Trends in policing effort and the number of confiscations for West Coast rock lobster

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Abstract

GLM methods are applied to compliance data on confiscations (and abandonments) and on policing effort to estimate recent trends in the amount of rock lobster that is poached. Estimates for 2016 are based on three months of data only; they are suggested by analysis not to be reliable, and hence recommended to be disregarded. A tentative suggestion for poaching trends relative to 2008 for the northern region (Super-areas 3+4+5+6) is a decrease to 0.3 from 2008 to 2012, with a subsequent increase to 0.5 by 2015. For the southern region (Super-area 8+) the corresponding rounded figures for the same periods (both increases) are 2.0 and 4.0. There is room for alternative suggestions for these numbers, which are put forward primarily to serve as a basis from which to initiate discussions.

Introduction

To obtain overall annual rates of increase in number of confiscations (which throughout this paper include abandonments) and in policing effort in a manner that takes into account possible monthly effects and, in the case of policing effort, the fact that various types of policing exercises are carried out, Generalised Linear Models (GLMs) were applied to these data (either aggregated or disaggregated by Super-area) by Brandão *et al.* (2011a, b and c). In this paper, the analyses of Brandão *et al.* (2013) on a Super-area basis are updated to include the further data now available.

Data

Monthly data on confiscations and policing effort obtained from one of the Directorates within the CD (Directorate: Compliance) for the period of April 2008 to March 2016 are used in the present analyses. Data for the period April 2013 to March 2016 are new compared to those used for the analyses carried out by Brandão and Butterworth (2013). These disaggregated data are reported in the Appendix 1.

The policing effort types included in the analyses were revised by scientists and compliance on the west coast rock lobster working group. The policing effort types selected as being those most likely to have resulted in rock lobster confiscations are: vehicles inspected, slipway inspections, coastal patrols, restaurant inspections, FPE inspections and sea patrols. The effort types of road blocks and permit checks used in previous analyses have consequently been omitted from the analyses presented in this paper.

Methods

Generalized linear models (GLMs) were used to investigate the variation of the number of confiscations of rock lobster as well as that of the policing effort that has occurred. Trends in the number of confiscations and in the policing effort are modelled in two ways; one by having the covariate "year" which is a factor which represents the year (i.e. a categorical nonlinear relationship is assumed between the number of confiscations/policing effort with the time period) and alternatively by having the covariate "Time" (essentially the date) which represents a continuous value for the year and month for which the data record applies (i.e. a linear relationship is assumed between the number of confiscations/policing effort with the date). (Note that "year" refers to a calendar year throughout this document.)

The expected policing effort (assuming a linear relationship with time) is modelled as:

$$\mathrm{E}(P) = \exp\left(\mu + \alpha_{month} + \beta_{type} + \gamma Time\right) \quad (1)$$

where

P is the policing effort, assumed to have an overdispersed Poisson distribution,

μ is the intercept,

α_{month} is the month effect,

β_{type} is the type of policing effect, where the "type" factor is associated with the different types of policing such as coastal patrols, restaurant inspections, sea patrols, slipway inspections, FPE inspections and vehicles inspections, and

Time is the time (date) representing the year and month to which the data applies, and γ is the associated coefficient.

When a nonlinear relationship is assumed between policing effort and time, the expected policing effort is modelled as:

$$\mathrm{E}(P) = \exp\left(\mu + \alpha_{month} + \beta_{type} + \delta_{year}\right) \quad (2)$$

where

δ_{year} is the year effect (2008 to 2016).

A weight is applied to each of the GLMs above to account for different levels of variance (beyond Poisson) in the data for the different measures of policing. The weight applied to the data is given by

the inverse of the estimated overdispersion parameter obtained by fitting the GLM of Equation (1) (without the "type" factor) to each separate data set for the different types of policing employed.

The same procedure as for policing effort is applied to the number of confiscations. The one difference in the GLMs is that the β_{type} effect does not apply in this case. There is no weighting of the data in this case.

Results

Tables 1-5 shows the parameter estimates for the GLMs fitted to the policing effort data and to the number of confiscations for Super-areas 3+4, 5+6, 8+, 3+4+5+6 and 3+4+5+6+8+ respectively.

For policing effort, whether a linear or nonlinear function is assumed over time, a slight positive trend is evident (Table 1 and Figure 1) for Super-area 3+4, but a slight decreasing trend in Super-areas 5+6, 3+4+5+6 and 3+4+5+6+8+ if a linear function is assumed over time (Tables 2, 4 and 5) and no trend for Super-area 8+ (Table 3). For a nonlinear function over time, slight downward to stable trends for Super-areas 8+, 3+4+5+6 and 3+4+5+6+8+ (Figures 3 to 5) and a continuing downward trend for Super-area 5+6 (Figure 2).

For the number of confiscations, whether a linear or nonlinear function is assumed over time, a downward trend is evident for Super-areas 3+4, 5+6 and 3+4+5+6. A downward trend since 2013 is evident for Super-area 3+4+5+6+8+. For Super-area 8+, a non-linear function assumed over time shows a downward trend since 2013 but a positive trend is evident if a linear function over time is assumed (Table 3 and Figure 3).

Thus, the instantaneous annual rates of increase obtained from the linear GLM for Super-area 3+4 are:

Confiscations: -23.8% (s.e. = 7.5%)

Policing effort: 10.9% (s.e. = 1.6%)

Together these suggested that removals from poaching have been decreasing at an instantaneous rate of 34.7% p.a. (s.e.=7.6%) over the last seven years. This corresponds to a net decrease of 29.3% over one year, or 50% over two.

For Super-area 5+6 these are:

Confiscations: -20.6% (s.e. = 7.1%)

Policing effort: -9.1% (s.e. = 1.1%)

Together these suggested that removals from poaching have been decreasing at an instantaneous rate of 11.5% p.a. (s.e.=7.2%) over the last seven years. This corresponds to a net decrease of 10.9% over one year, or 20.5% over two.

For Super-area 8+ these are:

Confiscations: 14.4% (s.e. = 5.6%)

Policing effort: 0.2% (s.e. = 0.9%)

Together these suggested that removals from poaching have been increasing at an instantaneous rate of 14.2% p.a. (s.e.=5.7%) over the last eight years. This corresponds to a net increase of 15.3% over one year, or 32.8% over two.

For combined Super-area 3-6 these are:

Confiscations: -21.4% (s.e. = 5.4%)

Policing effort: -2.2% (s.e. = 1.4%)

Together these suggested that removals from poaching have been decreasing at an instantaneous rate of 19.2% p.a. (s.e.=5.6%) over the last seven years. This corresponds to a net decrease of 17.5% over one year, or 31.9% over two.

For combined Super-area 3-8+ these are:

Confiscations: -3.5% (s.e. = 4.0%)

Policing effort: -3.9% (s.e. = 1.1%)

Together these suggested that removals from poaching have been increasing at an instantaneous rate of 0.5% p.a. (s.e.=4.2%) over the last eight years. This corresponds to a net increase of 0.5% over one year, or 0.9% over two.

Figure 6 shows the ratio of confiscations (plus abandonments) to policing effort type for the different Super-areas, corresponding to indices of the amount of rock lobster poached by policing effort type.

Discussion

In 2013 when such analyses were last considered to inform on poaching trends, summary views were developed for northern (Super-areas 3+4+5+6) and southern (Super-area 8+) regions. Since it seems likely that a similar approach might be followed now, the discussion below focuses on Figure 4 for the northern, and Figure 3 for the southern region.

Visual impressions of overall poaching trends (the ratios of confiscations plus abandonments to policing effort) in these two Figures are dominated by the very low values for 2016. Results for 2016 are, however, based on data for January-March only, rather than for all twelve months as for the other years. Although in principle the GLM standardisation removes the month effect, and accordingly renders the 2016 values comparable with those for the earlier years, questions of reliability do arise given the smaller sample sizes involved.

