Response to Reviewer Comments on "Review of Adjustment in Actual Production History to Establish Insurable Yields: Determination of Actuarially Sound Premium Rates"

1. Introduction

This document is a response to reviewer comments on the draft report titled "Review of Adjustment in Actual Production History to Establish Insurable Yields: Determination of Actuarially Sound Premium Rates." Reviews were received from Bickerstaff, Whatley, Ryan & Burkhalter, Inc. (David Bickerstaff), AgRisk Management (Bruce Babcock), Oliver Wyman Actuarial Consulting, Inc. (Eric Hornick), Nicholas Piggott, Vedenov Consulting (Dmitry Vedenov), and National Crop Insurance Services, Inc. (NCIS).

Sumaria Systems, Inc. was asked by the Risk Management Agency (RMA) to review actuarial procedures being proposed by RMA to implement Section 11009 of the 2014 Farm Bill. This amendment to §508(g)(4)(C) of the Federal Crop Insurance Act allows producers the option to exclude any recorded or appraised yield for any crop year in which the per planted acre yield in the county is at least 50% below the simple average per planted acre yield during the previous ten consecutive crop years. Two additional provisions that affect implementation are that: (a) In any crop year that a county triggers then a producer in a contiguous county is eligible to make such an election as well and (b) a separate determination will be made for irrigated and non-irrigated acreage within a county.

Sumaria System, Inc. was charged with the following specific tasks:

1. Review the adequacy of existing procedures for establishing premium rates given current approved yield calculations. The context of the proposed procedure for rating the APH adjustment is the current procedure for relating rates to the APH record.
2. Review the adequacy of the current procedures as a mechanism to appropriately establish premium rates for Section 11009 of the Agricultural Act of 2014.
3. Provide a draft and final technical report outlining all findings and recommendations, including any programming code or spreadsheets used in the analysis.

As explained to Sumaria Systems, Inc. by RMA personnel, task 1 was intended not as a comprehensive rate review but rather as a review of the actuarial concepts and procedures associated with the Trend Adjusted APH option. When exercised, this option allows the effective coverage level on an insured unit to exceed the nominal coverage level. Since the yield exclusion provision will also allow effective coverage levels to exceed nominal coverage levels, RMA proposed to extend the Trend Adjusted APH actuarial procedures for use with the yield exclusion provision.

Task 2 asked Sumaria Systems, Inc. to review whether it would be appropriate to extend the Trend Adjusted APH actuarial procedures for use with the yield exclusion provision, as proposed by RMA. The draft report described in task 3 is what was provided to the reviewers. Recommendations offered in that report were the following.

<u>Recommendation 1</u>

We recommend that the RMA follow the approach they have proposed and that we have described in computing effective coverage levels for policy units making use of the Yield Exclusion in determining the yield guarantee.

Recommendation 2

We recommend that the RMA adopt the proposed procedures for deriving effective coverage level differentials and premium rates for policy units making use of Yield Exclusion.

Recommendation 3

We recommend that the RMA evaluate the feasibility of incorporating marginal premium rate caps such that the additional premium for any coverage interval cannot exceed the increase in liability.

Recommendation 4

We recommend that the RMA re-evaluate the coverage level differentials as soon as practical and the behavioral component after two years of Yield Exclusion experience has been collected. This will be the beginning of capturing the data needed to refine current actuarial procedures. Prior to new data analysis, RMA might consider some extrapolation of the unit residual factor.[1]

Recommendation 5

We recommend that the RMA adjust experience at the individual record level to the smaller of the 65% common coverage level or the effective coverage level prior to compilation in county loss experience data, thus preserving the actual indemnity experience in the base ratemaking process as much as possible.

Recommendation 6

We recommend that the RMA continue its current methods for adjusting compiled data at the county loss experience data level to the 65% common coverage level.

2. Responses to Reviewer Comments

None of the reviewers expressed disagreement with recommendations 1, 5, and 6. Thus, this response will focus on issues raised by the reviewers that relate to recommendations 2, 3, and 4. It should also be noted that while some of the reviews addressed a wide range of issues, the responses provided here are limited only to reviewer comments that were directly related to the tasks assigned to Sumaria Systems, Inc.

2.1. Interpolation

For determining premium rates for effective coverage levels between the standard 5% increments, none of the reviewers expressed any disagreement with the proposed linear interpolation procedure. Piggott however notes that the combination of the Yield Exclusion provision and the premium subsidy schedule (premium subsidy percentages generally decrease as the nominal coverage level increases) make it possible for two identical insureds to be charged different premiums for the same effective coverage level. This could occur, for example, if one of the insureds chooses a 75% coverage level and does not use the Yield Exclusion provision while the second insured selects a 70% nominal coverage level but uses the Yield Exclusion provision to obtain a 75% effective coverage. Since the premium subsidy percentage

[1] Recommendation 4 has been revised from the draft version in response to reviewer comments. We are now recommending coverage level relativities be re-estimated as soon as possible and that the analysis extend beyond 85% coverage into the range relevant for the APH YE. Additionally, we have modified recommendation 4 to suggest that it would be reasonable for RMA to consider extrapolating the residual unit factor until experience data can be analyzed. However, we have no basis to suggest what form this extrapolation might take.

is higher for 70% coverage than for 75% coverage, the second insured would pay less for the same effective coverage.

Sumaria Systems Inc. agrees with this point but notes that both the Yield Exclusion provision and the premium subsidy schedule are statutory.

2.2. Extrapolation

The reviews provided by Vedenov, Bickerstaff, NCIS, and Babcock all expressed concerns about using linear extrapolation procedures for determining premium rates on effective coverage levels above the maximum nominal coverage level. In general, these reviewers all argued that the relationship between effective coverage levels and premium rates is likely to be nonlinear. For example, Babcock states that "for most any well-behaved and commonly used yield distributions, and for most risk levels, the relationship [between effective coverage levels and premium rates] is convex (rates increase at an increasing rate)." As emphasized by Bickerstaff, NCIS, and Babcock, the extent of the convexity will depend on the variance of the yield distribution with greater convexity occurring in areas with lower yield risk. As the level of yield risk increases the relationship between effective coverage levels and premium rates becomes more linear and, in extreme cases, can even become concave (premium rates increasing at a decreasing rate).

