly distributed across the seasons. In four out of the five years seasonal activity varied greatly throughout the year. From 1999 to 2003 X^2 values were > 23 with $p < 0.01$ in each individual year, indicating a strong seasonal influence in the data.

Victoria Esquimalt Seasonal Break and Enter												
Season	2004		2003		2002		2001		2000		1999	
Winter	0	0%	107	22%	160	21%	142	19%	287	31%	183	19%
Spring	0	0%	126	26%	191	25%	155	21%	172	18%	271	27%
Summer	0	0%	141	29%	175	23%	196	26%	216	23%	255	26%
Fall	0	0%	120	24%	249	32%	252	34%	258	28%	280	28%
Total	0	0%	494	100%	775	100%	745	100%	933	100%	989	100%

Table III.18: Victoria Esquimalt Seasonal Break and Enter

In figure III.49 the data for 1999 to 2003 is combined. The fall pattern observed in the disaggregated data strongly influences the overall distribution of break and enters.

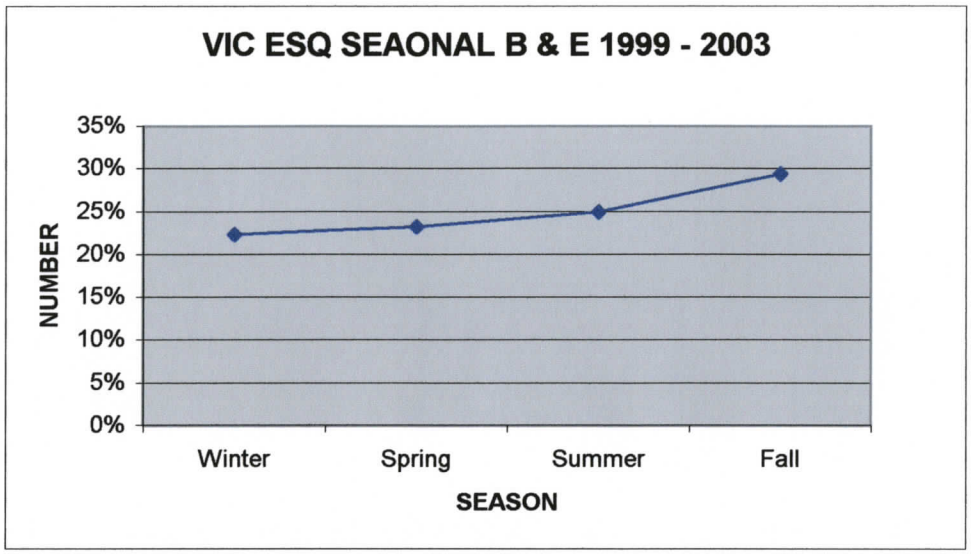


Figure III.49: Victoria Esquimalt B and E (B &E) Combined Seasonal Patterns 1999 – 2003.

The Kruskal-Wallis test was used to establish if there was a disproportionate level of variation in the average seasonal activity over the study period. The test indicated that at this level of analysis there was no significant difference between the seasons $X^2 = 1.97$, at 3 *df*, $p = 0.58$.

Appendix IV: Offender Case Studies

Subject One "Randy"

Subject one will be known as Randy, this is not his true name. Randy was interviewed at a correctional institution where he was in custody awaiting trial for three break and enters. Randy is 21 years old with a grade 8 education. He was unemployed at the time of the break enters. He is a drug user and used the proceeds from his crimes to support himself. He had been living in the CRD for approximately 7 weeks prior to his arrest. Randy had never lived in Victoria before. He had decided to stay in Victoria after being released from a Provincial corrections centre located in the CRD.

Randy was not new to residential break and enters, he divulged he had committed hundreds of residential burglaries in another city in British Columbia. Randy committed his first burglary when he was 10 or 11 years old. His 14 year old brother made him crawl through a bathroom window. His brother was charged for the break in. Randy has been committing break and enters since he was 12 years old.

Spatial Knowledge

Randy could only identify three municipalities in the CRD, Victoria, Saanich and Oak Bay. Of these three municipalities he knew nothing about Oak Bay and his knowledge about Victoria and Saanich was limited to a single neighbourhood in each municipality. His knowledge of neighbourhoods within the region was extremely poor. He could only identify the neighbourhood he lived in and the downtown core. When asked to rate his familiarity with neighbourhoods, he was moderately familiar (3) with the neighbourhood he lived in and confident about the downtown core (2). However, this

confidence was restricted to a small neighbourhood within the downtown. In fact he was confident of the immediate area surrounding a single intersection located in the downtown core.

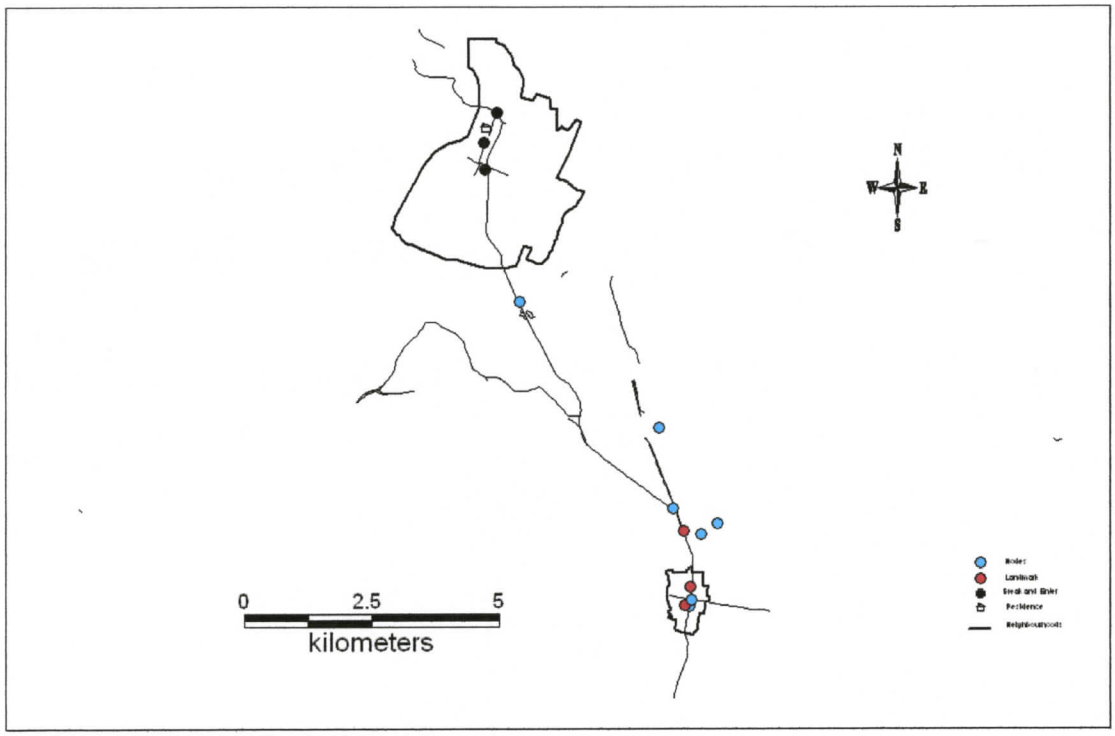


Figure IV.1: Subject One's Awareness Space.

When asked the nodes he was familiar with, Randy could only name 7 (Figure IV.1). Many of these nodes were not immediately noted by Randy, but came out in the conversation as we talked about other spatial attributes. He knew of these locations but was not familiar with the surrounding area because he was driven to them. He could only identify three landmarks in the region. One of the landmarks came out when he referenced the location of a node.

Randy was asked about the roads (paths) he was familiar with. His knowledge was extremely limited because he relied on mainly on taxis for transportation. He was

able to identify four streets surrounding his residence, and the two major routes, which he uses to access the downtown area (Figure IV.1). It is clear that Randy had minimal knowledge of the CRD, which is reflected in his break and enter pattern.

Break and Enters

Randy likes to plan his break and enters in advance. He will try to watch a neighbourhood to establish its routines. However, he does not always make advanced plans, instead if a good opportunity presents itself and he is in the mood he exploit it. Randy commits his break and

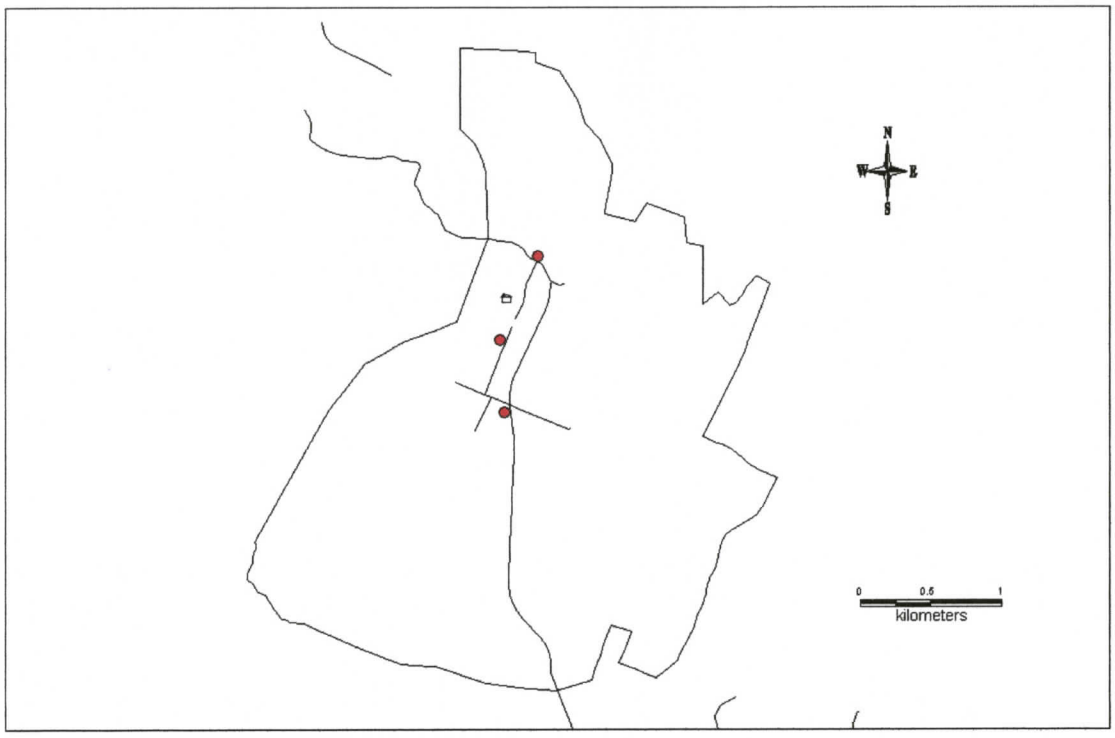


Figure IV.2: Subject One's Break and Enters.

enters in the daytime between the hours of 0900 and 1300, while kids are at school and parents or adults are at work. He does not use intoxicants when he commits a break in because he likes to keep his head straight during the commission of the offence.

Interestingly, Randy noted that there were areas he considered too risky to search for targets. One area he mentioned is located close to a restaurant (node) he frequented. He knew the area consisted predominately of subsidized housing. He felt it was too dangerous to offend in this area.

There are several occupancy cues he looks for when establishing targets, no cars in the driveway, newspapers piled up, or mail present. He uses cues to identify potential property/reward that may be present in the residence. Toys in the yard, leads him to believe that the house will contain kid's stereos, electronic game devices, computers, high tech gadgets. An old well kept expensive vehicle, for example a Cadillac, is an indication of senior residents, who would have jewelry. Randy believes that diamonds were cheap years ago, so older residents usually have lots. He believes that a home with an East Indian family tends to have lots of expensive gold jewelry. He legitimized his behaviour indicating that the goods were probably insured. He felt bad breaking a window in one residence because he didn't think it would be covered by insurance.

Randy was asked if he had ever gone back to a residence he had previously broken into. He stated he did once, he returned to a house approximately twenty minutes after the initial break and enter. The home owner had returned to the residence, upon discovering Randy, he stabbed him in the rear and kicked him out of the house. Randy has told friends about houses he has broken into. He knows that this information has been acted on and the houses subsequently re-victimized.

Randy commented on various forms of deterrence. He states that alarms do not stop him from committing a break in. He will cut the phone lines to prevent the alarm from activating. He did say that some alarm companies do have better products. He is not concerned by neighbourhood crime watches. He dresses in a manner that does not stand out so he fits into the neighbourhood as he travels through it. He does not have trouble with simple prevention techniques like sticks in window rails. If he has the proper tools with him, he can slide the window open enough and use a coat hanger to remove the stick.

