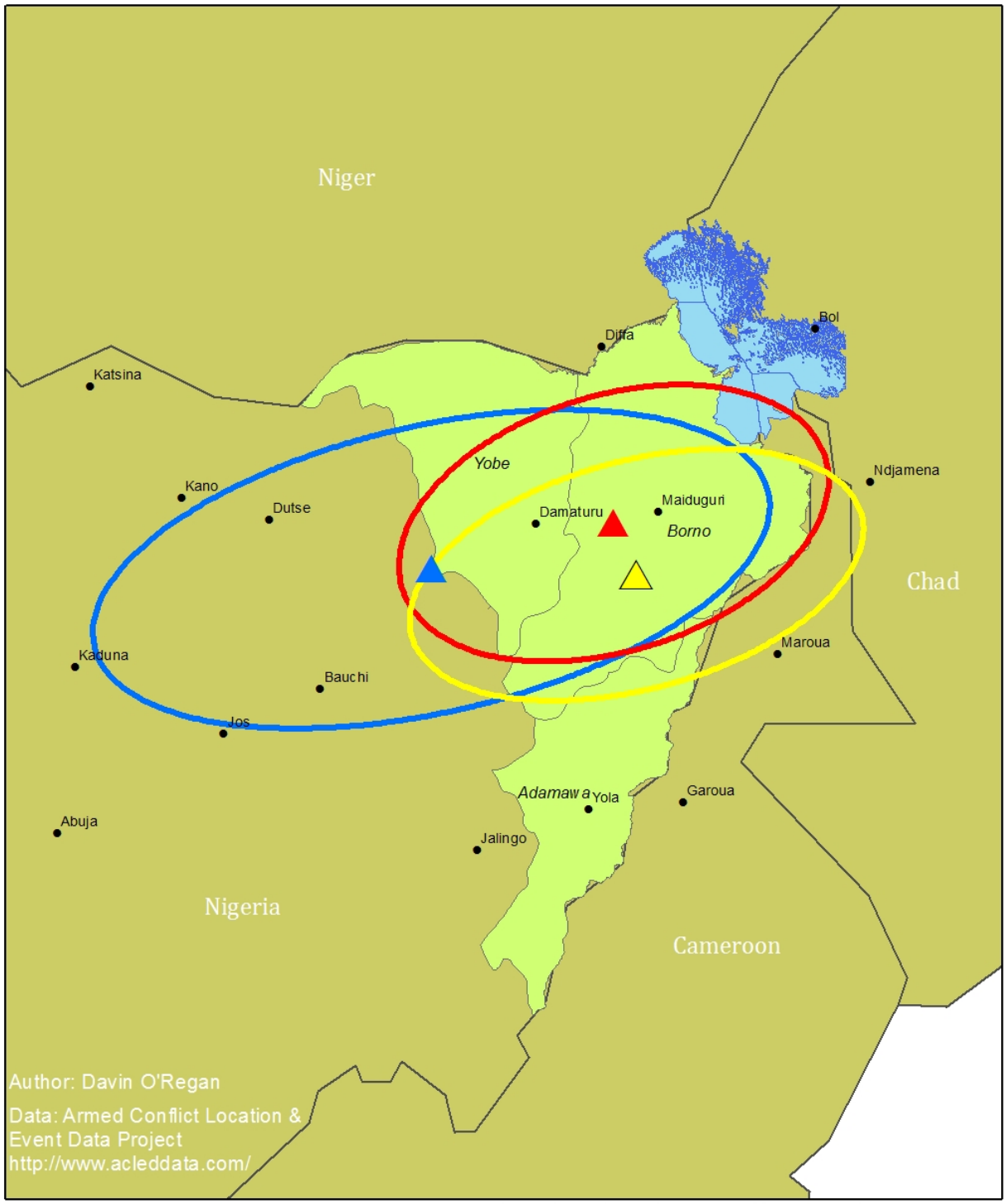
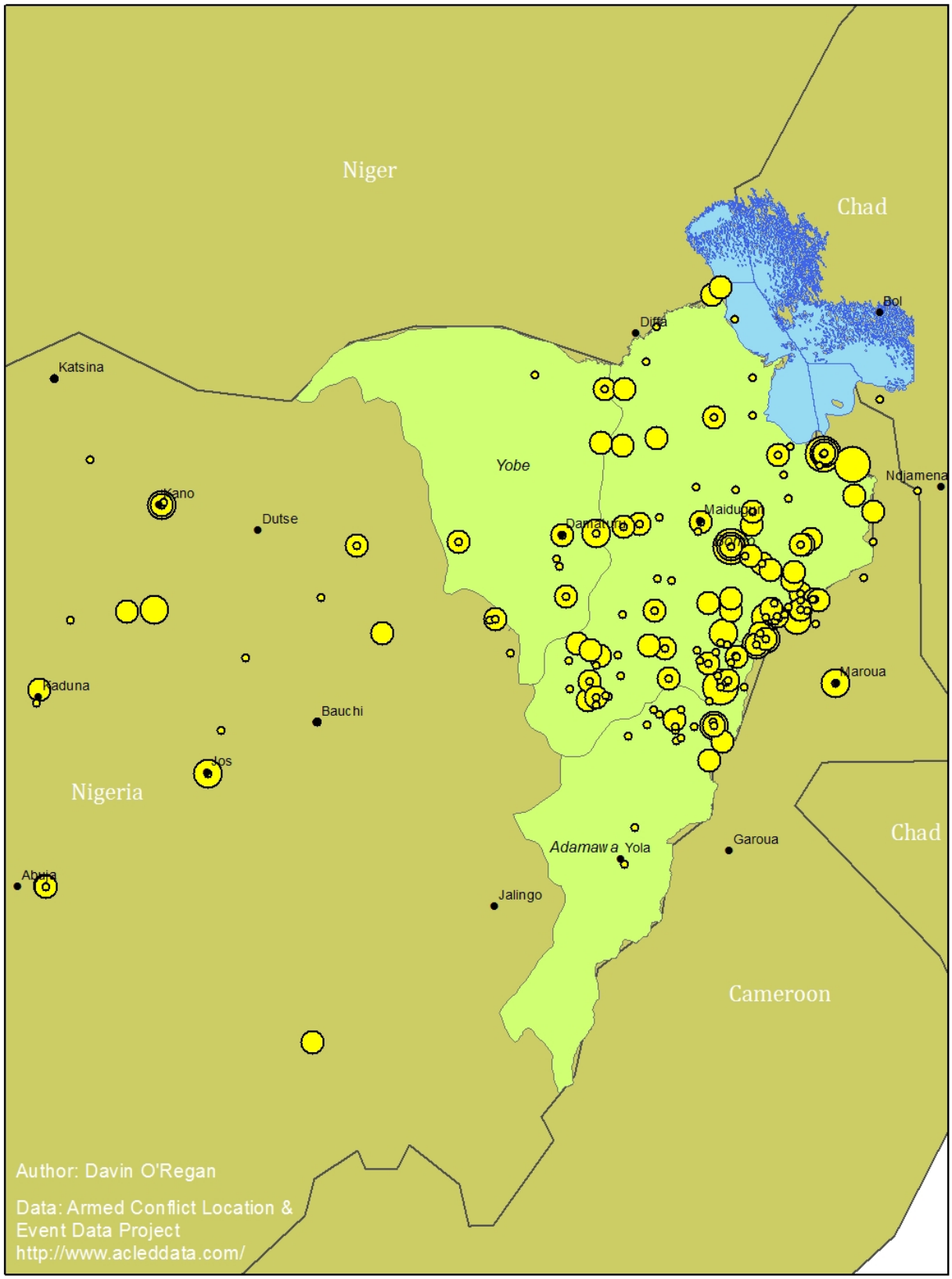
Distribution of Boko Haram Engagements and Incidents, 2012-2014



