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

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July 2013

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.* (2011b and c) on a Super-area basis are updated to include further data now available. These disaggregated data are reported in the Appendix.

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 2013 are used in the present analyses. Data for the period April 2011 to March 2013 are new compared to those used for the analyses carried out by Brandão and Butterworth (2011b and c).

The policing effort types included in the analyses were revised by scientists and compliance from 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 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).

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 2013).

A weight is applied to each of the above GLMs 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 being that the β_{type} effect does not apply in this case. No weighting of the data is performed 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-area 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 3 and Figure 3) for Super-area 8+, but a slight decreasing trend in Super-area 5+6, 3+4+5+6 and 3+4+5+6+8+ (Tables 2 to 5 and Figures 2 to 5). For Super-area 3+4 there's a slight downward trend if a non-linear function is assumed over time but a slight upward trend if a linear function is assumed (Table 1 and Figure 1).

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, and a positive trend for Super-area 8+ . For Super-area 3+4+5+6+8+, a non-linear function assumed over time shows a slight

positive trend but a downward trend is evident if a linear function over time is assumed (Table 5 and Figure 5).

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

Confiscations: -77.0% (s.e. = 16.6%)

Policing effort: 2.6% (s.e. = 5.0%)

Together these suggested that removals from poaching have been decreasing at an instantaneous rate of 79.7% p.a. (s.e.=17.3%) over the last three years. This corresponds to a net decrease of 54.9% over one year, or 79.7% over two.

For Super-area 5+6 these are:

Confiscations: -38.9% (s.e. = 16.2%)

Policing effort: -2.8% (s.e. = 3.0%)

Together these suggested that removals from poaching have been decreasing at an instantaneous rate of 36.1% p.a. (s.e.=16.5%) over the last three years. This corresponds to a net decrease of 30.3% over one year, or 51.4% over two.

For Super-area 8+ these are:

Confiscations: 26.1% (s.e. = 10.2%)

Policing effort: 5.4% (s.e. = 2.0%)

Together these suggested that removals from poaching have been increasing at an instantaneous rate of 20.7% p.a. (s.e.=10.4%) over the last three years. This corresponds to a net decrease of 23.0% over one year, or 51.4% over two.

For combined Super-area 3-6 these are:

Confiscations: -47.6% (s.e. = 12.6%)

Policing effort: -1.2% (s.e. = 4.0%)

Together these suggested that removals from poaching have been decreasing at an instantaneous rate of 46.4% p.a. (s.e.=13.2%) over the last three years. This corresponds to a net decrease of 37.1% over one year, or 60.5% over two.

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

Confiscations: -10.1% (s.e. = 8.5%)

Policing effort: -5.9% (s.e. = 2.7%)

Together these suggested that removals from poaching have been decreasing at an instantaneous rate of 4.2% p.a. (s.e.=9.0%) over the last three years. This corresponds to a net decrease of 4.1% over one year, or 8.1% over two.

Figures 1 to 5 also show the ratio of confiscations (plus abandonments) to policing effort for the different Super-areas, corresponding to indices of the amount of rock lobster poached. Super-area 5+6 show a decreasing trend in poaching, while Super-area 8+ shows an increasing trend, and the

trend for Super-area 3+4 depends on the method used. Table 6 gives the percentage change in the poaching level from 2009 to 2013 for the continuous time model and the percentage change from the average of 2009 and 2010 to the average of 2012 and for the poaching indices for the discrete time model. 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.

Reference

Brandão, A., Johnston, S.J. and Butterworth, D.S. 2011a. Trends in policing effort and the number of confiscations for West Coast rock lobster. Fisheries/2011/JUN/SWG-WCRL/32.

Brandão, A., Johnston, S.J. and Butterworth, D.S. 2011b. Trends in policing effort and the number of confiscations for West Coast rock lobster on a Super-area basis. Fisheries/2011/AUG/SWG-WCRL/46.

Brandão, A., Johnston, S.J. and Butterworth, D.S. 2011c. Further trends in policing effort and the number of confiscations for West Coast rock lobster on a Super-area basis. Fisheries/2011/AUG/SWG-WCRL/48.