Randy admitted to committing three residential break and enters in the CRD over a seven week period since his release from custody. Figure IV.2 shows the location of Randy's residence in relation to the break and enters. Table IV.1 identifies the distance from the start point to the target site. Two distances were used, straight line and actual distance. The distances traveled to all break and enters were minimal all were within one kilometer from Randy's residence, with the exception of 2, where a co-offender drove him to the site. He admitted it was foolish offending so close to home referring to it as "shitting in my own yard" but he did not have a car.

Distance From Res to B and E in Km		
Break and Enter	Straight Line	Actual
1	0.38	0.48
2	0.30	2.2
3	0.81	1.1

Table IV.1: Distance from Residence to Break and Enter.

All three break and enters occurred during the daytime hours over a period of approximately 7 weeks (Table IV.2).

Break and Enter	Date From	Time From	Date To	Time To
1	03/04/2006	824	03/04/2006	1545
2	13/05/2006	1700	13/05/2006	1745
3	16/05/2006	1600	17/05/2006	1600

Table IV.2: Date and Time range of Break and Enter.

Break and Enter One

The original purpose of the trip was to retrieve mail form the mail boxes located at the intersection north of Randy's residence. He walked from his residence to the mail boxes. The break and enter was impulsive with no previous planning, motivated by the need for money. The target was located on a quiet street with no pedestrian or vehicle traffic. The neighbourhood houses were vacant. When Randy realized he had spotted a good opportunity he went home, got his friend and returned to the target (Figure IV.3).

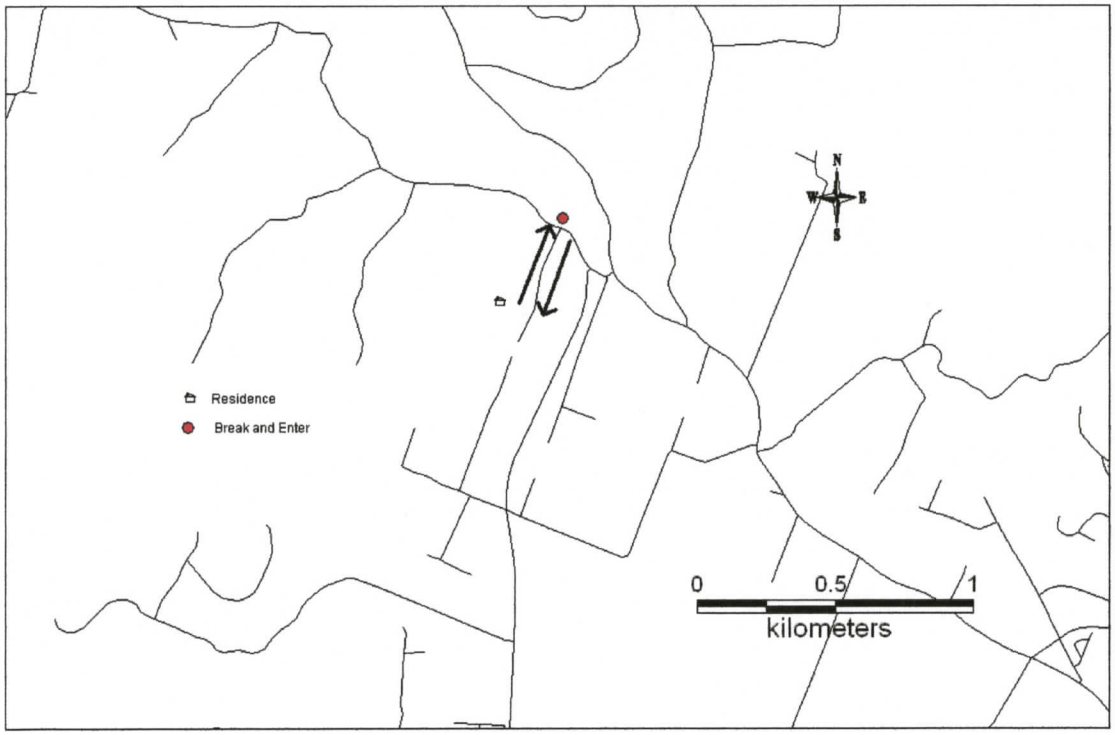


Figure IV.3: Journey to Break and Enter One.

When Randy returned with his co-offender, he knocked on the front door, looked in the windows and knocked on the rear door to determine if the house was vacant. He kicked in the back door to gain entry into the target. They removed a computer, TV and some jewelry. Originally, he tried to stash the property, but it was too much trouble. He used a wheel barrel to transport the property to his home.

Break and Enter Two

Randy originally observed the target the day prior to the break and enter. He was attracted to the street because it was a nice neighbourhood, with expensive homes, with no alarms. He believed there would be expensive goods inside, which were probably insured.

On the day of the burglary Randy's plan was to commit a break and enter. He and his friend drove to the block the target was located in (Figure IV.4). They sat in his friend's vehicle and watched the house for approximately two hours. He observed the residents leave the home.

Randy went into the back yard and used a screwdriver to open the back window. Randy's friend changed his mind and left. He removed the property from the residence and stashed it in the bushes south of the residence (Figure IV.4). He walked home and left with a friend. Randy and his friend returned approximately two hours later and retrieved the property.

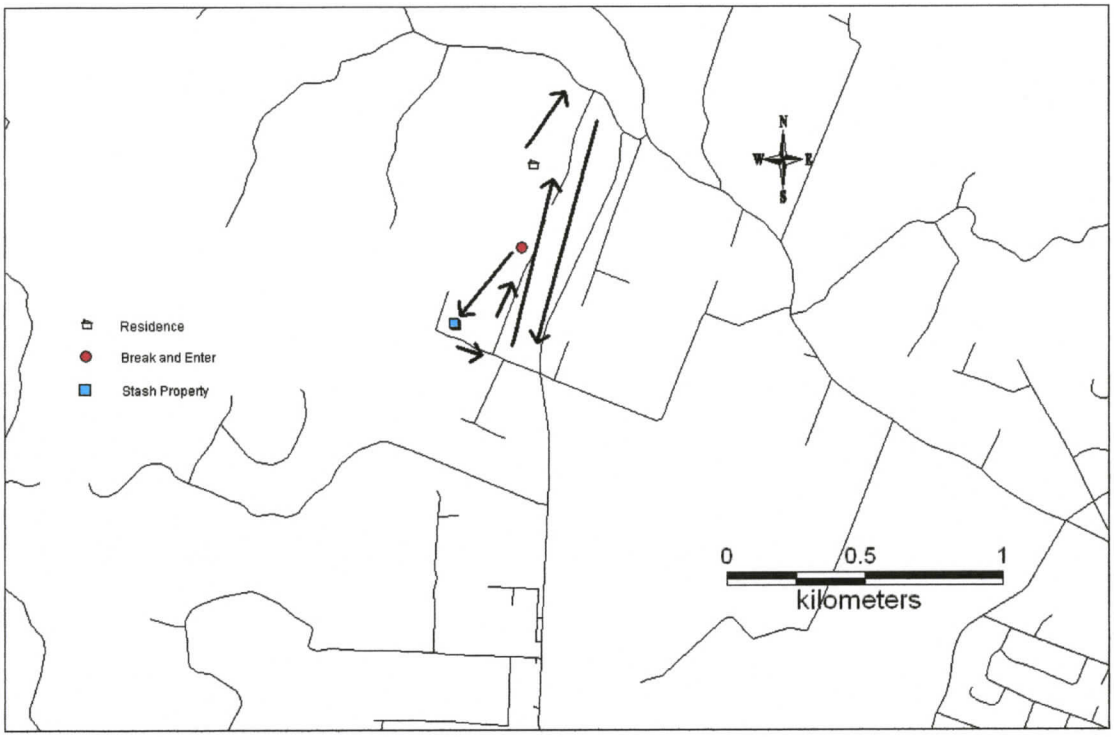


Figure IV.4: Journey to Break and Enter Two.

Break and Enter Three

When Randy started his trip from home the plan was to commit a break and enter. The reason he committed the break in was to make some money. Randy was alone, he rode a bicycle from his residence to the target location (Figure IV.5). He stashed the bike and approached his target, a house he had previously identified. He felt the residence would have computers in it. He noticed that the occupant was home so he had to abort the planned target. Randy walked up the street to the house next door. He knocked on the door and established the house was vacant.

Randy did not have tools with him so he had to break a window in the door, reach in and unlock the dead bolt. He felt remorse for breaking the window because he felt it wasn't insured. Randy looked through the house for 45 minutes, but he could not find

anything of value. In the end, he covered a TV with a blanket, carried it up the block and stashed it in some bushes (Figure IV.5).

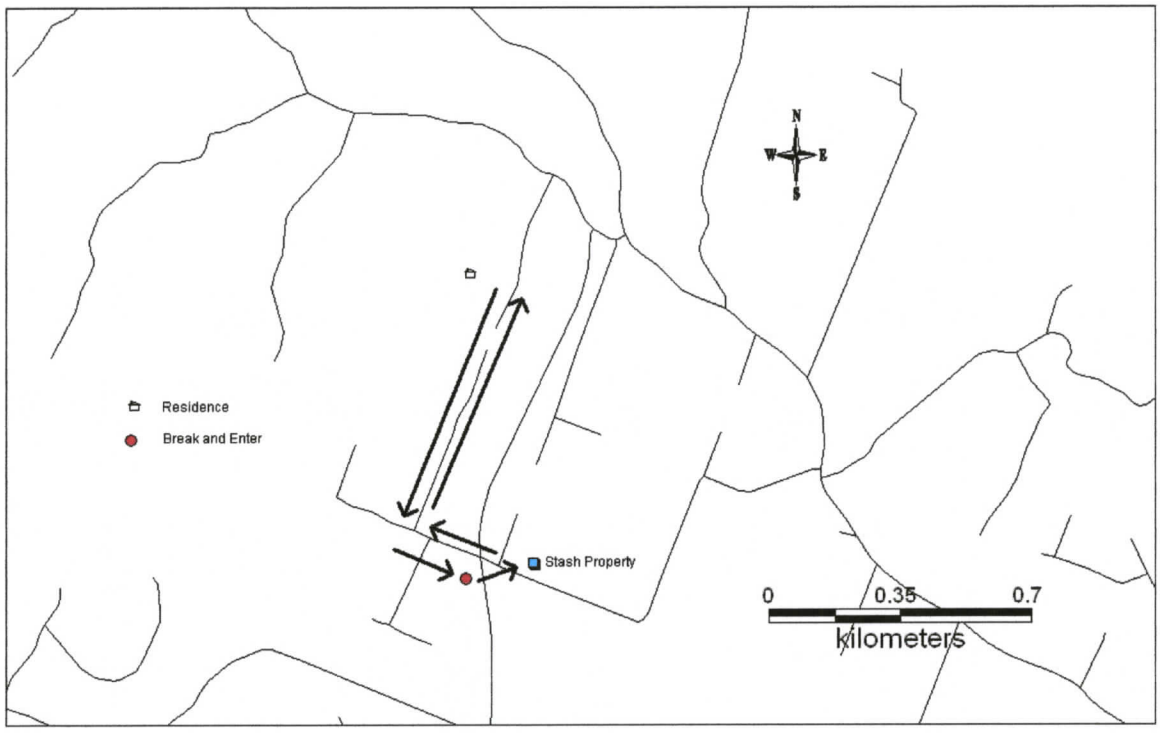


Figure IV.5: Journey to Break and Enter Three.

Property Disposition

Randy disposed of his property through a friend. He would phone his friend who would come to his residence to retrieve the items. He met this friend while he was institutionalized. He was paid in drugs or money for the property.

Co-Offender

In two of the burglaries Randy was accompanied by a co-offender. He states it was his decision to commit the burglaries not his friend.

Subject Two "Bill"

Bill is a 31 years old, a part time roofer, with a grade 11 education. Bill moved to Victoria a year before he was arrested and remanded in custody for a residential break and enter. Most of the year he lived in Victoria was spent in a corrections facility.

Spatial Knowledge

Bill knew of three municipalities, Esquimalt, Victoria and Saanich. However, he had only passed through Saanich and new only the downtown core of Victoria. When Bill was shown a map of the municipalities in the region he pointed incorrectly to two municipalities he did not know. He could not read the map because he was not familiar with the region. On a scale of one (very familiar) to five (limited familiarity) Bill judged his familiarity with Esquimalt (5) as limited. He felt more familiar with Victoria (4) but only with the downtown area. He was not familiar with Saanich at all. Bill could name only a limited number of neighbourhoods. He was very familiar with the downtown core (1) and James Bay (2). He was moderately familiar with Beacon Hill Park (3) and Fernwood (3). Bill identified an area from the Empress Hotel to Hillside and Quadra that he was moderately familiar (3) with. Figure 6 shows the municipalities, neighbourhoods, nodes, paths and landmarks Bill identified. Again because Bill lived in Victoria for a limited period of time and he was restricted to public transit and friends for transportation, he was not very familiar with the CRD.