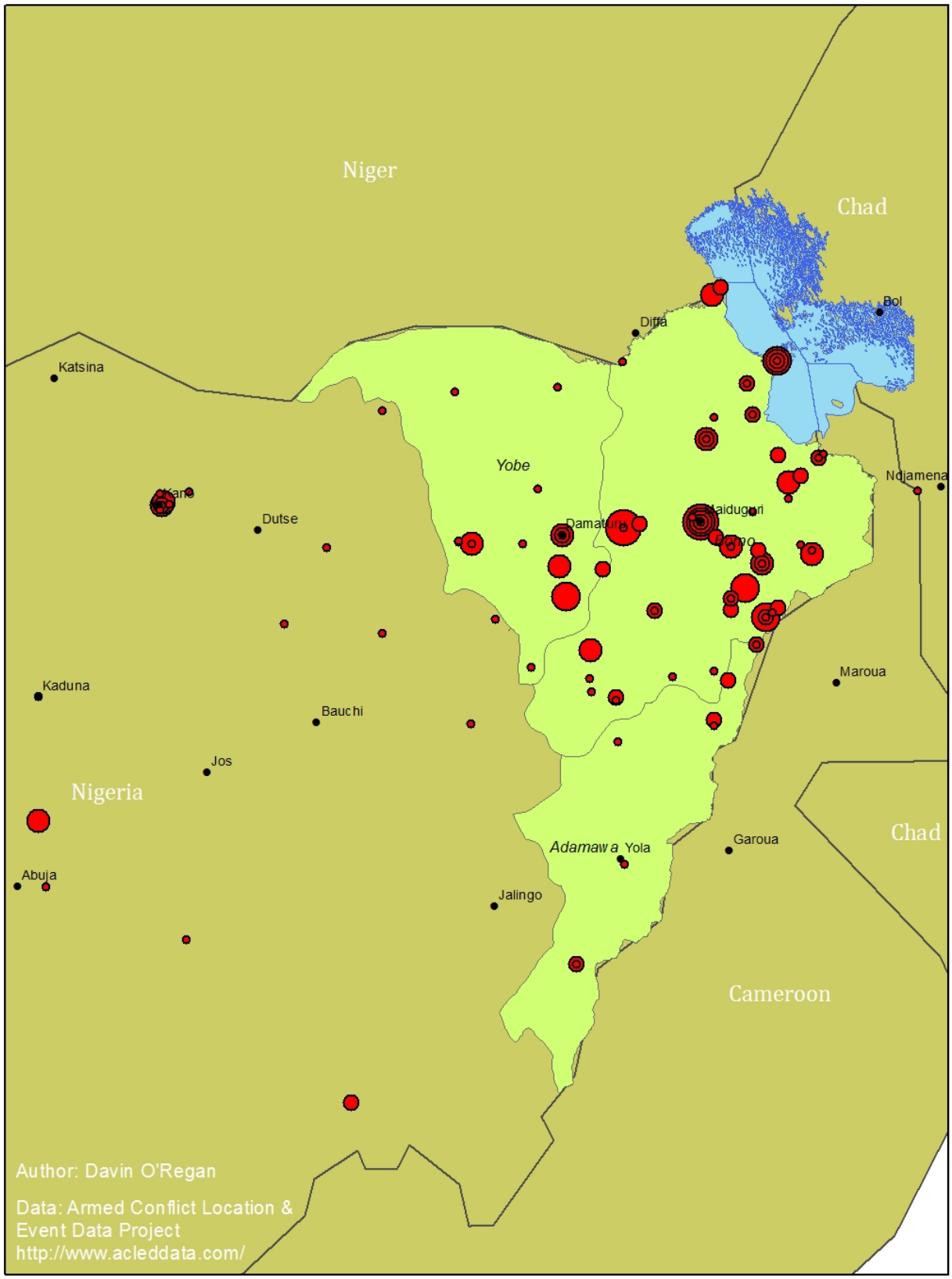
Legend

- Mean Center of Incidents Weighted by Fatalities, 2014 (Jan-Nov)
- Mean Center of Incidents Weighted by Fatalities, 2013
- Mean Center of Incidents Weighted by Fatalities, 2012
- Std. Dev. of Incidents Weighted by Fatalities, 2014 (Jan-Nov)
- Std. Dev. of Incidents Weighted by Fatalities, 2013
- Std. Dev. of Incidents Weighted by Fatalities, 2012

