Sacramento Valley Water Quality Coalition

Nitrogen Management Plan Summary Report Analysis
2019 Crop Year

Prepared for
Central Valley Regional Water Quality Control Board

Prepared by
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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

ACRONYMS

A	N Applied
A/R	Ratio of Nitrogen Applied to Nitrogen Removed
A/Y	Ratio of Nitrogen Applied to Yield
A-R	Nitrogen Applied Minus Nitrogen Removed
AUM	Animal Unit Month
CV	Coefficient of Variation

GAR	**Groundwater Quality Assessment Report**
HVA	**High Vulnerability Area**
INMP	**Irrigation and Nitrogen Management Plan**
LTILRP	**Long-Term Irrigated Lands Regulatory Program**
MC	**Medcouple Statistic**
MPIR	**Management Practice Implementation Report**
MRP	**Monitoring and Reporting Program**
MU	**Management Unit**
N	**Nitrogen**
NCWA	**Northern California Water Association**
NMP	**Nitrogen Management Plan**
NR	**Not Reported**
PLSS	**Public Land Survey System**
R	**Nitrogen Removed**
RWQCB	**Regional Water Quality Control Board**
SSURGO	**Soil Survey Geographic Database**
SVWQC	**Sacramento Valley Water Quality Coalition**
WDRs	**Waste Discharge Requirements**

EXECUTIVE SUMMARY

Subwatersheds within the Sacramento Valley Water Quality Coalition (SVWQC) (Coalition) collected Nitrogen Management Plan (NMP) Summary Reports for the 2019 crop year that were sent out to SVWQC members within high vulnerability areas (HVAs). The individual SVWQC Subwatersheds (Subwatersheds) assembled member data and submitted aggregated data for further analysis. The returned forms were reviewed and checked for errors and omissions, and members were contacted to correct any noticeable errors. While data quality was generally improved in 2019 compared to 2018 due to better validation in the online reporting tools, and a significant effort was made to correct all errors, some errors may have gone undetected. NMP data was submitted for 11,637 fields, associated with 3,084 members, and 531,307 acres. NMP data that was not reported consisted of 169 fields, associated with 83 members and approximately 4,622 acres. This was a significant improvement compared to the three previous reporting years.

Nitrogen (N) consumption ratio summary statistics were calculated by crop type for the whole Coalition. Summary statistics included the mean, standard deviation, histogram plot, box and whisker plot, and high outliers calculated for the following parameters: ratio of applied N to N removed (A/R); and the difference between applied N and N removed (A-R). The ratio of applied nitrogen to yield (A/Y) was also used for crops without literature values for N Removed (R). Results indicated several crops had a small number of records within the Coalition that limited the relevance of the statistical analysis and/or actual applicability of the outlier determination.

The NMP results showed that A/R and A-R can vary by several orders of magnitude within the same crop class. Some of the highest outliers may be due to reporting errors, although the exclusion of records with unreasonable N applied or yield values limited this.

The crop age statistical analysis results were inconclusive and limited by the small number of members who reported planting year and potentially inaccurate planting years. Walnuts and almonds were the only crops with a large amount of observations in each year, although many of the observations did not have a planting year. The other perennial crops had smaller numbers of observations in each age class, making it difficult to discern any trends.

Soil type, as represented by drainage class, had a significant effect on the mean A/R values in the following crops: alfalfa, dry beans, wine grapes, olive, sunflower, triticale, and wheat; however, the data was generally not normally distributed and many crops had drainage classes with a low number of observations, limiting the reliability of the analysis.

Results will be provided in individualized feedback reports to each member as part of the Coalition's education and outreach program. The feedback reports provide members with information on the status of A/R and A-R values for each of their parcels relative to the Coalition.

1 INTRODUCTION

The Central Valley Regional Water Quality Control Board (RWQCB) developed the Long-term Irrigated Lands Regulatory Program (LTILRP) to address surface water quality and to add groundwater quality monitoring and reporting requirements for agricultural irrigated land. The requirements were adopted as Waste Discharge Requirements (WDRs) and an associated Monitoring and Reporting Program (MRP) (General Order No. R5-2014-0030-R1). The Sacramento River Watershed WDRs for members of the Sacramento Valley Water Quality Coalition (SVWQC) were adopted March 12, 2014 and required members in high vulnerability areas (HVAs) for threat to groundwater quality from nitrates, identified in the June 2014 Groundwater Quality Assessment Report (GAR) and subsequent revisions (CH2M Hill, 2014; CH2M Hill, 2016), to prepare an annual Nitrogen Management Plan (NMP), followed by an NMP Summary Report for the previous crop year. The last revision to the WDRs in February 2019 requires members in both high and low vulnerability areas to prepare an Irrigation and Nitrogen Management Plan (INMP) and submit an INMP Summary Report for the previous crop year beginning in 2021. The INMP Summary Reports will have additional information on irrigation and nitrogen efficiency practices not included in the NMP Summary Reports. This report presents results from the final year of NMP data with INMP scheduled to be reported on in 2021.

SVWQC is required to summarize member NMP data to fulfill the WDRs for the Coalition's Annual Monitoring Report. This report satisfies Report Component No. 19 of the WDRs – NMP Summary Report Evaluation. This component requires an evaluation of members' NMP Summary Report data including comparisons of the ratio of N applied to N removed (A/R) and the difference between N Applied and N Removed (A-R) by crop type. The reporting requirements are further summarized in Section 1.2.

The Coalition will report back to each member, separate from this report, A/R and A-R estimates for each of the member's parcels compared to other members with the same crop in the Coalition. An example of this report is provided in Appendix B.

1.1 BACKGROUND

The area covered by the SVWQC's WDRs encompasses all the Sacramento River Watershed; however, the data in this report only covers the Valley floor portion of the SVWQC with HVAs designated in the November 2016 revision of the GAR. The SVWQC is operated as a partnership with 13 local Subwatersheds coordinated by the Northern California Water Association (NCWA) (Figure 1). The Subwatersheds provide leadership for grower outreach and education about the importance of implementing practices protective of surface and groundwater quality, while NCWA, the third-party recognized by the RWQCB, manages development and implementation of surface water monitoring, annual reporting and other Coalition deliverables, such as this report. Irrigated agriculture of the SVWQC extends over 1.3 million acres, roughly 8% of the Sacramento River Watershed (excluding rice, which is covered under a separate RWQCB order). The remaining approximate 92 percent of the Sacramento River Watershed consists of open space, riparian vegetation, and urban development.

Figure 1. Subwatersheds within SVWQC

Only 7 of the 13 Subwatersheds contain HVAs as identified in the November 2016 revision of the GAR, which was used for NMP reporting for the 2019 crop year (Figure 2). These 7 Subwatershed groups include the following: Dixon/Solano; Yolo; Sacramento-Amador; Colusa-Glenn; Butte-Yuba-Sutter; Shasta-Tehama; and Placer-Nevada-South Sutter-North Sacramento. The GAR evaluated land use in conjunction with soils and agronomy information and reviewed potential hydrogeologic vulnerabilities to identify practices or physical characteristics that pose a greater risk to groundwater quality impact than other areas. Further analysis then paired these results with groundwater quality data to refine the vulnerability conclusions. The vulnerability analysis was performed at the section level (1-mile square) for each Public Land Survey System (PLSS) section.

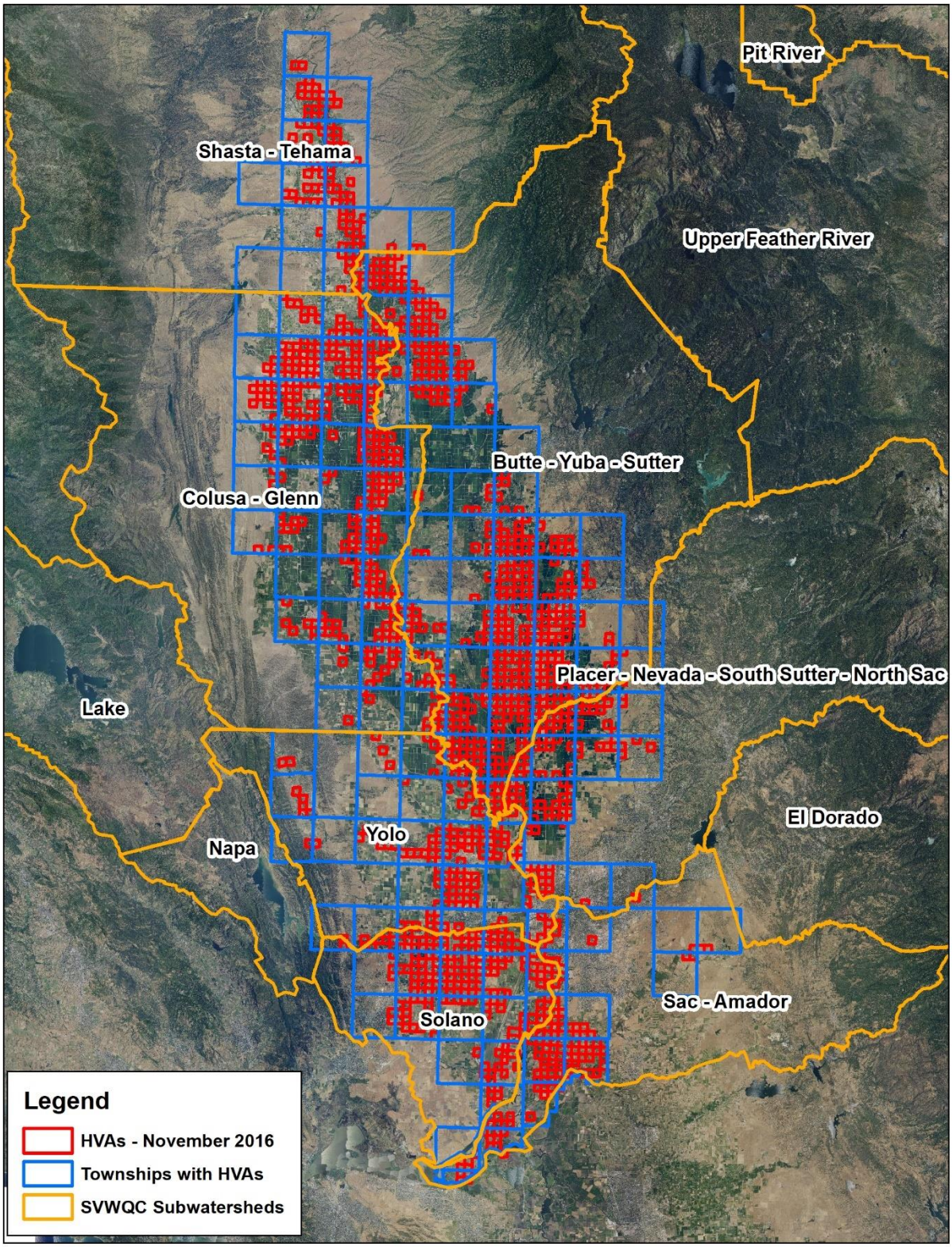

Figure 2. SVWQC HVAs from November 2016 Revision to GAR

1.2 PURPOSE

The purpose of this report is to summarize SVWQC member N data to fulfill the following requirements of the WDRs MRP for the Coalition's Annual Monitoring Report (Table 1):

Table 1. Summary of Order Requirements for Member Reported Nitrogen Data

	Summary of Requirements from MRP
1	Evaluation of A/R and A-R ratios by crop type
2	Evaluation of A/R and A-R by irrigation method, soil conditions, and farming operation size for each crop type
3	Provide A/R and A-R mean, standard deviation, histogram plot, and box and whisker plot for each crop type
4	Provide a quality assessment of the collected information (e.g. missing data, potentially incorrect/inaccurate reporting) and a description of corrective actions to be taken
5	Provide Township AR data table
6	Provide Individual Field AR data by Anonymous Member ID
7	Identify entries in the field AR data that are considered outliers for AR data, subject to follow up actions, and the standard used to make that determination

2 DATA COLLECTION, QUALITY AND ANALYSIS

Member NMP Summary Report data was collected by the seven (7) HVA-containing Subwatersheds within the Coalition, then compiled and analyzed as described below.

2.1 SUMMARY OF MEMBER DATA COLLECTION

On the NMP Summary Reports, members report the total amount of N applied (A) and yield (Y) in lbs per acre. Most members use an online reporting system. When possible, yield is converted by the Coalition to the amount of N removed at harvest (R) using published values of N sequestration in crop tissue (Geisseler, 2016). The Coalition uses the amount of N removed to determine A/R and A-R. If R values are not available, A/Y is calculated.

Most of the 2019 NMP data (>99%) was reported at the field level, with those fields being assigned to one APN. Some of the hand-collected data was reported by Management Unit (MU) which represents any fields that are managed for N in a similar way. If a MU contained multiple APNs, it was assigned to one APN that was used for analysis and reporting to avoid duplication.

Members submitted NMP Summary Reports to the Subwatershed in which their fields are located, which was then exported to a spreadsheet if collected online, or entered into a standardized MS Excel template if collected by hand. The completion statistics for the 2019 NMP Summary Reports are summarized in Table 2. NMP data was received for 11,637 fields representing 3,084 members and 531,307 acres. NMP data that was not reported comprised 169 fields representing 83 members and approximately 4,622 acres. This reporting rate was a significant improvement compared to the three previous reporting years.

Members can be counted in both the complete and incomplete categories if they only submitted data for a portion of their required fields. Several attempts were made by Subwatershed staff to contact members with outstanding reports.

Table 2. Status of NMP Summary Reports Received

NMP Submission Status	Count of Members[a]	Number of Fields[b]	Acres[c]
Not Submitted	83	169	4,622
Submitted	3,084	11,637	531,307

Notes:

[a] Members can be counted as both submitted and not submitted if they did not report on all their fields/MUs.

[b] Each record analyzed is generally one field. A small portion of the Coalition reported by MU which can have multiple fields. All fields or MUs spanning multiple APNs were assigned to a single APN for analysis to avoid duplication.

[c] The acreage for records not submitted is based on crop acres from prior years and may not represent the actual crop acreage for 2019.

The crop acreages from the NMP Summary Reports included in the statistical analysis are shown in Figure 3. The largest acreage crop reported was walnuts, followed by almonds and processing tomatoes. The number of fields and acreage for each crop type are shown in Table 3 for records that were (1) analyzed, (2) non-bearing or zero yield, or (3) exempt, incomplete, or questionable data. The determination of records that were exempt, incomplete, or had questionable data is discussed in Section 2.3.