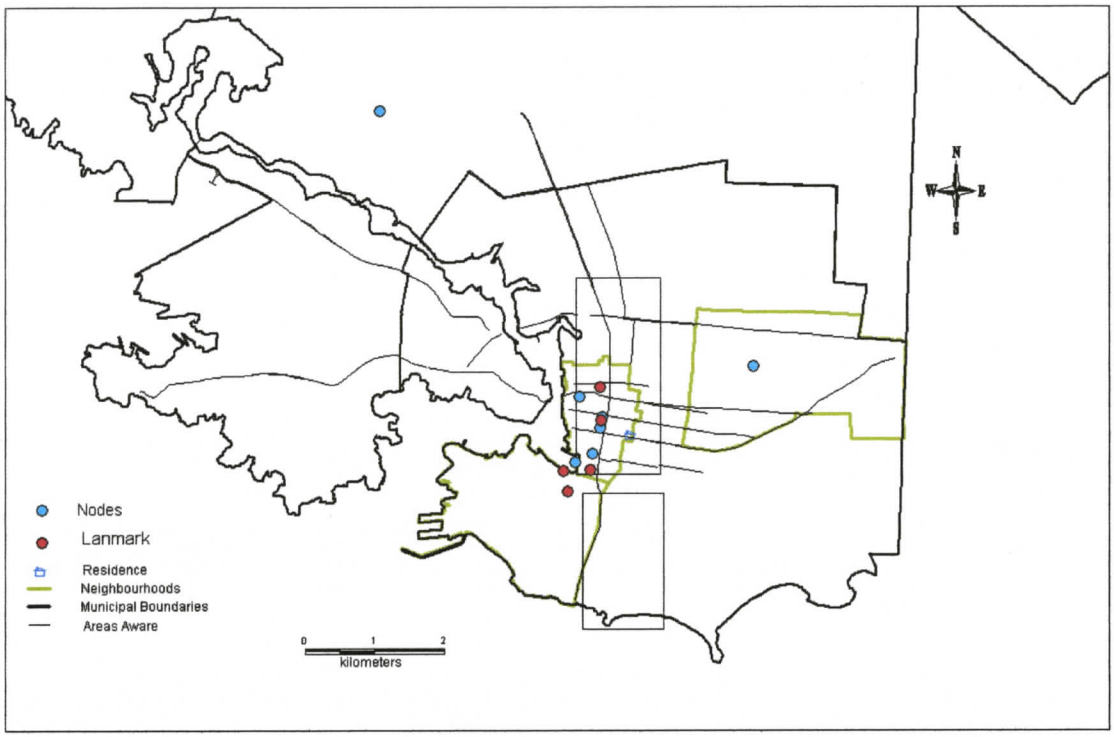


Figure IV.6: Subject Two's Awareness Space.

Break and Enter

Bill indicated that he does not like to do break and enters. He committed residential break and enters in the lower mainland when he was in his late teens. He pointed out that he was trained by a person who was never caught. He asserted that the recent break and enters he committed were not his idea, but instigated by his co-offender. He and his co-offender knew each other when they lived in the lower mainland. Bill states that the co-offender started breaking into houses to rip off drug dealers, which resulted in his banishment from the Lower Mainland.

There were two break and enters committed by Bill and his co-offender. Table IV.3 shows the distance from Bill's residence to the burglaries. In both cases the straight line distance is slightly shorter than the actual distance to the offence site. Both break and enters occurred during the day time hours approximately two weeks apart.

Distance From Res to B and E in Km		
Break and Enter	Straight Line	Actual
1	6.86	7.36
2	2.53	3.12

Table IV.3: Distance from Residence to Break and Enter.

Break and Enter	Date From	Time From	Date To	Time To
1	30/03/2006	900	30/03/2006	1200
2	12/04/2006		12/04/2006	

Table IV.4: Date and Time range of Break and Enter.

Break and Enter One

Bill was somewhat reluctant to talk about this break and enter because the police were unaware of his involvement. Figure IV.7 shows the general area the target was located in. A check of the police records reveals that there were several residential break and enters in this area in the time frame Bill provided.

The trip originated from Bill's residence with the purpose of making a drug sale. Bill could not disclose the exact location of the drug deal, but it was close to the break in. Once the sale was complete Bill's cohort wanted to break into a house belonging to a drug dealer he knew. The co-offender expected there would be drugs and money in the house. The co-offender had a vehicle which they used to travel to the target. Figure IV.7 shows the route taken by Bill and his cohort. They had to abort the original target when they discovered the residents were home.

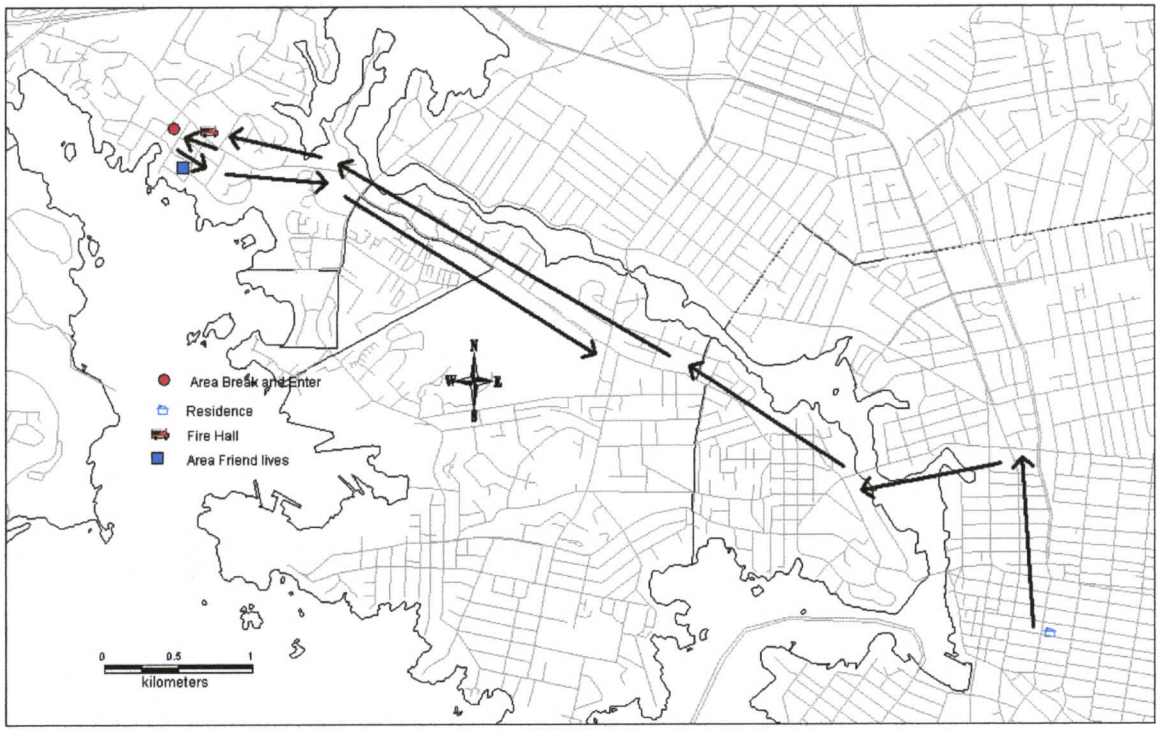


Figure IV.7: Journey to Break and Enter One.

Instead of abandoning the idea to offend, both Bill and his co-offender were in the mindset to commit a burglary. They did not need the money, but Bill described it as an addiction to the crime, the money and the rush. They searched the immediate area and found a house concealed by bushes, blocking the neighbours' view. They approached the front door and rang the door bell to do an occupancy check. They went to a side door, discovered it was unlocked and entered the house.

They left and drove to a friend's house a couple of streets from the site of the break and enter. Figure IV.7 shows the approximate area of the house. They traded the property for drugs and money. They left and proceeded to another friend's house in the Tillicum area. Bill was unsure or did not want to disclose the general location of this friend's residence.

Break and Enter Two

The purpose of the trip was to meet with a drug purchaser. The trip originated at Bill's residence. Both Bill and his cohort took the bus using the route shown in figure IV.8. The purchaser failed to show so Bill's co-offender decided to commit a break and enter.

The purpose of the break in was to get money. They started their journey through the streets from the general location of the failed drug deal. This distance from the drug deal to the offence location is much shorter,

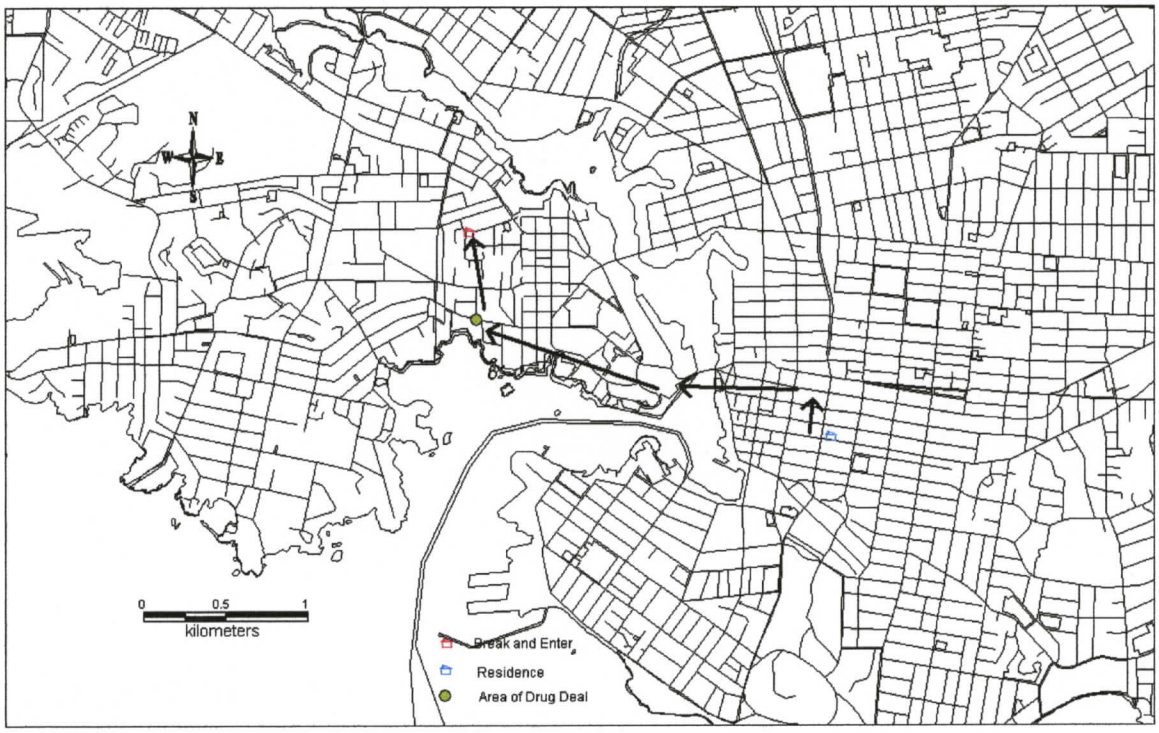


Figure IV.8: Journey to Break and Enter Two.

approximately one km. Bill was not familiar with this area so he followed the direction of his cohort. The co-offender selected the target, but Bill was very uneasy about it, he stated "it could've of had a sign on it that said HEAT". His instincts told him it was a bad target, but he attributed his failure to follow his gut felling to being "money simple". Bill

had missed his methadone appointment the day before. He wanted to obtained cash so he could buy some heroin. The police arrived shortly after they entered the house and both of them were arrested.

Intoxicants

Bill had been off heroin for eight months. He was taking methadone to kick the habit. However, when he missed his appointments he would chip heroin to get his head straight.

Subject Three "Trevor"

Trevor was 34 years old at the time of the interview. He has a grade 10 education. He was unemployed during the period he committed the burglaries. During this offending phase, Trevor was using increasing dosages of heroin, slipping deeper into drug addiction. He was going downhill quickly and was always broke. He quietly stated that he was trying to kill himself slowly.

Spatial Knowledge

Trevor had grown up in the region, therefore, his knowledge of the CRD was more extensive than the previous two subjects. He identified eight municipalities in the region (Figure IV.9). He rated his knowledge of each municipality on a scale of 1 (Know entirely) to 5 (know small proportion). He rated Sooke (1), View Royal (1), Sydney (1), and Colwood (2) the highest. He was less confident about Saanich (3) and Esquimalt (3/4) with only a moderate knowledge of the municipalities. His knowledge of Oak Bay (4) and Victoria (4/5) was limited to a few areas. Trevor incorrectly identified sub areas and some neighbourhoods as municipalities; however, he was confident about his

knowledge of these areas. He rated the neighbourhoods of Royal Oak (2), Uplands (2/3) and West Saanich (2) very high.