The problem, of course, is that the yield distribution for the insured unit is unobservable so errors are likely to occur with any assumed relationship between effective coverage levels and premium rates. Furthermore, in the absence of data on higher effective coverage levels, there is no way to empirically investigate which extrapolation procedure is likely to minimize these estimation errors. This is evidenced by the fact that while Vedenov, Bickerstaff, NCIS, and Babcock all criticize the linear extrapolation procedure, they each propose a different alternative. Vedenov suggests a quadratic or cubic extrapolation procedure whereby whatever quadratic (cubic) curvature exists in the premium rate relativities between the three (four) highest coverage levels is extrapolated out to effective coverage levels that exceed the maximum nominal coverage level available. The estimation procedure suggested by Bickerstaff is computationally different than that suggested by Venenov but also relies upon the curvature in the current rates to extrapolate to higher coverage levels. While we agree that the concern about convexity raised by Vedenov and Bickerstaff is worthy of examination we do not agree with their proposed solutions. These approaches are simply extrapolations that take curvature of the current rates into account. They don't offer any insight into whether this curvature extends *in the systematic way their approaches assume* to effective coverage levels well above the current maximum. Furthermore, we would point out that if the RMA believed that the current mathematical formulas used to develop coverage level differentials were valid at coverage levels much higher than those on which the rate formulas were based then they could simply use the current formulas. No approximation would be needed.

NCIS and Babcock recommend basing extrapolated coverage level rate relativities on assumed yield distributions. For their analysis, NCIS assumes that yields can be approximated by either a Weibull or a Beta distribution whereas Babcock considers both a truncated Normal and a Beta distribution before ultimately recommending the truncated Normal distribution. Babcock concedes that this distributional assumption will be "less appropriate" for high risk farmers because the assumption of a truncated normal yield distribution does not allow for a concave relationship between effective coverage levels and premium rates. While these analyses provide interesting insights, it is important to remember that we cannot observe the actual yield distribution. This is, of course, why *RMA's yield risk rating procedures*

are not based on any distributional assumptions. If we knew the actual yield distribution for each combination of risk classification factors (e.g., crop, county, type, practice), experience-based premium rating would not be required – premium rating would simply be a matter of integrating under the known distribution.

In Appendix A, we use Babcock's analysis, along with data on exclusion eligibility and base premium rates, to evaluate the extent of rate errors due to linear extrapolation. This analysis confirms that the number of yields excluded will generally be low in low risk counties. These are the counties with low premium rates where the analysis presented by both NCIS and Babcock indicated that rate errors would be large if yield exclusion were heavily used resulting in high effective coverage levels. Conversely, we show that a large number of yields will potentially be excluded in high risk counties with high premium rates. In the analysis presented by both NCIS and Babcock, the linear extrapolation procedures proposed by RMA performed reasonably well in high risk counties. Babcock's analysis using two probability distributions, the Beta and truncated Normal, produced ambiguous results regarding whether approximation error due to linear interpolation would be positive or negative in this case. Even if the error is negative, meaning rates are too low, the magnitude of the estimated error was small. One main point from our analysis is that the extent of rate error due to linear extrapolation is likely small in many counties because it has its greatest potential effect in low risk counties where few yields are likely to be excluded and has a relatively small effect in high risk counties where the number of yields excluded is likely to be much larger.

In response to these various concerns, we are revising our previous recommendation 4 and suggest that RMA perform a new analysis of coverage level relativities as soon as possible using its current procedure for developing rate differentials. Since this approach re-computes loss experience from several years at coverage levels other than the coverage actually insured, it appears straightforward to go ahead and do this analysis. However, it may still be advisable to revisit the issue again in a few years.

2.3. Capping Effective Coverage Levels

Vedenov recommended that a temporary cap be placed on effective coverage levels resulting from the Yield Exclusion provision with the cap being gradually relaxed as experience data for higher effective coverage levels becomes available.

We have no objection to Vedenov's recommendation of a temporary cap on effective coverage levels resulting from the Yield Exclusion provision but question whether this is allowable under the statute.

2.4. Marginal Premium Rate Caps

We recommended that RMA consider marginal premium rate caps such that the additional premium for any coverage interval cannot exceed the additional liability (recommendation 3). Vedenov stated that such a restriction was unnecessary because a marginal premium in excess of marginal liability would not occur with the proposed linear extrapolation procedure. Hornick (Oliver Wyman Actuarial Consulting, Inc.) argued that the marginal premium should be capped at a level that is less than the marginal liability because there is always some probability that a loss may not occur in the marginal layer of coverage.

Contrary to Vedenov's assertion, it is possible for marginal premium to exceed marginal liability (marginal premium rates in excess of 100%) even with the linear extrapolation procedure proposed by RMA. To see this, consider an example for non-irrigated cotton in Martin County, Texas where the effective coverage level increases from 85% to 90%. The 80% Coverage Level Differential is 1.15 and the

85% Coverage Level Differential is 1.20. Using the proposed linear extrapolation, the 90% Coverage Level Differential would be

$$90\%\ Coverage\ Level\ Differential = 1.20 + \frac{(1.20 - 1.15)}{(0.85 - 0.80)} \times (0.90 - 0.85) = 1.25$$

The liability per acre for 85% coverage would be equal to the product of approved yield, projected price, and 85%. Likewise the liability per acre for 90% coverage would be equal to the product of the approved yield, projected price, and 90%. For simplicity, assume a projected price of $1.00 per unit of production so the liability per acre for 85% coverage is equal to 85% of the approved yield and the liability per acre for 90% coverage is equal to 90% of the approved yield.

Assuming that the approved yield is equal to the reference yield, the 65% base rate is the sum of the reference rate and the fixed rate. For non-irrigated cotton in this county the reference rate is 0.5440 and the fixed rate is 0.0610, so the 65% base rate would be 0.6050. The premium per acre for 85% coverage would be equal to the product of liability, the base rate and the 85% coverage level differential or

$$\begin{aligned} 85\%\ Coverage\ Premium\ per\ Acre &= 85\% \times Approved\ Yield \times 0.6050 \times 1.20 \\ &= 0.6171 \times Approved\ Yield \end{aligned}$$

Likewise the premium per acre for 90% coverage would be

$$\begin{aligned} 90\%\ Coverage\ Premium\ per\ Acre &= 90\% \times Approved\ Yield \times 0.6050 \times 1.25 \\ &= 0.6806 \times Approved\ Yield \end{aligned}$$

In this example going from 85% to 90% coverage increases liability by 5% of Approved Yield but increases premium by 6.35% (0.6806 – 0.6171) of Approved Yield, implying a marginal premium rate that exceeds 100%.