To check on this, Appendix 2 repeats these GLM standardisations, but using data from January-March only for each year. The results are shown in Figures A2.1-2.2, and are compared to the results for data for the full periods for each year (except for the three months for 2016) in Figures A2.3-2.4. Some large differences are evident in these comparisons. The most important of these would seem to be those for the confiscations and abandonments per policing effort for 2012. For Super-area 8+, and particularly for Super-areas 3+4+5+6, the estimate for the first three months of the year is substantially lower for 2012; furthermore, for the latter northern region, estimates for 2013 to 2015 are also appreciably lower.

This check suggests that the values for 2016 in Figures 3 and 4 should NOT be considered reliable at this stage, so that trend inferences should be restricted to years to 2015 only, with the values plotted for 2016 disregarded.

In 2013, results were summarised as a decrease in poaching from 2008 to 2012 of between 0 and 50% for the northern region, and an increase between 25 and 125% for the southern region. As a first suggestion only, based on Figures 4 and 3 respectively (and recognising the existence considerable room for discussion), we tentatively put forward the following rounded "best" estimates (relative to 2008) with ranges in square brackets for relative changes in the extent of poaching:

Northern region (Super-areas 3+4+5+6):

2008-2012	Decrease to	0.30	[0.10; 0.60]
2012-2015	Increase to	0.50	[0.30; 0.70]

Southern region (Super-areas 8+):

2008-2012	Increase to	2.00	[1.00; 3.00]
2012-2015	Increase to	4.00	[2.00; 6.00]

References

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Table 1. GLM parameter/coefficient (and standard error) estimates for Super-area 3+4.

	Policing effort (year factor)	Policing effort (linear)	Confiscations (year factor)	Confiscations (linear)
January	0.011 (0.145)	0.162 (0.143)	-0.662 (0.540)	-0.731 (0.665)
February	-0.253 (0.155)	-0.110 (0.152)	-0.017 (0.446)	-0.066 (0.547)
March	-0.228 (0.154)	-0.094 (0.151)	0.948 (0.368)	0.919 (0.449)
April	-0.214 (0.156)	-0.141 (0.158)	0.217 (0.409)	0.058 (0.508)
May	-0.091 (0.151)	-0.027 (0.152)	-1.145 (0.614)	-1.284 (0.763)
June	-0.111 (0.152)	-0.056 (0.153)	-4.050 (2.320)	-4.170 (2.880)
July	-0.041 (0.149)	0.004 (0.150)	-2.255 (0.987)	-2.350 (1.220)
August	-0.020 (0.148)	0.016 (0.150)	-1.211 (0.635)	-1.290 (0.786)
September	-0.284 (0.159)	-0.257 (0.160)	-2.960 (1.360)	-3.020 (1.690)
October	0.058 (0.145)	0.077 (0.147)	-3.380 (1.680)	-3.420 (2.070)
November	0.051 (0.145)	0.060 (0.147)	-0.749 (0.537)	-0.769 (0.663)
December	0	0	0	0
Time (yr^{-1})	—	0.009 (0.001)	—	-0.020 (0.006)
2008	—	—	—	—
2009	-0.230 (0.154)	—	-1.424 (0.542)	—
2010	0.000 (0.000)	—	0.000 (0.000)	—
2011	0.346 (0.123)	—	-1.367 (0.371)	—
2012	0.244 (0.125)	—	-2.195 (0.528)	—
2013	0.180 (0.127)	—	-3.002 (0.769)	—
2014	0.378 (0.122)		-0.978 (0.320)	
2015	0.585 (0.117)		-1.297 (0.361)	
2016	0.855 (0.168)		-3.100 (1.100)	
coastal	0.938 (0.136)	0.938 (0.137)	—	—
FPE	-3.198 (0.205)	-3.198 (0.207)	—	—
restaurant	-3.173 (0.197)	-3.173 (0.199)	—	—
sea	-4.719 (0.235)	-4.719 (0.237)	—	—
slipway	0.988 (0.136)	0.988 (0.137)	—	—
vehicles	0	0	—	—

Table 2. GLM parameter/coefficient (and standard error) estimates for Super-area 5+6.

	Policing effort (year factor)	Policing effort (linear)	Confiscations (year factor)	Confiscations (linear)
January	0.498 (0.123)	0.461 (0.122)	0.637 (0.521)	0.330 (0.503)
February	0.283 (0.128)	0.254 (0.128)	0.389 (0.550)	0.099 (0.532)
March	0.258 (0.129)	0.236 (0.129)	0.573 (0.528)	0.300 (0.510)
April	0.440 (0.121)	0.380 (0.123)	0.263 (0.513)	0.126 (0.511)
May	0.535 (0.119)	0.482 (0.121)	0.177 (0.523)	0.057 (0.520)
June	0.344 (0.124)	0.299 (0.125)	-3.060 (1.820)	-3.160 (1.810)
July	0.499 (0.120)	0.461 (0.121)	-4.040 (2.950)	-4.130 (2.930)
August	0.530 (0.119)	0.500 (0.121)	-2.890 (1.690)	-2.960 (1.670)
September	0.232 (0.127)	0.210 (0.128)	-1.326 (0.842)	-1.377 (0.836)
October	0.617 (0.117)	0.602 (0.119)	-1.780 (1.020)	-1.820 (1.010)
November	0.567 (0.118)	0.559 (0.120)	-1.006 (0.747)	-1.023 (0.741)
December	0	0	0	0
Time (yr^{-1})	—	-0.008 (0.001)	—	-0.017 (0.006)
2008	—	—	—	—
2009	-0.161 (0.084)	—	0.373 (0.471)	—
2010	0	—	0	—
2011	-0.080 (0.075)	—	-0.418 (0.446)	—
2012	-0.148 (0.077)	—	-0.937 (0.528)	—
2013	-0.333 (0.081)	—	-0.681 (0.485)	—
2014	-0.486 (0.084)		-0.687 (0.486)	
2015	-0.613 (0.088)		-0.639 (0.478)	
2016	-0.489 (0.153)		-2.860 (1.630)	
coastal	-0.947 (0.096)	-0.947 (0.097)	—	—
FPE	-2.919 (0.099)	-2.919 (0.101)	—	—
restaurant	-3.174 (0.123)	-3.174 (0.125)	—	—
sea	-5.058 (0.141)	-5.058 (0.142)	—	—
slipway	-0.723 (0.100)	-0.722 (0.101)	—	—
vehicles	0	0	—	—

Table 3. GLM parameter/coefficient (and standard error) estimates for Super-area 8+.

	Policing effort (year factor)	Policing effort (linear)	Confiscations (year factor)	Confiscations (linear)
January	0.198 (0.108)	0.194 (0.108)	-0.034 (0.590)	-0.066 (0.636)
February	0.219 (0.108)	0.215 (0.107)	1.177 (0.473)	1.133 (0.509)
March	0.139 (0.110)	0.135 (0.109)	-1.302 (0.896)	-1.358 (0.967)
April	0.057 (0.110)	0.059 (0.112)	0.953 (0.483)	1.049 (0.523)
May	0.126 (0.109)	0.127 (0.110)	-0.046 (0.587)	0.038 (0.636)
June	0.191 (0.107)	0.192 (0.108)	-0.036 (0.586)	0.036 (0.634)
July	0.288 (0.105)	0.288 (0.106)	-1.025 (0.793)	-0.966 (0.863)
August	0.243 (0.106)	0.243 (0.107)	-2.240 (1.320)	-2.190 (1.430)
September	-0.043 (0.113)	-0.043 (0.114)	0.087 (0.568)	0.122 (0.614)
October	0.098 (0.109)	0.098 (0.110)	-0.090 (0.594)	-0.066 (0.642)
November	0.077 (0.110)	0.077 (0.111)	-0.703 (0.713)	-0.691 (0.771)
December	0	0	0	0
Time (yr^{-1})	—	0.000 (0.001)	—	0.012 (0.005)
2008	-0.014 (0.096)	—	-0.647 (0.750)	—
2009	-0.001 (0.088)	—	-0.705 (0.654)	—
2010	0	—	0	—
2011	0.205 (0.083)	—	0.452 (0.482)	—
2012	0.147 (0.085)	—	-0.403 (0.595)	—
2013	0.004 (0.087)	—	1.131 (0.433)	—
2014	-0.065 (0.089)		0.396 (0.487)	
2015	0.103 (0.085)		0.726 (0.459)	
2016	-0.048 (0.143)		-1.190 (1.230)	
coastal	0.567 (0.080)	0.567 (0.080)	—	—
FPE	-2.247 (0.095)	-2.247 (0.096)	—	—
restaurant	-2.185 (0.088)	-2.185 (0.089)	—	—
sea	-4.544 (0.146)	-4.544 (0.147)	—	—
slipway	0.280 (0.077)	0.280 (0.077)	—	—
vehicles	0	0	—	—

Table 4. GLM parameter/coefficient (and standard error) estimates for Super-areas 3+4+5+6.