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	0.543 (0.254)	0.482 (0.254)	0.378 (0.684)	0.248 (0.811)
February	0.120 (0.278)	0.057 (0.278)	0.907 (0.619)	0.841 (0.732)
March	0.217 (0.272)	0.152 (0.272)	2.170 (0.543)	2.168 (0.641)
April	-0.012 (0.278)	0.005 (0.285)	1.046 (0.580)	0.532 (0.705)
May	0.020 (0.276)	0.035 (0.282)	-0.842 (0.901)	-1.290 (1.100)
June	-0.157 (0.288)	-0.143 (0.295)	-2.890 (2.170)	-3.270 (2.610)
July	0.109 (0.270)	0.120 (0.275)	-1.150 (1.020)	-1.470 (1.230)
August	-0.003 (0.277)	0.006 (0.283)	-0.133 (0.731)	-0.390 (0.879)
September	-0.519 (0.321)	-0.512 (0.327)	-1.900 (1.370)	-2.100 (1.660)
October	0.100 (0.270)	0.104 (0.275)	-2.540 (1.840)	-2.660 (2.210)
November	0.242 (0.262)	0.244 (0.267)	-1.360 (1.110)	-1.430 (1.330)
December	0	0	0	0
Time (yr^{-1})	—	0.002 (0.004)	—	-0.064 (0.014)
2008	—	—	—	—
2009	-0.266 (0.190)	—	-1.055 ((0.512)	—
2010	0	—	0	—
2011	0.179 (0.147)	—	-1.367 (0.335)	—
2012	0.058 (0.152)	—	-2.195 (0.476)	—
2013	-0.622 (0.300)	—	-3.086 (0.876)	—
coastal	1.134 (0.215)	1.134 (0.215)	—	—
FPE	-2.938 (0.312)	-2.938 (0.318)	—	—
restaurant	-2.630 (0.281)	-2.630 (0.286)	—	—
sea	-4.564 (0.298)	-4.564 (0.303)	—	—
slipway	1.183 (0.211)	1.183 (0.215)	—	—
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	0.600 (0.188)	0.546 (0.185)	1.839 (0.900)	1.478 (0.835)
February	0.142 (0.206)	0.090 (0.204)	1.320 (0.952)	0.992 (0.888)
March	0.416 (0.195)	0.366 (0.192)	1.532 (0.928)	1.236 (0.864)
April	0.530 (0.184)	0.512 (0.186)	1.057 (0.902)	0.798 (0.878)
May	0.638 (0.181)	0.621 (0.183)	1.248 (0.881)	1.021 (0.857)
June	0.404 (0.189)	0.390 (0.190)	-4.370 (6.950)	-4.560 (6.710)
July	0.602 (0.182)	0.590 (0.183)	-3.060 (3.670)	-3.220 (3.550)
August	0.684 (0.179)	0.675 (0.181)	-1.810 (2.080)	-1.940 (2.010)
September	0.273 (0.194)	0.266 (0.195)	-0.210 (1.160)	-0.310 (1.120)
October	0.721 (0.178)	0.717 (0.179)	-0.590 (1.300)	-0.660 (1.260)
November	0.696 (0.179)	0.693 (0.180)	-0.220 (1.160)	-0.250 (1.130)
December	0	0	0	0
Time (yr^{-1})	—	-0.002 (0.003)	—	-0.033 (0.014)
2008	—	—	—	—
2009	-0.150 (0.102)	—	0.519 ((0.546)	—
2010	0	—	0	—
2011	-0.084 (0.091)	—	-0.418 (0.483)	—
2012	-0.126 (0.092)	—	-0.937 (0.572)	—
2013	-0.417 (0.188)	—	-0.760 (0.672)	—
coastal	-0.944 (0.132)	-0.944 (0.133)	—	—
FPE	-2.891 (0.135)	-2.891 (0.136)	—	—
restaurant	-2.964 (0.171)	-2.964 (0.172)	—	—
sea	-4.858 (0.178)	-4.858 (0.179)	—	—
slipway	-0.668 (0.138)	-0.668 (0.139)	—	—
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	0.235 (0.143)	0.245 (0.140)	0.140 (0.956)	0.620 (1.000)
February	0.121 (0.146)	0.127 (0.143)	1.915 (0.815)	2.373 (0.847)
March	0.012 (0.150)	0.012 (0.147)	-0.310 (1.040)	0.120 (1.100)
April	0.123 (0.144)	0.159 (0.144)	1.126 (0.872)	1.300 (0.936)
May	0.179 (0.142)	0.211 (0.142)	1.336 (0.851)	1.489 (0.912)
June	0.242 (0.140)	0.269 (0.140)	1.313 (0.853)	1.443 (0.916)
July	0.422 (0.135)	0.444 (0.135)	0.523 (0.956)	0.630 (1.020)
August	0.299 (0.138)	0.317 (0.138)	-1.090 (1.510)	-1.010 (1.610)
September	0.009 (0.148)	0.022 (0.148)	0.461 (0.967)	0.530 (1.040)
October	0.182 (0.142)	0.191 (0.142)	1.048 (0.880)	1.091 (0.944)
November	0.052 (0.146)	0.056 (0.146)	0.557 (0.950)	0.580 (1.020)
December	0	0	0	0
Time (yr^{-1})	—	0.004 (0.002)	—	0.022 (0.009)
2008	-0.045 (0.101)	—	-0.709 (0.586)	—
2009	0.015 (0.091)	—	-0.705 (0.507)	—
2010	0	—	0	—
2011	0.208 (0.087)	—	0.452 (0.373)	—
2012	0.177 (0.088)	—	-0.403 (0.461)	—
2013	0.033 (0.155)	—	1.177 (0. 473)	—
coastal	0.508 (0.105)	0.508 (0.105)	—	—
FPE	-2.526 (0.117)	-2.526 (0.117)	—	—
restaurant	-2.143 (0.106)	-2.143 (0.106)	—	—
sea	-4.820 (0.180)	-4.820 (0.181)	—	—
slipway	0.139 (0.098)	0.139 (0.099)	—	—
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	0.584 (0.238)	0.522 (0.234)	1.572 (0.665)	1.250 (0.636)
February	0.139 (0.261)	0.078 (0.257)	1.230 (0.693)	0.948 (0.665)
March	0.349 (0.249)	0.289 (0.245)	1.824 (0.649)	1.582 (0.620)
April	0.354 (0.241)	0.346 (0.243)	1.054 (0.655)	0.737 (0.654)
May	0.442 (0.236)	0.434 (0.238)	0.952 (0.663)	0.674 (0.661)
June	0.223 (0.247)	0.217 (0.249)	-3.680 (3.600)	-3.920 (3.560)
July	0.439 (0.237)	0.434 (0.238)	-2.070 (1.690)	-2.270 (1.670)
August	0.471 (0.235)	0.467 (0.236)	-0.990 (1.080)	-1.150 (1.070)
September	0.036 (0.259)	0.033 (0.259)	-0.485 (0.902)	-0.604 (0.890)
October	0.524 (0.233)	0.522 (0.233)	-0.880 (1.040)	-0.960 (1.030)
November	0.544 (0.232)	0.543 (0.233)	-0.439 (0.901)	-0.478 (0.892)
December	0	0	0	0
Time (yr^{-1})	—	-0.001 (0.003)	—	-0.040 (0.011)
2008	—	—	—	—
2009	-0.174 (0.102)	—	0.167 ((0.413)	—
2010	0	—	0	—
2011	-0.005 (0.122)	—	-0.705 (0.351)	—
2012	-0.072 (0.124)	—	-1.282 (0.431)	—
2013	-0.493 (0.251)	—	-1.251 (0.531)	—
coastal	0.501 (0.177)	0.501 (0.177)	—	—
FPE	-1.931 (0.188)	-1.931 (0.188)	—	—
restaurant	-2.637 (0.230)	-2.637 (0.231)	—	—
sea	-4.531 (0.241)	-4.531 (0.242)	—	—
slipway	0.560 (0.181)	0.560 (0.181)	—	—
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	0.478 (0.175)	0.373 (0.172)	1.055 (0.591)	1.110 (0.591)
February	0.222 (0.184)	0.122 (0.182)	1.452 (0.567)	1.516 (0.567)
March	0.249 (0.183)	0.154 (0.181)	1.229 (0.580)	1.301 (0.580)
April	0.223 (0.176)	0.184 (0.178)	1.072 (0.585)	1.004 (0.596)
May	0.294 (0.173)	0.260 (0.176)	1.057 (0.585)	0.998 (0.597)
June	0.234 (0.175)	0.205 (0.178)	-0.104 (0.731)	-0.155 (0.745)
July	0.429 (0.168)	0.404 (0.170)	-0.701 (0.872)	-0.743 (0.888)
August	0.373 (0.170)	0.353 (0.172)	-1.014 (0.978)	-1.048 (0.994)
September	0.020 (0.184)	0.005 (0.186)	-0.168 (0.743)	-0.194 (0.757)
October	0.335 (0.172)	0.325 (0.173)	-0.008 (0.715)	-0.025 (0.726)
November	0.281 (0.174)	0.276 (0.175)	-0.099 (0.732)	-0.107 (0.743)
December	0	0	0	0
Time (yr^{-1})	—	-0.005 (0.002)	—	-0.008 (0.007)
2008	0.684 (0.145)	—	-0.867 ((0.715)	—
2009	0.010 (0.108)	—	-0.401 (0.333)	—
2010	0	—	0	—
2011	0.098 (0.098)	—	-0.326 (0.283)	—
2012	0.050 (0.099)	—	-1.022 (0.356)	—
2013	-0.286 (0.186)	—	-0.323 (0.381)	—
coastal	0.289 (0.128)	0.276 (0.129)	—	—
FPE	-2.281 (0.139)	-2.284 (0.140)	—	—
restaurant	-2.206 (0.142)	-2.201 (0.143)	—	—
sea	-4.852 (0.194)	-4.863 (0.195)	—	—
slipway	0.405 (0.126)	0.414 (0.127)	—	—
vehicles	0	0	—	—

Table 6. Summary of change in poaching levels from 2009 to 2013 (and 95% confidence intervals) for the continuous log-linear model and the percentage change from average of 2009 and 2010 to the average of 2012 and 2013 for the poaching indices for the discrete year factor model.