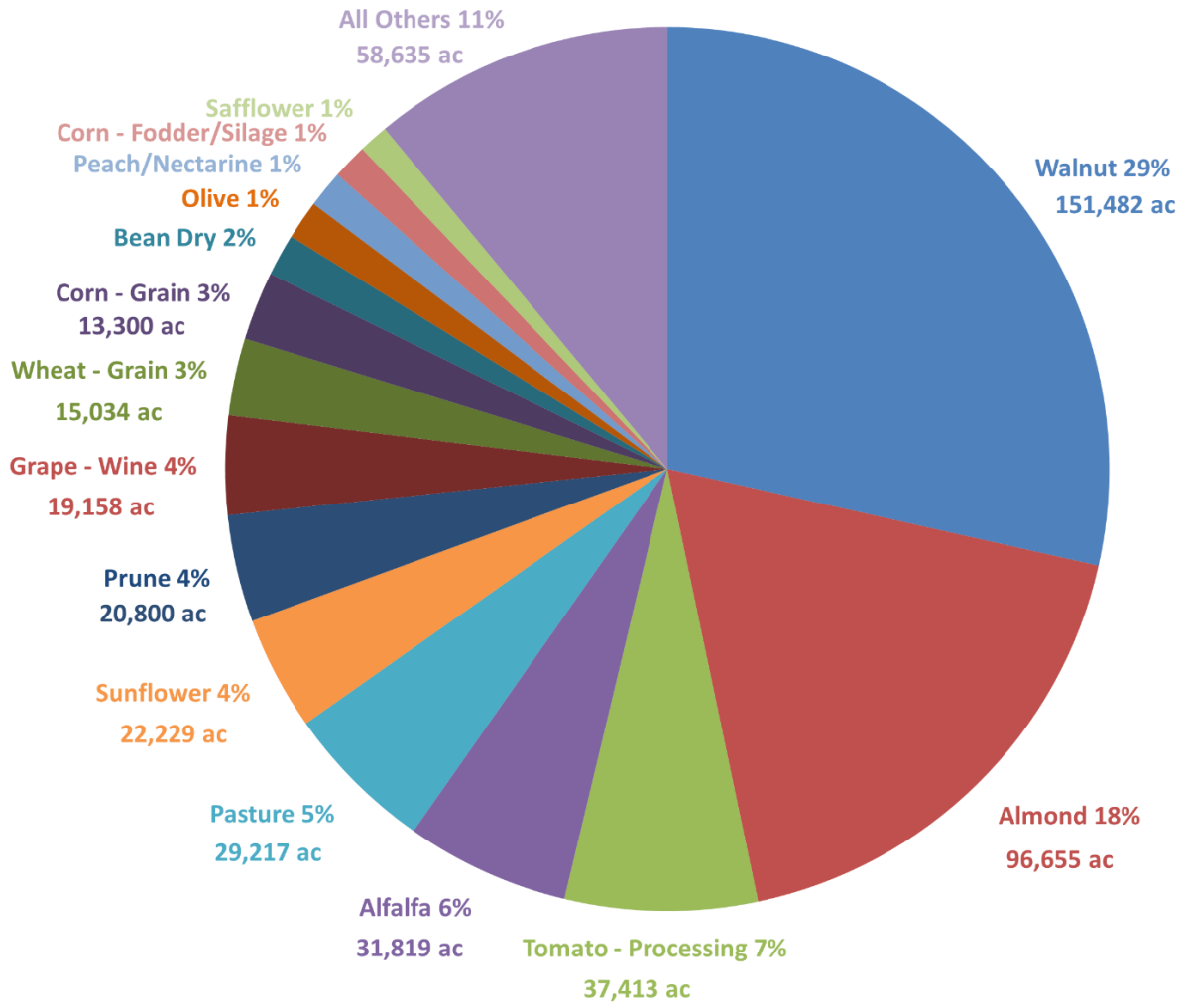

Figure 3. Crop Acreage Totals for Submitted NMP Summary Reports

Table 3. Summary of Crops Reported on SVWQC NMP Summary Reports

Crop	Analyzed		Non-Bearing / Zero Yield		Exempt, Incomplete, or Questionable Data	
	No. of Fields	Acres	No. of Fields	Acres	No. of Fields	Acres
Alfalfa	551	29,944	31	1,275	11	600
Almond	1,705	82,272	246	13,483	8	900
Apple	8	149	4	75	0	0
Apricot/ Aprium	5	10	0	0	0	0
Asparagus	4	105	2	2	0	0
Barley - Grain	22	768	0	0	0	0
Barley - NR	0	0	0	0	2	72
Bean - Green	2	169	0	0	0	0

Crop	Analyzed		Non-Bearing / Zero Yield		Exempt, Incomplete, or Questionable Data	
	No. of Fields	Acres	No. of Fields	Acres	No. of Fields	Acres
Bean Dry	160	7,976	6	176	2	0
Berry	0	0	3	5	0	0
Broccoli	0	0	3	31	0	0
Cabbage	0	0	5	38	1	15
Carrot	0	0	2	144	0	0
Cherry	21	844	11	177	0	0
Chestnut	4	12	1	4	0	0
Christmas Tree	2	53	0	0	0	0
Citrus	22	257	3	5	0	0
Corn - Fodder/ Silage	77	6,715	2	65	0	0
Corn - Grain	185	13,299	0	0	1	1
Corn - NR	2	70	2	13	0	0
Corn - Popcorn	1	110	0	0	0	0
Corn - Sweet	6	221	0	0	1	5
Cotton	32	1,671	1	145	1	74
Cover Crop	1	15	2	110	0	0
Cucumber	29	1,405	4	71	0	0
Dichondra	2	118	1	79	0	0
Fallow	0	0	0	0	19	455
Fig	2	32	0	0	1	1
Filbert/ Hazelnut	0	0	1	1	0	0
Flower/ Ornamental	0	0	1	2	1	4
Grain Hay	11	263	0	0	0	0
Grape - Other	7	122	3	42	0	0
Grape - Table	1	2	0	0	0	0
Grape - Wine	274	17,335	43	1,824	0	0
Grape Rootstock	3	139	4	47	1	8
Greenhouse	0	0	2	4	0	0
Hay/ Forage	53	1,925	12	806	1	68
Hemp	1	9	0	0	0	0
Herb/ Spice	2	22	0	0	1	6
Hops	2	12	0	0	0	0
Kiwifruit	40	1,401	3	30	1	16
Lavender	1	1	0	0	0	0
Melon	13	518	2	12	0	0
Millet	5	329	0	0	0	0
Misc. Field Crops	0	0	0	0	1	498

Crop	Analyzed		Non-Bearing / Zero Yield		Exempt, Incomplete, or Questionable Data	
	No. of Fields	Acres	No. of Fields	Acres	No. of Fields	Acres
Misc. Fruit Tree	106	3,439	29	682	0	0
Misc. Nut Tree	9	440	1	81	0	0
Misc. Row Crop	44	3,548	6	85	0	0
Misc. Vegetable	25	517	8	139	0	0
Non-Irrigated Crop	0	0	0	0	29	783
Nursery	0	0	18	358	3	49
Oat - Fodder/ Silage	18	981	1	60	0	0
Oat - Grain	9	366	0	0	0	0
Okra	1	20	0	0	0	0
Olive	138	6,992	18	564	3	46
Other	2	39	15	1,729	0	0
Pasture	62	4,400	27	3,011	381	21,806
Peach/ Nectarine	277	7,067	13	186	0	0
Pear	84	3,791	8	185	0	0
Pecan	32	927	22	653	0	0
Pepper	22	782	1	16	0	0
Persimmon	20	341	3	8	0	0
Pistachio	41	1,733	46	3,268	0	0
Plum/ Pluot	40	1,321	11	188	0	0
Pomegranate	2	21	3	15	0	0
Prune	499	19,646	38	1,086	2	68
Pumpkin	5	23	6	143	2	10
Rangeland	0	0	2	51	0	0
Research	1	1	20	143	0	0
Rice	0	0	0	0	47	1,225
Rice - Wild	1	61	1	3	0	0
Ryegrass	35	1,201	1	70	0	0
Safflower	102	4,547	18	1,230	0	0
Seed Crop	35	1,721	24	524	1	330
Sorghum/Milo	26	1,072	6	57	0	0
Squash	0	0	3	14	0	0
Strawberry	0	0	2	7	1	2
Sudan Grass	21	812	6	816	0	0
Sunflower	459	21,883	9	273	2	73
Tomato - Fresh Market	2	32	0	0	0	0
Tomato - NR	0	0	4	48	0	0
Tomato - Processing	706	37,216	2	60	4	136

Crop	Analyzed		Non-Bearing / Zero Yield		Exempt, Incomplete, or Questionable Data	
	No. of Fields	Acres	No. of Fields	Acres	No. of Fields	Acres
Triticale	49	1,666	0	0	0	0
Turf	3	221	3	182	0	0
Turnip	0	0	2	43	0	0
Vine Seed	156	5,363	1	23	2	48
Walnut	3,309	137,526	340	13,447	7	509
Watermelon	1	19	6	183	0	0
Wheat - Fodder/ Silage	10	352	1	114	0	0
Wheat - Grain	329	14,969	0	0	1	65
Wheat - NR	4	487	27	840	2	64
Winter Grain	1	33	2	159	0	0
Winter Vegetable	1	100	0	0	0	0

Notes:
NR - specific crop type not reported. A/R and A-R could not be calculated for this category.

2.2 SUMMARY OF MEMBER DATA QUALITY EVALUATION

Subwatershed staff initially checked all returned forms for completeness. The NMP summary reports had to include, at minimum, the following information to be analyzed:

- APN
- Crop
- N applied
- Yield and yield unit if N applied > 0

The NMP summary reports were reviewed to check for completeness or any errors in the reported data. Any NMP data flagged during the review process was sent to the applicable Subwatershed for follow-up with the member. Common errors identified during the review process included:

1. Member-reported APN did not have a matching APN in the corresponding county GIS parcel database. These discrepancies typically occurred because of a transcription error or in some cases because the parcel had been redrawn but had not been updated within the County GIS shapefile.
2. Amount of N fertilizer applied per acre was greater than 500 lbs/acre, which is typically the maximum reasonable value for the crops grown within the Coalition. This could have been the result of a transcription error, reporting total fertilizer applied versus the percent of N in the fertilizer, or total N applied for the field or MU instead of per acre.
3. Production unit was not correct (e.g. tons was listed when the actual unit was lbs) or was provided on a volume basis rather than mass basis (e.g. number of trees, cut flowers, square feet of turf, etc.). Corrections from volume to mass basis were made where possible based on

typical values for the crop type (Table 4) (e.g. if the yield unit was listed as cartons of oranges and no carton weight was provided, a typical carton weight of 40 lbs was used).

4. Yield was much higher than the typical range of values for the given crop, as show in Appendix C. This was typically the result of either transcription error, failure to convert yield units to pounds (lbs), or using total yield instead of yield per acre. Yield could also have been reported on a different basis than the typical standard for the crop. For example, prune yields are typically reported on a dry basis but some members may have reported on a wet basis. Nut crops can also be reported as gross weight, in-shell weight, or kernel/meat weight. The Coalition requested that members indicate the yield basis on their NMP Summary Reports, but some members did not fill this out or entered an incorrect basis. All reported yields were converted, where possible, to the typical standard reporting basis for the crops listed in Table 5.

Table 4. Estimated Yield Unit Weights for Conversion from Volumetric Units

Crop	Volumetric Yield Unit	Estimated Yield Unit Weight
Kiwifruit	tray	7 lbs/tray
Christmas Trees	number of trees	50 lbs/tree
Pasture	animal unit month (AUM)	1,000 lbs/AUM
Cotton	bale	500 lbs

Table 5. Yield Basis Conversion Factors

Crop	Reported Basis	Standard Basis	Conversion Factor to Standard Basis
Almond	gross	kernel	0.27
Almond	in-shell	kernel	0.59
Walnut	gross	in-shell	0.82
Walnut	kernel	in-shell	2
Pistachio	gross	in-shell (CPC)	0.82
Pecan	kernel	in-shell	2
Prune	fresh fruit	dried fruit	0.33

2.3 DATA EXCLUSIONS

After outreach was completed, the following exclusions were made prior to statistical analysis:

1. Exempt crops (rice, non-irrigated crops, fallow, pasture with no N applied, wetlands, or aquaculture)

2. Any incomplete records without an APN, crop, N applied, or yield/yield unit if N applied > 0
3. N applied greater than 500 lbs/acre
4. Yield values beyond the reasonable range for the reported crop, shown in Appendix C
5. Parcels occurring completely outside of an HVA, based on the county GIS datasets and the parcel centroid. Parcels not in an HVA did not have to report for the 2019 CY.

3 N REMOVED CALCULATION DATA SOURCES AND PROCEDURES

To calculate **R**, the amount of N removed in the harvested portion of each crop, the Coalition relied on estimates from:

Nitrogen concentrations in harvested plant parts - A literature overview (Geisseler 2016)
https://apps1.cdfa.ca.gov/FertilizerResearch/docs/Geisseler_Report_2016_12_02.pdf

This report includes information on N removal values for each crop as shown in Table 6, and includes complete references for studies providing N removal data, as well as the following information:

- A coefficient of variation (CV) is provided which indicates the variability among the published values for a specific crop.
- The number of published values both within and outside of California is also shown. In some cases, there are several studies that provide N removal values; in other cases, there are only one or two studies. Similarly, for some crops N removal values are reported from various parts of the Central Valley, while for other crops, values may be for other states.
- The time period when the values were published are presented in the detailed discussion of each crop.

While the information in Geisseler (2016) provides several factors to evaluate the relevance of N removal values, it does not give an overall confidence rating or reflect all the information and criteria that needs to be considered to determine how well the N removal values represent crop varieties grown within the Coalition. Therefore, the N removal values in Geisseler (2016) are used in this analysis because they are the best available sources of data, but they should not be considered definitive, and they should be expected to change and improve over time. No conversions from A/Y to A/R or A-R were attempted for crops without a N removed coefficient.

Even if the N removed coefficient used to calculate R is considered a good estimate, differences in the basis on which yield is reported (i.e. fresh vs. dry weight, in-shell vs shelled weight) can affect R values. In addition, for perennial crops, N accumulation in perennial tissue is not included in the R value, and for crops where marketable yield is reported and cull or trash is removed in a processing facility, the calculated amount of N removed underestimates the actual amount (Geisseler, 2016).