	Policing effort (year factor)	Policing effort (linear)	Confiscations (year factor)	Confiscations (linear)
January	0.307 (0.143)	0.338 (0.140)	0.370 (0.398)	0.125 (0.397)
February	0.074 (0.150)	0.106 (0.148)	0.282 (0.406)	0.055 (0.406)
March	0.068 (0.150)	0.102 (0.148)	0.724 (0.370)	0.516 (0.368)
April	0.196 (0.144)	0.181 (0.145)	0.250 (0.377)	0.108 (0.386)
May	0.299 (0.141)	0.286 (0.142)	-0.056 (0.405)	-0.181 (0.414)
June	0.164 (0.146)	0.153 (0.146)	-3.250 (1.450)	-3.360 (1.490)
July	0.290 (0.142)	0.281 (0.142)	-3.160 (1.410)	-3.250 (1.440)
August	0.318 (0.141)	0.311 (0.141)	-2.086 (0.851)	-2.158 (0.870)
September	0.032 (0.150)	0.026 (0.151)	-1.583 (0.674)	-1.637 (0.692)
October	0.403 (0.138)	0.399 (0.139)	-2.041 (0.834)	-2.076 (0.852)
November	0.366 (0.139)	0.365 (0.140)	-0.926 (0.531)	-0.944 (0.542)
December	0	0	0	0
Time (yr^{-1})	—	-0.002 (0.001)	—	-0.018 (0.005)
2008	—	—	—	—
2009	-0.177 (0.113)	—	-0.043 (0.356)	—
2010	0.000 (0.000)	—	0	—
2011	0.038 (0.098)	—	-0.705 (0.324)	—
2012	-0.041 (0.100)	—	-1.282 (0.399)	—
2013	-0.187 (0.103)	—	-1.139 (0.379)	—
2014	-0.206 (0.104)		-0.796 (0.335)	
2015	-0.179 (0.103)		-0.858 (0.342)	
2016	0.021 (0.167)		-2.950 (1.140)	
coastal	0.249 (0.120)	0.249 (0.120)	—	—
FPE	-2.173 (0.129)	-2.173 (0.130)	—	—
restaurant	-2.959 (0.159)	-2.959 (0.159)	—	—
sea	-4.575 (0.184)	-4.575 (0.184)	—	—
slipway	0.319 (0.122)	0.319 (0.122)	—	—
vehicles	0	0	—	—

Table 5. GLM parameter/coefficient (and standard error) estimates for Super-areas 3+4+5+6+8+.

	Policing effort (year factor)	Policing effort (linear)	Confiscations (year factor)	Confiscations (linear)
January	0.304 (0.120)	0.276 (0.119)	0.146 (0.363)	0.058 (0.371)
February	0.188 (0.123)	0.163 (0.122)	0.654 (0.326)	0.569 (0.333)
March	0.146 (0.125)	0.124 (0.124)	0.219 (0.357)	0.137 (0.364)
April	0.134 (0.122)	0.108 (0.123)	0.549 (0.325)	0.526 (0.335)
May	0.222 (0.120)	0.199 (0.121)	-0.052 (0.371)	-0.073 (0.381)
June	0.177 (0.121)	0.157 (0.122)	-1.037 (0.505)	-1.054 (0.520)
July	0.289 (0.118)	0.273 (0.119)	-1.896 (0.707)	-1.911 (0.733)
August	0.284 (0.118)	0.271 (0.119)	-2.135 (0.797)	-2.147 (0.818)
September	-0.003 (0.126)	-0.012 (0.127)	-0.679 (0.442)	-0.688 (0.456)
October	0.272 (0.118)	0.266 (0.119)	-0.923 (0.484)	-0.929 (0.498)
November	0.242 (0.119)	0.239 (0.120)	-0.844 (0.472)	-0.847 (0.485)
December	0	0	0	0
Time (yr^{-1})	—	-0.003 (0.001)	—	-0.003 (0.003)
2008	0.738 (0.136)	—	-0.958 (0.723)	—
2009	-0.018 (0.096)	—	-0.448 (0.336)	—
2010	0	—	0	—
2011	0.104 (0.086)	—	-0.326 (0.289)	—
2012	0.034 (0.088)	—	-1.022 (0.363)	—
2013	-0.111 (0.091)	—	-0.097 (0.271)	—
2014	-0.151 (0.092)		-0.401 (0.295)	
2015	-0.064 (0.090)		-0.260 (0.283)	
2016	-0.047 (0.148)		-2.279 (0.913)	
coastal	0.120 (0.094)	0.105 (0.094)	—	—
FPE	-2.390 (0.105)	-2.403 (0.105)	—	—
restaurant	-2.590 (0.113)	-2.596 (0.113)	—	—
sea	-4.731 (0.156)	-4.743 (0.157)	—	—
slipway	0.245 (0.094)	0.241 (0.094)	—	—
vehicles	0	0	—	—

Table 6. Summary of change in poaching levels from 2009 to 2015 (and 95% confidence intervals) for the continuous log-linear model and the percentage change from average of 2009 and 2010 to the average of 2015 and 2016 for the poaching indices for the discrete year factor model.

Area	Continuous linear trend	Discrete year factor
Super-area 3+4	-91.2% (-96.8%; -75.4%)	-86.8%
Super-area 5+6	-55.3% (-83.3%; 19.6%)	-60.5%
Super-area8+	170.1% (24.3%; 487.0%)	46.1%
Super-area 3+4+5+6	-73.9% (-87.9%; -43.7%)	-73.9%
Super-area 3+4+5+6+8+	-3.3% (-42.0%; 83.8%)	-43.7%