Area	Continuous linear trend	Discrete year factor
Super-area 3+4	-95.9% (-84.0%; -98.9%)	-86.9%
Super-area 5+6	-76.4% (-93.5%; -14.1%)	-60.9%
Super-area8+	129.1% (1.2%; 418.7%)	148.6%
Super-area 3+4+5+6	-84.4% (-56.0%; -94.5%)	-68.1%
Super-area 3+4+5+6+8+	-15.6% (-58.2%; 70.5%)	-21.4%

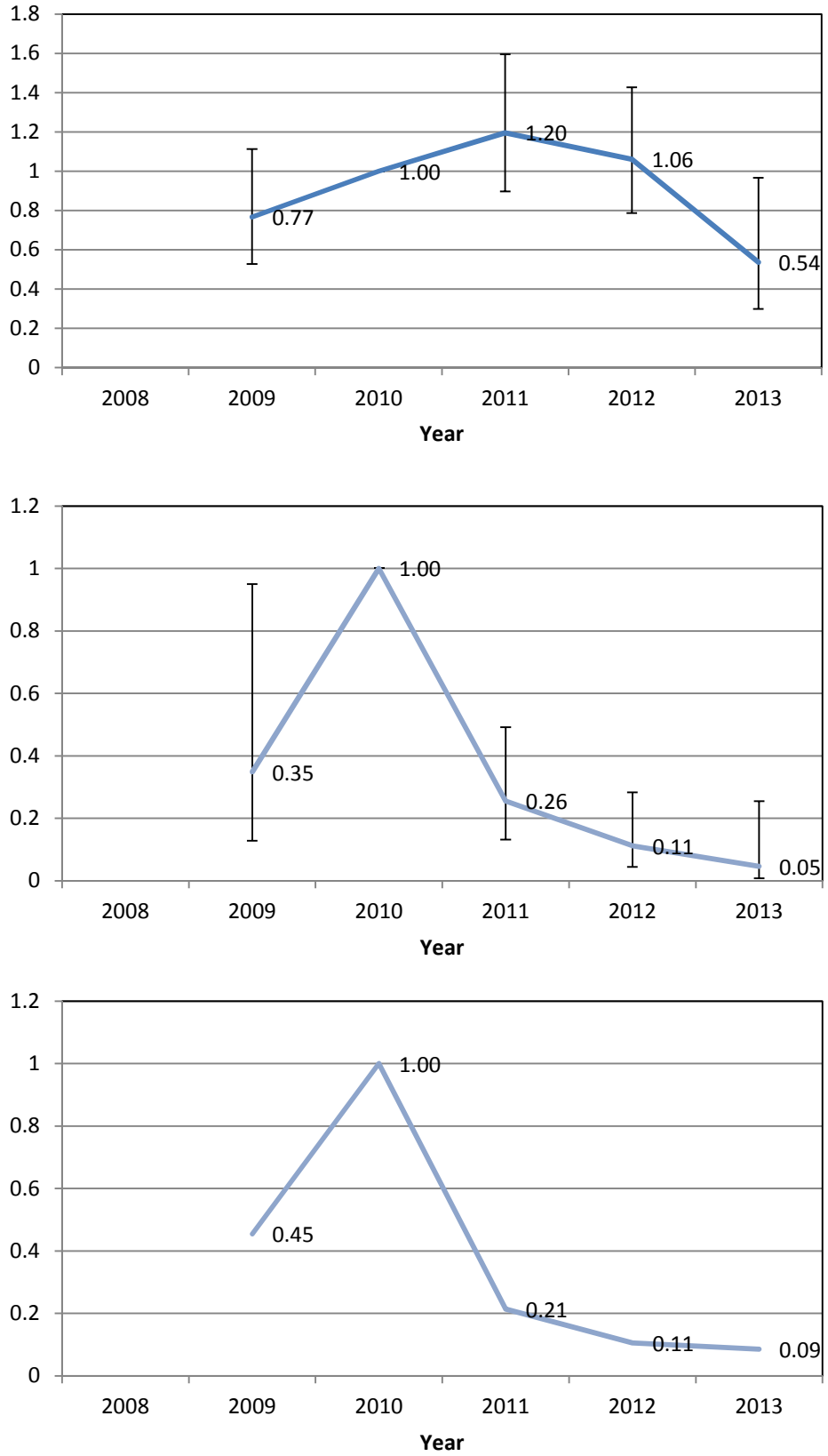
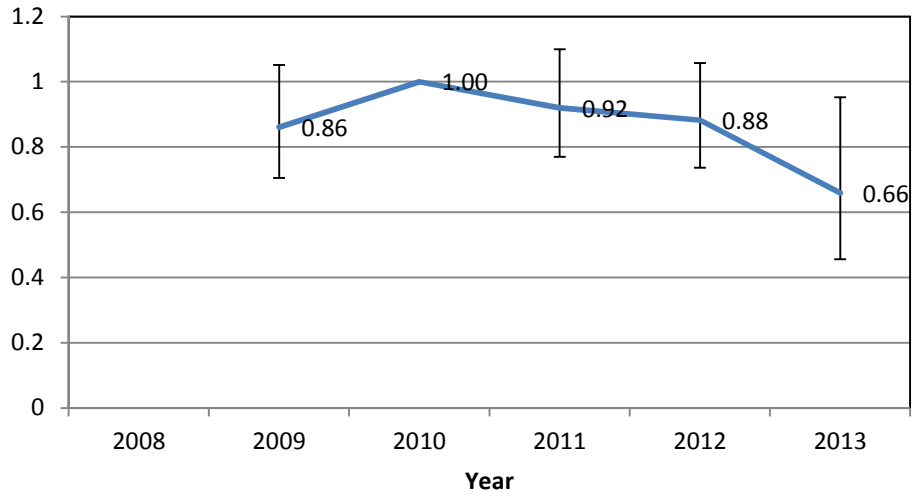
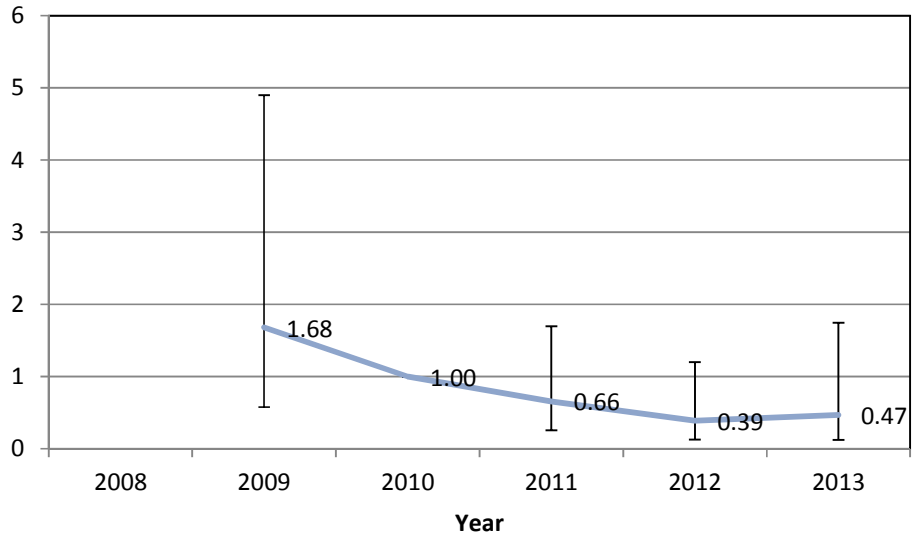