We don't disagree with Hornick that, in principle, marginal premium rates should be capped at a level that is less than 100% since, even for very high effective coverage levels, there is always some probability that a loss may not occur in the marginal layer of coverage. However, we would suggest that this theoretical point cannot be practically implemented without knowing the yield distribution on the insured unit. Since RMA cannot observe yield distributions on insured units but may (due to the Yield Exclusion provision) be required to determine premium rates for coverage levels significantly above the current maximum nominal coverage level, a marginal premium rate cap of 100% was proposed to avoid allowing marginal premium to exceed marginal liability.

2.5. Behavioral Load

In our draft report we noted that a behavioral response might occur due to the potential for high effective coverage with the Yield Exclusion provision. We recommended that RMA evaluate this issue after collecting two years of Yield Exclusion experience.

In their review, NCIS noted that the Yield Exclusion provision could increase incentives for both moral hazard and adverse selection. For the unit-level federal crop insurance products, the primary mechanism for controlling moral hazard is the deductible (100% minus the coverage level). If the Yield Exclusion provision causes the effective coverage level to increase, the effective deductible will decrease. Currently, the maximum coverage level is 85% so the minimum allowable deductible is 15%. With the Yield Exclusion provision it will be possible to have effective coverage levels higher than 85% (effective deductible less than 15%). It is even possible that effective coverage levels could exceed 100%

so the effective deductible will be negative. The obvious concern is that lower (or even negative) deductibles will create increased incentives for insured growers to engage in moral hazard behaviors.[2]

NCIS also argued that the Yield Exclusion provision could exacerbate existing adverse selection problems because, within a given county that qualifies for one or more years of yield exclusion, riskier growers are more likely to choose to exclude yields.[3]

We agree with NCIS that these are legitimate concerns, which is why we recommended that RMA evaluate this issue after two years of data are available. If we understand correctly, NCIS is not disagreeing with our recommendation *per se* but is instead arguing that some rate adjustment should be employed immediately in anticipation of Yield Exclusion induced increases in moral hazard and adverse selection problems. RMA currently uses a proportional unit residual factor to partially address moral hazard and adverse selection. The unit residual factor is typically set at 1.00 for lower coverage levels. At higher coverage levels the unit residual factor may or may not exceed 1.00. If it exceeds 1.00 it also increases as the coverage level increases. If the unit residual factor is greater than 1.00 for 85% coverage, then using the 85% coverage unit residual factor for effective coverage levels beyond 85% would generate a higher load in absolute terms (because the proportional load would be applied to a higher underlying premium rate). With the Yield Exclusion provision, the question is whether the proportional unit residual factor should continue increasing as effective coverage levels increase beyond the current 85% maximum (that is, should there be a positively sloped unit residual factor extrapolation). If so, a follow-up question is whether the positively sloped extrapolation should be linear, convex, or concave.

We agree with NCIS that the Yield Exclusion provision will lead to higher effective coverage levels that may exacerbate moral hazard and/or adverse selection problems. Given this, some positively sloped unit residual factor extrapolation may be appropriate. However, until experience data are available that can be used to analyze these issues, we have no basis for making recommendations about how such premium loads should be constructed.

Appendix A: Analysis of Rate Error from Linear Extrapolation

In this appendix we present analysis of the linear extrapolation error issue raised by Vedenov, Bickerstaff, NCIS, and Babcock. All four reviewers argue that using linear extrapolation to derive premium rates for coverage levels above the current maximum nominal coverage level will lead to errors in premium rates because the rate relativities should be convex rather than linear. The information used in our analysis includes: (1) county level base premium rates for corn and cotton, (2) county level information on crop years eligible for yield exclusion, and (3) Babcock's simulated relationships between effective coverage levels and linear extrapolation error.

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[2] Note that this definition of deductible, as used in crop insurance, expresses the loss borne by the insured before an indemnity is paid as a percentage of expected revenue or expected yield. Given this definition a negative deductible is quite possible. If the deductible were expressed with reference to the maximum revenue or yield it could only be negative if the amount of coverage exceeded the maximum possible revenue or yield. Our point is that a zero of negative deductible as commonly defined in crop insurance does not mean that the insurer has assumed all risk and that the insured bears no risk.

[3] NCIS also argued that the Yield Exclusion provision would likely change the riskiness of the book of business for Approved Insurance Providers because higher risk counties will qualify for yield exclusion more often than lower risk counties. Furthermore, Yield Exclusion induced increases in effective coverage levels would likely increase claim frequency and thus loss adjustment expenses. We don't disagree with either of these points but both are beyond the scope of issues that Sumaria Systems Inc. was asked to review.

It is clear that the effect of yield exclusion on effective coverage levels and premium rates depends, in part, upon the number of years of yields eligible for exclusion and the number of years actually excluded. To address the first issue, we obtained data on crop years eligible for yield exclusion (excludible years) from the RMA. These are the data underlying the maps posted on the RMA website [http://www.rma.usda.gov/news/currentissues/aph/index.html]. These data span the 19 year period from 1995-2013; however in this analysis we use the data for the most recent 10 years, 2004-2013. For non-irrigated corn, the percent of counties with each number of excludible years is shown by the orange bars in Figure A.1, which indicates that approximately 37% of corn counties had no excludible years in the past 10, that approximately 26% of counties had 1 excludible year, and that approximately 15% of counties had 2 excludible years. The percentage of counties continues to decline as the number of excludible years increases from 3-7 and no county had more than 7 excludible years. The blue bars in Figure A.1 show the average base premium rate for counties with each number of excludible years. The average premium rates for counties with zero and 1 excludible years are approximately 8.7% and 11.7%, respectively. Average rates for counties with 2-7 excludible years range from approximately 17% to 26%. To summarize, the data in Figure A.1 show that more than 60% of non-irrigated corn counties had zero or 1 excludible years, and that those counties have average base premium rates in the 10% range. A decreasing percentage of counties had 2 or more excludible years and those counties have average base premium rates near or above 20%. The main point is that a large percentage of non-irrigated corn counties have 0-1 excludible years and those counties have average premium rates in the 10% range. Counties with more excludible years have much higher premium rates on average.