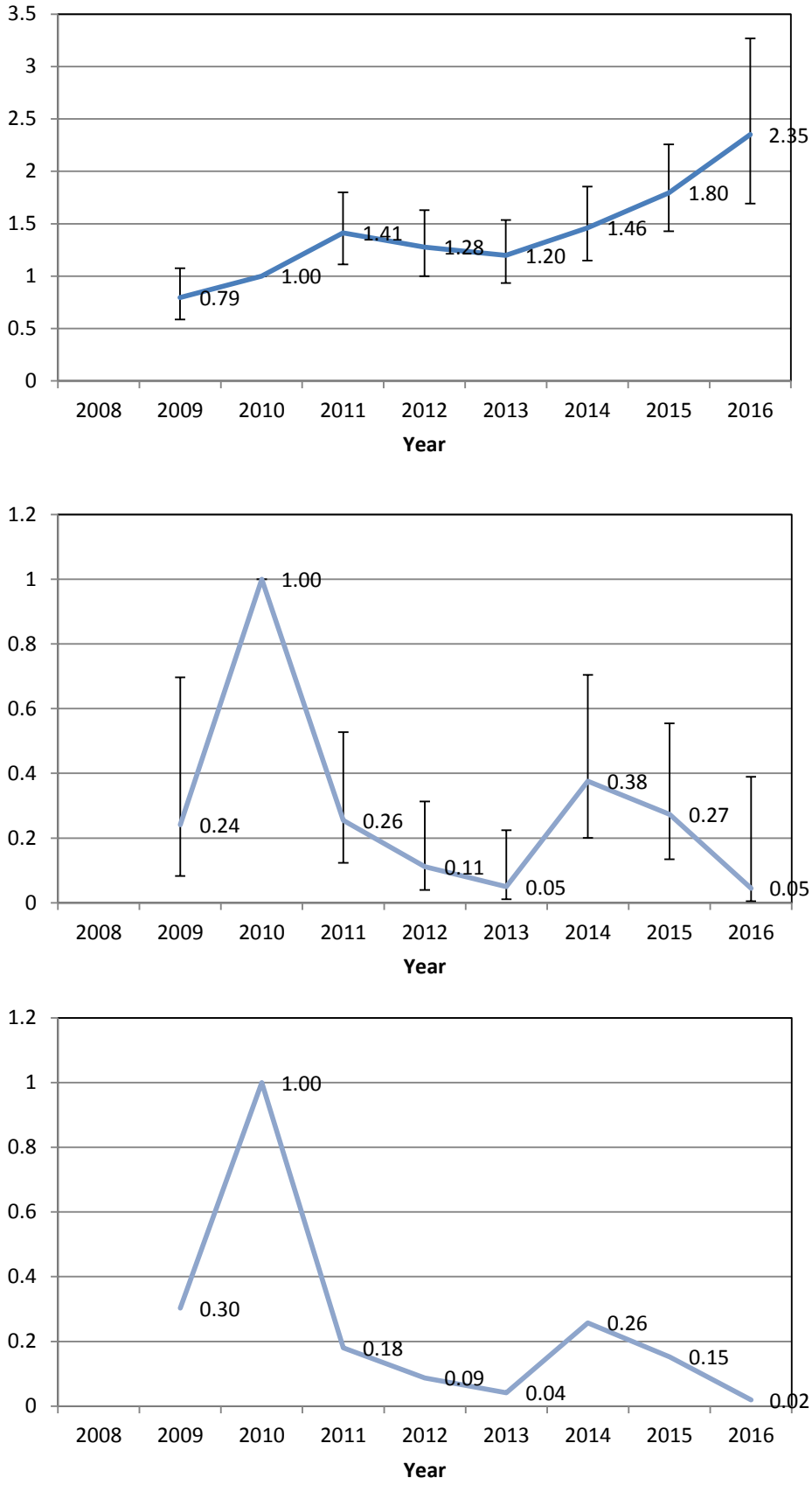

Figure 1. Year effect (together with 95% confidence limits) for policing effort (top), the number of confiscations plus abandonments (middle) and the ratio of the number of confiscations plus abandonments to policing effort for Super-area 3+4.

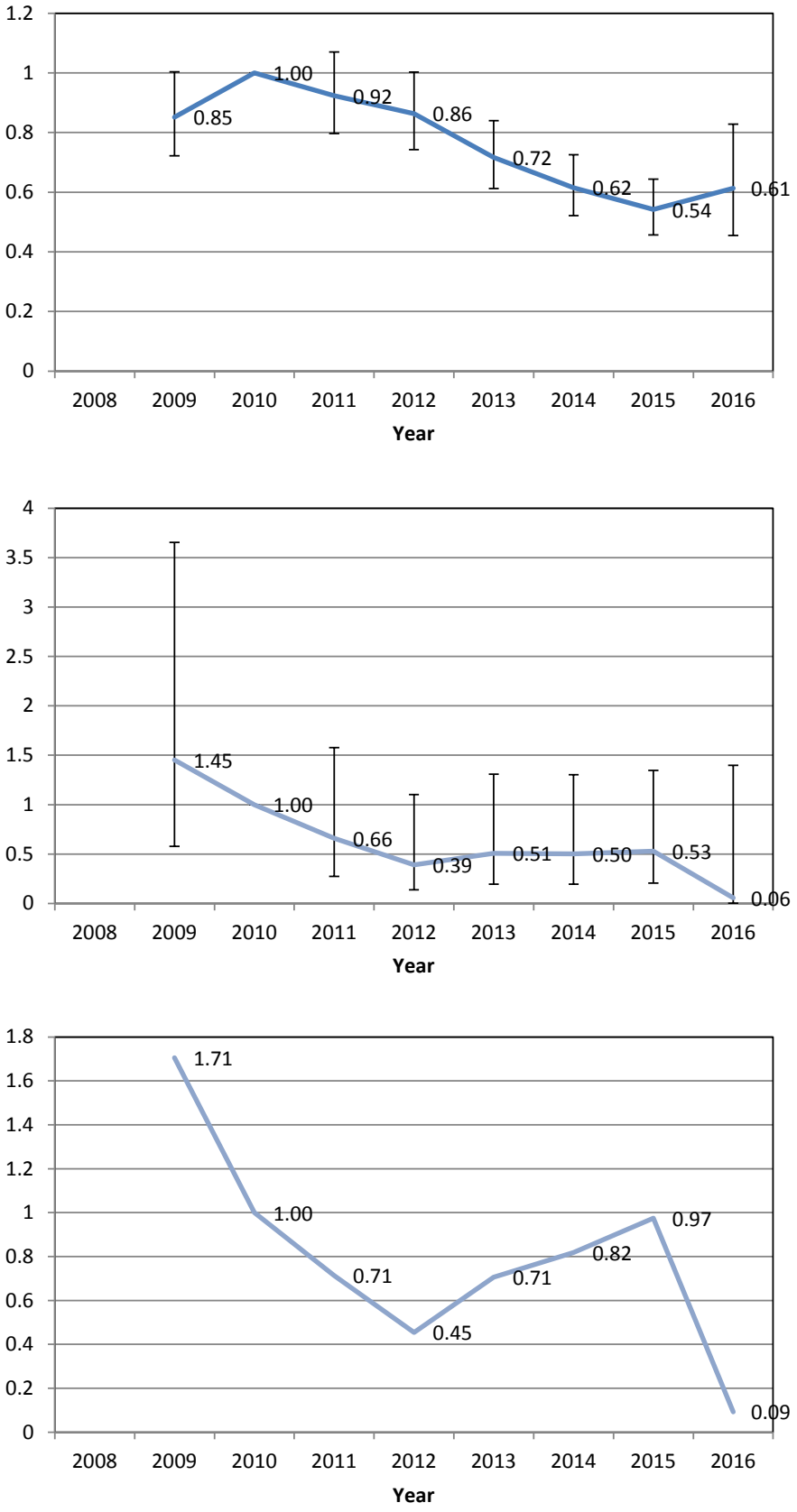

Figure 2. Year effect (together with 95% confidence limits) for policing effort (top), the number of confiscations plus abandonments (middle) and the ratio of the number of confiscations plus abandonments to policing effort for Super-area 5+6.