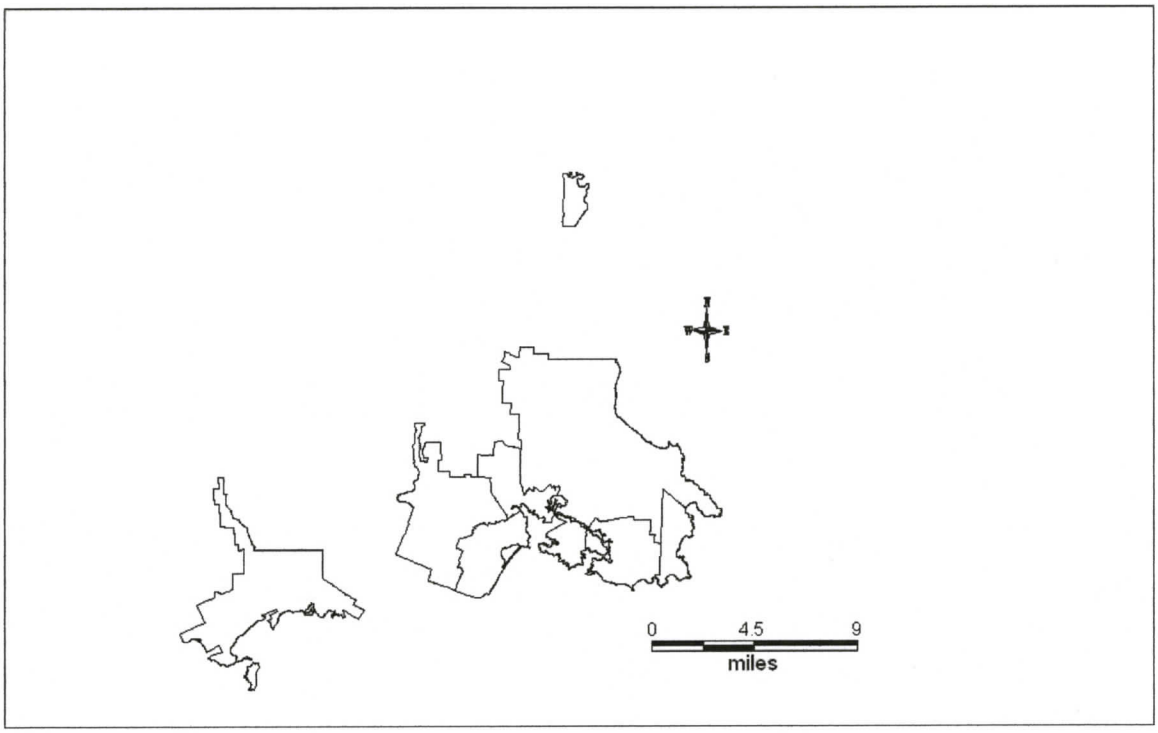


Figure IV.9: Subject Three's Municipal Awareness.

When Trevor was shown a map of the region he needed assistance orienting himself. He pointed correctly to Sydney, but had trouble initially pointing to Victoria, choosing the Sooke Basin. Trevor again oriented himself and pointed correctly to Victoria. He had no difficulty pointing to the other municipalities he named.

When asked what neighbourhoods (Figure IV.10) he knew, Trevor identified Goldstream (5) and Admirals (5). He incorrectly described Langford and Esquimalt as neighbourhoods, when in fact they are municipalities. He then proceeded to describe areas surrounding intersections. He new the immediate area surround the following intersections, Cedar Hill X RD and Shelbourne, McKenzie Ave and Shelbourne St (5), Hillside Ave and Shelbourne St (5), Fort and Foul Bay (5), Oak Bay and Foul Bay (5),

and Fairfield and Foul Bay (5). However, he rated his knowledge of the areas as confined to the immediate areas around the intersections.

Trevor was able to name and point out numerous landmarks and nodes located in the CRD (Figure IV.11). He identified several paths (roads), however, it was clear after discussing his offences that his knowledge of roads (paths) in the region was far more extensive than he originally articulated.

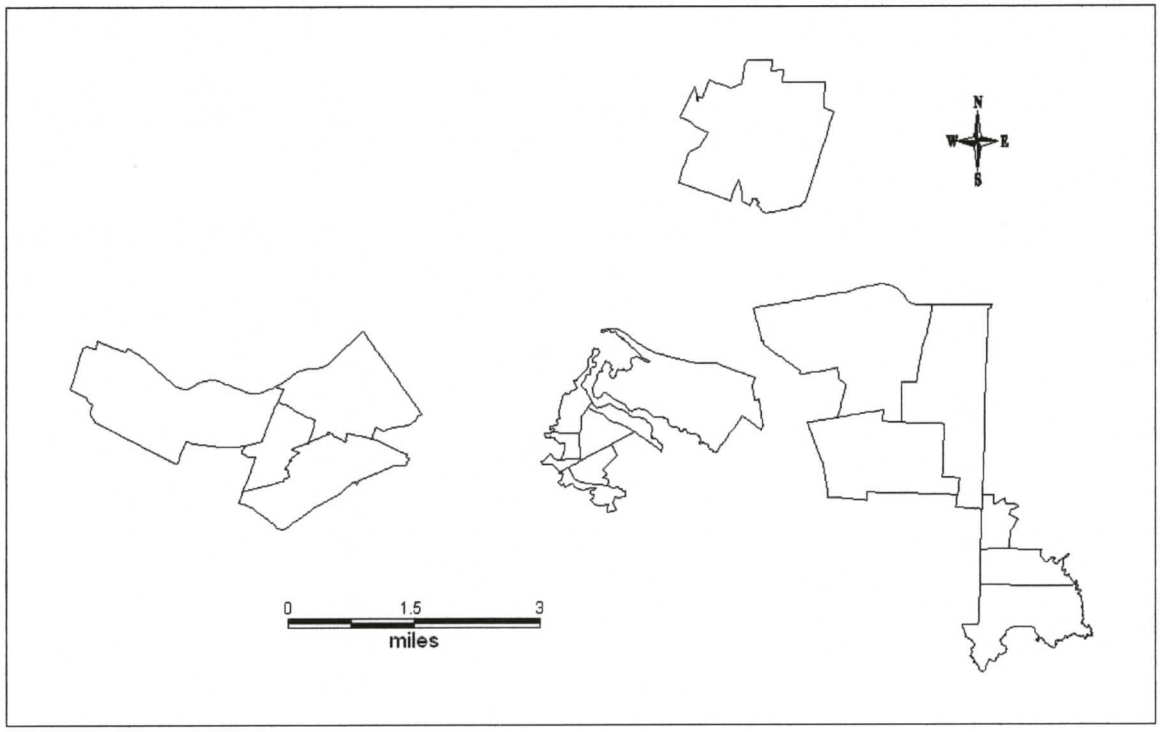


Figure IV.10: Subject Three's Neighbourhood Awareness.

Figure IV.12 shows the municipalities and neighbourhoods along with the location of Trevor's offences. Figure IV.13 displays the location of Trevor's offences with the spatial attributes he described. It is evident that the break and enters are in close proximity to pathways, nodes and landmarks he knew within the region. He did not offend in the neighbourhoods he lived in.

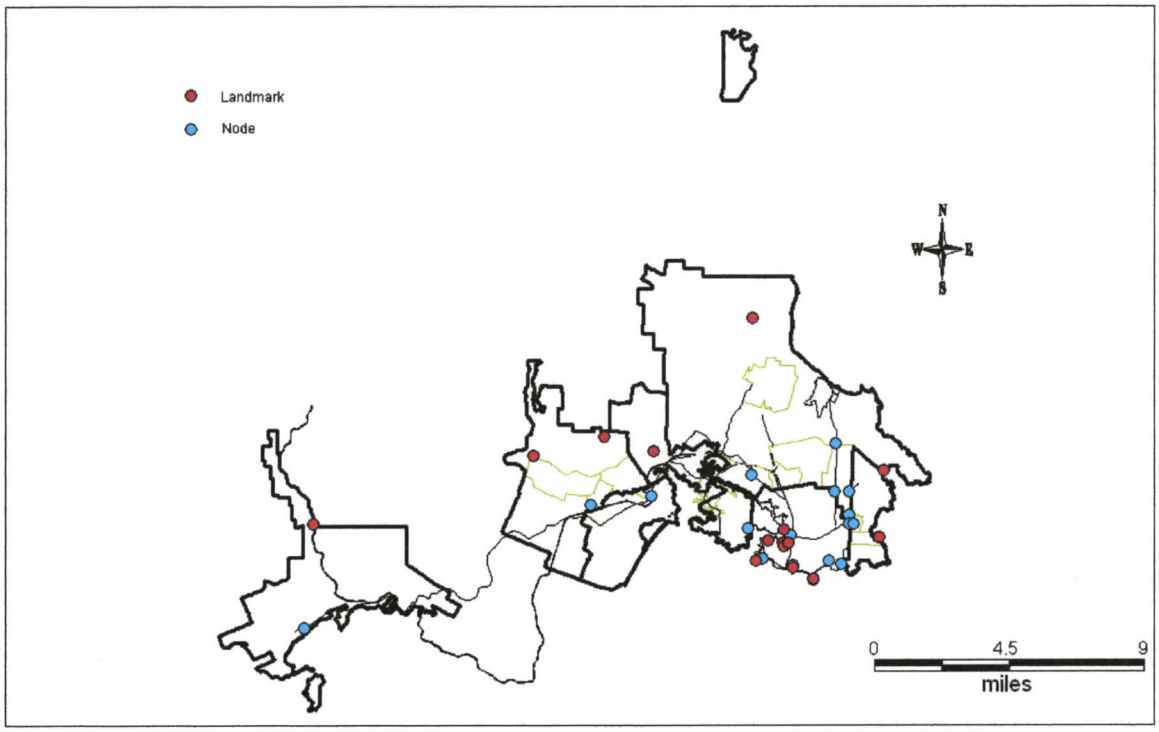


Figure IV.11: Subject Three's Awareness Space.

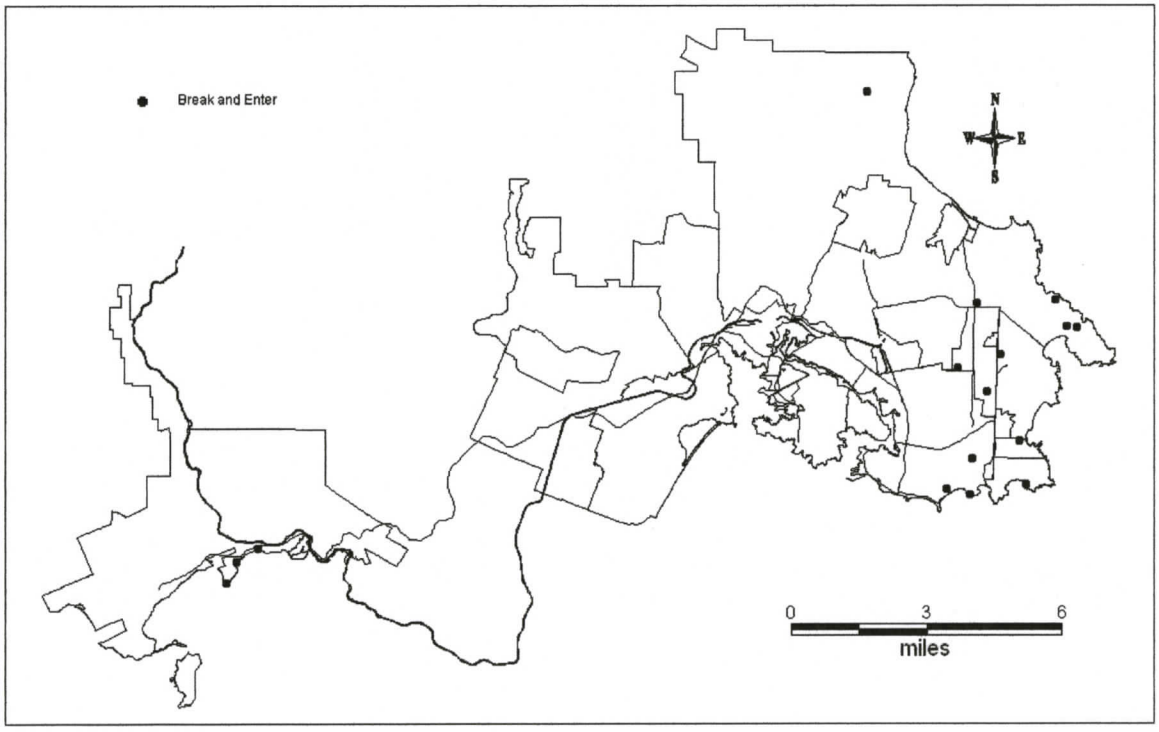


Figure IV.12: Subject Three's Break and Enters.