Table 6. N Removed (R) Conversion Factors

Crop	No. of Observations		CV (%)	N Removed Conversion Factor (lbs N/lbs yield)
	California	Total		
Field Crops				
Alfalfa – Hay	49	49	12.5	0.031150
Alfalfa – Silage	6	6	17.5	0.012000
Barley – Grain	4	61	14.6	0.016800
Barley – Straw	0	970	31.3	0.007700
Beans, Dry - Blackeye	1	164	10.4	0.036500
Beans, Dry - Garbanzo	2	108	11.3	0.033600
Beans, Dry - Lima	2	75	5.4	0.036150
Corn – Grain	0	1,775	20.8	0.012000
Corn – Silage	71	71	10.5	0.003780
Cotton	27	80	29.5	0.021850
Fescue, Tall - Hay	260	260	16.2	0.025400
Oat – Grain	0	134	9.6	0.018850
Oat – Straw	2	526	34.7	0.007400
Oat – Hay	49	49	18.2	0.010850
Orchard Grass - Hay	60	60	20	0.027250
Ryegrass, Perennial - Hay	60	60	16.8	0.027450
Safflower	12	149	20	0.028400
Sorghum – Grain	0	256	29.7	0.016500
Sorghum - Silage	260	260	21	0.003670
Sunflower	0	208	14.3	0.027050
Triticale - Grain	51	51	13	0.020200
Triticale - Straw	0	102	38.3	0.005750
Triticale - Silage	19	19	13.7	0.004515
Wheat, Common - Grain	113	113	10.3	0.021500
Wheat - Straw	3	494	33	0.006900
Wheat - Silage	39	39	18.6	0.005250
Wheat, Durum - Grain	41	41	3.7	0.021050

Crop	No. of Observations		CV (%)	N Removed Conversion Factor (lbs N/lbs yield)
	California	Total		
Vegetables				
Asparagus	2	19	14	0.002925
Beans, Green (Snap Beans)	1	122	25.7	0.002890
Broccoli	15	46	20.4	0.005600
Carrots	1	167	22.4	0.001645
Corn, Sweet	0	50	13.1	0.003585
Cucumbers	1	10	17.4	0.001080
Garlic	1	12	19.5	0.007550
Lettuce, Iceberg	45	68	16.7	0.001315
Lettuce, Romaine	14	26	13.7	0.001810
Melons, Cantaloupe	1	31	15.5	0.002435
Melons, Honeydew	1	12	22.1	0.001475
Melons, Watermelons	1	6	23.9	0.000695
Onions	13	45	19.7	0.001970
Pepper, Bell	6	40	7.9	0.001655
Potatoes	5	64	13.6	0.003120
Pumpkin	1	13	10.1	0.003680
Squash	11	74	22.4	0.001835
Sweet Potatoes	11	23	16.8	0.002370
Tomatoes, Fresh market	1	34	16.5	0.001305
Tomatoes, Processing	24	24	11.1	0.001365
Tree and Vine Crops				
Almonds	31	31	4.1	0.068000
Apples	1	132	35.1	0.000540
Apricots	1	22	114	0.002780
Cherries	1	24	19.8	0.002210
Figs	1	19	18.1	0.001270
Grapefruit	26	27	7.8	0.001480
Grapes - Raisins	16	19	5.8	0.005050

Crop	No. of Observations		CV (%)	N Removed Conversion Factor (lbs N/lbs yield)
	California	Total		
Grapes - Table	16	19	5.8	0.001130
Grapes - Wine	8	38	13	0.001800
Lemons	21	22	10	0.001290
Nectarines	31	41	27.1	0.001820
Olives	6	29	22.8	0.003140
Oranges	26	82	10.9	0.001480
Peaches	5	25	20.7	0.001130
Pears	1	64	17.9	0.000645
Pistachios	11	11	3.5	0.028050
Plums	1	11	11.2	0.001415
Pomegranate	0	7	15	0.007600
Prunes	18	18	16.3	0.005600
Tangerines	1	2	29.2	0.001270
Walnuts	18	18	11.2	0.015950

Notes:

1. Conversion factors are calculated from N concentrations expressed in lbs/ton at a moisture content common for the respective crop at harvest.
2. The calculated value for N removed is only accurate on a multi-year basis but may not be accurate for a specific year.
3. For perennial crops, N accumulation in perennial tissue is not included in the value.
4. For most crops where marketable yield is reported and cull or trash is removed in a processing facility, the calculated amount of N removed underestimates the actual amount, the difference being the N in cull or trash.

4 Documentation of Statistical Procedures and Tools

Statistical analysis was performed using Python, an open-source, high-level performing coding language. Each field or MU was assigned to a single APN if multiple APNs were reported. Fields were grouped by crop type and summary statistics calculated at the Coalition level.

4.1 Crop Grouping

The Coalition grouped some similar crops together for the statistical analysis. Crops that were grouped into different categories than the specific crop type reported are shown in Table 7. Crops that are harvested in different ways (e.g. grain corn vs. silage corn) or different varieties (e.g. processing vs. fresh

market tomatoes) were separated for the analysis. Some members did not indicate the specific crop type for these crops on their report. The Coalition attempted to determine this via follow-up with the member or by comparison of the reported yield to typical values. If the specific crop type could not be determined, it was followed by "-NR" indicating it was not reported.

Planting year for perennial crops was also requested by the Coalition for statistical analysis since the yield and N removed vary by age. For crops where sufficient data on age was reported, additional statistical analysis by age group was performed.

Table 7. Crop Types Grouped into Different Categories for Statistical Analysis.

Specific Crop	Crop Grouping for Analysis
Alfalfa - Seed	Seed Crop
Barley	Barley – NR
Bean - Blackeye	Bean Dry
Bean - Garbanzo	Bean Dry
Bean - Lima	Bean Dry
Blackberry	Berry
Cabbage - Seed	Seed Crop
Corn	Corn - NR
Cucumber - Seed	Vine Seed
Grass Hay	Hay/Forage
Melon - Seed	Vine Seed
Oat	Oat - NR
Onion - Seed	Vine Seed
Orange	Citrus
Peach	Peach/Nectarine
Pumpkin - Seed	Vine Seed
Ryegrass - Non-Irrigated	Non-Irrigated Crop
Safflower - Non-Irrigated	Non-Irrigated Crop
Squash - Seed	Vine Seed
Sudan Grass - Seed	Seed Crop
Sunflower - Non-Irrigated	Non-Irrigated Crop
Tomato	Tomato - NR
Vegetable Seed	Seed Crop
Walnut - Non-Irrigated	Non-Irrigated Crop

Specific Crop	Crop Grouping for Analysis
Watermelon - Seed	Vine Seed
Wheat	Wheat - NR
Wheat - Non-Irrigated	Non-Irrigated Crop

4.2 SUMMARY STATISTICS

The summary statistics are provided in Appendix A. For each crop type, the following summary statistics were calculated for A/R and A-R for all fields in the Coalition: mean, standard deviation, minimum, maximum, histogram plot, and box and whisker plot. For crops without R values, A/Y values are shown instead of A/R and A-R. Non-bearing or zero yield fields are not included in the statistics since A/R cannot be calculated. High outliers were determined using the modified interquartile range (IQR) method of Hubert and Vandervieren (2008). This method is different than what the Coalition used previously and adjusts the outlier threshold for skewness using the medcouple statistic (MC). When the data distribution is perfectly symmetrical, MC = 0 and the outlier threshold is the standard method of ±1.5*IQR from Tukey (1977). For crops with less than four unique values of A/R, A-R, or A/Y, outliers could not be calculated. These crops with a limited number of observations are shown in a table at the end of Appendix A. In addition, for the histogram and box and whisker plots, values greater than three times the difference between the upper and lower whisker were not shown to avoid skewing the display.

For almonds and walnuts, A/R box and whisker plots by crop age were also generated. The NR age group includes all fields where planting age was not reported. For other permanent crops where age was reported, there were not enough fields for different planting years for the information to be meaningful. Almond and walnut fields where age was not reported are shown in the "NR" group.

In the box and whisker plots, the boxes draw the 25th, 50th, and 75th percentiles, the whiskers show the outlier thresholds, and the dots above and below the box indicate the high and low outliers, respectively (Figure 4). Only high outliers represent potential over-application of N fertilizer and are shown in the outlier count in the summary tables for each crop in Appendix A. Outliers that are more than three times greater than the upper whisker were not displayed on the box and whisker plot to limit skewing of the data.

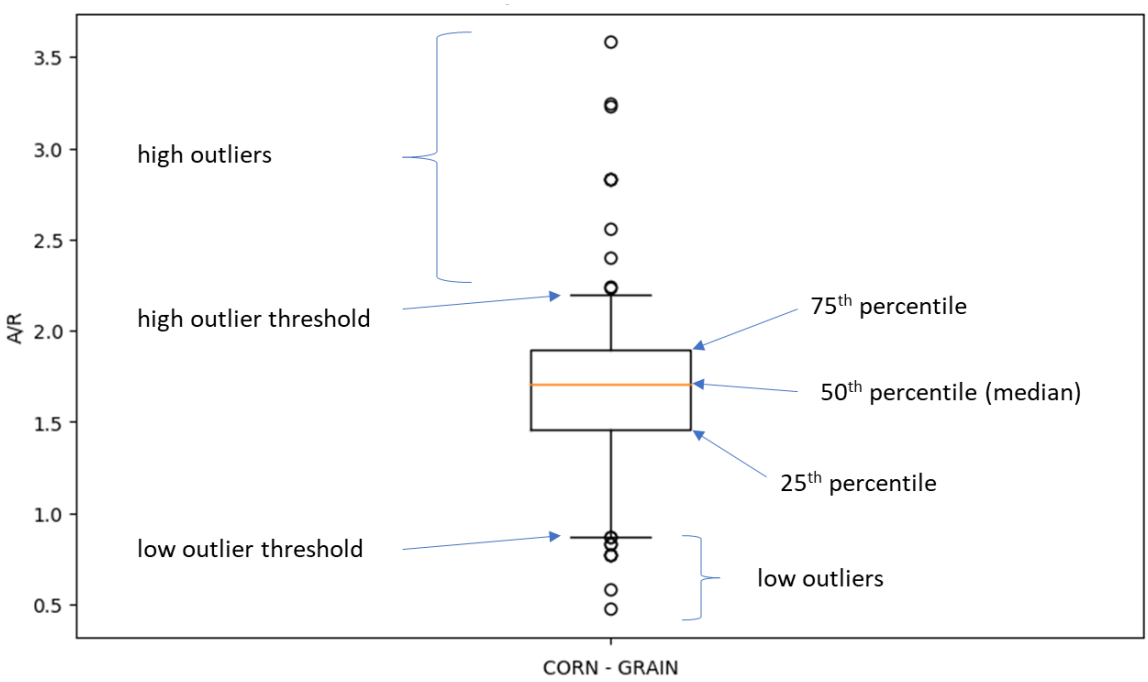

Figure 4. Interpretation Diagram for Box and Whisker Plot.

4.3 SOIL TYPE EVALUATION

The WDRs require that the evaluation of A/R ratios by crop type include an evaluation of irrigation method, soil conditions, and farming operation size. Irrigation method will be collected as part of the INMP reporting requirements beginning in 2021 for the 2020 crop year, so the A/R evaluation by irrigation type will occur during the next reporting year. Farming operation size is currently not collected as part of the NMP reporting.

Soil drainage class was selected to further evaluate outlier status at the Coalition level for each crop type. Soil drainage class refers to the frequency and duration of wet periods under conditions similar to those under which the soil developed. Anthropogenic alteration of the water regime, either through drainage or irrigation, is not a consideration unless the alterations have significantly changed the morphology of the soil. Soil data was obtained from the USDA Soil Survey Geographic Database (SSURGO) (https://websoilsurvey.nrcs.usda.gov/). Soil drainage class was determined for each field using the predominant soil drainage class for the largest map unit within each parcel. The drainage classes were then aggregated into 4 classes:

1. Well Drained
    - Excessively Drained
    - Somewhat Excessively Drained
    - Well Drained
2. Moderately Well Drained
3. Somewhat Poorly Drained
4. Poorly Drained

- Poorly Drained
- Very Poorly Drained

The influence of soil drainage class on A/R values for each crop was assessed using a one-way ANOVA test using the SciPy statistical package in Python (https://docs.scipy.org/doc/scipy/reference/generated/scipy.stats.f_oneway.html). This test evaluates (for each crop type) the hypothesis that all drainage classes have the same mean A/R values. A result is considered statistically significant for p-values < 0.05. The soil evaluation was not performed for crops without R values or with a small number of observations.

5 RESULTS

5.1 NMP DATA

Boxplots of the yield and N applied for the largest acreage crops within the Coalition are shown in Figures 5 and 6, respectively. The yield and N applied for some crop types varied by several orders of magnitude.

The summary statistics by crop type for A/R, A-R, and A/Y are provided in Appendix A.

The box and whisker plots of A/R by crop age for almonds and walnuts did not show any clear differences in mean A/R values between the different age groups. The difference in number of observations between age groups, the lack of planting year response by most members, and uncertain planting years for some orchards makes it difficult to evaluate whether there are any significant differences between age groups.

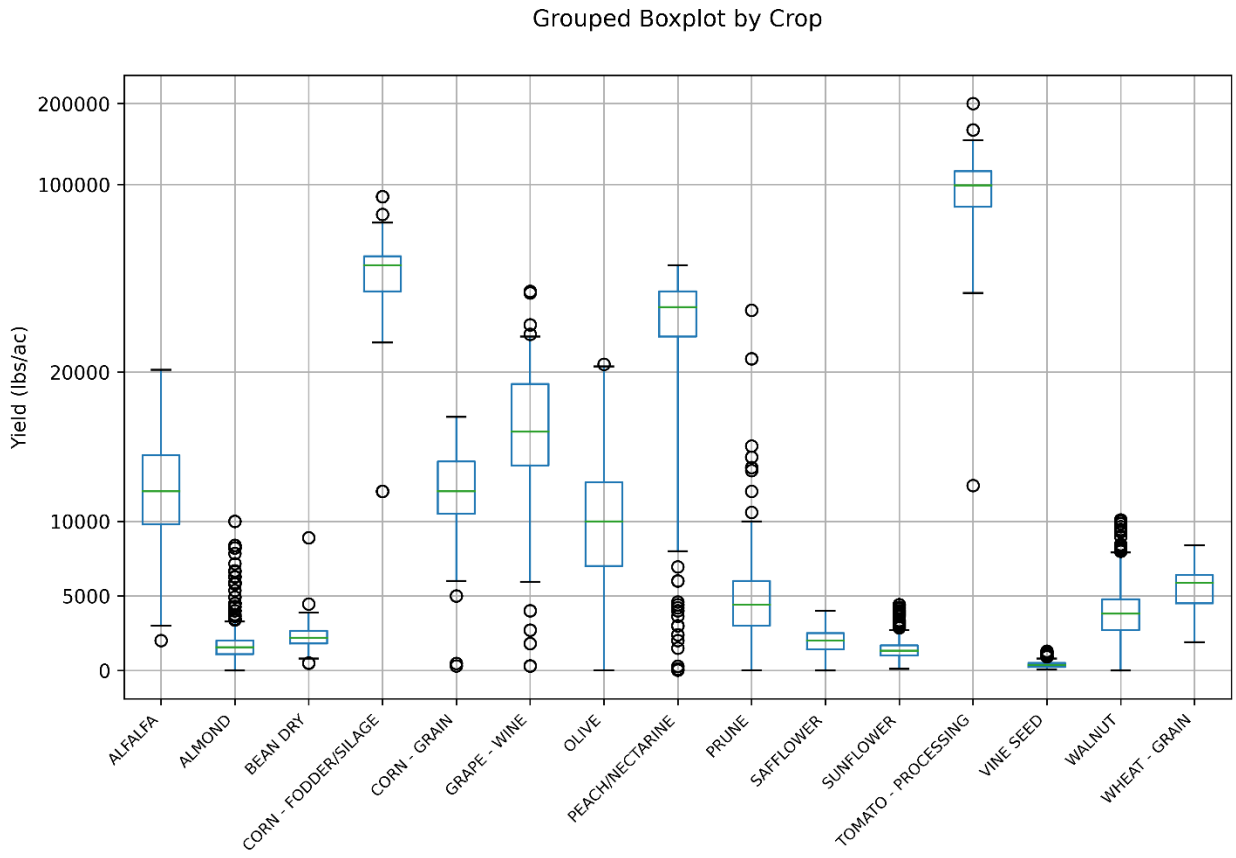

Figure 5. Box and Whisker Plot Showing the Yield per Acre for the Highest Acreage Crops