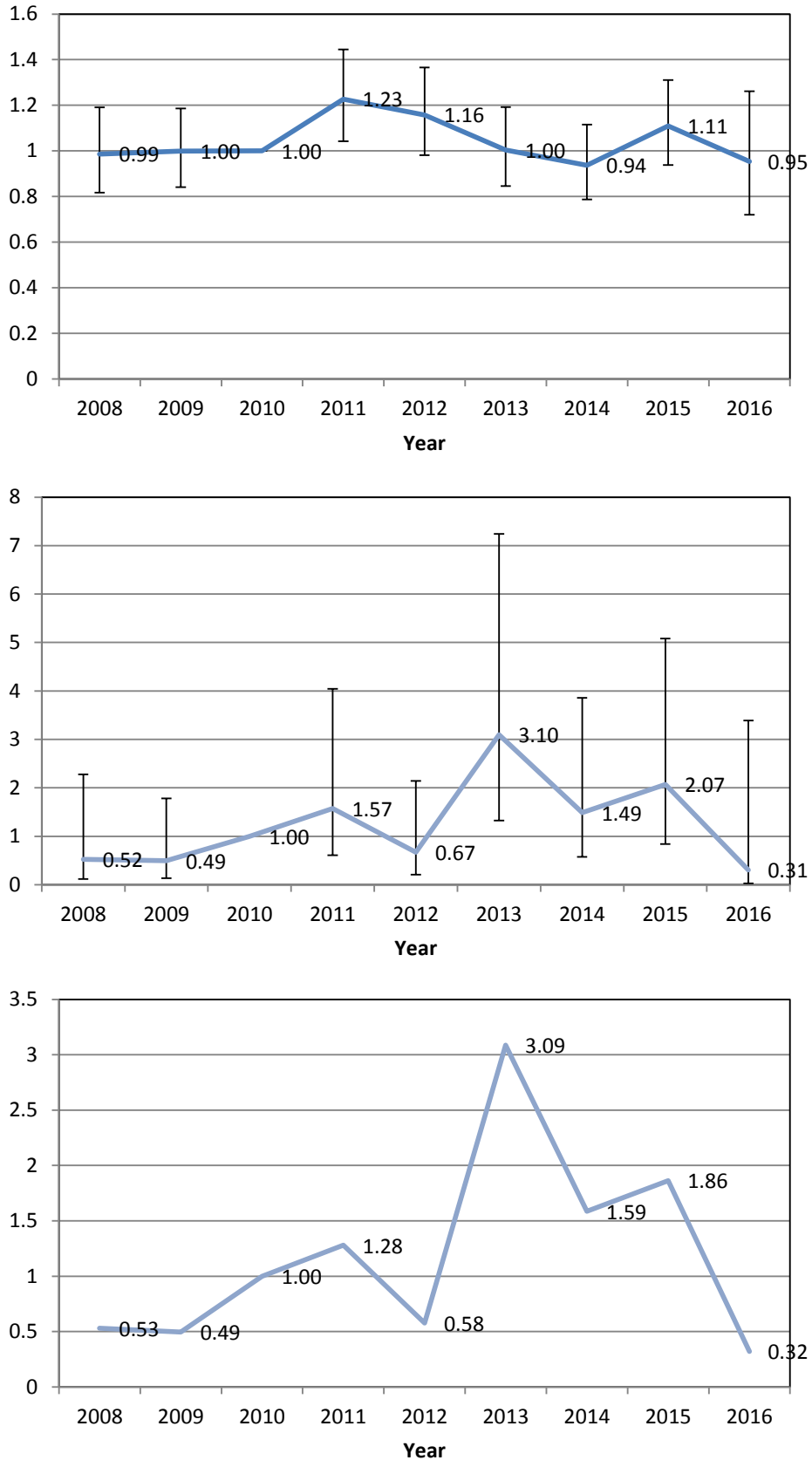

Figure 3. Year effect (together with 95% confidence limits) for policing effort (top), the number of confiscations plus abandonments (middle) and the ratio of the number of confiscations plus abandonments to policing effort for Super-area 8+.

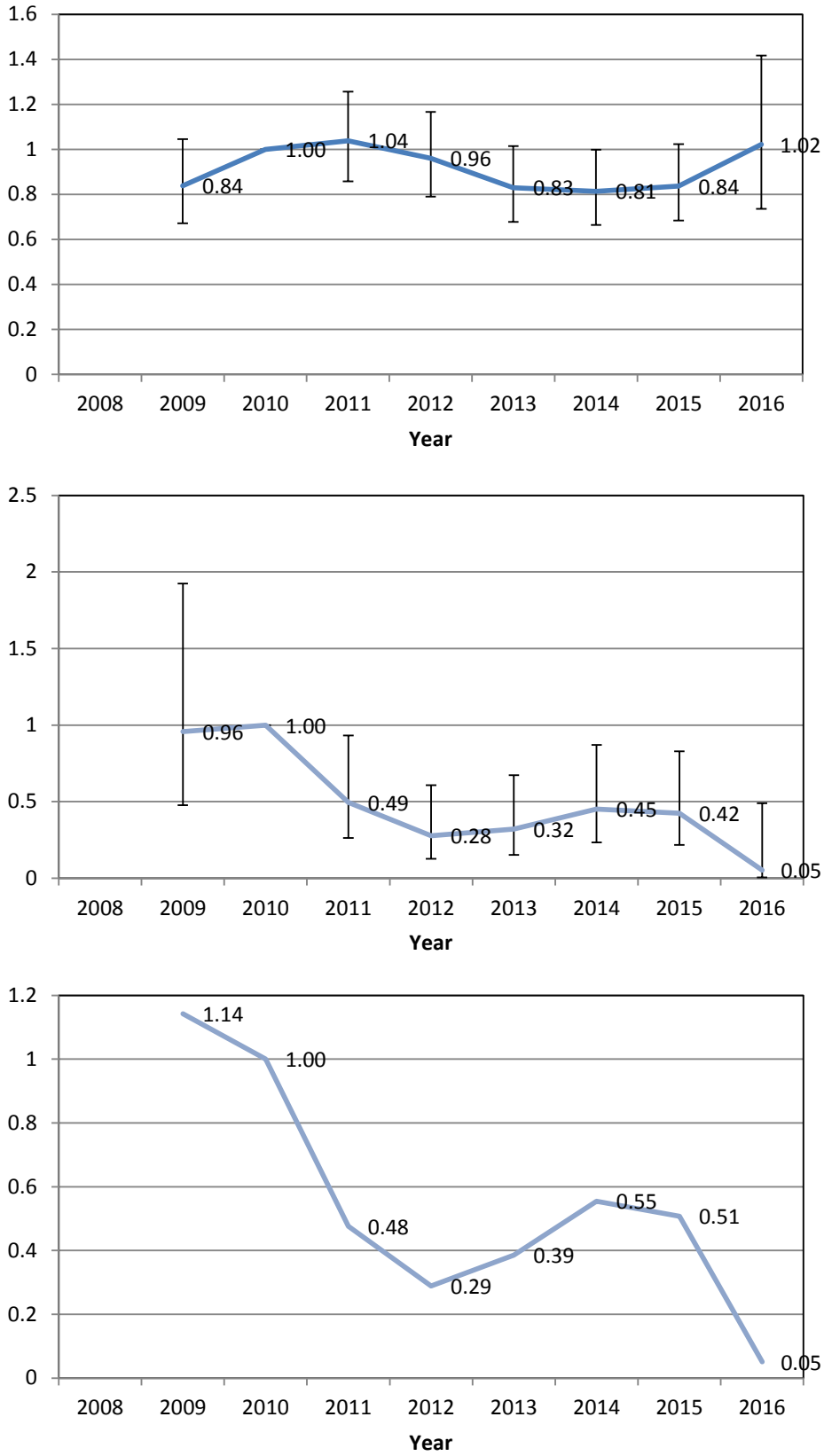

Figure 4. Year effect (together with 95% confidence limits) for policing effort (top), the number of confiscations plus abandonments (middle) and the ratio of the number of confiscations plus abandonments to policing effort for Super-areas 3+4+5+6.