Figure 1. Year effect (together with 95% confidence limits) for policing effort (top), the number of confiscations plus abandonments (middle) and the ratio of the number of confiscations plus abandonments to policing effort for Super-area 3+4.





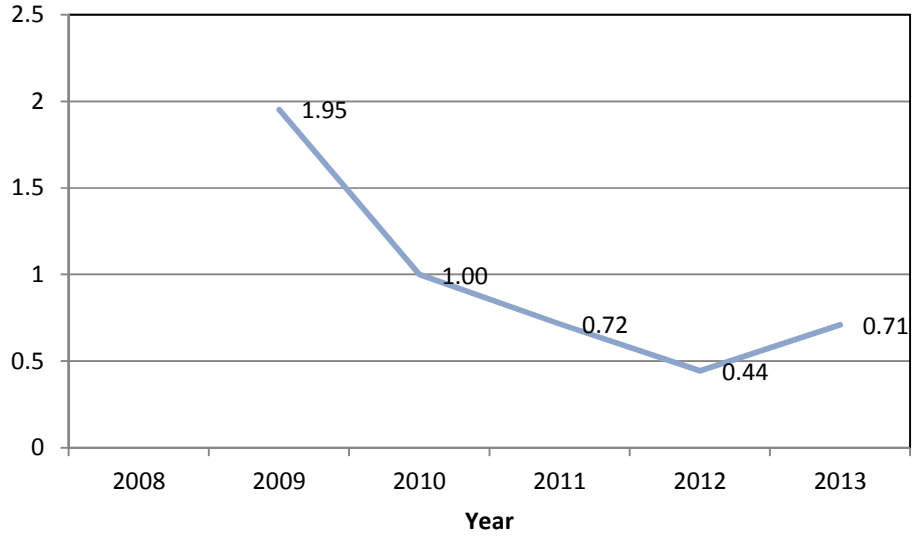


Figure 2. Year effect (together with 95% confidence limits) for policing effort (top), the number of confiscations plus abandonments (middle) and the ratio of the number of confiscations plus abandonments to policing effort for Super-area 5+6.