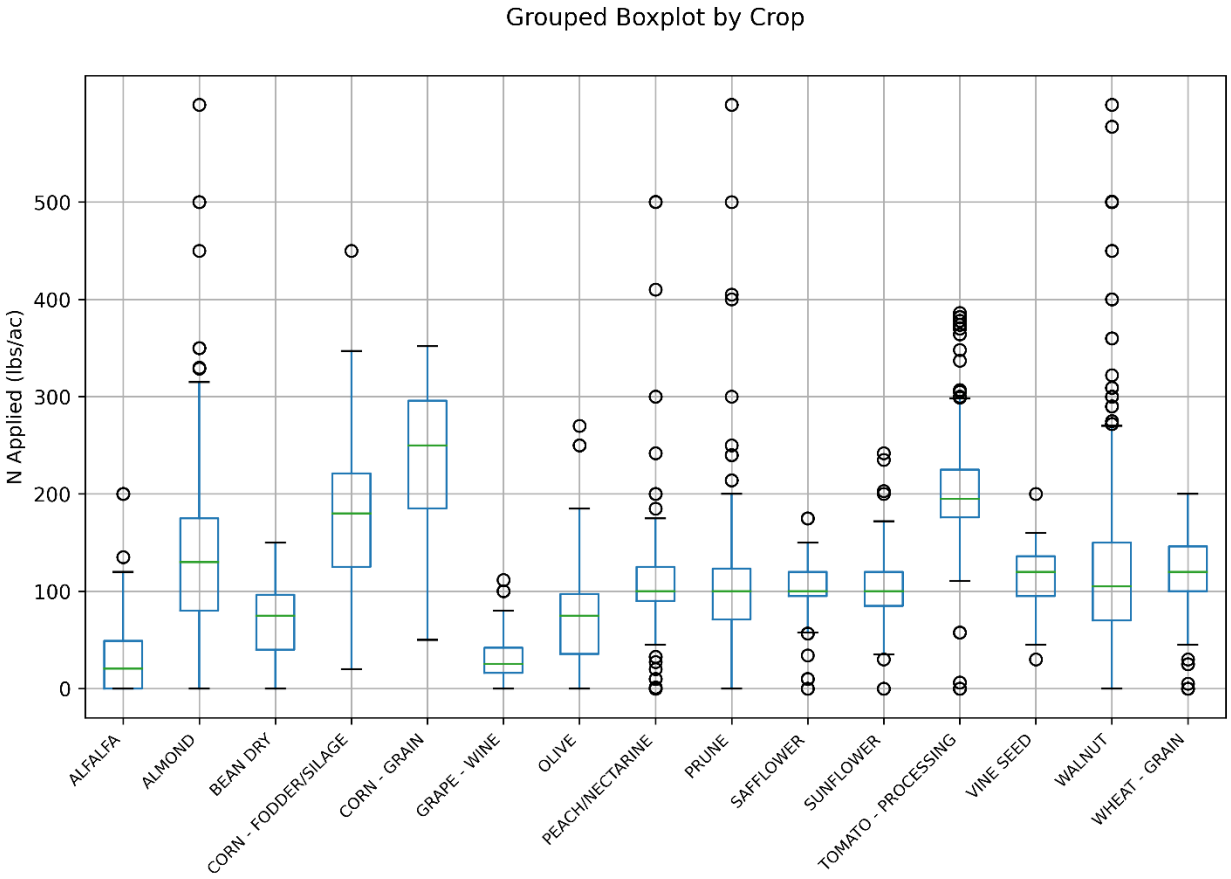

Figure 6. Box and Whisker Plot Showing the N Applied per Acre for the Highest Acreage Crops

5.2 SOIL TYPE EVALUATION RESULTS

Fifteen crop types were included in the soil type evaluation, with the remaining crops either not having enough observations or not having R values. Results are shown in Table 8. Most of the analyzed crops had a large percentage of their observations from the well-drained soil class, limiting the reliability of the analysis which assumes a normal distribution. P-values less than 0.05, which indicate a significant effect, occurred for the following crops: alfalfa, dry beans, wine grapes, olive, sunflower, triticale, and wheat. Olive had an extremely high outlier in the well-drained class which skewed the mean A/R, limiting the reliability of the analysis. Some of the crops with significant effects had slightly higher mean A/R values in the moderately well drained class, but some of these were because of outliers skewing the results.

Table 8. Evaluation of Soil Drainage Class Effect on A/R.

Crop	Drainage Class	# of Fields	Mean A/R	P-value
Alfalfa	Poor	111	0.03	0.0000
	Somewhat Poor	97	0.05	
	Moderately Well	151	0.13	
	Well	186	0.09	
Almond	Poor	48	1.74	0.9623
	Somewhat Poor	97	1.56	
	Moderately Well	258	1.98	
	Well	1269	5.71	
Bean Dry	Poor	18	0.72	0.0000
	Somewhat Poor	36	0.80	
	Moderately Well	46	1.10	
	Well	58	0.92	
Corn – Fodder/Silage	Poor	24	1.73	0.0750
	Somewhat Poor	7	1.05	
	Moderately Well	6	1.05	
	Well	37	0.84	
Corn - Grain	Poor	61	2.27	0.1218
	Somewhat Poor	49	1.74	
	Moderately Well	25	4.05	
	Well	51	1.57	
Grape - Wine	Poor	131	1.07	0.0000
	Somewhat Poor	111	0.89	
	Moderately Well	8	1.25	
	Well	18	0.91	
Olive	Poor	4	4.53	0.0076
	Somewhat Poor	10	2.25	
	Moderately Well	9	2.75	
	Well	112	40.19	
Peach/Nectarine	Poor	1	2.01	0.9529
	Somewhat Poor	3	1.87	
	Moderately Well	57	11.37	
	Well	213	170.46	
Pear	Poor	40	5.36	0.7390
	Somewhat Poor	42	3.58	
	Moderately Well	1	4.13	
	Well	1	0.00	
Prune	Poor	12	3.24	0.1574
	Somewhat Poor	29	4.61	
	Moderately Well	137	8.81	
	Well	309	62.52	

Crop	Drainage Class	# of Fields	Mean A/R	P-value
Sunflower	Poor	83	3.60	0.0005
	Somewhat Poor	67	3.23	
	Moderately Well	67	3.75	
	Well	238	3.48	
Tomato - Processing	Poor	105	1.61	0.2450
	Somewhat Poor	145	1.66	
	Moderately Well	91	1.66	
	Well	358	1.45	
Triticale	Poor	25	0.86	0.0000
	Somewhat Poor	7	1.69	
	Moderately Well	2	2.28	
	Well	15	1.38	
Walnut	Poor	66	3.40	0.1795
	Somewhat Poor	587	4.19	
	Moderately Well	586	12.01	
	Well	1985	7.63	
Wheat - Grain	Poor	51	1.01	0.0241
	Somewhat Poor	76	1.03	
	Moderately Well	54	1.11	
	Well	143	1.04	

6 CONCLUSIONS

The overall member completion percentage for NMP Summary Reports for the 2019 CY was a significant improvement compared to previous years. Many of the reporting errors encountered on member NMP summary reports in previous years were reduced by using standardized, online reporting systems and improved data validation checking. This reduced the amount of time spent reviewing data for potential errors. While data quality was generally improved in 2020 compared to previous years, and a significant effort was made to correct all errors, some errors may have gone undetected. Common errors identified during the review process included incomplete data, unreasonable values for yield or N applied, incorrect yield units, or missing/incorrect yield basis if different than standard.

The NMP results showed that A/R and A-R can vary by several orders of magnitude within the same crop class. Some of the highest outliers may be due to reporting errors, although the exclusion of records with unreasonable N applied or yield values limited this.

The crop age statistical analysis results were inconclusive and limited by the small number of members who reported planting year and potentially inaccurate planting years. Walnuts and almonds were the only crops with a large amount of observations in each year, although many of the observations did not have a planting year. The other perennial crops had smaller numbers of observations in each age class, making it difficult to discern any trends.

Soil type, as represented by drainage class, had a significant effect on the mean A/R values in the following crops: alfalfa, dry beans, wine grapes, olive, sunflower, triticale, and wheat; however, the data was generally not normally distributed and many crops had drainage classes with a low number of observations, limiting the reliability of the analysis.

7 MEMBER FEEDBACK AND OUTREACH

Member outreach is expected to occur in winter 2020. Outreach activities will include individualized feedback reports sent to each member in the Coalition who submitted N application and yield data. The reports will include a table showing township and Coalition averages for N applied, A/R, and A-R for each of the member's fields. An example of an individual member feedback report is provided in Appendix C.

The member feedback report is designed to show nitrogen use efficiency for the member's fields within the context of other members in the Coalition. Members are also encouraged to contact the Coalition if they identify any incorrectly reported values that were not identified during the data review process.

8 ANNUAL MANAGEMENT PRACTICE IMPLEMENTATION DATA

The farm evaluation data required by the WDRs is not included with this report as the most recent Farm Evaluation survey was conducted for the 2017 crop year and reported in 2018. Farm Evaluation data will be collected again and reported in 2021 for the 2020 year.

Management practice implementation data from INMP and Management Practice Implementation Report (MPIR) will be collected and reported in 2021 for the 2020 crop year.

9 ANNUAL NITROGEN MANAGEMENT PLAN SUMMARY REPORT DATA

The township-level aggregated and individual field A/R and A-R (AR) data is provided in Appendix D. The individual field AR data is summarized by anonymous member ID. Some APNs could not be matched with the county dataset and therefore the township for these parcels is listed as "Unknown". This could be due to an error in the reported APN or a correct APN that was recently redrawn and had not yet been updated in the county's GIS parcel layer. For crops without R values, A/Y values are provided. Outliers in the individual field AR table, which are required to be identified by the WDRs, were determined using A/R. Outliers were not determined for crops without R values or less than 4 unique values of A/R.

Field data by anonymous APN ID will be reported in 2021 for the 2020 crop year.

10 REFERENCES

CH2M Hill. 2014. Sacramento Valley Water Quality Coalition groundwater quality assessment report. Northern California Water Association. June 2014.

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Geisseler, D. 2016. Nitrogen concentrations in harvested plant parts - A literature overview. https://apps1.cdfa.ca.gov/FertilizerResearch/docs/Geisseler_Report_2016_12_02.pdf

Hubert, M. and Vandervieren, E. 2008. An adjusted boxplot for skewed distributions. Computational Statistics & Data Analysis. 52(12):5186-5201. DOI: 10.1016/j.csda.2007.11.008

Tukey. J.W. 1977. Exploratory data analysis. Addison-Wesley, Reading MA.

APPENDICES

Appendix A: Summary Statistics by Crop

Appendix B: Example Member Feedback Report

Appendix C: Maximum Yields by Crop Type for Data Exclusion

Appendix D: Annual Nitrogen Management Plan Summary Report Data

APPENDIX A

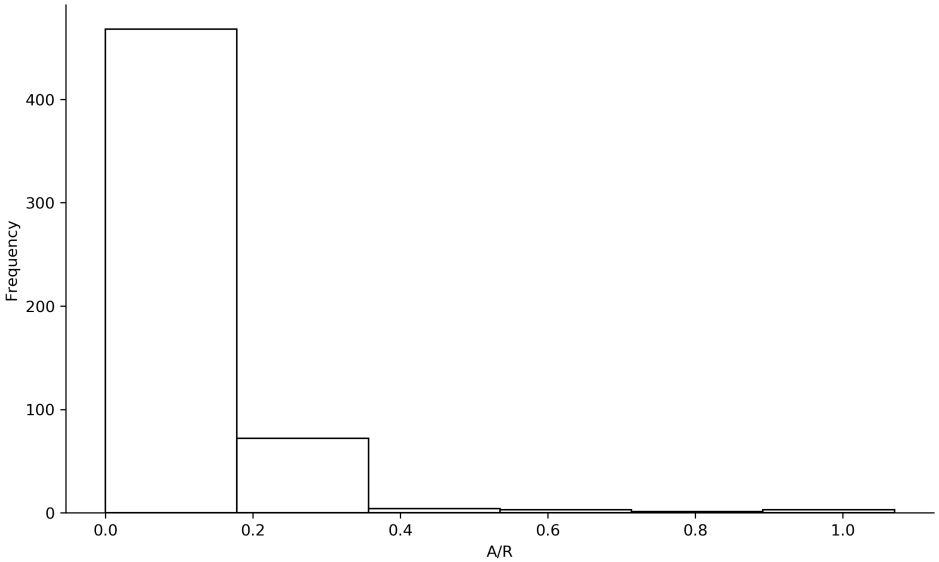
SUMMARY STATISTICS BY CROP

1. ALFALFA

Table 1-1. Summary statistics for ALFALFA fields in Coalition.

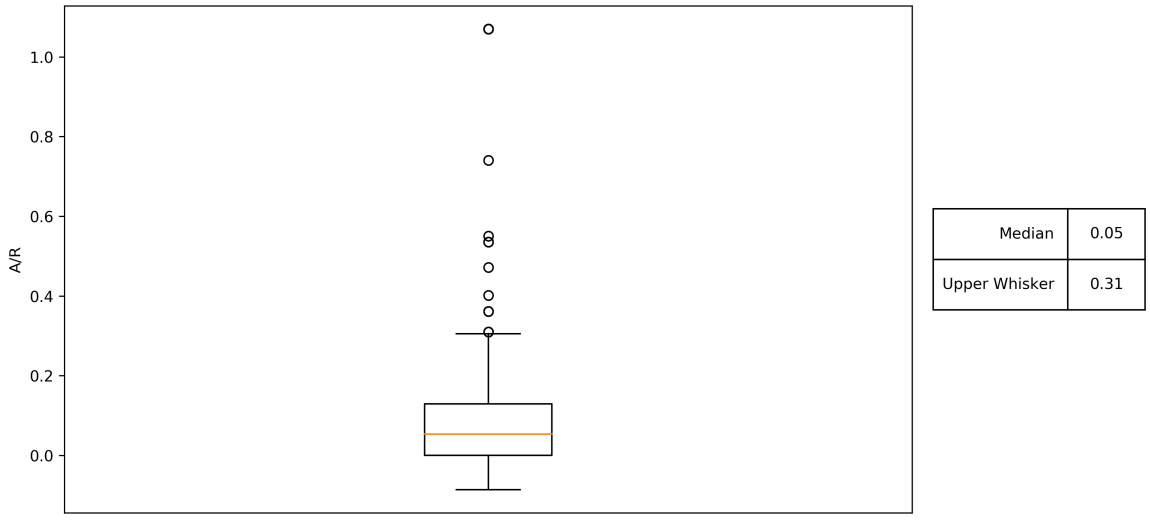
Parameter	# Fields	Acreage	Mean	St. Dev.	Min	Max	Outlier Threshold	No. Outliers
A/R	551	29943.67	0.08	0.12	0.0	1.07	0.31	13
A-R	551	29943.67	-352.79	114.92	-635.46	13.1	-63.69	5

Figure 1-1. Histogram of A/R for ALFALFA fields in the Coalition.