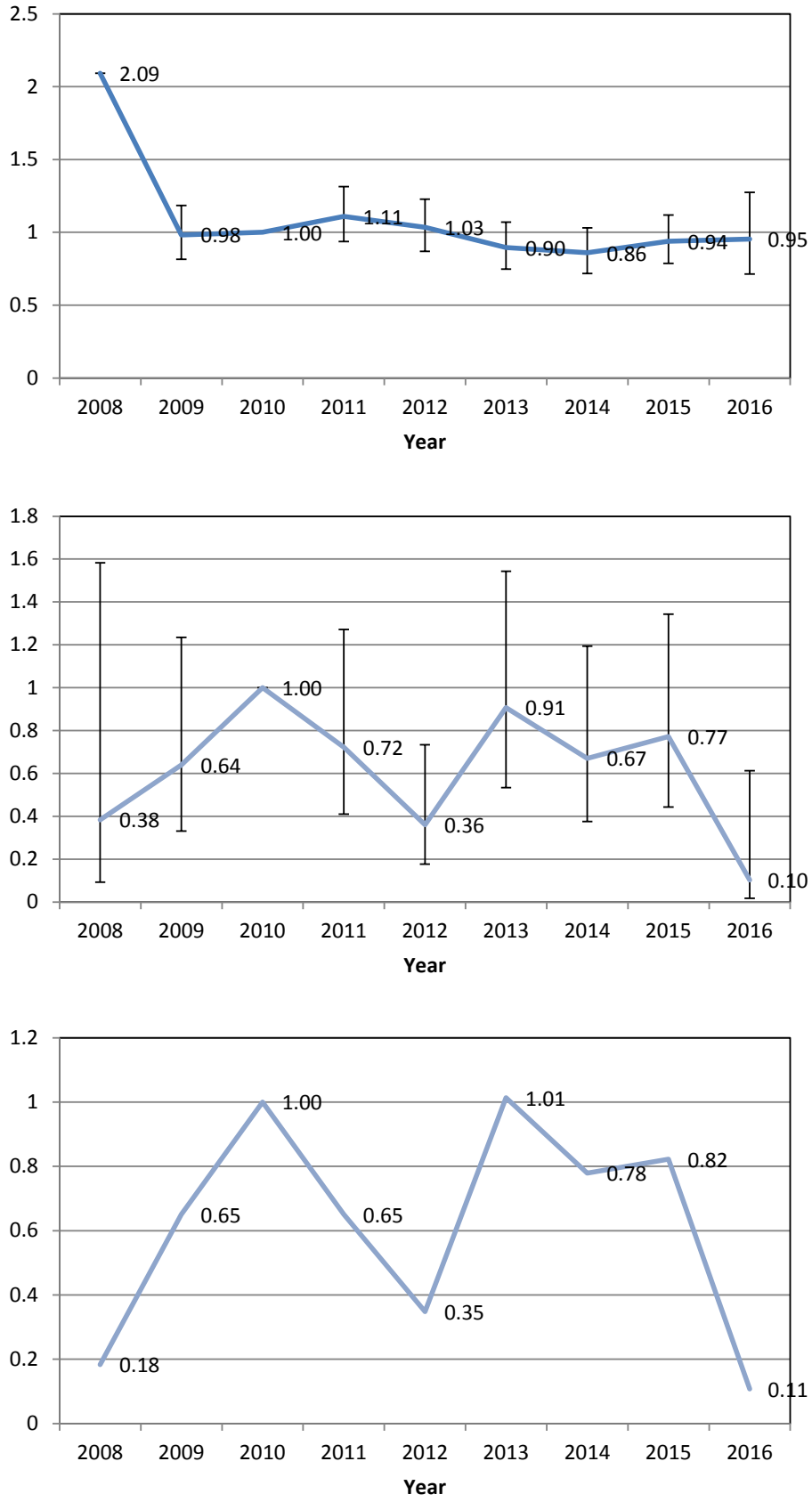

Figure 5. Year effect (together with 95% confidence limits) for policing effort (top), the number of confiscations plus abandonments (middle) and the ratio of the number of confiscations plus abandonments to policing effort for Super-areas 3+4+5+6+8+.

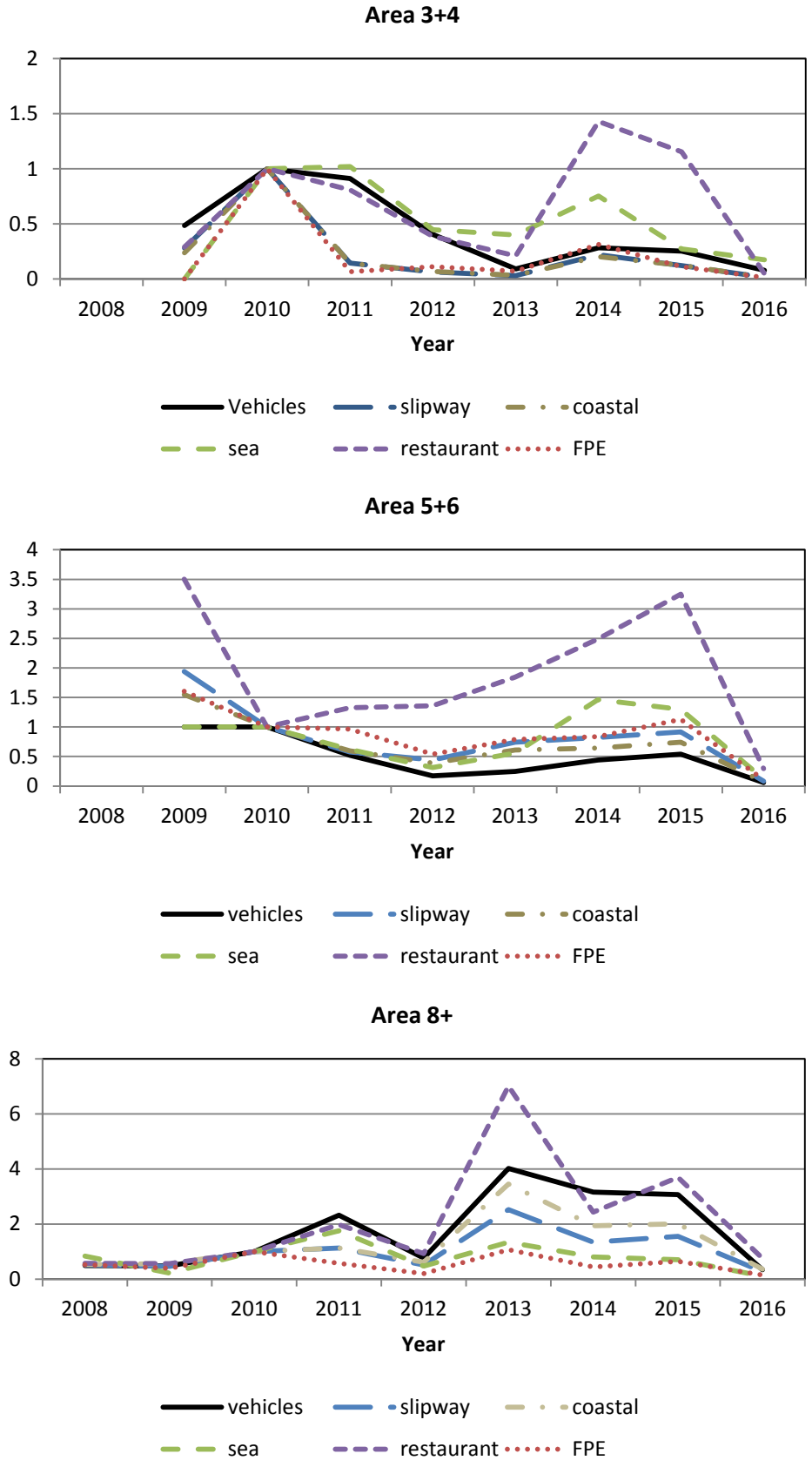

Figure 6. The ratio of the number of confiscations plus abandonments to policing effort type for Super-areas 3+4, 5+6 and 8+.

Appendix 1: West Coast rock lobster confiscations and policing effort data by month and Super-area.

NOTE: For reasons of confidentiality, the data in these tables have been excluded from thihis publically available version of this document.

Table A1.1. Confiscations (confiscations+abandonments) by month and Super-area.

Table A1.2. Policing effort by vehicles inspected by month and Super-area.

Table A1.3. Policing effort by slipway inspections by month and Super-area.

Table A1.4. Policing effort by coastal patrols by month and Super-area.

Table A1.5. Policing effort by sea patrols by month and Super-area.

Table A1.6. Policing effort by restaurant inspections by month and Super-area.

Table A1.7. Policing effort by sea FPE inspections by month and Super-area.

Appendix 2: GLM results based on only the first three months of the year for Super-area 8+ and Super-areas 3+4+5+6

Results are given when fitting to the policing effort data and to the number of confiscations for Super-areas 8+ and 3+4+5+6 but restricting the analyses to the first three months of each year only for comparability with data available for 2016. For simplification, the weights that are applied to each of the GLMs for policing effort to account for different levels of variance (beyond Poisson) in the data for the different measures of policing obtained using all the available data have been used in the GLM analyses of this Appendix which are restricted to the first three months of the year.

Figures A2.1 and A2.2 show the year effect (together with 95% confidence limits) for policing effort, the number of confiscations plus abandonments and the ratio of the number of confiscations plus abandonments to policing effort for Super-area 8+ and Super-areas 3+4+5+6 respectively, when the GLMs are restricted to the first three months of the year. Figures A2.3 and A2.4 compare these results with those of Figures 3 and 4 respectively, which include all the available data.