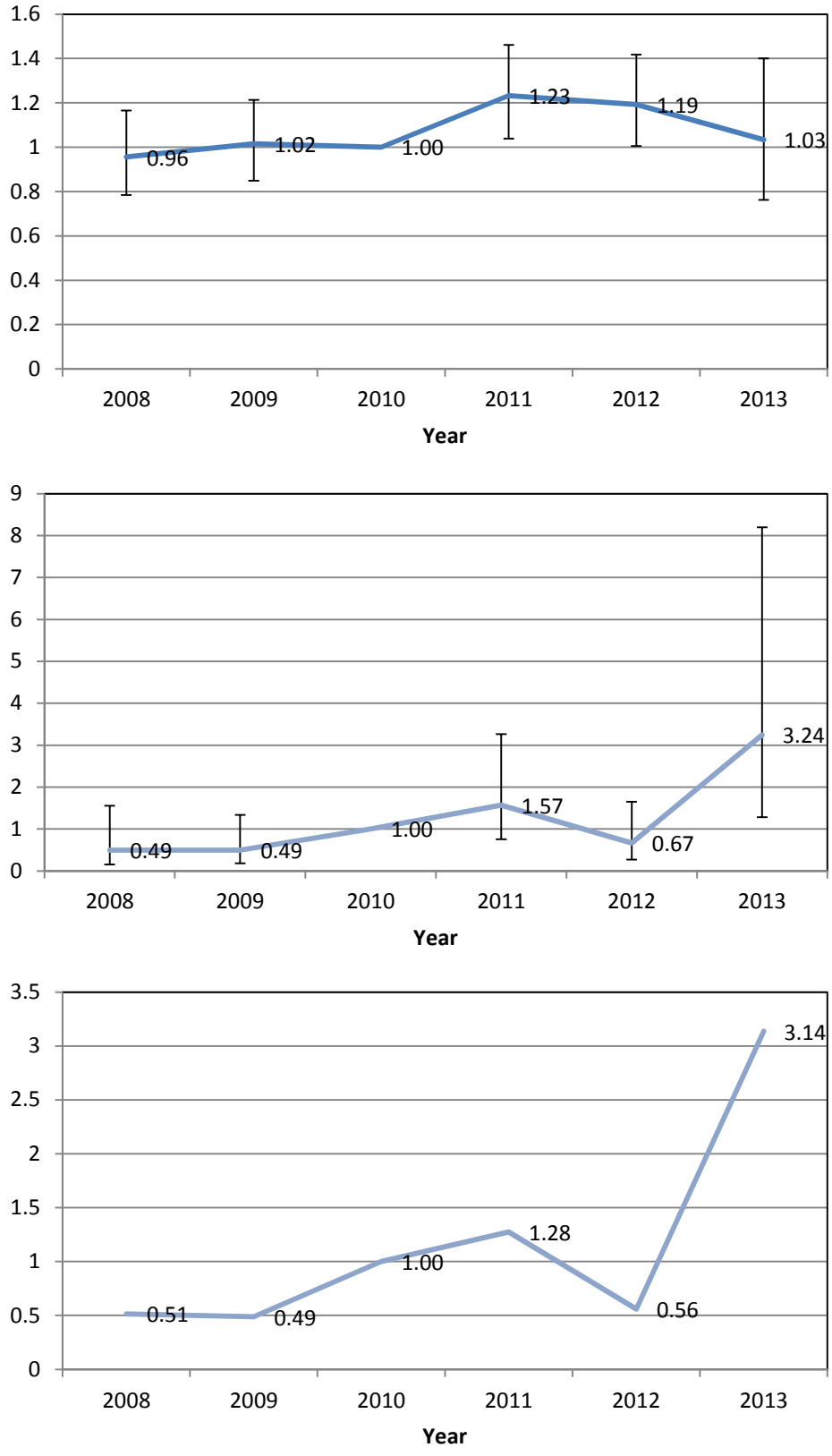
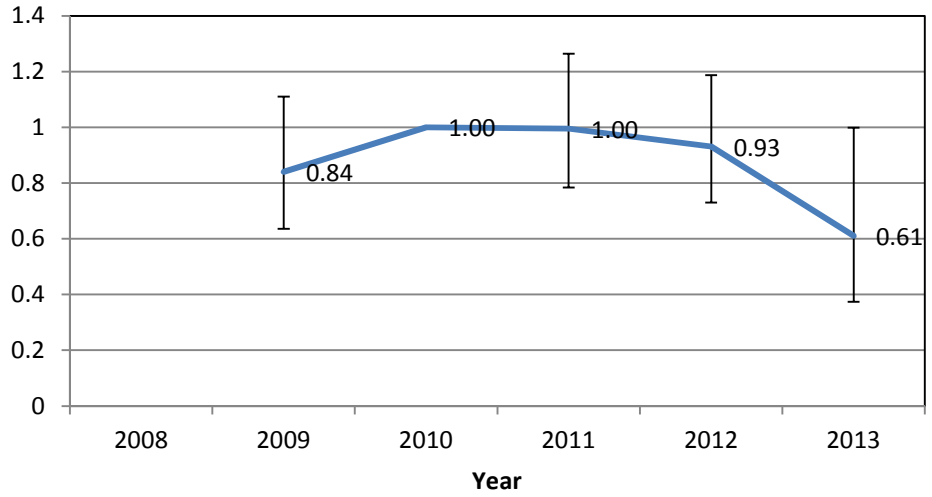
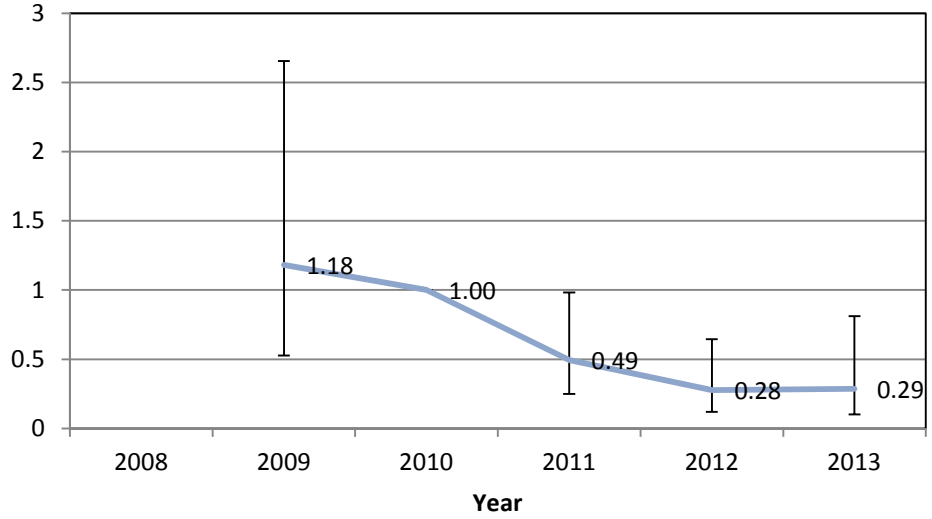


Figure 3. Year effect (together with 95% confidence limits) for policing effort (top), the number of confiscations plus abandonments (middle) and the ratio of the number of confiscations plus abandonments to policing effort for Super-area 8+.





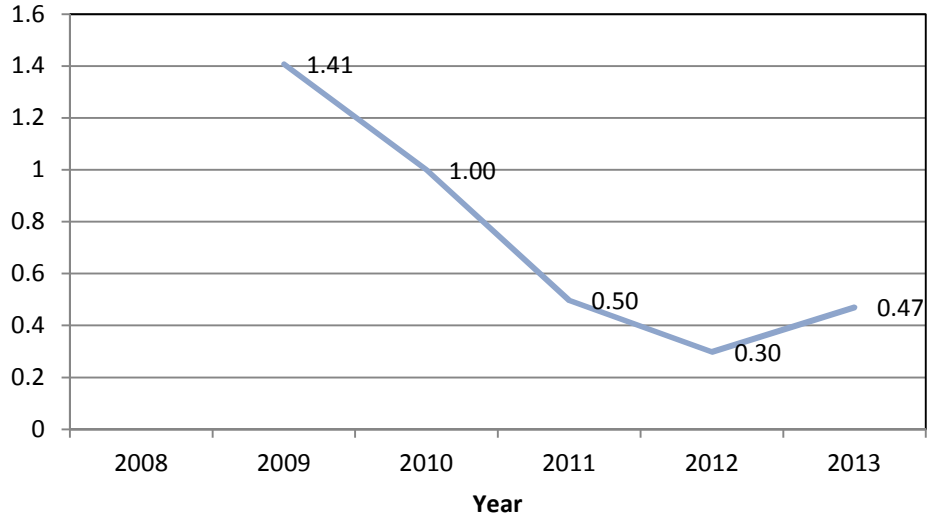


Figure 4. Year effect (together with 95% confidence limits) for policing effort (top), the number of confiscations plus abandonments (middle) and the ratio of the number of confiscations plus abandonments to policing effort for Super-areas 3+4+5+6.