Figure A.2 summarizes the same information as Figure A.1, but for non-irrigated cotton. The patterns revealed are the same. Approximately 66% of non-irrigated cotton counties had zero or 1 excludible years. These counties have average base premium rates in the 13% to 15% range. Average premium rates for non-irrigated cotton counties with 2 or more excludible years range from approximately 21% to 52%.

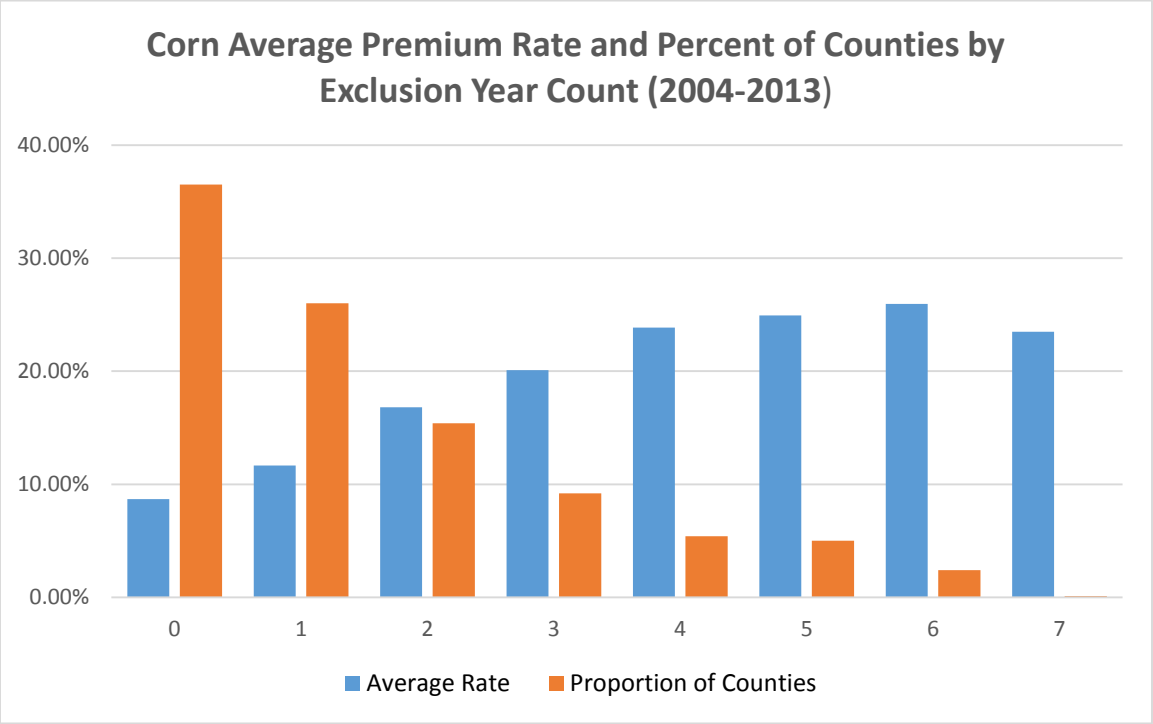

Figure A.1 Non-irrigated corn average base premium rates and percentage of counties by number of years eligible for yield exclusion.

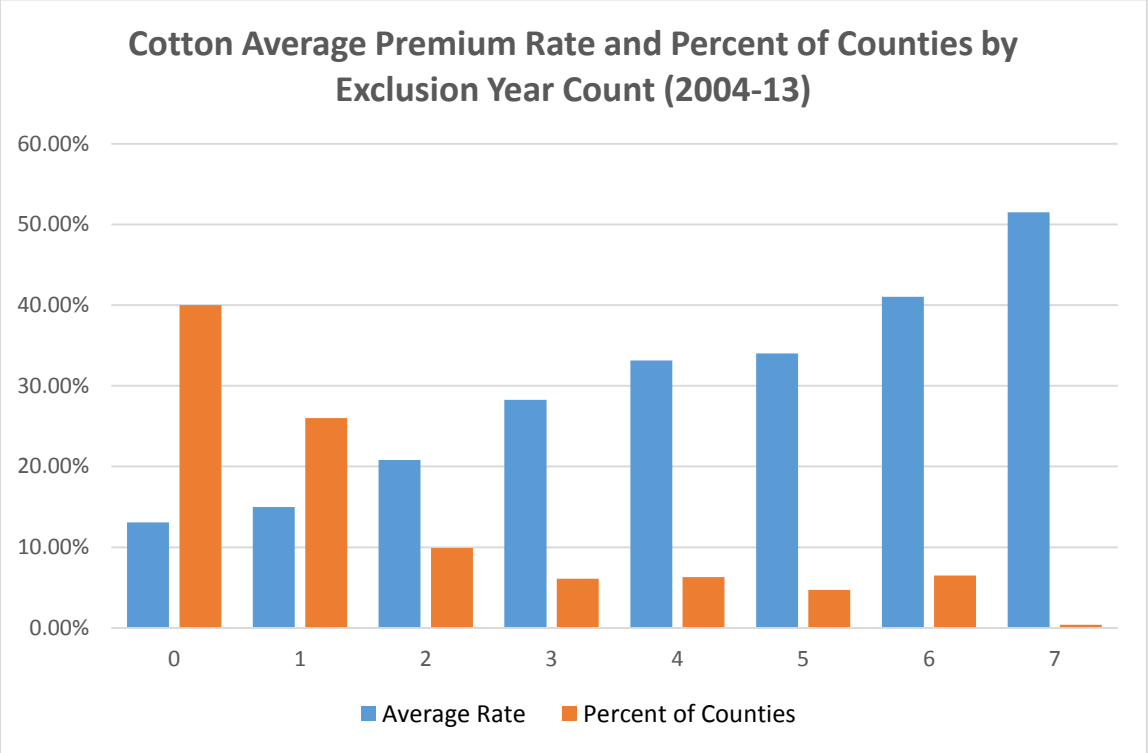

Figure A.2 Non-irrigated cotton average base premium rates and percentage of counties by number of years eligible for yield exclusion.