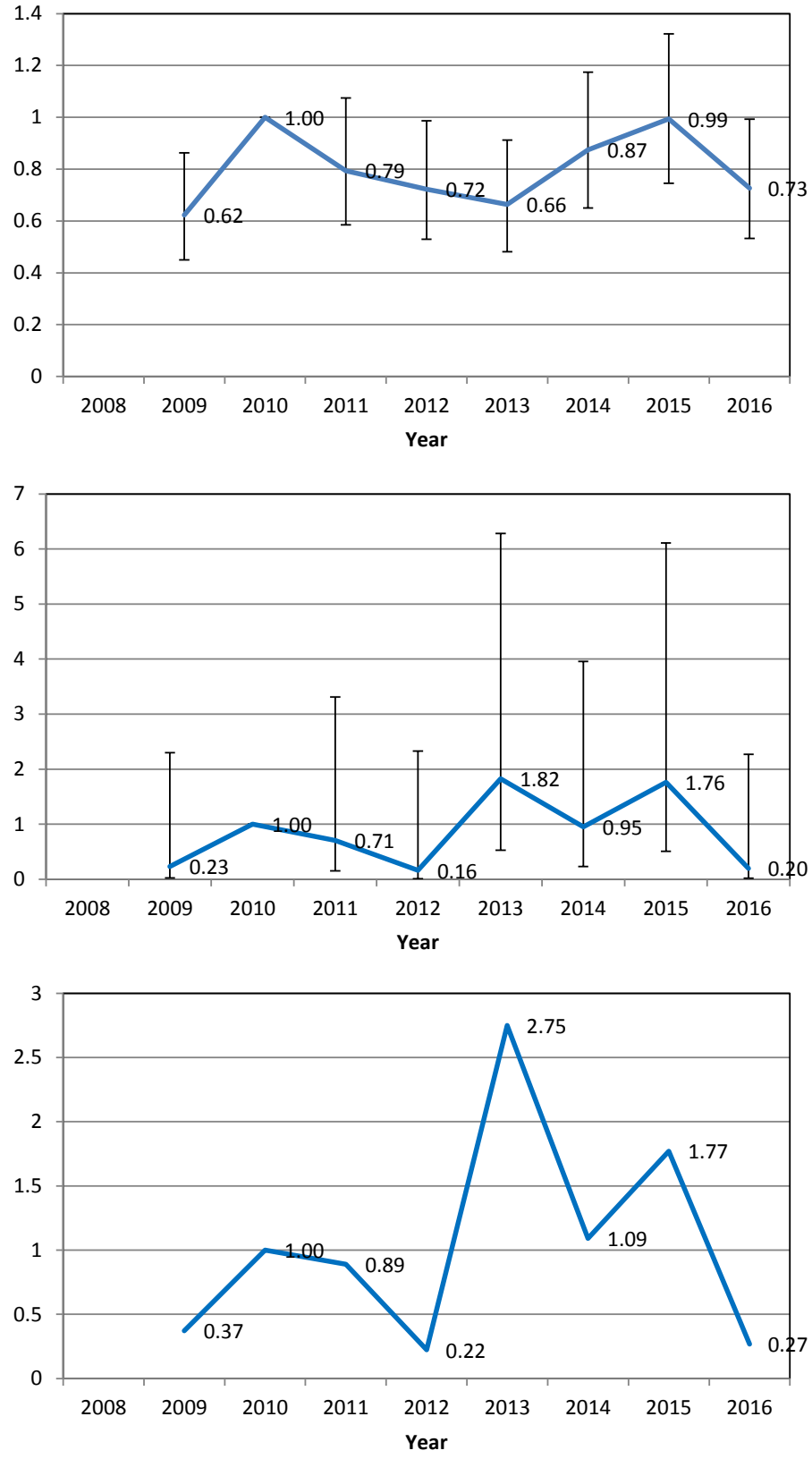

Figure A2.1. Year effect (together with 95% confidence limits) for policing effort (top), the number of confiscations plus abandonments (middle) and the ratio of the number of confiscations plus abandonments to policing effort for Super-area 8+, when only the first three months of the year are included.

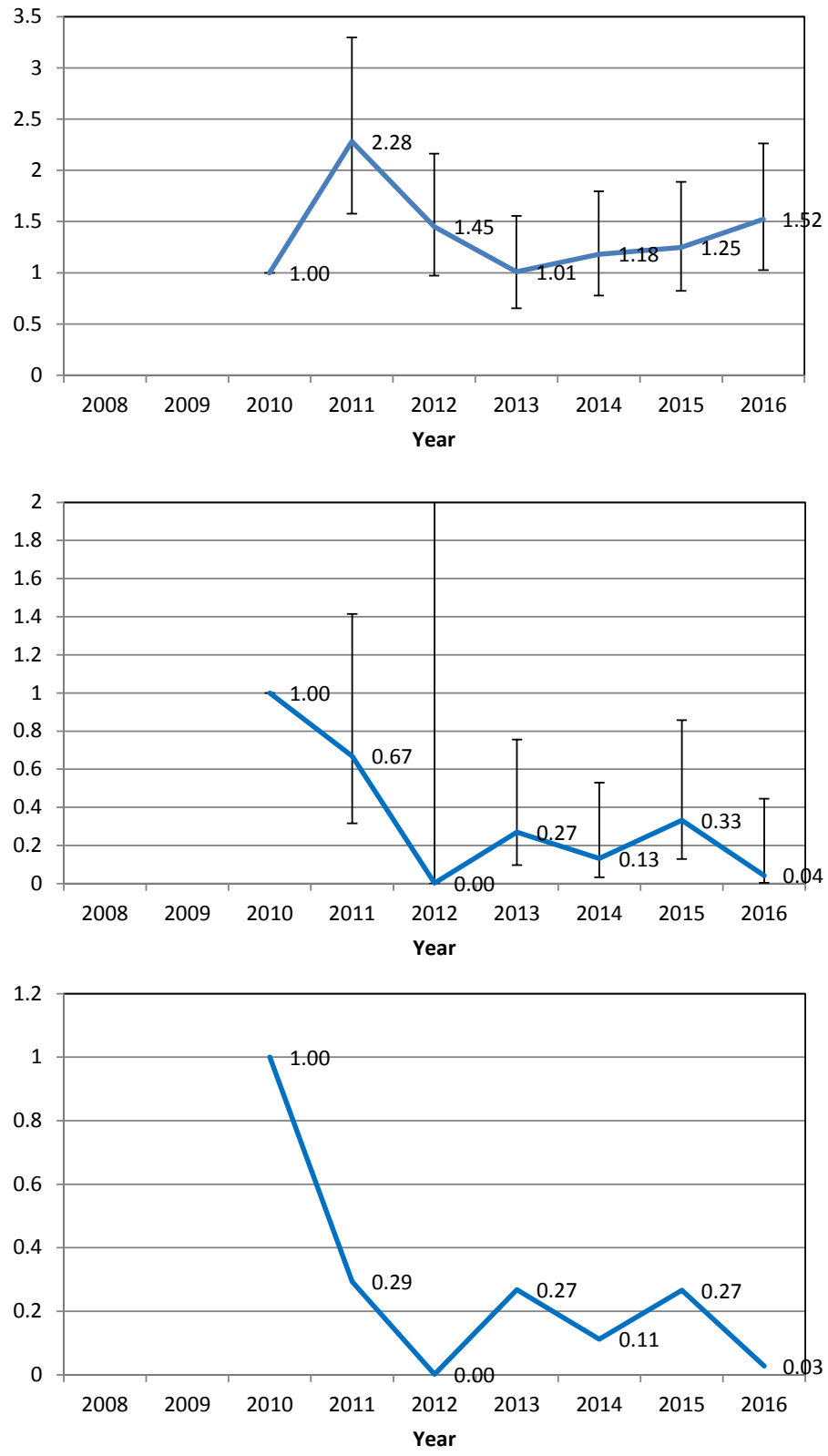

Figure A2.2. Year effect (together with 95% confidence limits) for policing effort (top), the number of confiscations plus abandonments (middle) and the ratio of the number of confiscations plus abandonments to policing effort for Super-areas 3+4+5+6, when only the first three months of the year are included.