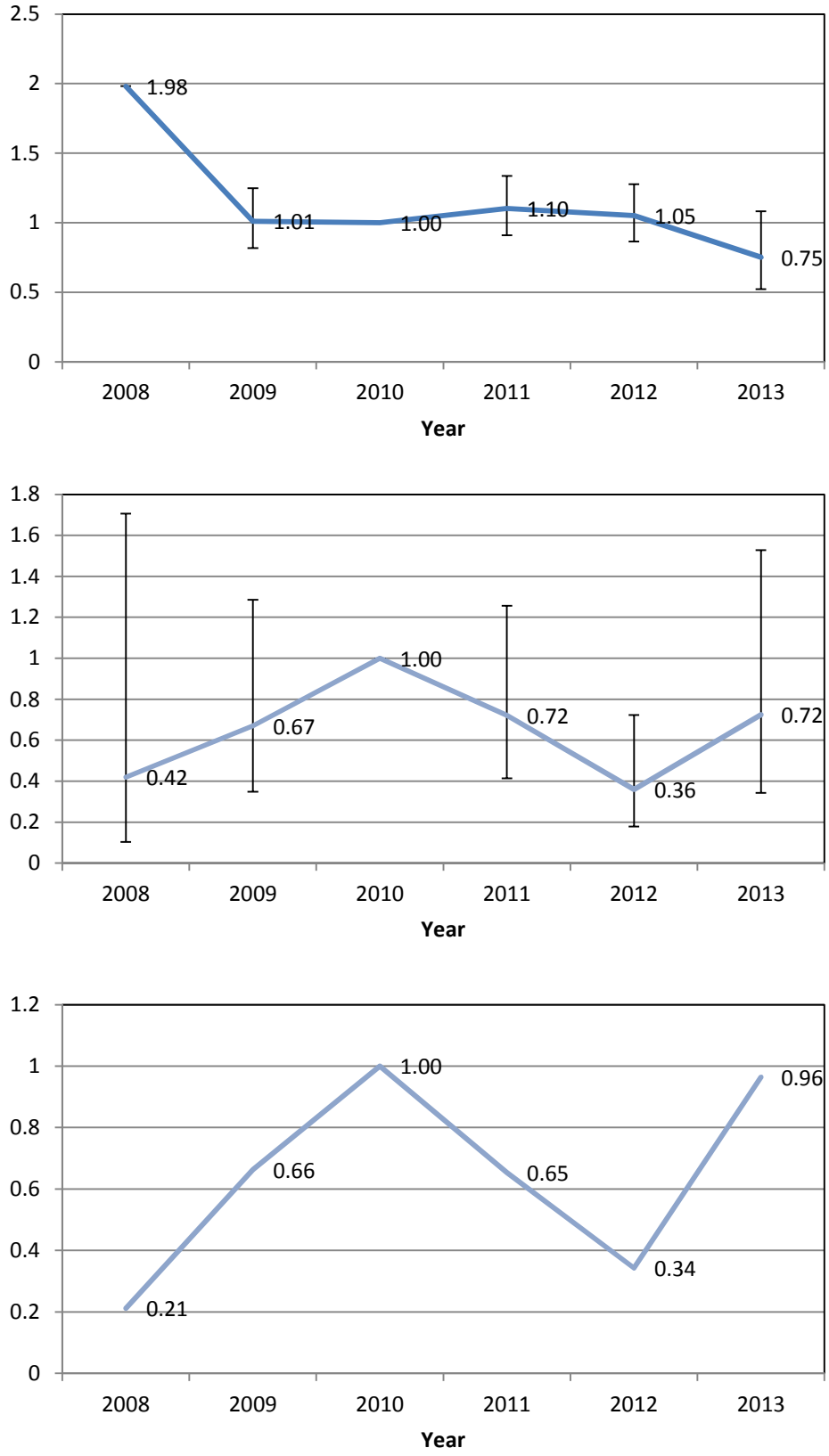


Figure 5. Year effect (together with 95% confidence limits) for policing effort (top), the number of confiscations plus abandonments (middle) and the ratio of the number of confiscations plus abandonments to policing effort for Super-areas 3+4+5+6+8+.

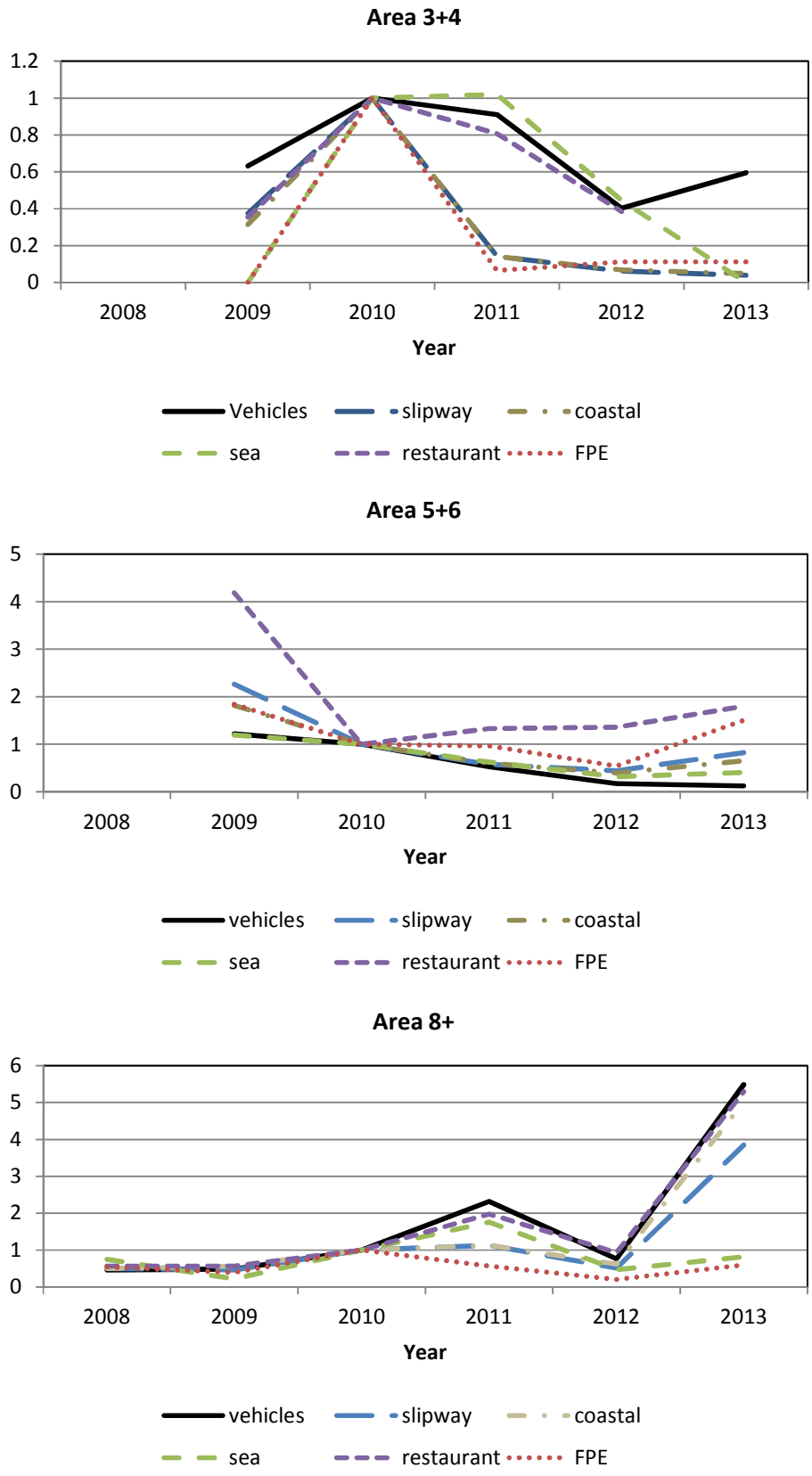


Figure 6. The ratio of the number of confiscations plus abandonments to policing effort type for Super-areas 3+4, 5+6 and 8+.