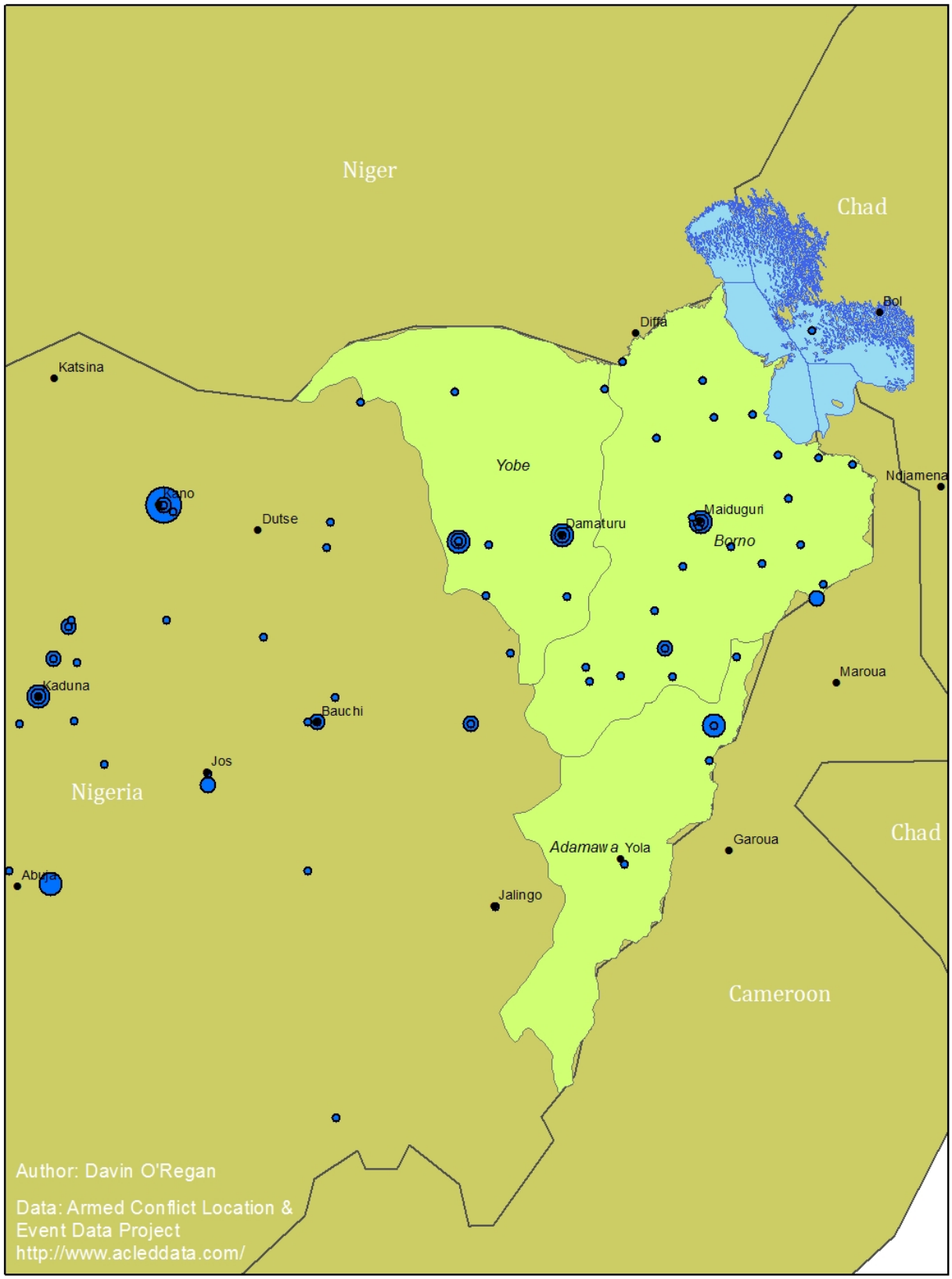
Location and Intensity of Boko Haram Engagements and Incidents, 2014



Location and Intensity of Boko Haram Engagements and Incidents, 2013



Location and Intensity of Boko Haram Engagements and Incidents, 2012



Fatalities

0 55 110 220 Miles

1 - 10 11 - 25 26 - 50 51 - 100 101 - 185

Data Sources and Methodology:

All maps and statistics were derived from the Armed Conflict Location & Event Data Project (ACLED). The complete ACLED data set, which covers conflict events across Africa from 1997 onwards, was narrowed by selecting only those incidents that occurred in Nigeria, Chad, Cameroon, and Niger and included "Boko Haram" or "Ansaru" as a listed event "actor." Events that did not feature at least one fatality were excluded. Maps and analysis for the calendar year 2014 exclude events in December as data was unavailable for that month when analysis was conducted.

Is the Difference in 2014 and 2012 Geographic Mean Centers Significant?

Given the nature of the Boko Haram conflict, tests of statistical differences between mean values in 2012, 2013, and 2014 are problematic. Specifically, necessary assumptions that all observations (each episode of violence) are random and independent seem unreasonable. It is very likely that the same cells or units of Boko Haram were involved in multiple incidents, and therefore events are not "independent." Groups may at times be strategic in their selection of targets, so neither would events be random. For this event data, cluster analysis procedures may be more revealing and appropriate.