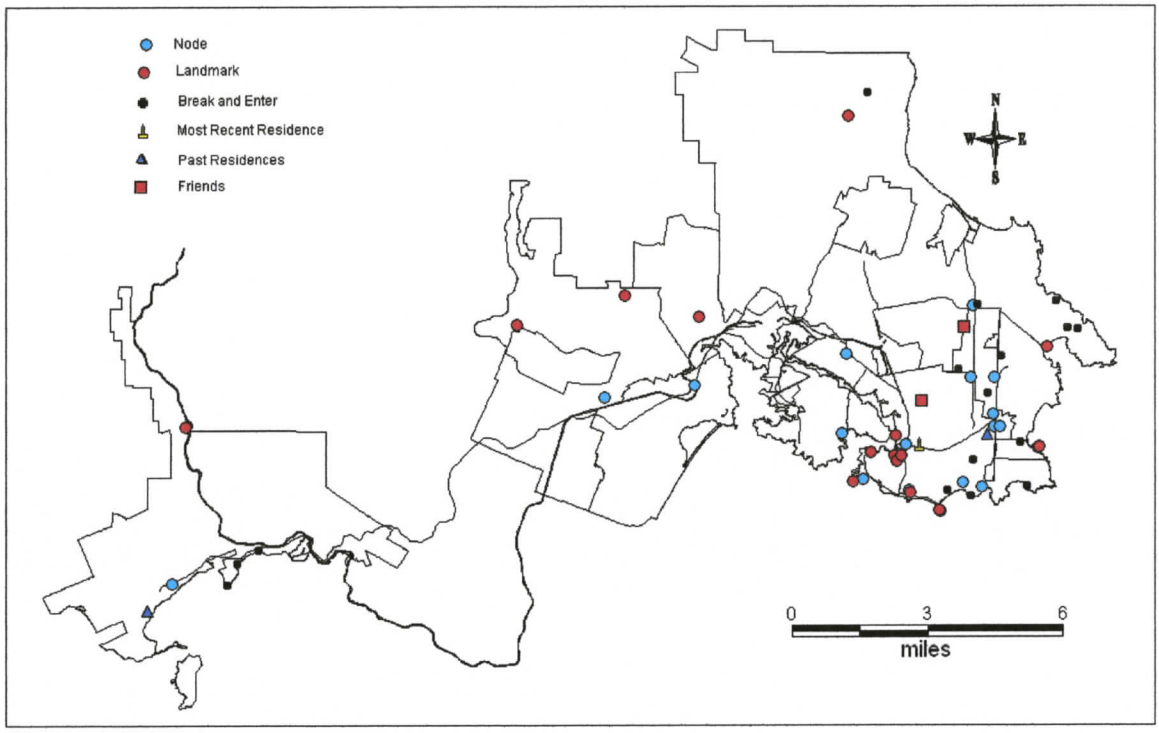


Figure IV.13: Subject Three's Break and Enters Over Awareness Space.

Break and Enter

Trevor's considers burglary a job, his motivation is to make money. He never does a break in on a whim, desperation or out of greed. He is patient, if the situation does not seem right he will go home. He tries to plan his offences to some degree, but he will take advantage of an opportunity if one presents itself. Trevor was reluctant to work with a co-offender, since he felt it increases the risk of apprehension. Since one of his goals was to stay out of jail he always worked alone. He will not use intoxicants when he works so he has his wits about him. However, Trevor was suffering from heroin addiction near the end of his burglary series.

Trevor will target areas he is familiar with ones he feels comfortable in. He will not spend too much time in a specific area to avoid creating a pattern. He feels the police

will target areas that are overworked. Therefore, he tries to spread his activity out over a larger area. This way he reduces his risk and has more freedom or time to offend.

Trevor relies on gut instinct or a second sense to identify targets. He sometimes has premonitions about a house prior to his target search. While searching he will find houses that will just present themselves to him. He provided more concrete target cues, for example, classier more expensive homes, which are secluded or hidden. Upon finding a target he will watch the house to check for occupancy. He looks for parked vehicles, too many lights on with no movement, or lights on with the TV off. If he is satisfied the premises is vacant he will ring or knock on the door. If he is confronted he states he can easily come up with a plausible story. Trevor prefers to take small items, laptops, gold, or jewelry from the houses he targets.

Rarely has he re-victimized a premises, remembering only two occasions where he has returned to a previously burglarized property. He does not tell others about residences he has targeted.

Table IV.5 shows both straight line distances and actual distance from Trevor's residence to the offence sites. There would be an expected difference between the two measures, however, if the extreme values in 1 and 3 are excluded the average difference between the straight line and actual distance is only one kilometer. The average distance, of the offences discussed, was 6.3 kilometres straight line distance and 7.9 kilometres actual distance.

Distance From Res to B and E in Km				
Break and Enter	Straight Line	Friends	Actual	Difference
1	3.6		N/A	N/A
2	2.9		5	2.1
3	3.6		4.3	0.7
4	7.1		7.96	0.86
5	6.7		8.18	1.48
6	6.9		8.07	1.17
7	1.9		2.97	1.07
8	3.1	2.5	3.9	0.8
9	1.9		2.3	0.4
10	5.4		6.73	1.33
11	3		4.7	1.7
12	4.1		N/A	N/A
13	23.8		32.6	8.8
14	12.7		13.7	1
15	2.6		3.1	0.5
16	4.3		N/A	N/A

Table IV.5: Distance from Residence to Break and Enter.

Trevor discussed 13 out of the 17 break and enters he committed between November 2005 and February 2006. We did not discuss the break and enters in Oak Bay, numbers 1, 11 and 16. Table IV.6 provides the date on which each event occurred.

Event	DATE
1	03/11/2005
2	11/11/2005
3	21/11/2005
4	29/11/2005
5	29/11/2005
6	02/12/2005
7	07/12/2005
8	27/12/2005
9	05/01/2006
10	30/01/2006
11	06/02/2006
12	06/02/2006
13	07/02/2006
14	13/02/2006
15	14/02/2006
16	18/02/2006

Table IV.6: Date of Break and Enter.

Break and Enter One

Figure IV.14: Break and Enter One.

Trevor did not discus this break and enter with the interviewer. Using the police notes[1] it was established that Trevor used a ladder to open a living room window to gain entry to the residence. He removed a laptop and cash from the house.

[1] The police notes are a summary of admissions made by Trevor to the police detectives. The police investigator cross checked the interview notes with police files to determine the voracity of the statements.

Figure IV.15: Break and Enter One in Relation to Other Break and Enters.

Break and Enter Two

Trevor was living in Sooke when he committed his second in the series of break and enters. He was at home bored and in need of money. He took a bus from the area of his residence. Figure IV.16 shows his route to and from the offence site. He got off the bus close to his target. He had never been in the area before, but had a gut instinct or second sense about it. He ventured down a side street across from the bus stop. He found a house close to the beach, concealed on three out of four sides. He established no one was home, used a screwdriver to pop a sliding glass door and entered the house. He removed small electronic items and jewelry. He left the residence and took a cab home.

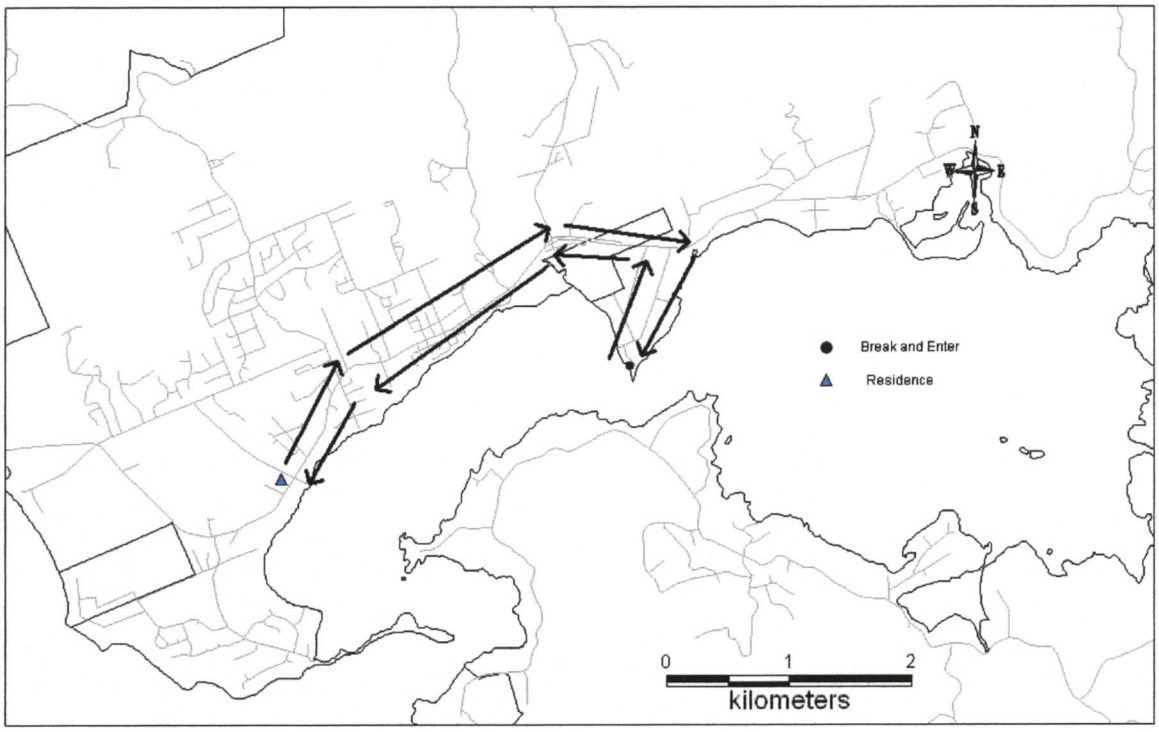


Figure IV.16: Journey to Break and Enter Two.

Break and Enter Three

Trevor needed money to buy drugs. It was dark, between 1700 and 1600 hours, he took a bus from his residence and got off on the main road near the offence site. He left the bus stop, located a street cloaked in darkness, forested, near the waterfront. He discovered an expensive home with a long driveway. The house was dark which lead him to believe no one was home. Trevor entered the house through a kitchen window. He discovered a large amount of money in the master bedroom. He left the house and returned home.

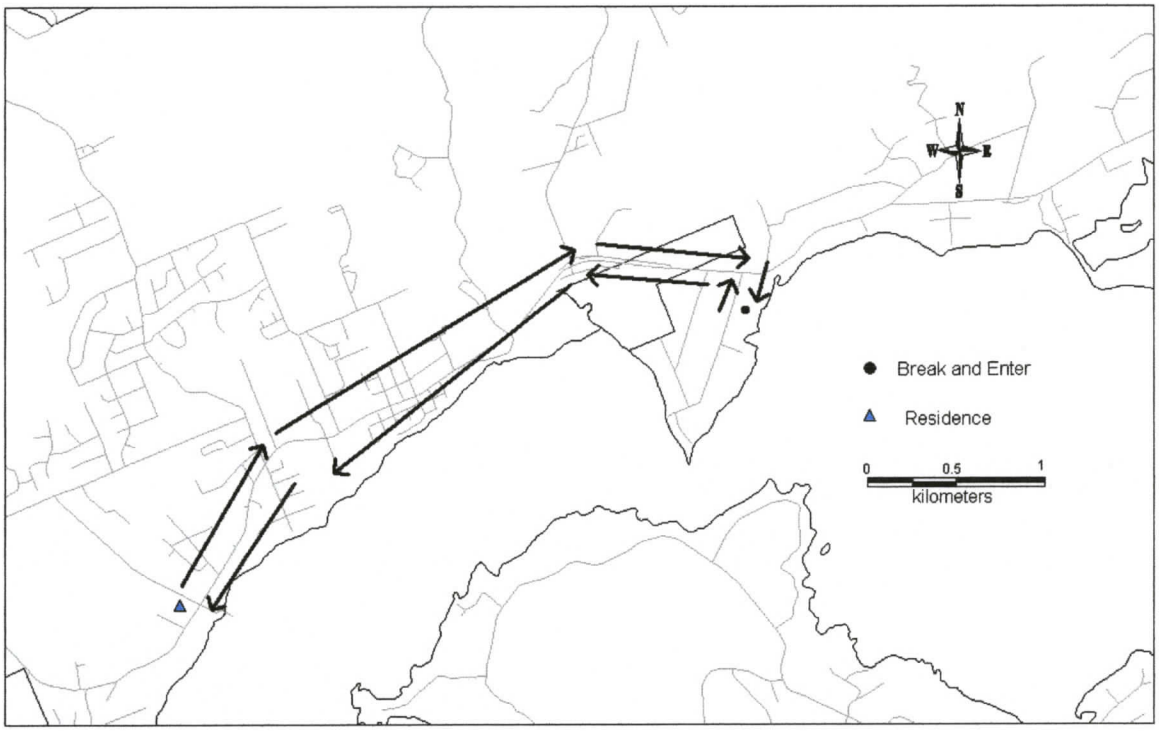


Figure IV.17: Journey to Break and Enter Three.