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

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

Year	Month	Area 3-4	Area 5-6	Area 8+
2008	**April**			507
2008	**May**			217
2008	**June**			1510
2008	**July**			14
2008	**August**			46
2008	**September**			493
2008	**October**			513
2008	**November**			60
2008	**December**			392
2009	**January**			269
2009	**February**			277.1
2009	**March**			825
2009	**April**	1168	6019	334
2009	**May**	42	8621	288
2009	**June**	38	6	2074
2009	**July**	81	9	304
2009	**August**	112	4	186
2009	**September**	0	24	0
2009	**October**	35	1177	8
2009	**November**	170	358	609
2009	**December**	219	33	242
2010	**January**	1347	8584	112
2010	**February**	2999	1	5517
2010	**March**	7841	6308	300
2010	**April**	2151	3826	2421
2010	**May**	0	54	527
2010	**June**	16	0	207
2010	**July**	35	77	26
2010	**August**	945	228	3
2010	**September**	12	50	24
2010	**October**	61	731	240
2010	**November**	58	845	1026
2010	**December**	1202	3514	554
2011	**January**	298	5342	302
2011	**February**	117	7589	3702
2011	**March**	2854	1924	188
2011	**April**	50	1	1741
2011	**May**	0	18	4999
2011	**June**	0	24	1881
2011	**July**	330	34	224
2011	**August**	218	300	308
2011	**September**	216	382	252
2011	**October**	12	59	2378
2011	**November**	155	275	1122
2011	**December**	0	0	115
2012	**January**	0	4	338
2012	**February**	0	67	53
2012	**March**	0	0	568
2012	**April**	981	809	11
2012	**May**	616	4195	157
2012	**June**	31	17	371
2012	**July**	37	54	2175
2012	**August**	63	73	1
2012	**September**	0	2531	1808
2012	**October**	13	78	1496
2012	**November**	8	1503	21
2012	**December**	107	154	323
2013	**January**	191	1778	2067
2013	**February**	0	1694	8667
2013	**March**	326	3330	83

Table A2. Policing effort by vehicles inspected by month and Super-area.

Year	Month	Area 3-4	Area 5-6	Area 8+
2008	**April**			419
2008	**May**			409
2008	**June**			349
2008	**July**			407
2008	**August**			342
2008	**September**			230
2008	**October**			378
2008	**November**			265
2008	**December**			380
2009	**January**			464
2009	**February**			351
2009	**March**			434
2009	**April**	129	1027	306
2009	**May**	17	996	154
2009	**June**	3	65	264
2009	**July**	2	18	191
2009	**August**	35	509	302
2009	**September**	2	117	168
2009	**October**	3	180	357
2009	**November**	23	423	473
2009	**December**	26	149	487
2010	**January**	125	630	421
2010	**February**	12	0	517
2010	**March**	5	8	345
2010	**April**	31	22	119
2010	**May**	0	72	351
2010	**June**	0	132	136
2010	**July**	164	344	599
2010	**August**	81	553	280
2010	**September**	2	43	151
2010	**October**	79	479	240
2010	**November**	43	563	459
2010	**December**	37	162	229
2011	**January**	50	207	218
2011	**February**	0	46	98
2011	**March**	0	100	126
2011	**April**	1	80	80
2011	**May**	5	73	36
2011	**June**	17	54	58
2011	**July**	1	76	493
2011	**August**	1	715	751
2011	**September**	17	370	230
2011	**October**	27	766	153
2011	**November**	43	1304	217
2011	**December**	0	0	144
2012	**January**	2	313	80
2012	**February**	29	695	74
2012	**March**	0	210	69
2012	**April**	0	813	965
2012	**May**	0	680	226
2012	**June**	8	934	150
2012	**July**	0	318	167
2012	**August**	8	623	672
2012	**September**	0	380	53
2012	**October**	52	477	451
2012	**November**	61	1236	133
2012	**December**	0	246	327
2013	**January**	0	786	251
2013	**February**	0	172	211
2013	**March**	11	884	66

Table A3. Policing effort by slipway inspections by month and Super-area.

Year	Month	Area 3-4	Area 5-6	Area 8+
2008	**April**			474
2008	**May**			456
2008	**June**			322
2008	**July**			345
2008	**August**			249
2008	**September**			127
2008	**October**			221
2008	**November**			143
2008	**December**			248
2009	**January**			265
2009	**February**			266
2009	**March**			197
2009	**April**	91	181	274
2009	**May**	47	193	191
2009	**June**	25	102	372
2009	**July**	46	155	529
2009	**August**	28	200	528
2009	**September**	28	94	255
2009	**October**	50	200	309
2009	**November**	75	158	277
2009	**December**	61	205	303
2010	**January**	45	207	577
2010	**February**	51	20	338
2010	**March**	51	99	526
2010	**April**	41	153	189
2010	**May**	40	204	133
2010	**June**	40	166	215
2010	**July**	30	390	249
2010	**August**	45	406	311
2010	**September**	40	129	188
2010	**October**	45	281	237
2010	**November**	96	237	277
2010	**December**	149	322	267
2011	**January**	108	328	454
2011	**February**	124	233	430
2011	**March**	139	381	260
2011	**April**	72	237	326
2011	**May**	104	151	418
2011	**June**	102	204	473
2011	**July**	91	192	458
2011	**August**	108	335	421
2011	**September**	92	256	359
2011	**October**	136	337	441
2011	**November**	130	337	462
2011	**December**	0	0	374
2012	**January**	102	188	380
2012	**February**	142	252	298
2012	**March**	94	143	350
2012	**April**	84	185	362
2012	**May**	138	250	438
2012	**June**	91	232	435
2012	**July**	118	232	530
2012	**August**	111	161	534
2012	**September**	0	145	404
2012	**October**	121	212	270
2012	**November**	124	200	273
2012	**December**	84	128	299
2013	**January**	123	191	209
2013	**February**	0	40	293
2013	**March**	98	116	265

Table A5. Policing effort by coastal patrols by month and Super-area.