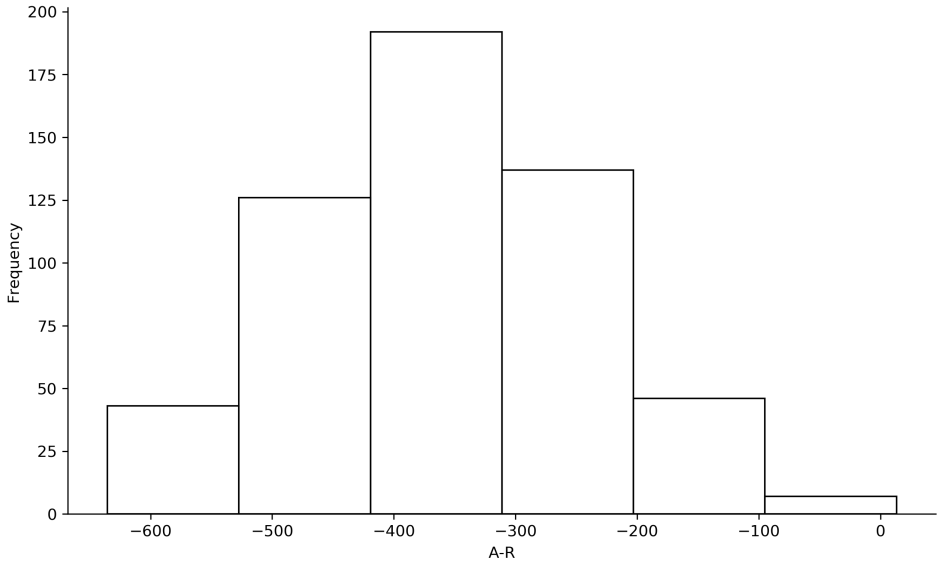
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot.

Figure 1-2. Box and whisker plot of A/R for ALFALFA fields in the Coalition.



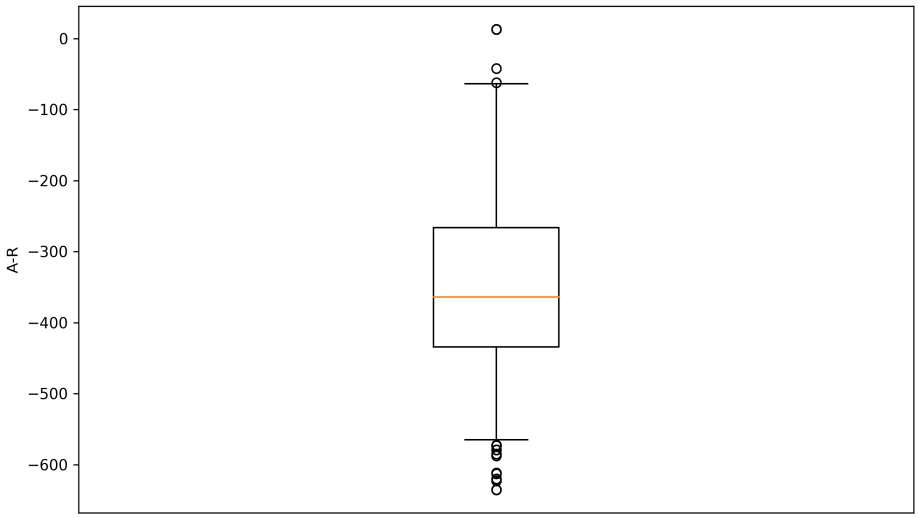
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot. The whiskers are the medcouple values with the upper whisker being the outlier threshold. Dots are outliers.

Figure 1-3. Histogram of A-R for ALFALFA fields in the Coalition.



Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot.

Figure 1-4. Box and whisker plot of A-R for ALFALFA fields in the Coalition.



Median	-363.8
Upper Whisker	-63.69

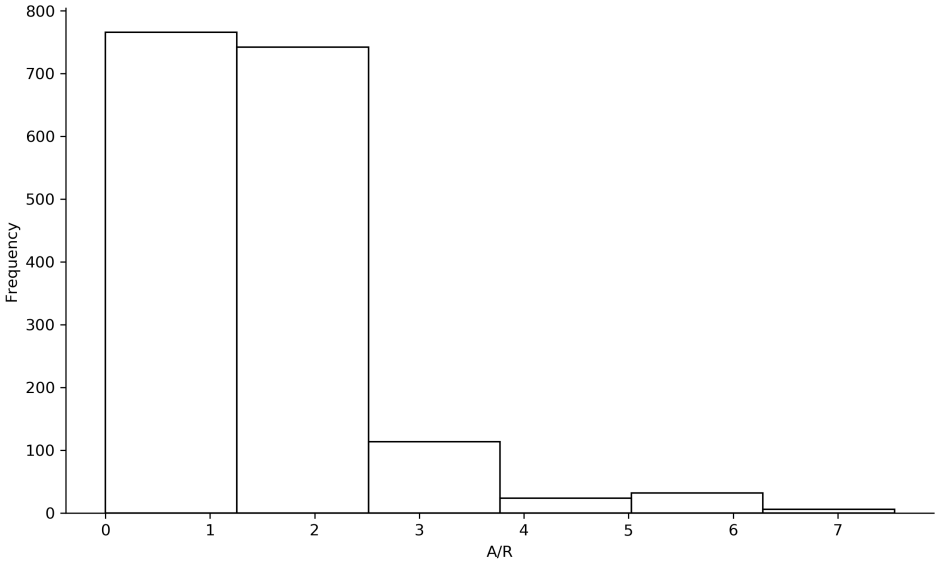
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot. The whiskers are the medcouple values with the upper whisker being the outlier threshold. Dots are outliers.

2. ALMOND

Table 2-1. Summary statistics for ALMOND fields in Coalition.

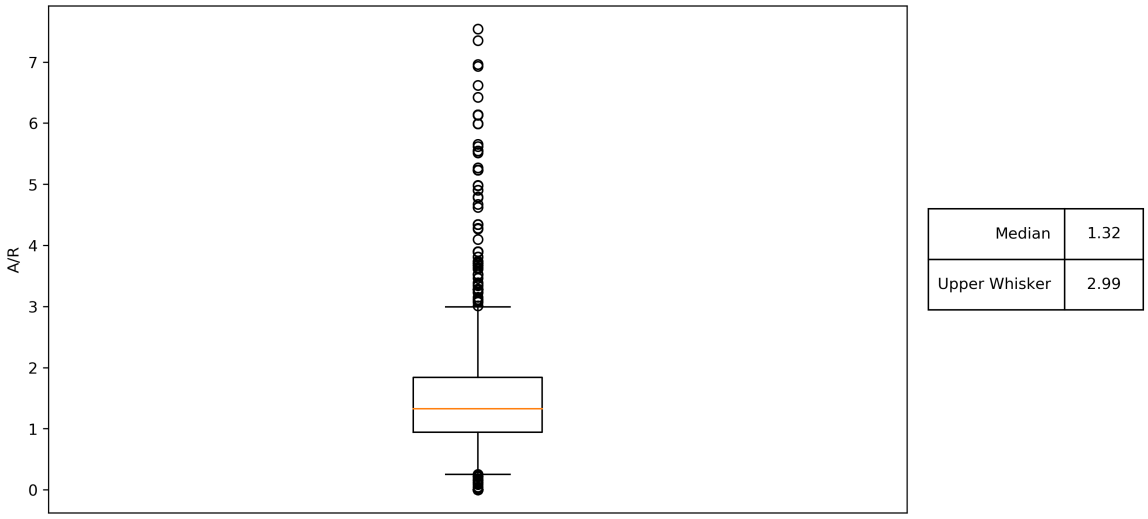
Parameter	# Fields	Acreage	Mean	St. Dev.	Min	Max	Outlier Threshold	No. Outliers
A/R	1705	82271.66	4.72	124.63	0.0	5147.06	2.99	143
A-R	1705	82271.66	33.18	71.67	-531.91	532.0	133.16	69

Figure 2-1. Histogram of A/R for ALMOND fields in the Coalition.



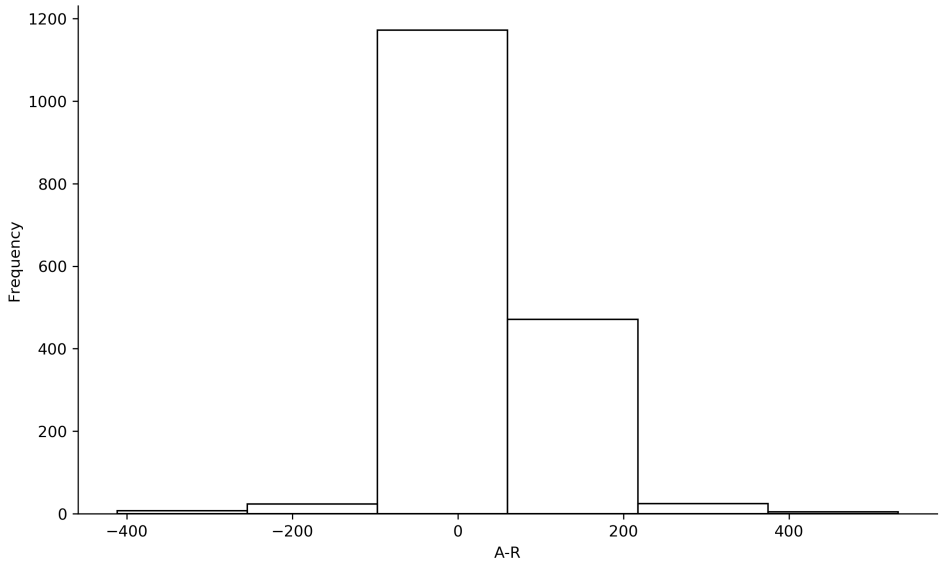
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot.

Figure 2-2. Box and whisker plot of A/R for ALMOND fields in the Coalition.



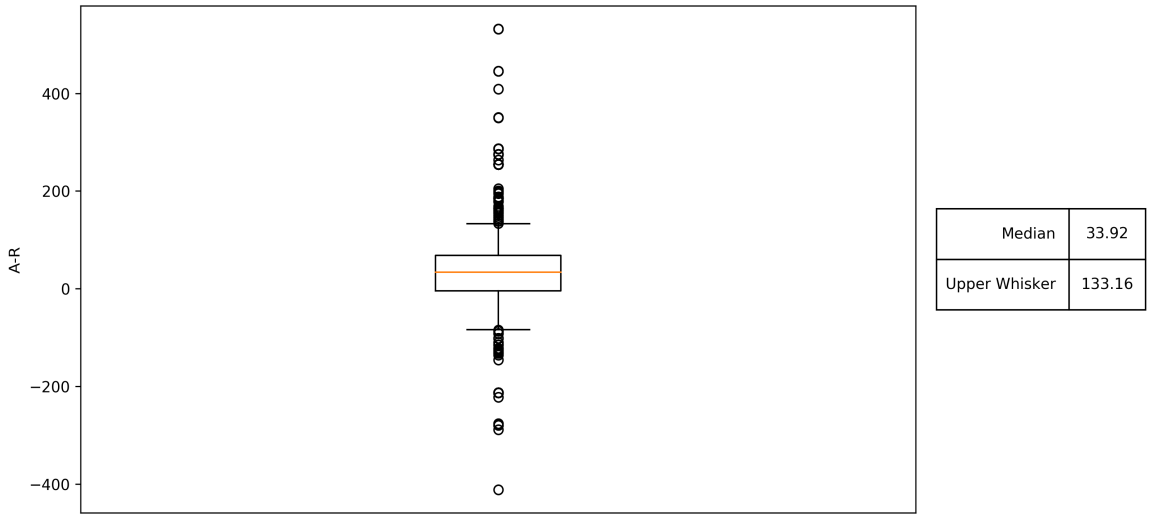
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot. The whiskers are the medcouple values with the upper whisker being the outlier threshold. Dots are outliers.

Figure 2-3. Histogram of A-R for ALMOND fields in the Coalition.



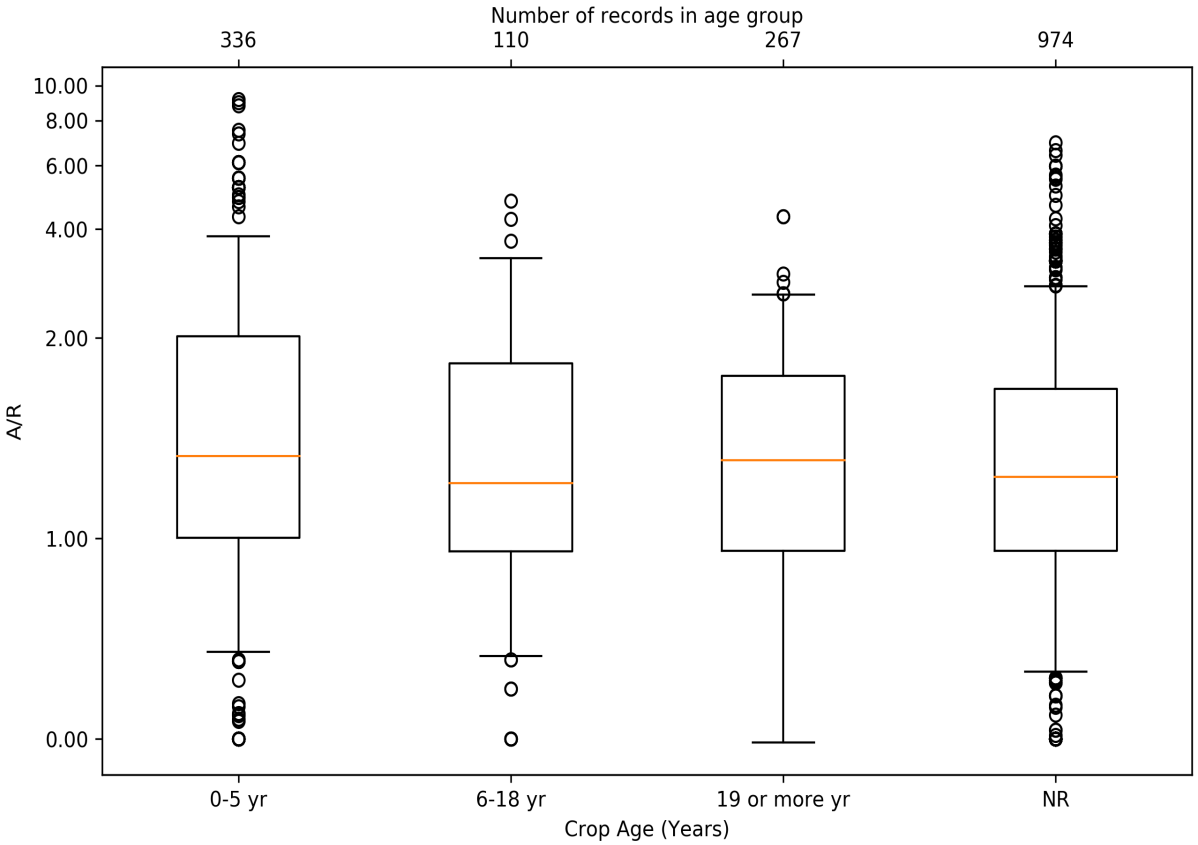
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot.