Break and Enter Four

Trevor related a storey where he burglarized three locations over the course of a week, two sites on the same day. A review of the police notes indicates he confused the sequence of events, the locations and the dates which the break and enters occurred on.

Trevor stated he was looking for an opportunity to commit a break and enter. He left his residence and started walking along the right identified in Figure IV.18. He found many of the neighbourhoods had too many lights. Many of the houses had alarm stickers, although, he indicated alarms do not deter him from a good target.

He located a good target at between 1900 and 2000 hours. He approached the front door and rang the door bell. He went to the back door and knocked on it. He found a 4x4 and threw it through a window gaining entry to the premises. Trevor removed only small items including a lap top.

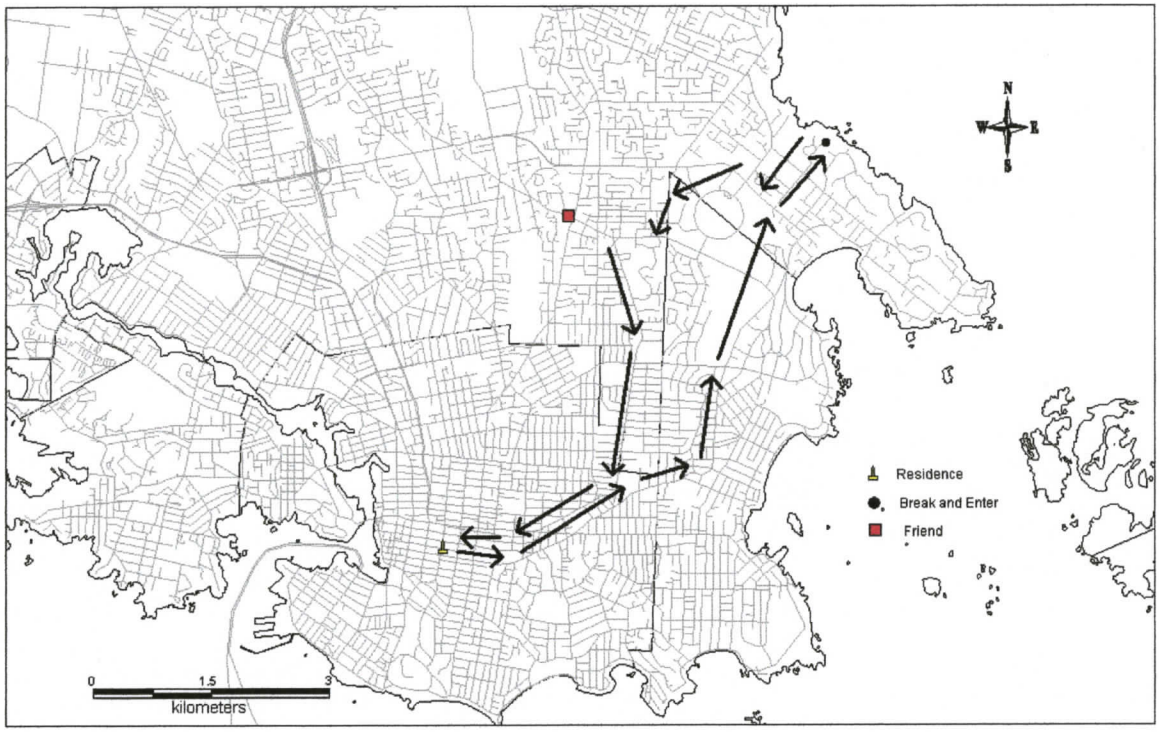


Figure IV.18: Journey to Break and Enter Four.

He left through back yards making his way to a main road where he eventually caught a bus home.

The police notes contradict Trevor's version of this event. First, this break and enter occurred on the same day he committed a second burglary in the same area. In that break in Trevor stated he used a car for transportation. Second, entry was gained by popping a sliding glass door not breaking a window. Third, a DVD player, television, computer monitor and some jewelry were taken in the incident. It is unlikely he could have walked and bused home with this amount of property in his possession. He would have required a vehicle to transport the property, a vehicle he had in the second offence committed on that day.

Break and Enter Four and Five

Reviewing the police notes and taking Trevor's account into consideration there were two events in the same day, not one. The route to these events is shown in figure IV.19. Trevor needed money to pay for his rent so he decided to commit a break and enter. He had a car, but he did not relate how he came into possession of the vehicle.

His journey took him through a wealthy area where he began his search. He found there were too many house alarms in the area. He considered that there would be a greater police presence because it was a wealthy area, therefore, there would be a quicker police response. He thought he would stand out in this area so he decided to search elsewhere.

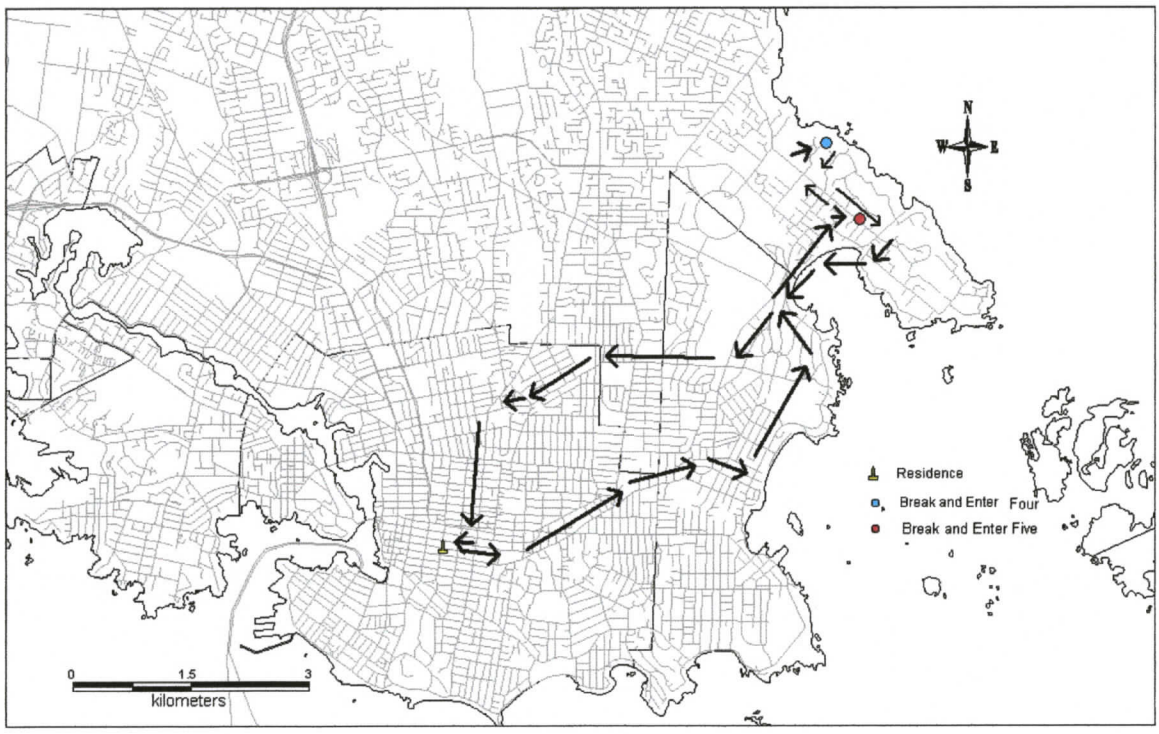


Figure IV.19: Journey to Break and Enter Four and Five.

He continued on the route shown in Figure IV.19 until he came to a dead end road. He got lost so he parked the car at the end of the road and started walking along the street. As is evident from figure IV.19 break and enter six is located on a dead end road. Trevor found a house in complete darkness (beak and enter six) so he rang the door bell establishing no one was home. He went to the side of the house where he found a glass sliding door. He pried the door and gained entry. The police report indicates he removed a DVD player, a television, a computer monitor and jewelry.

On his way home Trevor discovered a second opportunity (break and enter seven). He observed a big house in complete darkness. There were no vehicles present at the house. He proceeded to the front door and rang the door bell. There was not response so he walked to the side of the house where he rang a second door bell. He assured himself that the premise was empty.

Trevor smashed a bathroom window in his first attempt to gain entry, but this was not successful. He found a crowbar and successfully pried a set of French doors located on the second floor of the house to gain entry. He removed a big screen TV, a DVD player and jewelry. He left the premises and drove home.

Trevor's accounts of these events concur with the police notes, with the exception of the sequence and location of the events. There is little doubt that break and enter four and five occurred in the manner described above. This shows the value of having police reports to substantiate the subject's account of events.

Break and Enter Six

Break and enter four, five and six occurred in a series in the same general area. As mentioned above there was some confusion in the sequence and location of the events. Break and enter six was pieced together using Trevor's account and the information from the police report.

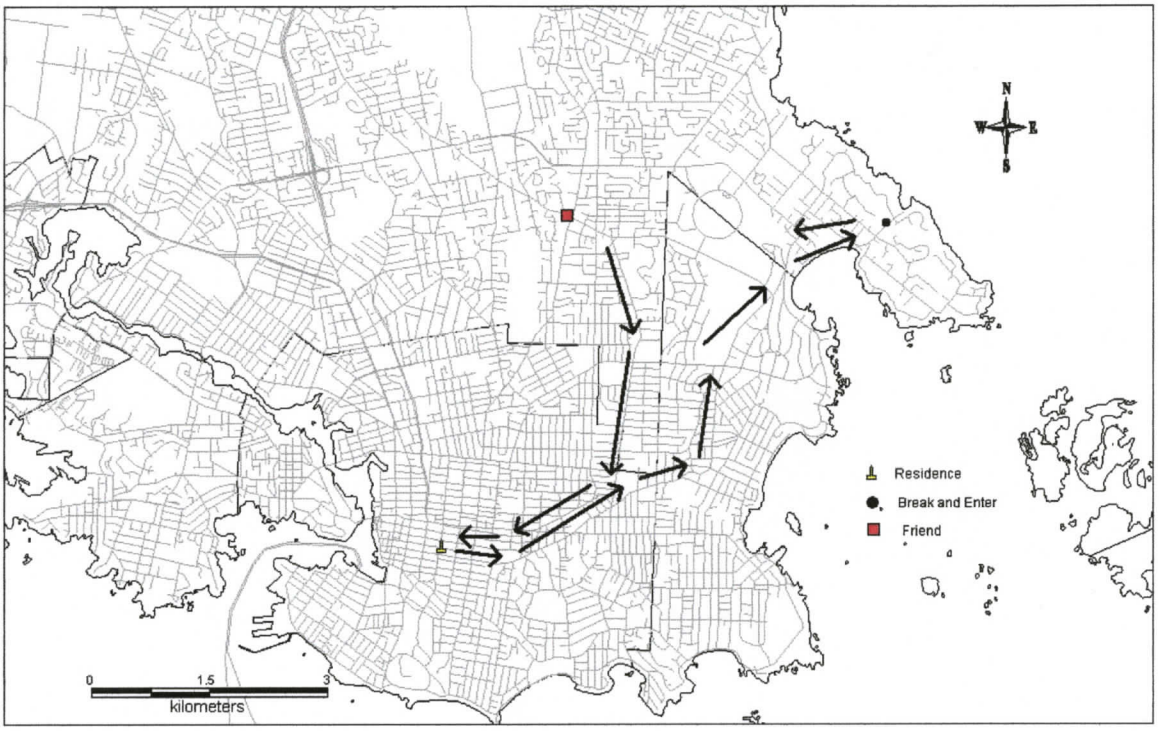


Figure IV.20: Journey to Break and Enter Six.

Trevor left his residence on foot with the intention to commit a break and enter. Figure IV.20 shows the path he took to the site of the burglary. He discovered a large home in complete darkness. He observed no vehicles in the driveway so he believed the house was vacant. He rang the door bell and received no response. He went to the back of the house and found and insecure sliding glass door. It is noted in the police report that a duffle bag and liquor were removed from the premises.

Trevor left the residence through adjoining backyards. Figure IV.20 shows a gap in the route he took home. Trevor did not describe the route from the offence site to the location where he caught a bus home.

Break and Enter Seven

Trevor was home doing nothing, when he decided to go out and commit a burglary. He was comfortable, not desperate so he walked for three to four hours.