Before moving to Babcock's analysis of the relationship between effective coverage level and extrapolation error it is useful to further examine yield exclusion eligibility and the effects of exclusion on effective coverage levels. Figures A.3 and A.4 show the percentages of counties with each number of excludible years observed in the data, *for counties with base premium rates below 10%*. For non-irrigated corn, Figure A.3 shows that approximately 60% of such counties had no excludible years in the period 2004-2013. Approximately 32% of counties had 1 excludible year in the same period. Roughly 8% of these low risk non-irrigated corn counties had from 2 to 5 excludible years in the 10 year period. Figure A.4 shows that approximately 67% of low risk non-irrigated cotton counties had no excludible years in the 10 year period, approximately 28% had 1 excludible year, and approximately 4% of counties had 2 excludible years.

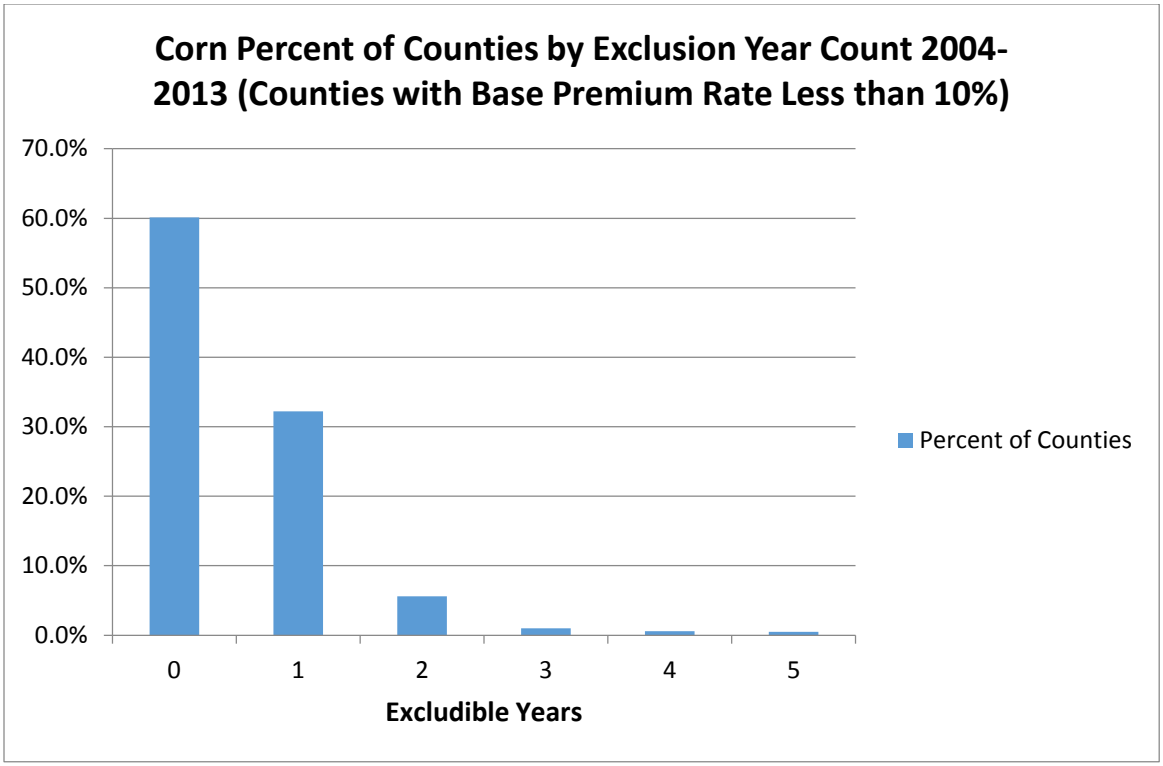

Figure A.3 Percentage of low risk (premium rate < 10%) non-irrigated corn counties by number of years eligible for yield exclusion.

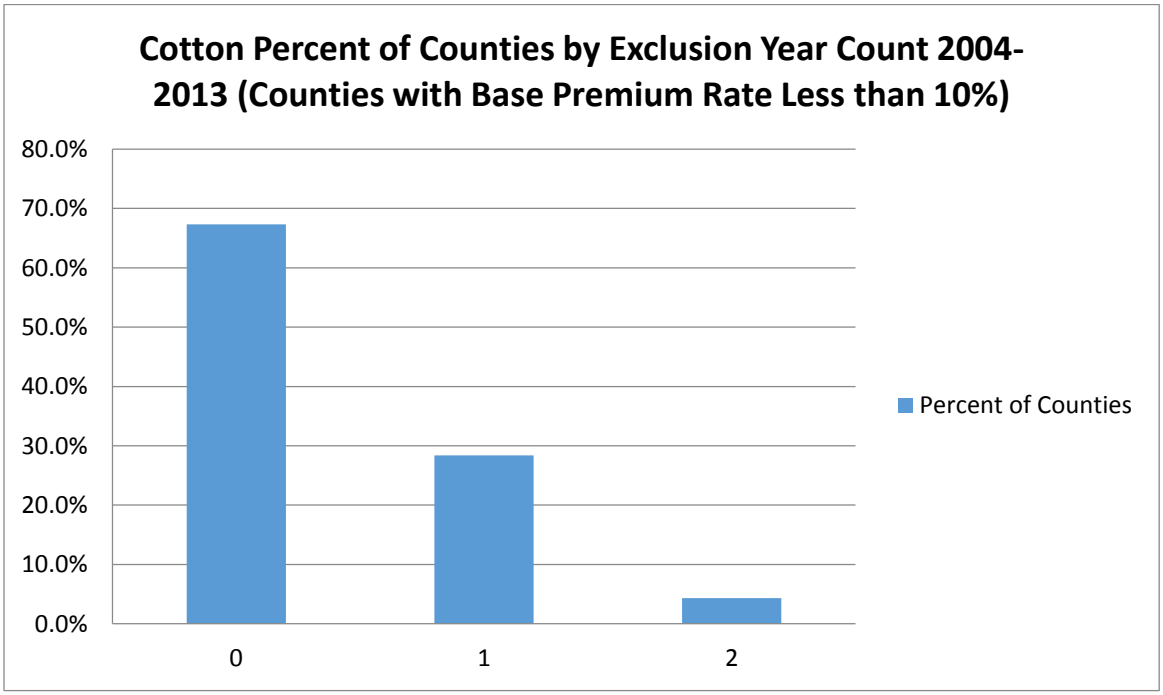

Figure A.4 Percentage of low risk (premium rate < 10%) non-irrigated cotton counties by number of years eligible for yield exclusion.