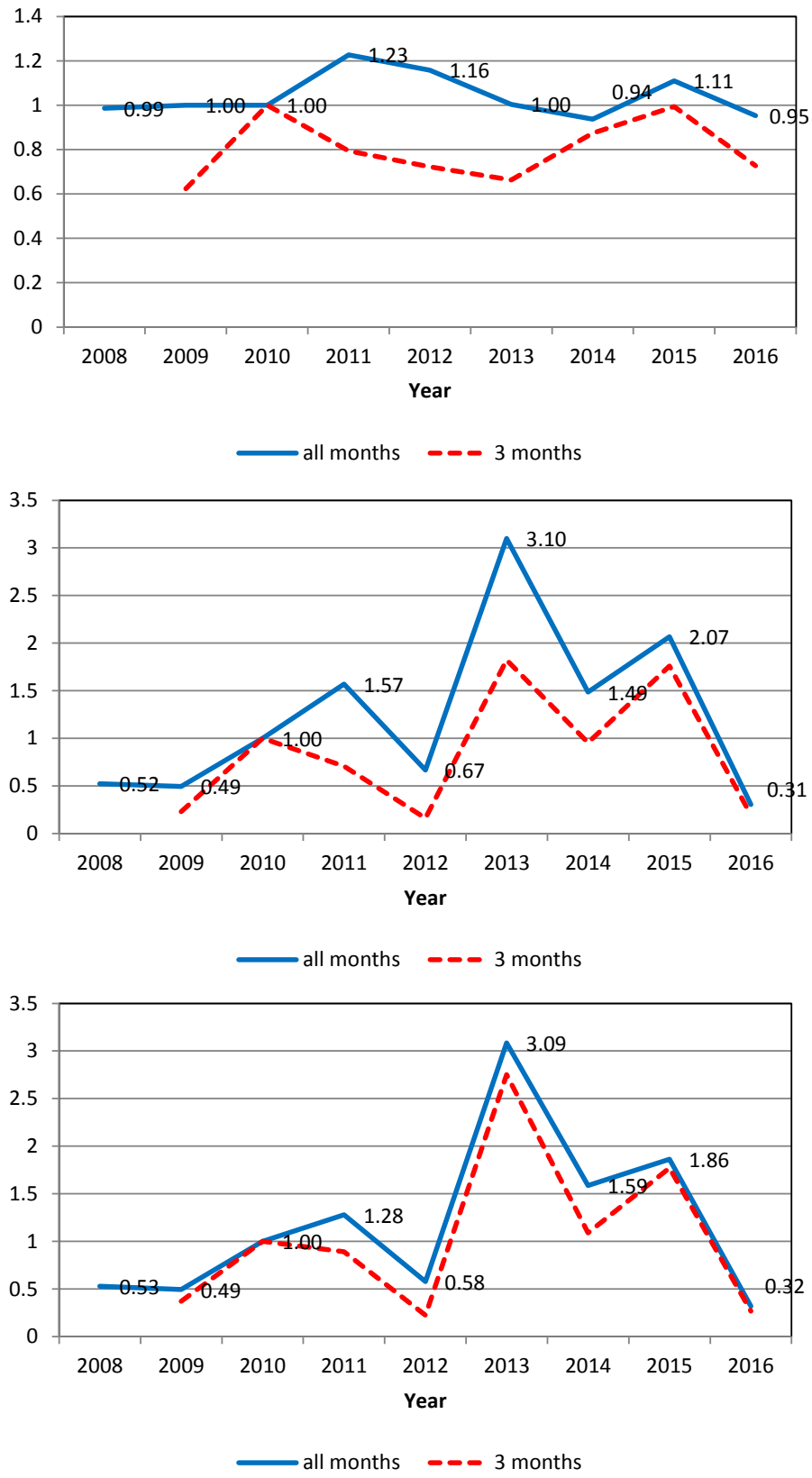

Figure A2.3. Comparison of year effect for policing effort (top), the number of confiscations plus abandonments (middle) and the ratio of the number of confiscations plus abandonments to policing effort for Super-area 8+, when all months or only the first three months of the year are included.

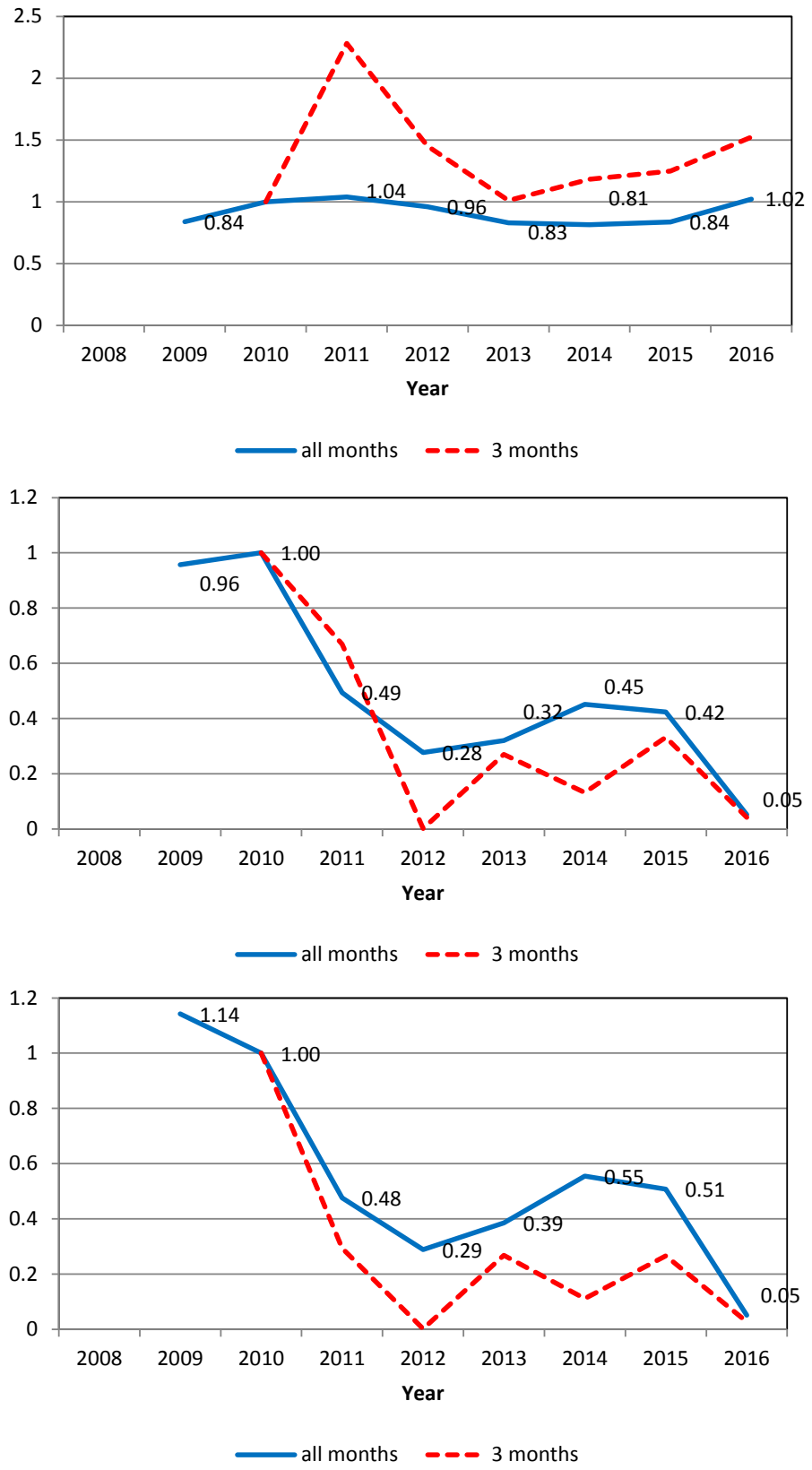

Figure A2.4. Comparison of year effect for policing effort (top), the number of confiscations plus abandonments (middle) and the ratio of the number of confiscations plus abandonments to policing effort for Super-areas 3+4+5+6, when all months or only the first three months of the year are included.