Figure 2-4. Box and whisker plot of A-R for ALMOND fields in the Coalition.



Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot. The whiskers are the medcouple values with the upper whisker being the outlier threshold. Dots are outliers.

Figure 2-5. Box and whisker plot of A/R for ALMOND fields in the Coalition by age



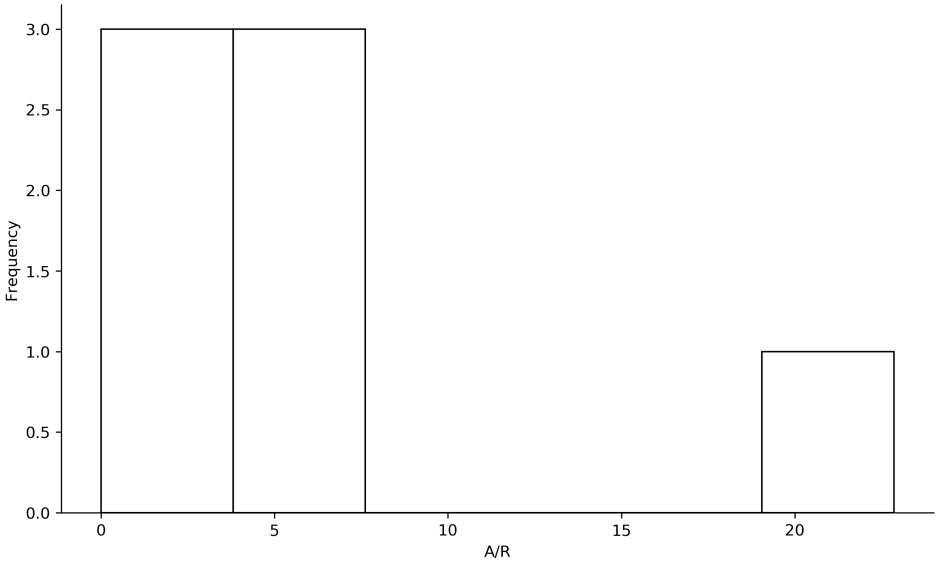
Values >2x the difference between the upper and lower whisker not shown to avoid skewing of plot.

3. APPLE

Table 3-1. Summary statistics for APPLE fields in Coalition.

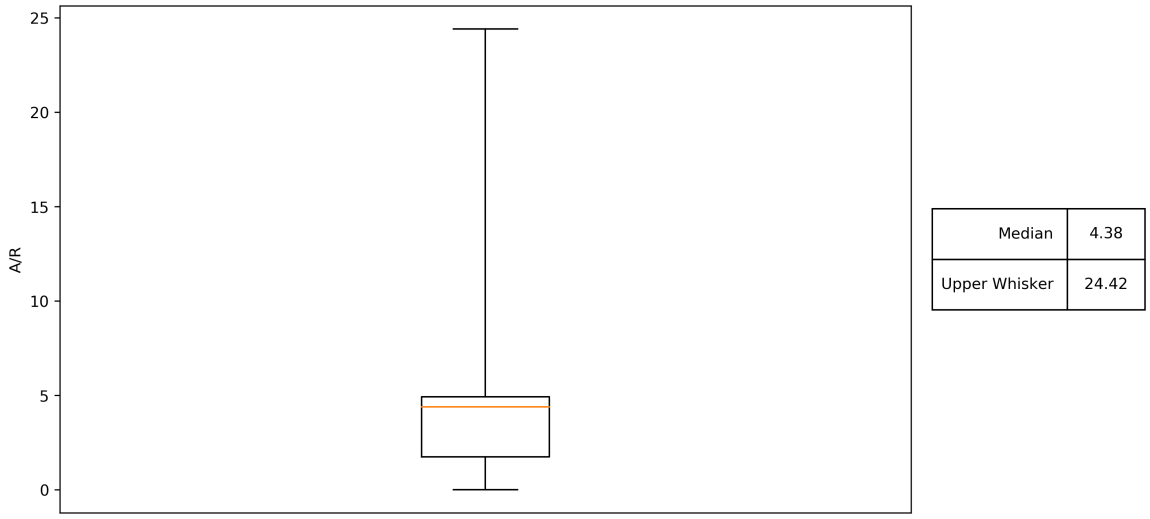
Parameter	# Fields	Acreage	Mean	St. Dev.	Min	Max	Outlier Threshold	No. Outliers
A/R	8	148.9	32.31	75.33	0.0	217.86	24.42	1
A-R	8	148.9	49.08	34.21	-9.45	79.63	77.39	1

Figure 3-1. Histogram of A/R for APPLE fields in the Coalition.



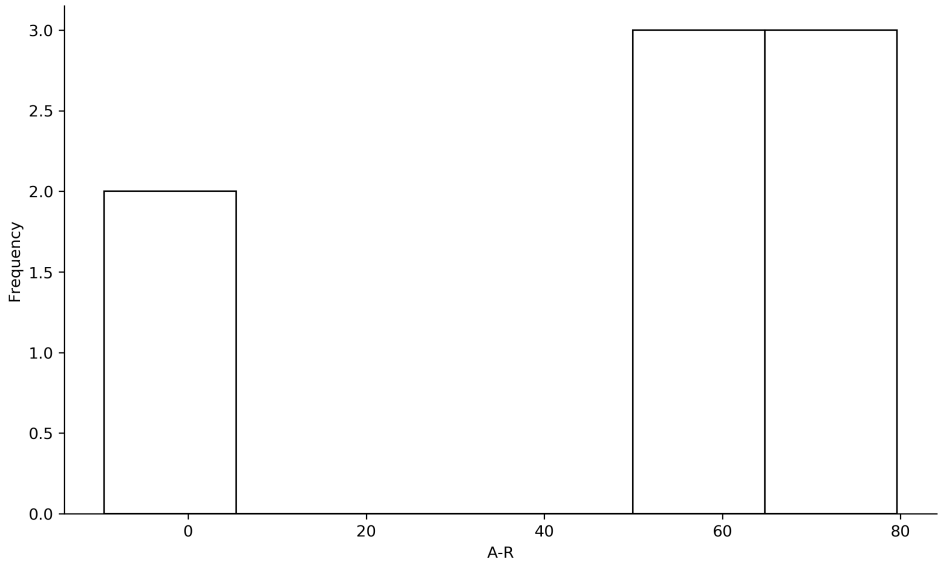
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot.

Figure 3-2. Box and whisker plot of A/R for APPLE fields in the Coalition.



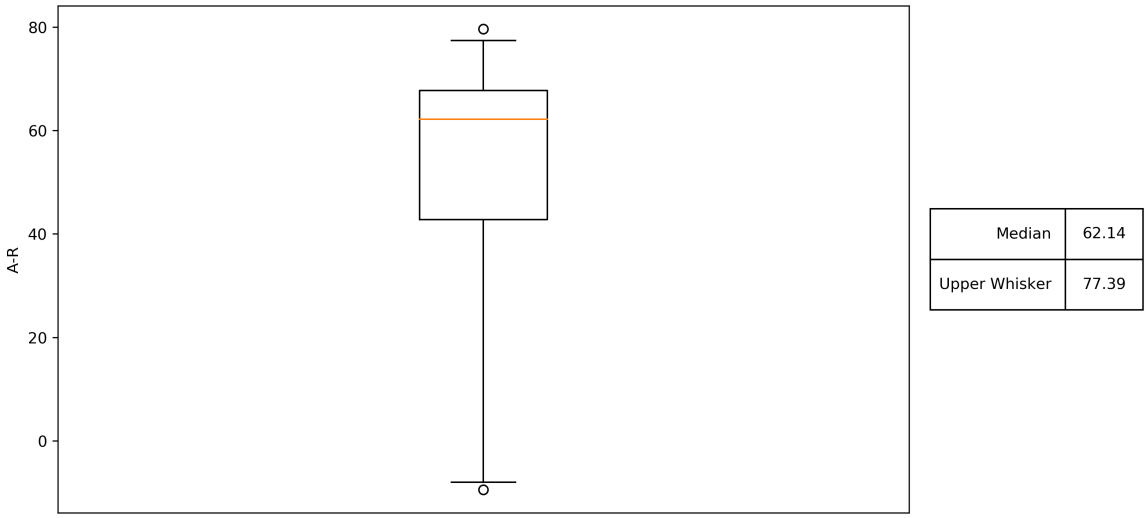
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot. The whiskers are the medcouple values with the upper whisker being the outlier threshold. Dots are outliers.

Figure 3-3. Histogram of A-R for APPLE fields in the Coalition.



Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot.

Figure 3-4. Box and whisker plot of A-R for APPLE fields in the Coalition.



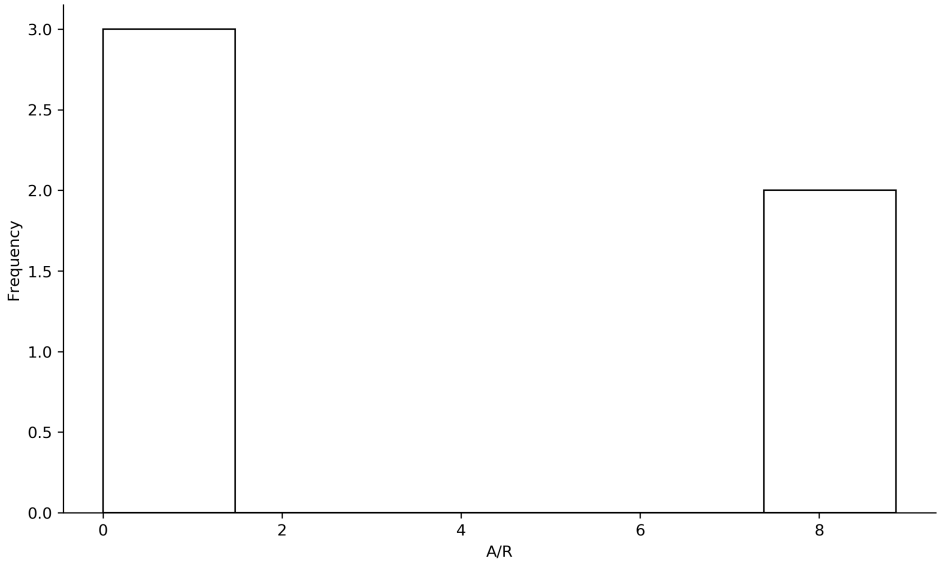
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot. The whiskers are the medcouple values with the upper whisker being the outlier threshold. Dots are outliers.

4. APRICOT/APRIUM

Table 4-1. Summary statistics for APRICOT/APRIUM fields in Coalition.

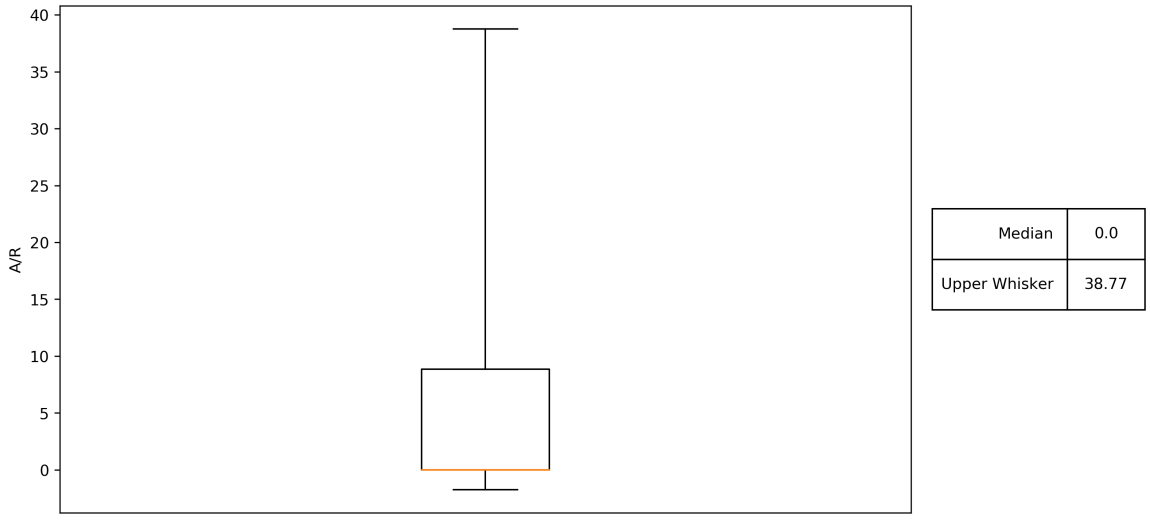
Parameter	# Fields	Acreage	Mean	St. Dev.	Min	Max	Outlier Threshold	No. Outliers
A/R	5	10.0	3.54	4.85	0.0	8.86	38.77	0
A-R	5	10.0	32.85	51.84	-8.13	89.6	368.39	0

Figure 4-1. Histogram of A/R for APRICOT/APRIUM fields in the Coalition.



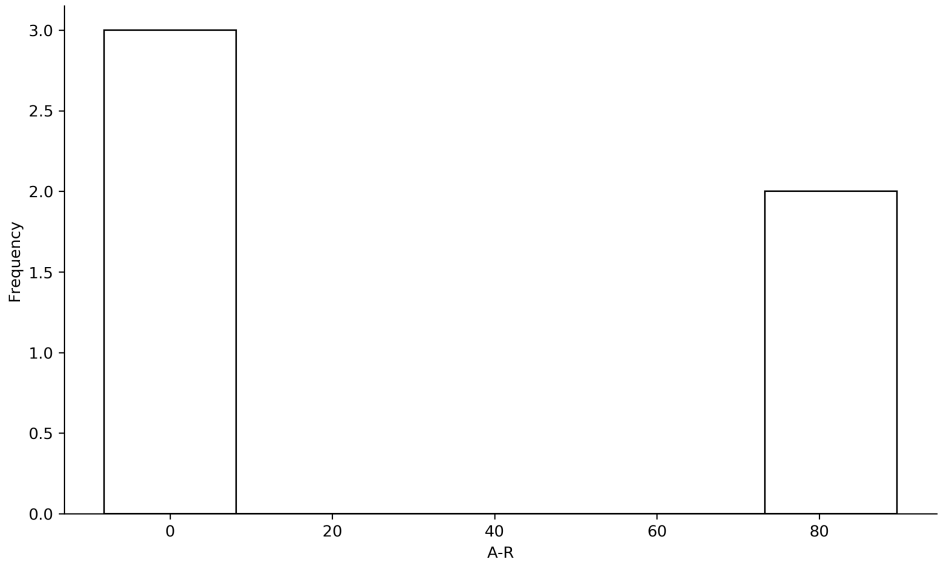
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot.