Since most low risk corn and cotton counties had either zero or 1 excludible years, and since yield exclusion has no effect with zero exclusion years, an important question is: "What is the potential effect of 1 excludible year." In order to address this question we first examine the effect of 1 excluded year on

effective coverage levels. Figure A.5 shows effective coverage levels for a 10 year yield history with 1 yield excluded and Figure A.6 presents a similar summary for a 5 year yield history with 1 yield excluded. These figures assume a T-yield of 100 for the excluded year and further assume that the actual yield for the excluded year is below 60 such that a yield plug of 60 is applied for the excluded year. What these figures show is that 1 excluded year only results in effective coverage significantly above 85%, where use of the extrapolation procedure begins, if the nominal coverage level is above 75%. Even with 85% nominal coverage the effective coverage level is approximately 92% for a 10-year yield history when the average yield for non-excluded years is 200 (note that this is 200% of the t-yield for the excluded year) and is approximately 100% for a 5-year APH yield history with 1 excluded year and an average yield for non-excluded years of 200. These results indicate that two conditions must exist in order for 1 excluded yield to increase effective coverage to a level of 90% to 100%. These conditions are: (1) high nominal coverage level above 75% and (2) average yield for non-excluded years much higher than the exclusion year yield (with plug if applicable). Next we examine how these results translate into potential rate errors due to linear extrapolation.

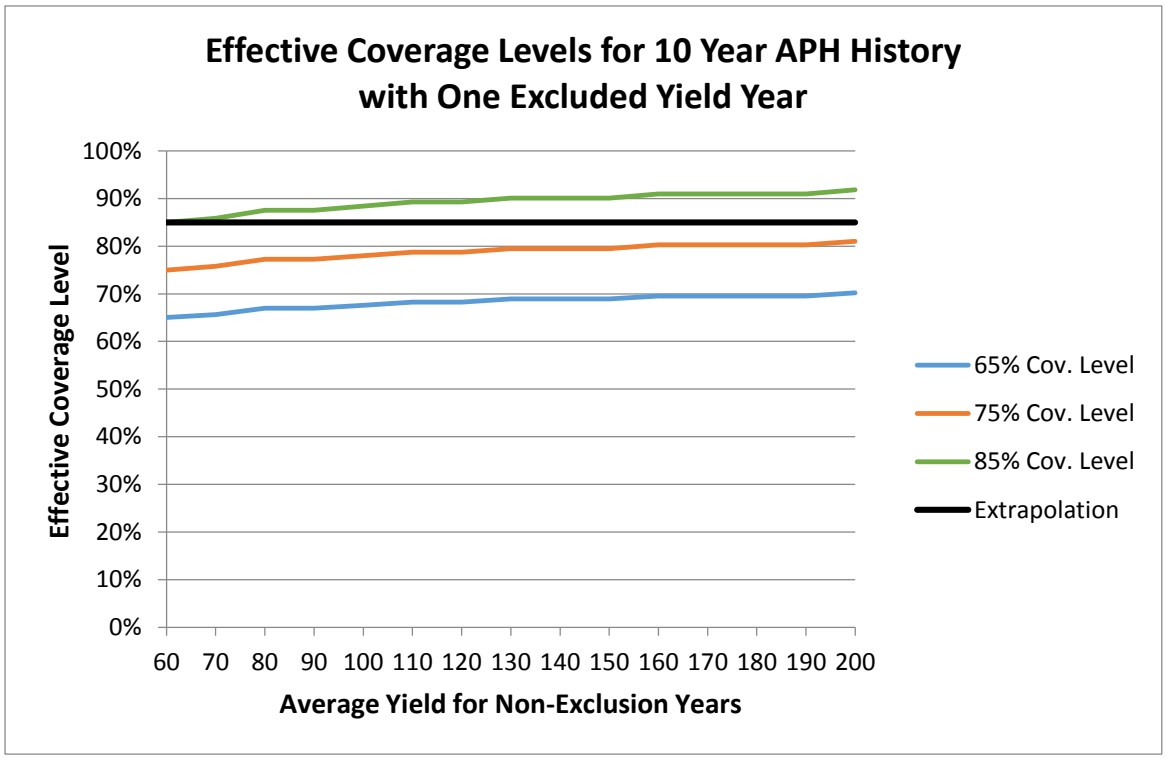

Figure A.5 Analysis of effective coverage levels for a producer with a 10-year yield history and one excluded year with yield below the county T-yield.

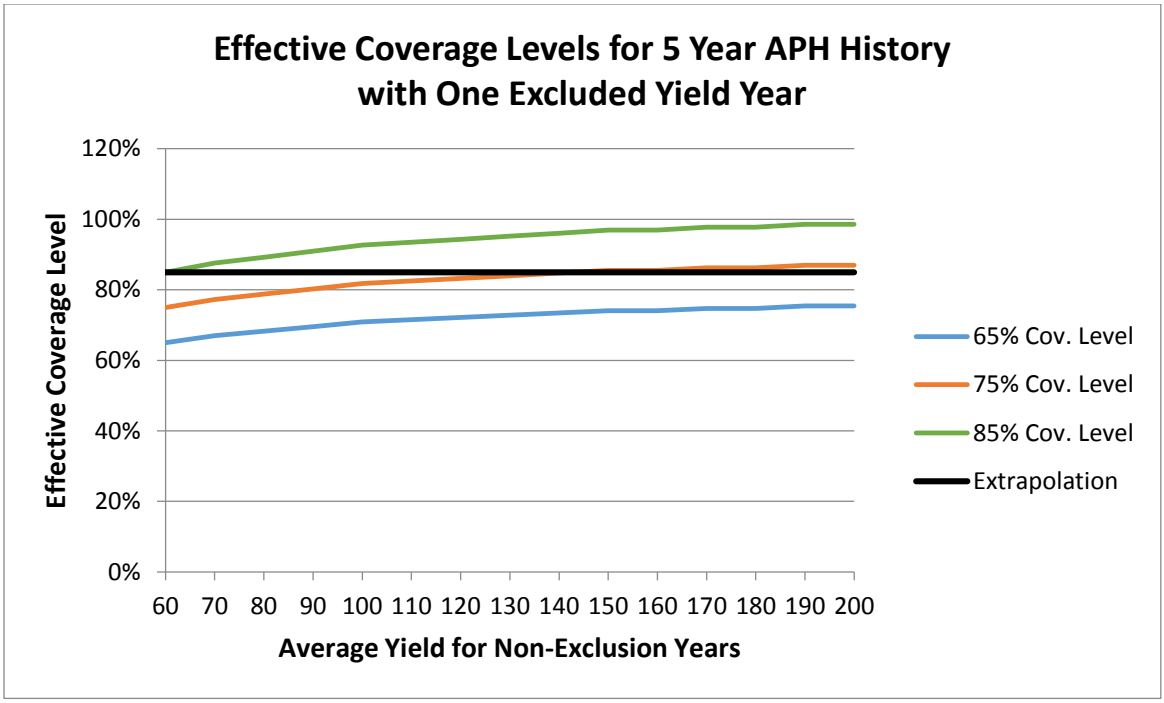

Figure A.6 Analysis of effective coverage levels for a producer with a 5-year yield history and one excluded year with yield below the county T-yield.