Year	Month	Area 3-4	Area 5-6	Area 8+
2008	**April**			707
2008	**May**			676
2008	**June**			571
2008	**July**			592
2008	**August**			467
2008	**September**			149
2008	**October**			349
2008	**November**			143
2008	**December**			269
2009	**January**			357
2009	**February**			368
2009	**March**			243
2009	**April**	64	177	214
2009	**May**	58	183	237
2009	**June**	40	109	413
2009	**July**	56	140	676
2009	**August**	58	130	661
2009	**September**	42	90	358
2009	**October**	59	179	357
2009	**November**	68	167	524
2009	**December**	68	134	449
2010	**January**	56	144	947
2010	**February**	41	20	602
2010	**March**	48	87	518
2010	**April**	52	142	358
2010	**May**	35	150	281
2010	**June**	26	152	318
2010	**July**	43	236	396
2010	**August**	61	286	497
2010	**September**	45	72	334
2010	**October**	61	188	437
2010	**November**	75	170	458
2010	**December**	105	215	394
2011	**January**	114	218	1341
2011	**February**	130	170	415
2011	**March**	135	264	384
2011	**April**	107	134	333
2011	**May**	110	122	430
2011	**June**	132	158	494
2011	**July**	112	170	812
2011	**August**	101	247	635
2011	**September**	89	143	630
2011	**October**	131	191	1375
2011	**November**	11	234	532
2011	**December**	0	0	341
2012	**January**	90	171	526
2012	**February**	118	201	512
2012	**March**	91	117	530
2012	**April**	65	118	627
2012	**May**	132	196	538
2012	**June**	88	168	505
2012	**July**	118	159	473
2012	**August**	96	136	493
2012	**September**	0	126	417
2012	**October**	96	168	434
2012	**November**	105	175	416
2012	**December**	72	134	521
2013	**January**	92	155	320
2013	**February**	0	54	352
2013	**March**	86	113	330

Table A7. Policing effort by sea patrols by month and Super-area.

Year	Month	Area 3-4	Area 5-6	Area 8+
2008	April			0
2008	May			1
2008	June			0
2008	July			0
2008	August			1
2008	September			0
2008	October			5
2008	November			1
2008	December			0
2009	January			6
2009	February			3
2009	March			4
2009	April	0	5	0
2009	May	0	6	5
2009	June	0	0	3
2009	July	0	2	0
2009	August	0	0	0
2009	September	0	0	8
2009	October	0	7	7
2009	November	0	5	4
2009	December	0	3	3
2010	January	4	7	1
2010	February	0	1	3
2010	March	0	0	1
2010	April	0	1	0
2010	May	0	0	0
2010	June	0	0	2
2010	July	1	1	0
2010	August	0	2	0
2010	September	0	5	3
2010	October	0	5	3
2010	November	2	8	4
2010	December	1	2	2
2011	January	1	5	3
2011	February	0	8	7
2011	March	1	5	1
2011	April	0	3	0
2011	May	0	4	2
2011	June	0	1	0
2011	July	0	1	0
2011	August	0	0	1
2011	September	0	0	0
2011	October	0	0	2
2011	November	0	7	0
2011	December	0	0	1
2012	January	0	5	6
2012	February	0	9	3
2012	March	0	0	0
2012	April	0	0	4
2012	May	0	3	2
2012	June	0	7	0
2012	July	0	3	0
2012	August	0	1	0
2012	September	0	1	0
2012	October	0	4	0
2012	November	1	6	0
2012	December	1	1	12
2013	January	0	9	20
2013	February	0	2	5
2013	March	0	3	2

Table A8. Policing effort by restaurant inspections by month and Super-area.

Year	Month	Area 3-4	Area 5-6	Area 8+
2008	**April**			30
2008	**May**			44
2008	**June**			47
2008	**July**			87
2008	**August**			27
2008	**September**			29
2008	**October**			28
2008	**November**			27
2008	**December**			21
2009	**January**			16
2009	**February**			31
2009	**March**			23
2009	**April**	2	18	9
2009	**May**	11	8	47
2009	**June**	0	19	38
2009	**July**	4	13	52
2009	**August**	2	39	52
2009	**September**	2	14	37
2009	**October**	0	27	61
2009	**November**	0	5	46
2009	**December**	1	7	15
2010	**January**	7	6	18
2010	**February**	7	2	65
2010	**March**	3	7	36
2010	**April**	4	46	47
2010	**May**	2	48	58
2010	**June**	0	63	67
2010	**July**	3	73	57
2010	**August**	0	71	23
2010	**September**	10	27	69
2010	**October**	0	51	11
2010	**November**	2	28	23
2010	**December**	0	33	13
2011	**January**	3	35	27
2011	**February**	3	33	19
2011	**March**	2	47	20
2011	**April**	0	22	53
2011	**May**	0	18	27
2011	**June**	0	10	66
2011	**July**	0	11	47
2011	**August**	3	13	32
2011	**September**	1	9	24
2011	**October**	0	13	26
2011	**November**	0	15	35
2011	**December**	0	0	11
2012	**January**	0	10	5
2012	**February**	0	3	16
2012	**March**	0	1	51
2012	**April**	0	8	25
2012	**May**	0	16	63
2012	**June**	4	19	48
2012	**July**	0	25	44
2012	**August**	2	15	19
2012	**September**	0	17	33
2012	**October**	5	10	30
2012	**November**	0	6	14
2012	**December**	0	1	2
2013	**January**	0	3	26
2013	**February**	0	3	14
2013	**March**	0	15	19

Table A9. Policing effort by sea FPE inspections by month and Super-area.

Year	Month	Area 3-4	Area 5-6	Area 8+
2008	**April**			10
2008	**May**			9
2008	**June**			10
2008	**July**			27
2008	**August**			9
2008	**September**			7
2008	**October**			12
2008	**November**			9
2008	**December**			11
2009	**January**			16
2009	**February**			20
2009	**March**			14
2009	**April**	0	42	11
2009	**May**	0	26	13
2009	**June**	0	18	21
2009	**July**	0	29	22
2009	**August**	0	27	18
2009	**September**	0	25	8
2009	**October**	0	33	15
2009	**November**	0	27	12
2009	**December**	0	13	6
2010	**January**	0	18	10
2010	**February**	3	4	12
2010	**March**	0	18	9
2010	**April**	1	31	2
2010	**May**	0	48	8
2010	**June**	0	23	22
2010	**July**	0	35	13
2010	**August**	0	28	15
2010	**September**	0	24	30
2010	**October**	0	50	10
2010	**November**	1	36	2
2010	**December**	5	16	6
2011	**January**	10	27	15
2011	**February**	10	23	5
2011	**March**	6	33	6
2011	**April**	2	30	19
2011	**May**	0	15	10
2011	**June**	6	16	25
2011	**July**	3	14	37
2011	**August**	0	18	54
2011	**September**	0	22	42
2011	**October**	0	19	44
2011	**November**	2	9	46
2011	**December**	0	0	81
2012	**January**	0	11	22
2012	**February**	0	11	49
2012	**March**	0	18	20
2012	**April**	0	10	54
2012	**May**	0	43	65
2012	**June**	2	25	41
2012	**July**	0	34	40
2012	**August**	2	18	39
2012	**September**	0	28	20
2012	**October**	0	21	37
2012	**November**	0	15	47
2012	**December**	6	6	33
2013	**January**	0	10	33
2013	**February**	0	2	43
2013	**March**	2	9	52