Figure IV.21: Journey to Break and Enter Seven.

Trevor ambled along in a southerly direction, zig zagging through the streets, casing houses as he walked (Figure IV.21). This was described as a purely opportunistic endeavor, if a suitable target presented itself, he would take advantage of the opportunity.

At about 1800 hours, he was about to abandon his efforts when he came across a large house in darkness. He watched the house for movement and saw none. He advanced

to the front door and rang the door bell. When there was no response he went to the back door and knocked. When he was convinced there was no one home he pried the back basement door and entered the premises. He acquired some rolled change, a flat screen monitor and some liquor.

He left the premises and walked home. While walking he phoned an drug dealer who would purchase the property. A meeting was arranged in front of Trevor's apartment building. Trevor exchanged the property for heroin and money.

Break and Enter Eight

Trevor was visiting a friend when he decided he was going to commit a break in. Figure IV.22 about illustrates the route he took to the offence site. He started to search for a target when he was approximately three blocks from the target site. He found a house that stood out, every light was on, the TV was on and there was no movement. He sensed that no one was home. To confirm his suspicions he stood and watched. He entered the property walked around the yard then sat and watched for a moment. He approached the front door and rang the door bell. Convinced no one was home he proceeded to the back patio door, finding it unlocked, he entered the residence.

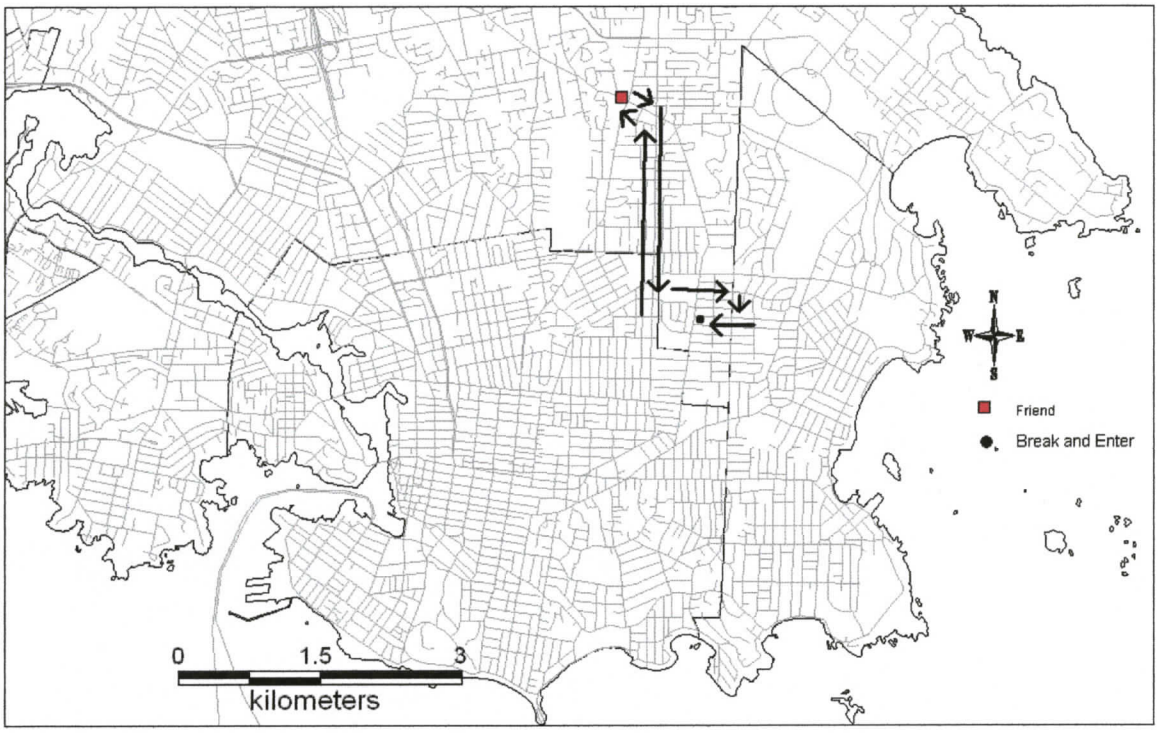


Figure IV.22: Journey to Break and Enter Eight.

Trevor found gold, an X-box with games and DVD's. He left the residence on a bicycle he took from the house. He returned to his friend's house where he spent the night.

Break and Enter Nine

Motivated by the need for money, Trevor decided to commit a burglary. He left his home and followed the route described in figure IV.23. He found a house that was in darkness, with no vehicles in the drive way. He approached the front door and rang the door bell. No one answered so he checked the back door. When he was sure there was no one home he smashed a window in the front door to gain entry. He obtained money and jewelry in the house. He walked a half block from

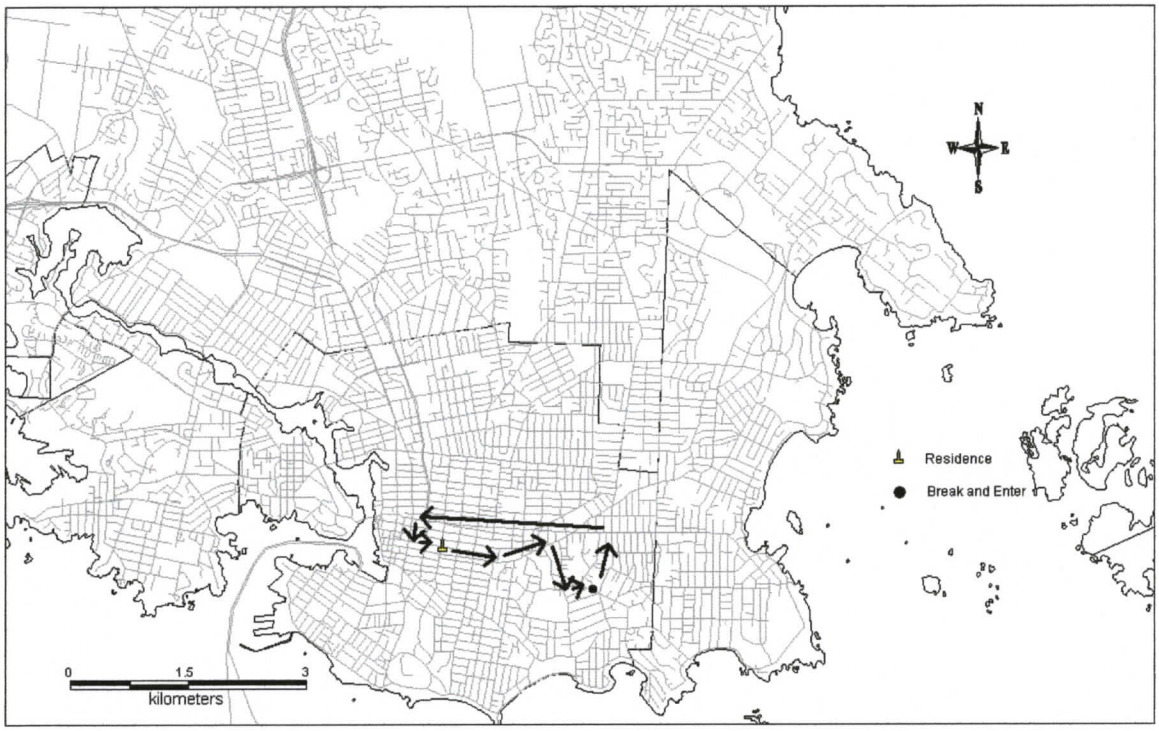


Figure IV.23: Journey to Break and Enter Nine.

the residence to a main road where he caught a bus downtown. He walked from town to his apartment (Figure IV.23).

Break and Enter Ten

Trevor's next target was an old age home he delivered food to several years ago. He rationalized that in these homes the elderly tend to leave their apartment doors open or unlocked. He new the apartment building would afford easy access to small easily transportable items like credit cards. He left his home, taking the bus, which dropped him off across the street from the apartment complex (Figure IV.24).

He entered the lobby, walking right past the receptionist, making sure he did not make eye contact. He acted as if he owned the place hoping to avoid attention. He wondered through the hallways, stopping at apartments which had open doors. If the occupant was present, he would apologize telling them he was in the wrong unit, or he

was doing maintenance on the balconies. He was confronted by several occupants, but he managed to avoid detection by staff. He went through three or four units, removing cash, a credit card and jewelry. When he left the complex, he noticed a police cruiser in the area. He crossed the street and entered a shopping mall to avoid detection. He waited 10 minutes and called a taxi. He took the taxi home, however, he could not remember the route.

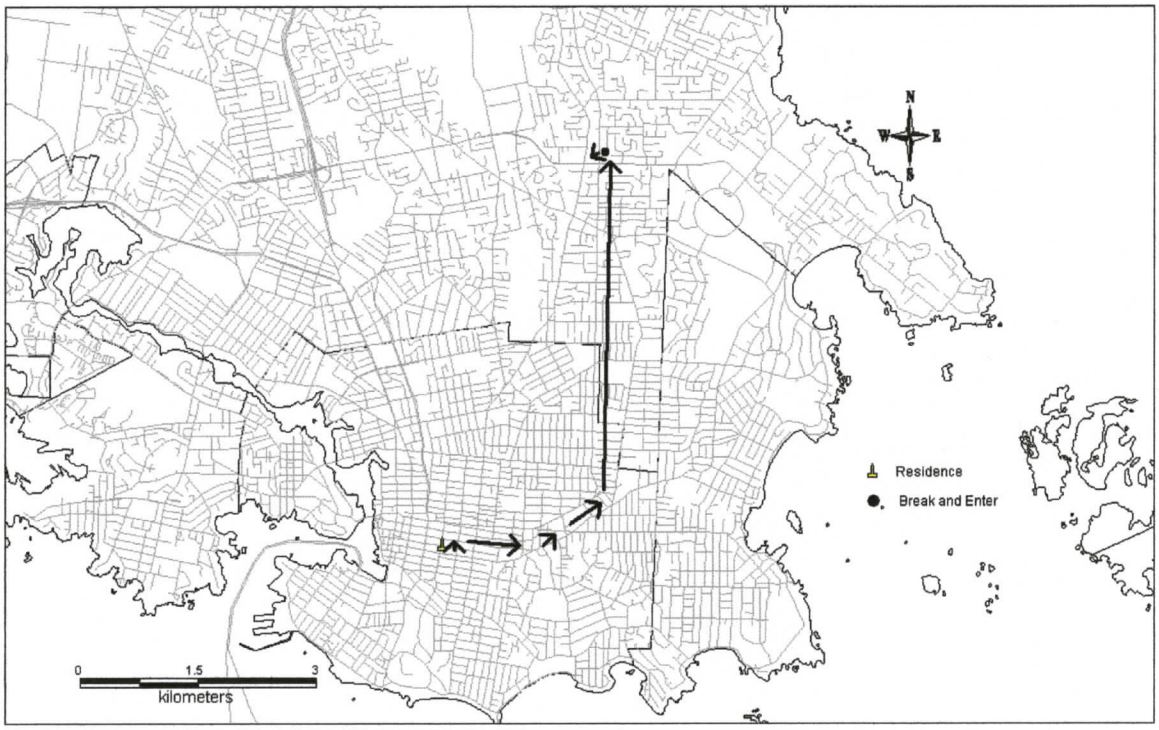


Figure IV.24: Journey to Break and Enter Ten.

Break and Enter Eleven

This break in was not discussed with Trevor. A review of the police notes indicates this was a new house with an expensive car in the garage. Trevor smashed a window located on the side of the house to gain entry. He removed small portable electronics from the residence.

Figure IV.25: Journey to Break and Enter Eleven.

Figure IV.26: Break and Enter in Relation to Other Break and Enters.

Break and Enter Twelve

Earlier in the day Trevor had wandered through a hospital emergency ward checking purses and wallets of patients while they awaited treatment. He obtained two sets of keys to an apartment building catering to the elderly. He left the hospital and returned to his residence

Trevor decided he was going to break into the two apartments with the keys he had obtained. Later in the day he caught a bus from his residence to a gas station near the target. He looked at a road map at the gas station to determine the target location. He cut across a shopping mall parking lot and found the complex.