Figures A.7 and A.8 were extracted from Babcock's reviewer report. These figures show the estimated error due to linear extrapolation for counties with premium rates ranging from 1% (0.01) to 30% (0.30). The results in Figure A.7 were estimated using a truncated normal distribution and those in Figure A.8 were estimated using a Beta distribution. Results for the two distributions are consistent in indicating that rates derived through linear extrapolation exhibit negative extrapolation error for counties with premium rates below 10%. The results are ambiguous for counties with premium rates of 10% or higher. The truncated normal distribution indicates almost no rate error for a premium rate of 30%, very small negative error for a premium rate of 20% and slightly larger negative error for a premium rate of 10%. The Beta distribution indicates modest positive rate errors for premium rates of 20% and 30% and almost no error for counties with a base premium rate of 10%.

Given the ambiguities in Babcock's results for the two distributions with rates of 10% or higher, and the relatively small magnitude of estimated error at these premium rates for both distributions, we would interpret these results as supporting the use of linear extrapolation for counties with base premium rates at or above 10%. Importantly, as Figures A.1 and A.2 show, these high risk areas are where more yield years are eligible for exclusion and hence where yield exclusion will have its largest influence on effective coverage levels.

Estimated linear extrapolation errors for counties with rates of 5%, 2.5%, and 1% depend upon the effective coverage level. While Babcock shows effective coverage levels ranging as high as 155%, our results above indicate that the relevant range given 1 excluded yield is up to 90% for a 10 year yield history and 100% for a 5 year yield history. Consider a 5 year yield history with 100% effective coverage and a 5% nominal premium rate. Figures A.7 and A.8 indicate estimated extrapolation errors of approximately negative 5% and negative 2.5% for this case. Thus, based on the information from our analysis of effective coverage levels and Babcock's estimates of extrapolation error, the error associated with a 5% base rate, a relatively short 5 year yield history, 1 excluded year, and an average yield for non-

excluded yields of 200% of the T-yield for the excluded year is very small. Estimated extrapolation errors for premium rates of 2.5% and 1% are negative and considerably larger in magnitude.

In our assessment, it would be appropriate for the RMA to address this issue as early as possible. Babcock recommended use of results from the truncated normal distribution, stating that the RMA has the required draws from this distribution available due to its use in Revenue Protection rating. However, as is apparent from Babcock's results, different distributions produce significantly different results. And as we have noted earlier there is certainly no consensus on an appropriate distribution for the wide range of crops and regions for which the RMA has to produce rates. One could make different distributional assumptions and average them, but we suggest RMA continue its non-parametric approach. We recommend that RMA utilize the approach that has been used in the past to re-estimate coverage level relativities for counties with base rates below 5%. This approach estimates losses at coverage levels other than that for which insurance was actually purchased, without imposing distributional assumptions. To date the process has been used up to the 85% coverage level. Conceptually, we see no reason not to take it to higher levels as dictated by APH YE.

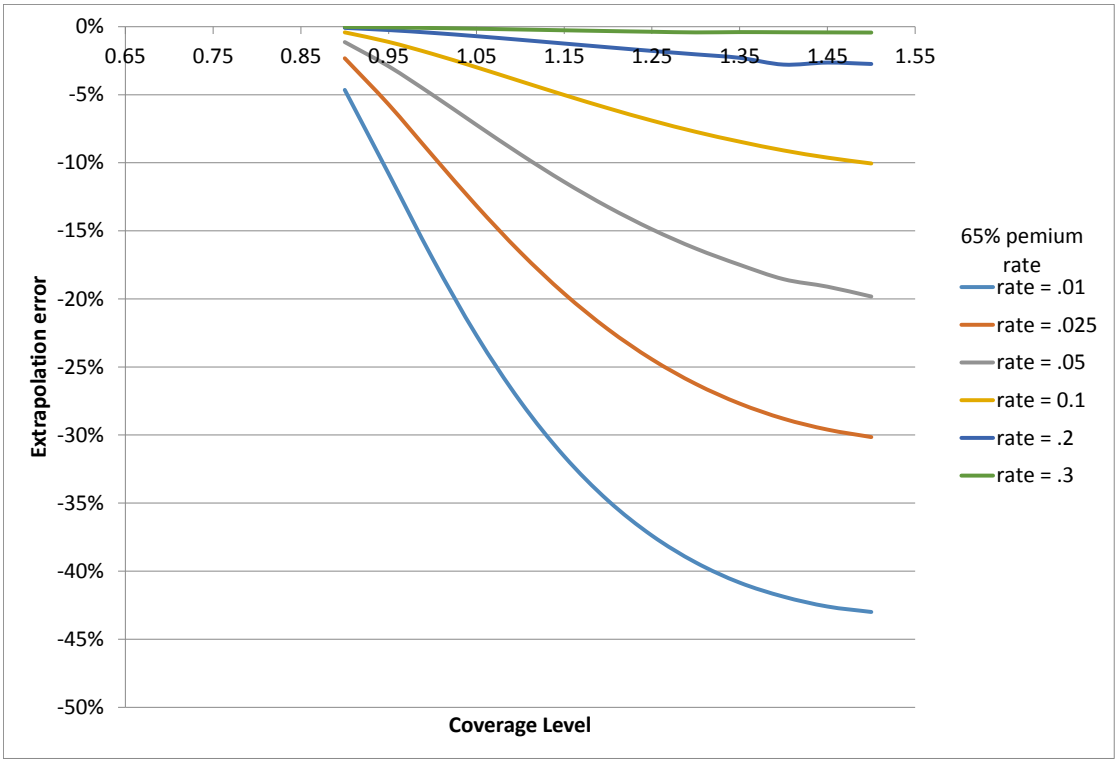

Figure A.7 Extrapolation errors for the truncated normal yield distribution. (Note: This is Figure 10 from Babcock's review report.)