Figure 4-2. Box and whisker plot of A/R for APRICOT/APRIUM fields in the Coalition.



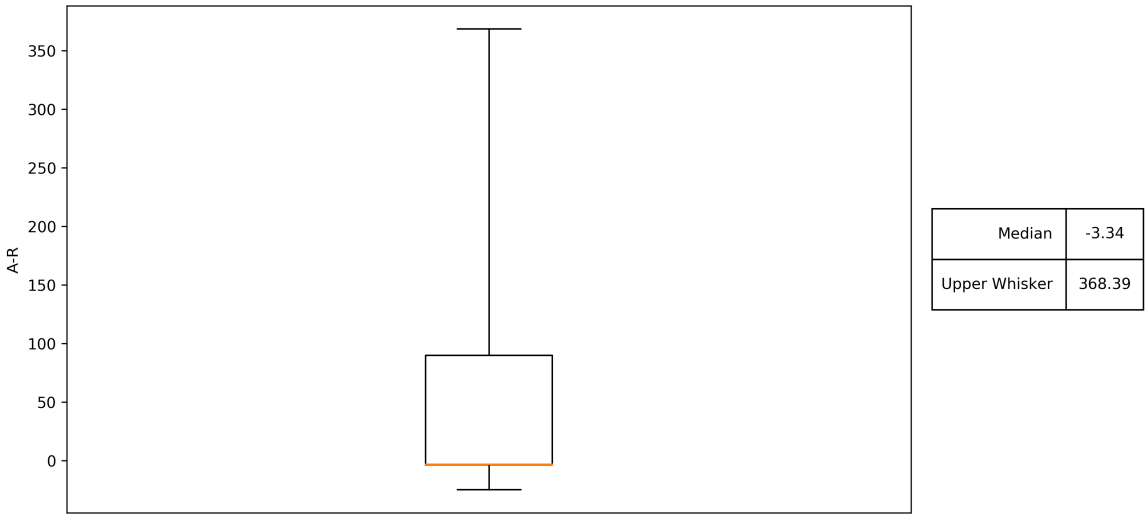
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot. The whiskers are the medcouple values with the upper whisker being the outlier threshold. Dots are outliers.

Figure 4-3. Histogram of A-R for APRICOT/APRIUM fields in the Coalition.



Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot.

Figure 4-4. Box and whisker plot of A-R for APRICOT/APRIUM fields in the Coalition.



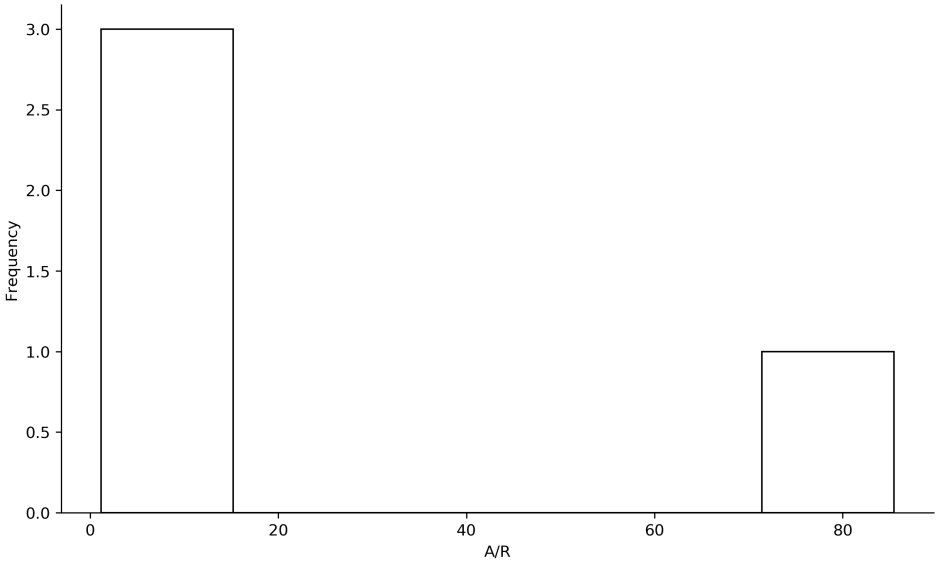
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot. The whiskers are the medcouple values with the upper whisker being the outlier threshold. Dots are outliers.

5. ASPARAGUS

Table 5-1. Summary statistics for ASPARAGUS fields in Coalition.

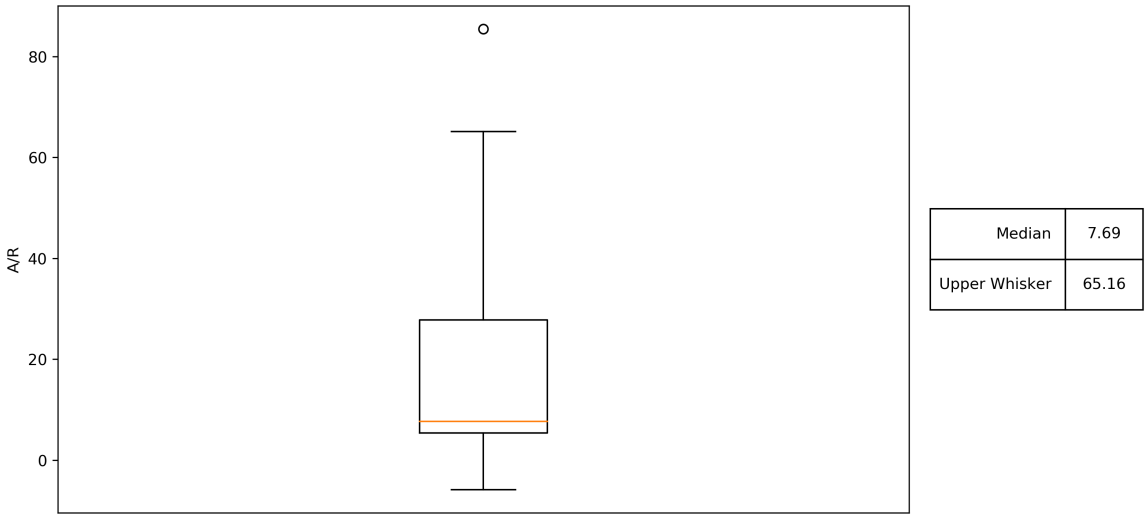
Parameter	# Fields	Acreage	Mean	St. Dev.	Min	Max	Outlier Threshold	No. Outliers
A/R	4	105.0	25.5	40.1	1.15	85.47	65.16	1
A-R	4	105.0	79.47	112.84	1.33	247.08	185.29	1

Figure 5-1. Histogram of A/R for ASPARAGUS fields in the Coalition.



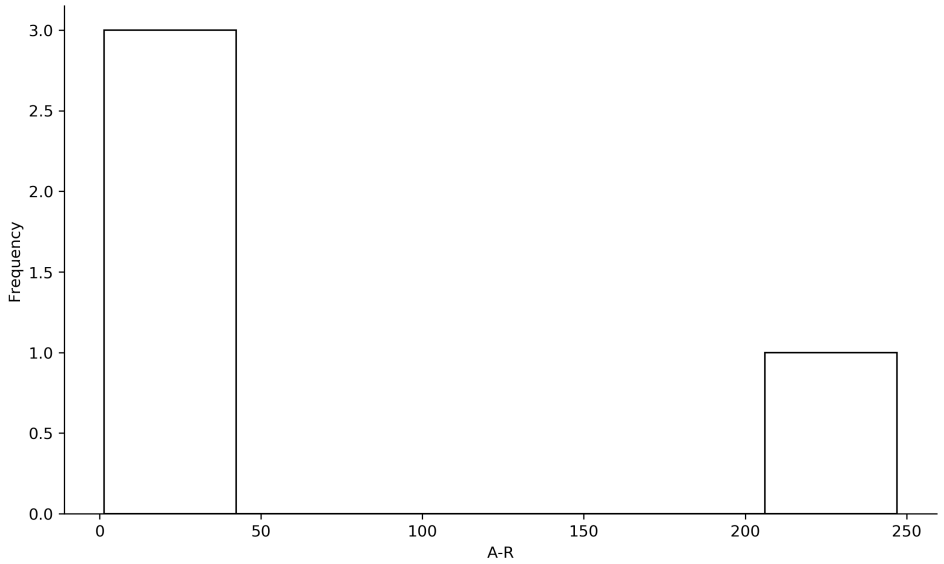
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot.

Figure 5-2. Box and whisker plot of A/R for ASPARAGUS fields in the Coalition.



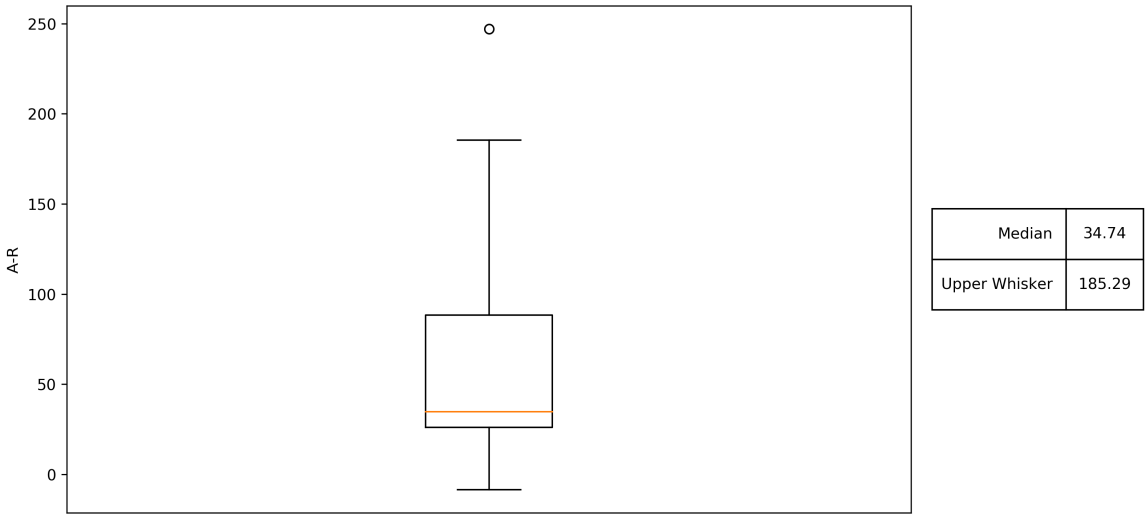
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot. The whiskers are the medcouple values with the upper whisker being the outlier threshold. Dots are outliers.

Figure 5-3. Histogram of A-R for ASPARAGUS fields in the Coalition.



Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot.

Figure 5-4. Box and whisker plot of A-R for ASPARAGUS fields in the Coalition.



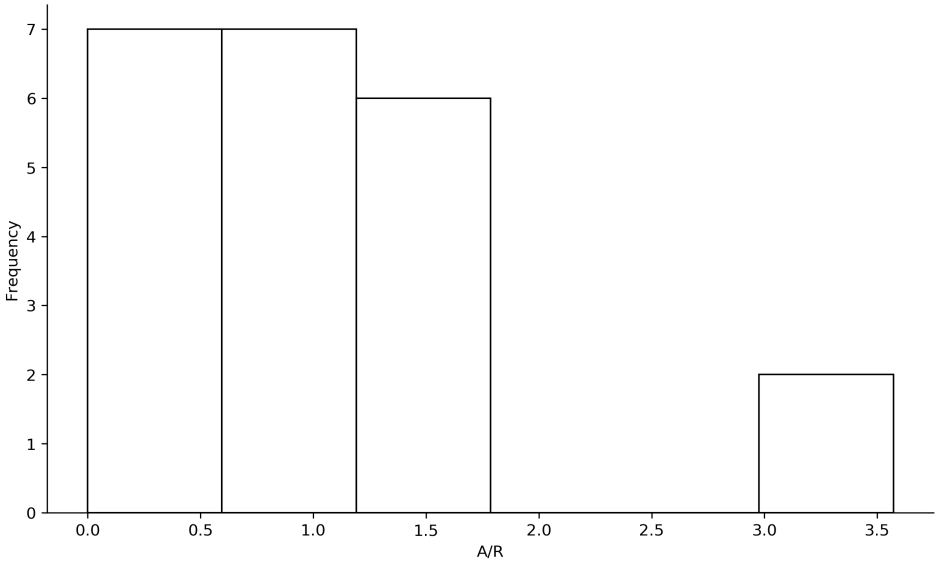
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot. The whiskers are the medcouple values with the upper whisker being the outlier threshold. Dots are outliers.

6. BARLEY - GRAIN

Table 6-1. Summary statistics for BARLEY - GRAIN fields in Coalition.

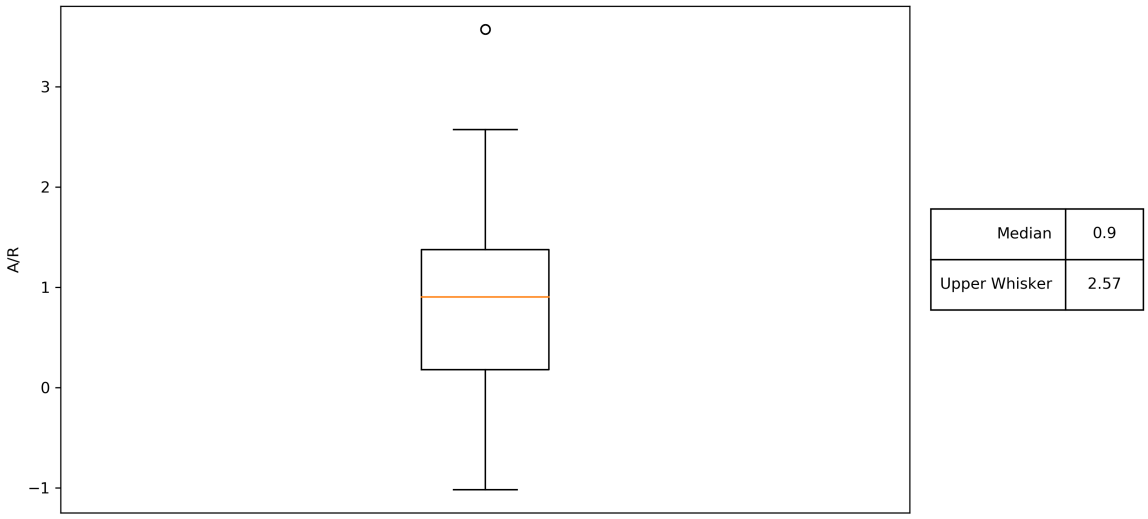
Parameter	# Fields	Acreage	Mean	St. Dev.	Min	Max	Outlier Threshold	No. Outliers
A/R	22	767.8	1.01	0.99	0.0	3.57	2.57	2
A-R	22	767.8	-5.2	40.97	-91.44	43.2	119.79	0

Figure 6-1. Histogram of A/R for BARLEY - GRAIN fields in the Coalition.