However, if one does assume events are random and independent and further assume that the entire conflict with Boko Haram is ongoing and incomplete and each set of events for 2012, 2013, and 2014 constitutes a different sample of the entire population of conflict events, then one can conduct a test of the statistical significance of the difference of mean centers. First, a F statistic is constructed to determine whether the variances of the 2014 and 2012 samples are statistically different:

$$F = \frac{Variance\ of\ 2014\ Distribution}{Variance\ of\ 2012\ Distribution} = \frac{148^2}{219^2} = 0.4567$$

Critical F_{268}^{340} values when α is 0.05 are 0.7983 and 1.2566. Since 0.7983 > 0.4567, then we conclude that the variance of the 2014 incident distribution is different from the variance of the 2012 incident distribution. Given this difference in variance, an unpooled t statistic can be constructed to test whether the difference in mean values is effectively zero:

$$t = \frac{Difference\ of\ Mean\ Values\ of\ 2014\ and\ 2012\ Distributions}{\sqrt{\frac{Variance\ of\ 2014\ Distribution}{2014\ sample\ size} + \frac{Variance\ of\ 2012\ Distribution}{2012\ sample\ size}}}$$

$$t = \frac{130.2}{\sqrt{\frac{148^2}{341} + \frac{219^2}{269}}} = 8.36$$

$$Degrees\ of\ freedom = \frac{\left(\frac{Variance\ of\ 2014}{2014\ sample\ size} + \frac{Variance\ of\ 2012}{2012\ sample\ size}\right)^2}{\frac{\left(\frac{Variance\ of\ 2014}{2014\ sample\ size}\right)^2}{2014\ sample\ size - 1} + \frac{\left(\frac{Variance\ of\ 2012}{2012\ sample\ size}\right)^2}{2012\ sample\ size - 1}} = 449.87$$

The absolute value of critical $t_{449.87}$ when α is 0.05 = 1.965. Since 8.36 > 1.965, we reject the hypothesis that the difference in mean values for the 2014 and 2012 spatial distributions of Boko Haram incidents is zero. In other words, the mean center of the 2014 and 2012 events are statistically significantly different from one another.

Other Summary Data:	Year	No. of Incidents	No. of Fatalities	Avg. Fatalities	Std. Dev. of Fatalities	Min	Max
All Incidents	2014	341	7,825	22.95	38.41	1	370
	2013	238	2,989	12.56	19.33	1	165
	2012	269	1,660	6.17	13.02	1	185
Incidents in Borno, Adamawa, and Yobe (States Under "Emergency" Rule)	2014	286	7,057	24.67	44.56	1	370
	2013	201	2,726	13.56	20.42	1	165
	2012	187	1,009	5.4	6.85	1	50
Proportion of Values, States of Emergency/All Incidents	2014	84%	90%	107%	116%	1	100%
	2013	84%	91%	108%	106%	1	100%
	2012	70%	61%	88%	53%	1	27%
Incidents Within 50 Miles of Nigerian Border	2014	191	4,572	23.98	42.25	1	370
	2013	93	1,230	13.23	14.84	1	62
Proportion of Values, 50 Miles of Border/All Incidents	2014	56%	58%	104%	110%	1	100%
	2013	39%	41%	105%	77%	1	38%
Boko Haram Attacks on Civilians	2014	185	3,600	19.46	30.62	1	300
	2013	109	1,119	10.26	16.22	1	142
Proportion of Values, Attacks on Civilians/All Incidents	2014	54%	46%	85%	80%	1	81%
	2013	46%	37%	82%	84%	1	86%
Boko Haram Engagements with Military	2014	134	3,518	26.25	45.67	1	370
	2013	110	1,667	15.15	22.36	1	165
Proportion of Values, Engagements with Military/All Incidents	2014	39%	45%	114%	119%	1	100%
	2013	46%	56%	121%	116%	1	100%
Incidents in Maiduguri, Capital of Borno State	2014	10	164	16.4	18.08	1	56
	2013	43	648	15.07	26.08	1	165

Note: For a reason that could not been determined, the value of all fatalities during Boko Haram attacks on civilians in 2014 in this table is 3,600, which is slightly higher than the 3,458 tabulated in a blog post by ACLED.[1] Potentially, the 3,600 number may include deaths of Boko Haram fighters that perished in attacks on civilians, which are excluded from the ACLED tabulations. However, the reason for the difference between the two tabulations is not known.

[1] "Trend 3: Violence Against Civilians in 2014." Armed Conflict Lovation & Event Data Project. Accessed January 31, 2015. http://www.acleddata.com/violence-against-civilians-in-2014/.