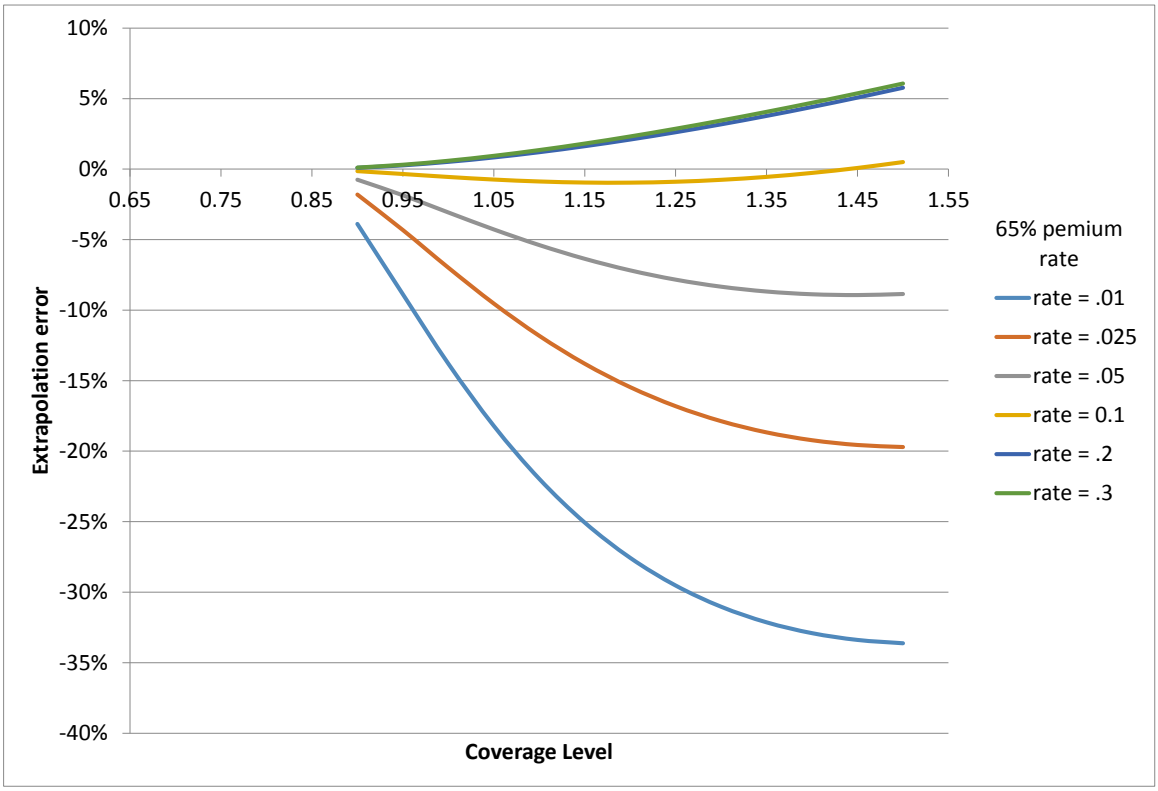

Figure A.7 Extrapolation errors for the Beta distribution. (Note: This is Figure 11 from Babcock's review report.)

Appendix B: Tabular Presentation of Information in Figures A.1 through A.5

Table A.1 Non-Irrigated corn average base premium rates and percentage of counties by number of years eligible for exclusion 2004-2013.

Exclusion Year Count	Average Rate	Proportion of Counties
0	8.69%	36.5%
1	11.67%	26.0%
2	16.82%	15.4%
3	20.10%	9.2%
4	23.86%	5.4%
5	24.93%	5.0%
6	25.95%	2.4%
7	23.50%	0.1%

Table A.2 Non-Irrigated cotton average base premium rates and percentage of counties by number of years eligible for exclusion 2004-2013.

Exclusion Year Count	Average Rate	Proportion of Counties
0	13.09%	40.0%
1	14.98%	26.0%
2	20.83%	9.9%
3	28.29%	6.1%
4	33.17%	6.3%
5	34.04%	4.7%
6	41.06%	6.5%
7	51.50%	0.4%

Table A.3 Percent of low risk (premium less than 10%) non-irrigated corn counties by number of years eligible for yield exclusion.

Eligible Years	Percent of Counties
0	60.1%
1	32.2%
2	5.6%
3	1.0%
4	0.6%
5	0.5%

Table A.4 Percentage of low risk (premium rate less than 10%) non-irrigated cotton counties by number of years eligible for yield exclusion.

Eligible Years	Percent of Counties
0	67.3%
1	28.4%
2	4.3%

Table A.5 Analysis of effective coverage levels for a producer with a 10-year yield history and one excluded year with yield below the county T-yield.

Average Yield for Non-Exclusion Years	----------Coverage Level----------			Extrapolation Point
	65%	75%	85%	
60	65%	75%	85%	85%
70	66%	76%	86%	85%
80	67%	77%	88%	85%
90	67%	77%	88%	85%
100	68%	78%	88%	85%
110	68%	79%	89%	85%
120	68%	79%	89%	85%
130	69%	80%	90%	85%
140	69%	80%	90%	85%
150	69%	80%	90%	85%
160	70%	80%	91%	85%
170	70%	80%	91%	85%
180	70%	80%	91%	85%
190	70%	80%	91%	85%
200	70%	81%	92%	85%

Table A.6 Analysis of effective coverage levels for a producer with a 5-year yield history and one excluded year with yield below the county T-yield.

Average Yield for Non-Exclusion Years	----------Coverage Level----------			Extrapolation Point
	65%	75%	85%	
60	65%	75%	85%	85%
70	67%	77%	88%	85%
80	68%	79%	89%	85%
90	70%	80%	91%	85%
100	71%	82%	93%	85%
110	72%	83%	94%	85%
120	72%	83%	94%	85%
130	73%	84%	95%	85%
140	73%	85%	96%	85%
150	74%	86%	97%	85%
160	74%	86%	97%	85%
170	75%	86%	98%	85%
180	75%	86%	98%	85%
190	75%	87%	99%	85%
200	75%	87%	99%	85%