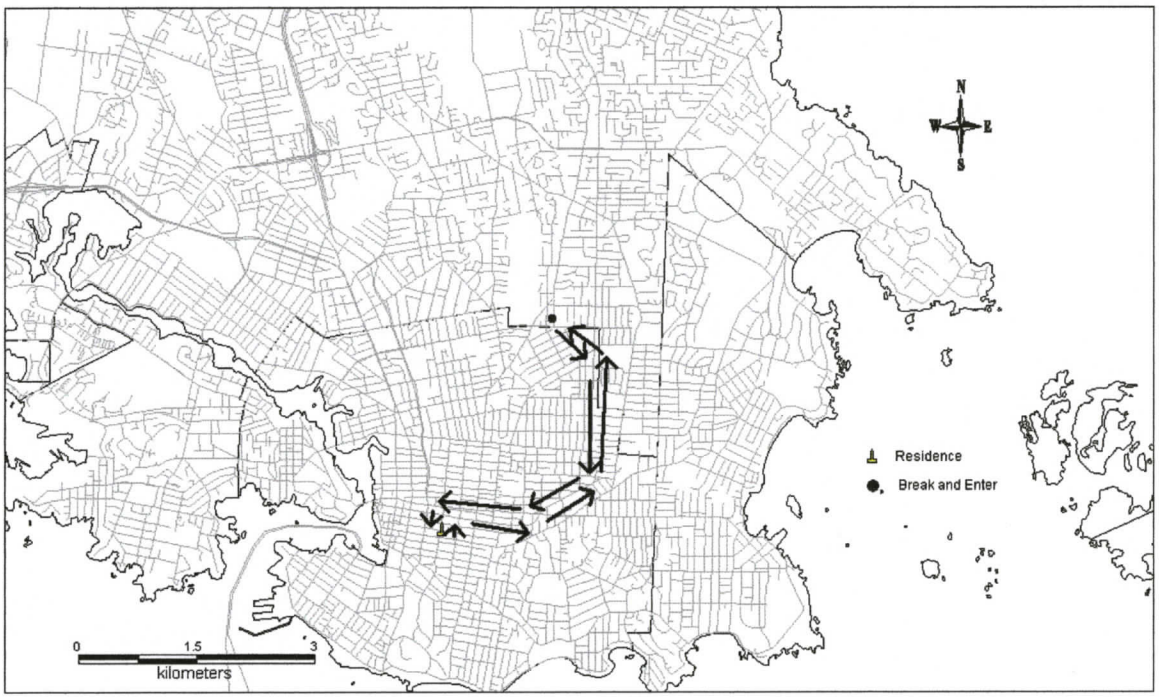


Figure IV.27: Journey to Break and Enter Twelve.

Trevor buzzed the front door panel to the apartments and received no response. He entered the building using one of the stolen keys. He went to the apartments knocked on each door. He left then came back and knocked again. He determined the apartments were unoccupied so he used the keys to enter. He obtained jewelry from one or both of

the apartments. He followed the same route back to the service station, where he caught a bus back to his home.

Break and Enter Thirteen

Trevor was short of money so he decided he would commit a break and enter. He was living in town but traveled back to the area where he lived in November. He stated he had a premonition about a house, he had never seen it before, but he knew how to get to it.

He took buses from town to the area of the target location (Figure IV.28). He got off the bus across the street from the house he burgled. It was a large house with a pool in the backyard. He kicked in the master bedroom balcony door. He removed cash and jewelry from the home.

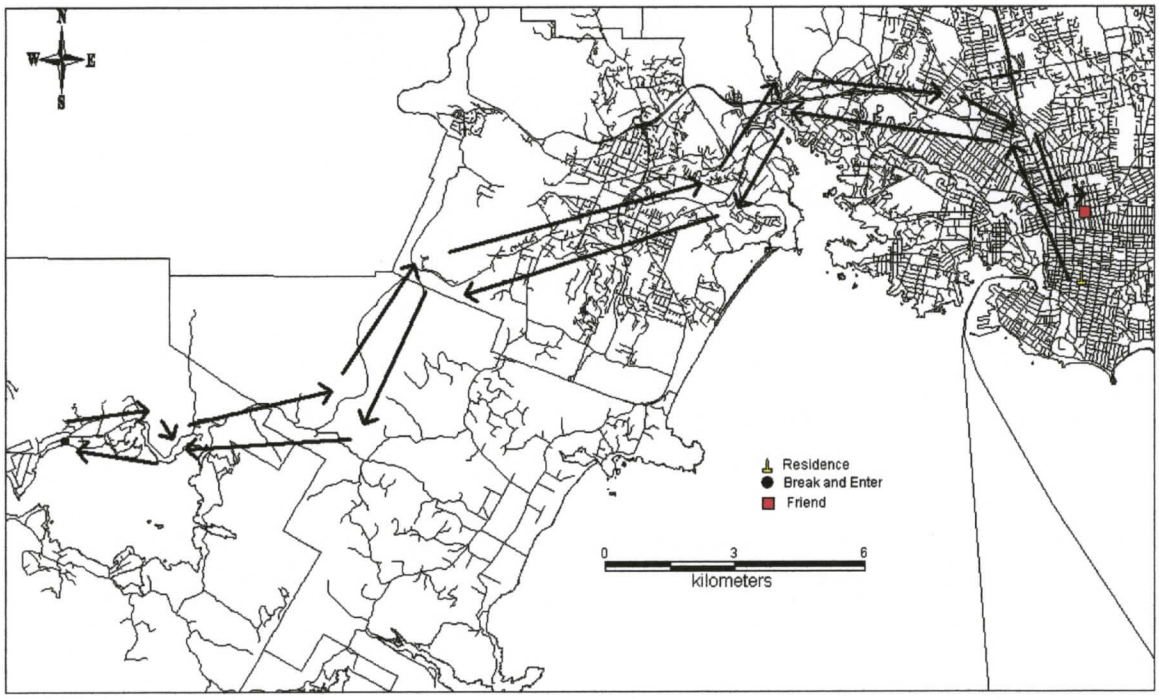


Figure IV.28: Journey to Break and Enter Thirteen.

When he was finished he took a cab to a friend's residence where he bought drugs and socialized. He left his friends residence and returned home.

Break and Enter Fourteen

Trevor's addiction was becoming more severe. The primary purpose of the trip was to commit a burglary. Trevor needed money to support his habit. The journey originated from his residence, using public transit. Figure IV.29 displays the route taken to the crime scene. Trevor chose a search area he was familiar with. He learned about it in the late 1990's, during visits to his friend who had lived in the area.

Trevor entered the house through a basement bedroom window. He removed jewelry from the premises and took a bus straight home.

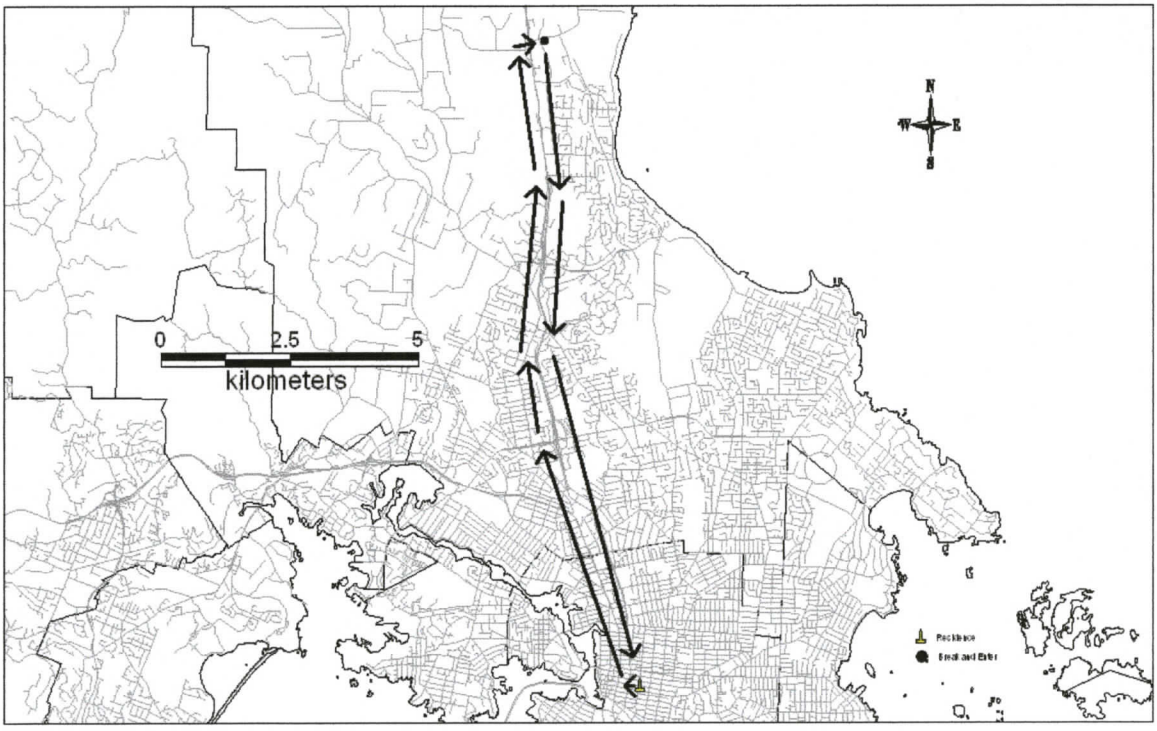


Figure IV.29: Journey to Break and Enter Fourteen.

Break and Enter Fifteen

The trip purpose was to commit a break and enter. Starting at his residence, Trevor walked to the crime scene using the route identified in Figure IV.30. Trevor grew up in the general area so he was familiar and comfortable searching for targets here.

The break in occurred early in the day. He found a house where he suspected the occupants were out. He knocked on the door and did not receive a response. He went to the side of the house, entering through a side door. He removed camera equipment, jewelry and a bike. He used the bike for transportation back along the same route to his residence.

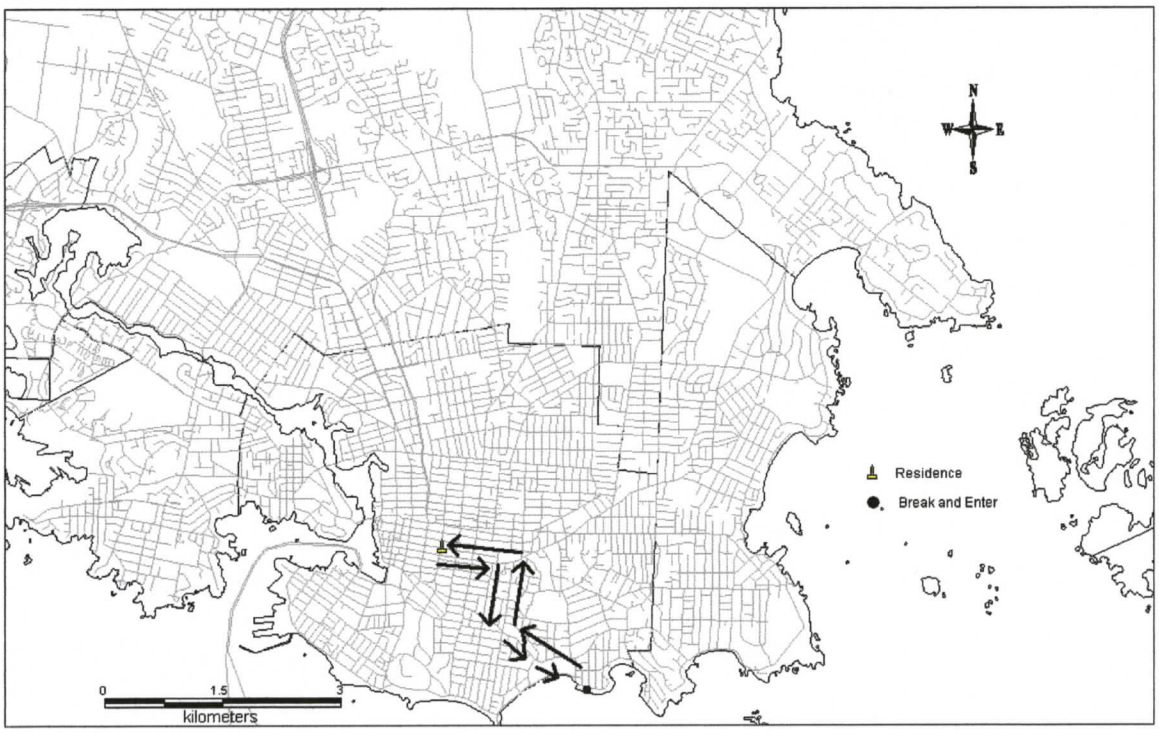


Figure IV.30: Journey to Break and Enter Fifteen.

Break and Enter Sixteen

Trevor did not discuss this break and enter, however, Figure IV.31 shows the location of the break and enter in relation to his residence; previous residence; friend's residences and other break and enters. The police notes indicate Trevor smashed a window

Figure IV.31: Break and Enter Sixteen.

gaining entry through a back balcony door. He removed a laptop from a basement office.

This is the last in the series of burglaries which he committed over a two and half month period. The interviews concentrated on residential break and enter, however, Trevor committed several thefts, as well as commercial break and enters within this time frame.

Figure IV.32: Break and Enter Sixteen in Relation to Other Break and Enters.