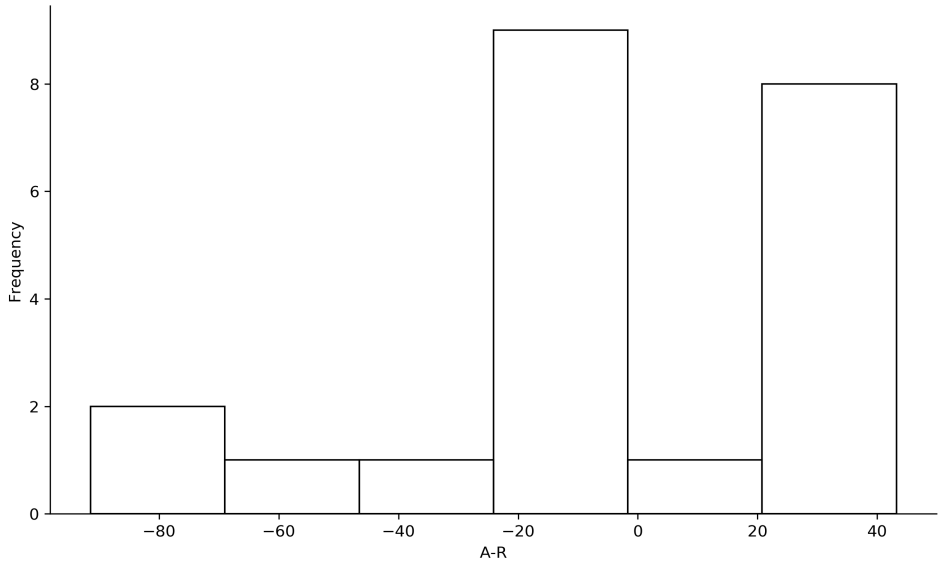
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot.

Figure 6-2. Box and whisker plot of A/R for BARLEY - GRAIN fields in the Coalition.



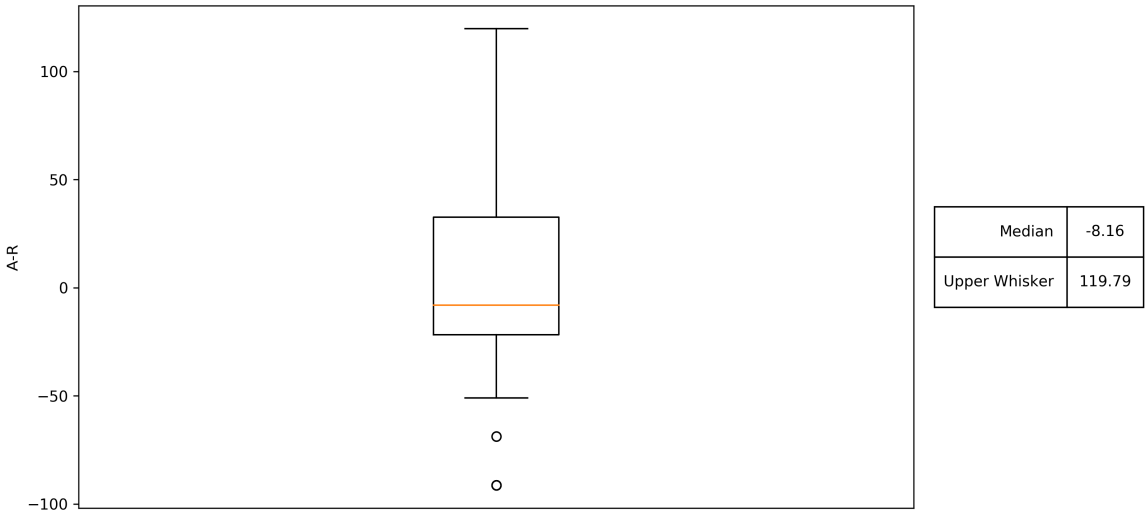
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot. The whiskers are the medcouple values with the upper whisker being the outlier threshold. Dots are outliers.

Figure 6-3. Histogram of A-R for BARLEY - GRAIN fields in the Coalition.



Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot.

Figure 6-4. Box and whisker plot of A-R for BARLEY - GRAIN fields in the Coalition.



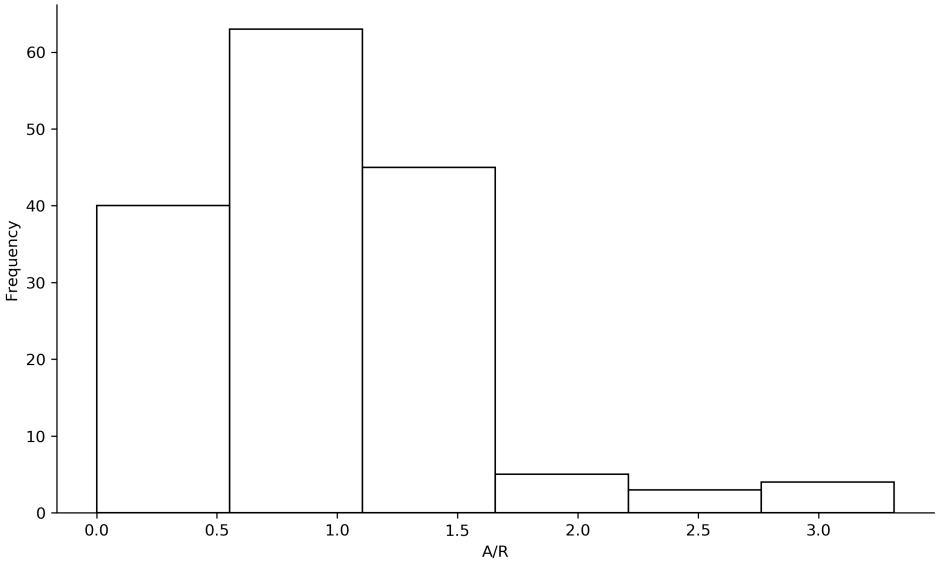
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot. The whiskers are the medcouple values with the upper whisker being the outlier threshold. Dots are outliers.

7. BEAN DRY

Table 7-1. Summary statistics for BEAN DRY fields in Coalition.

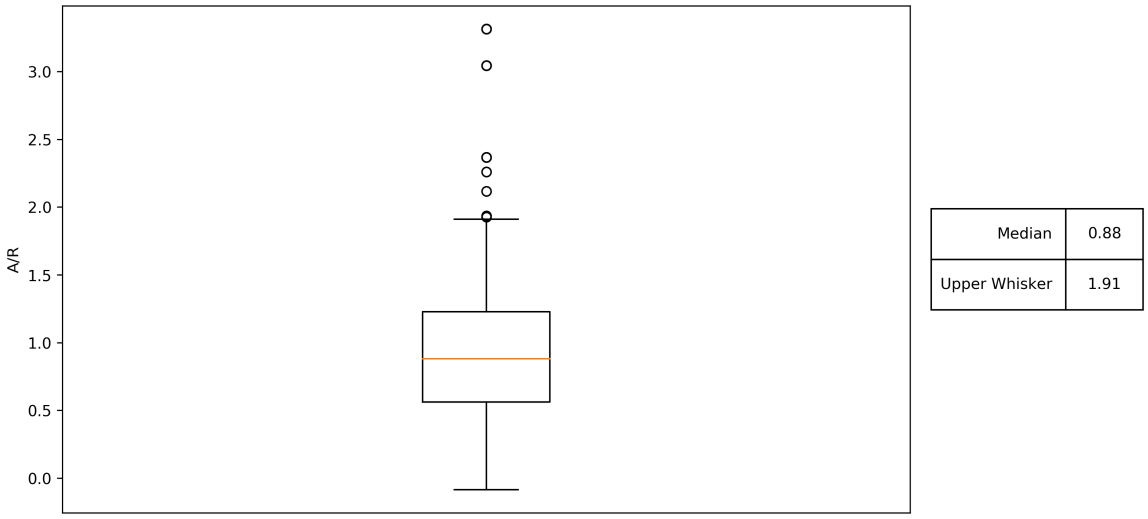
Parameter	# Fields	Acreage	Mean	St. Dev.	Min	Max	Outlier Threshold	No. Outliers
A/R	160	7976.4	0.92	0.63	0.0	3.31	1.91	10
A-R	160	7976.4	-14.18	46.57	-235.21	86.6	74.23	2

Figure 7-1. Histogram of A/R for BEAN DRY fields in the Coalition.



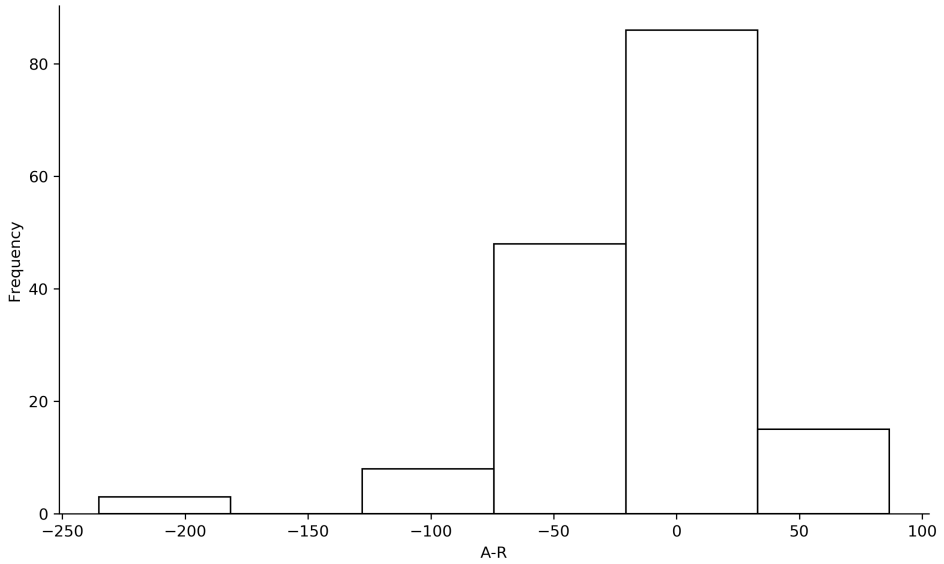
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot.

Figure 7-2. Box and whisker plot of A/R for BEAN DRY fields in the Coalition.



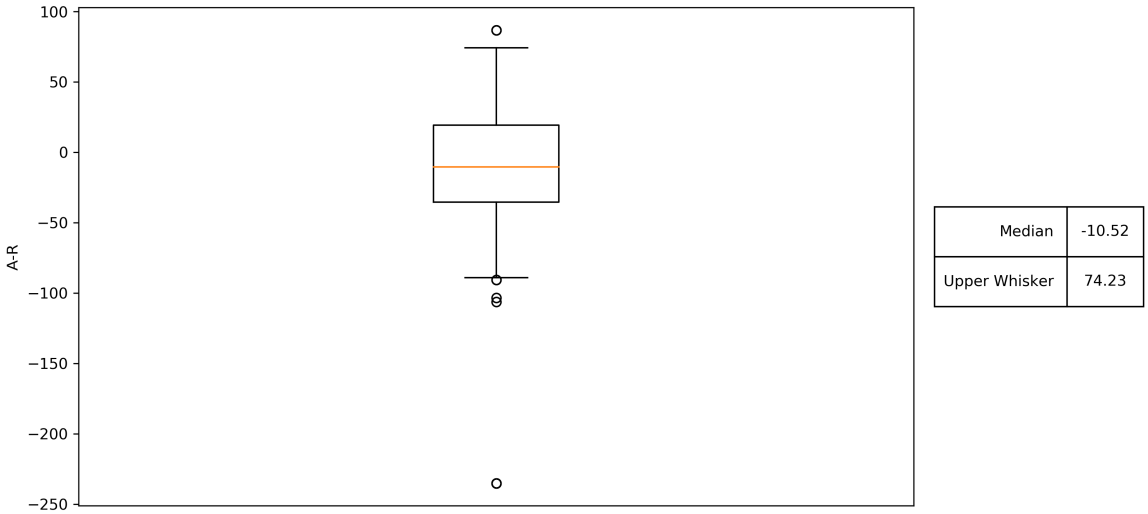
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot. The whiskers are the medcouple values with the upper whisker being the outlier threshold. Dots are outliers.

Figure 7-3. Histogram of A-R for BEAN DRY fields in the Coalition.



Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot.

Figure 7-4. Box and whisker plot of A-R for BEAN DRY fields in the Coalition.



Median	-10.52
Upper Whisker	74.23

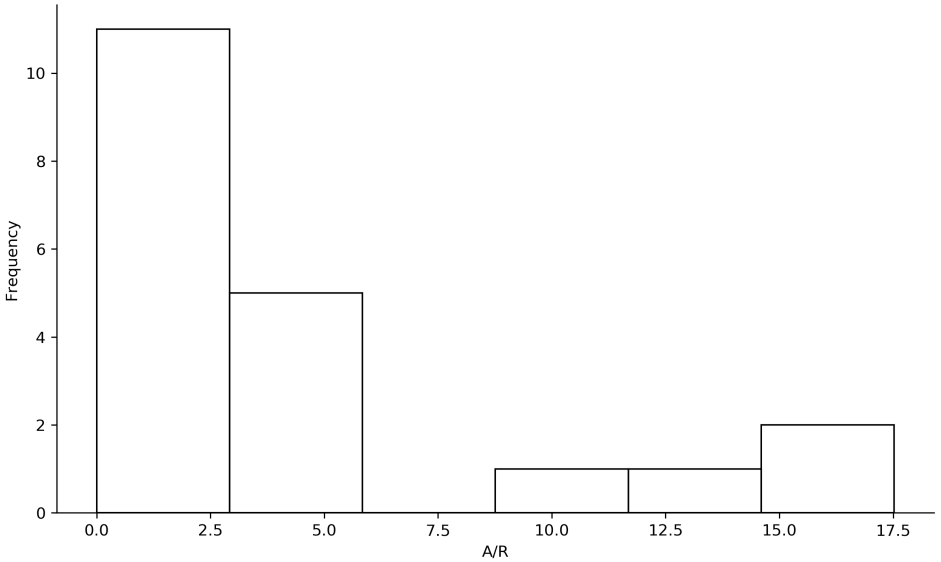
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot. The whiskers are the medcouple values with the upper whisker being the outlier threshold. Dots are outliers.

8. CHERRY

Table 8-1. Summary statistics for CHERRY fields in Coalition.

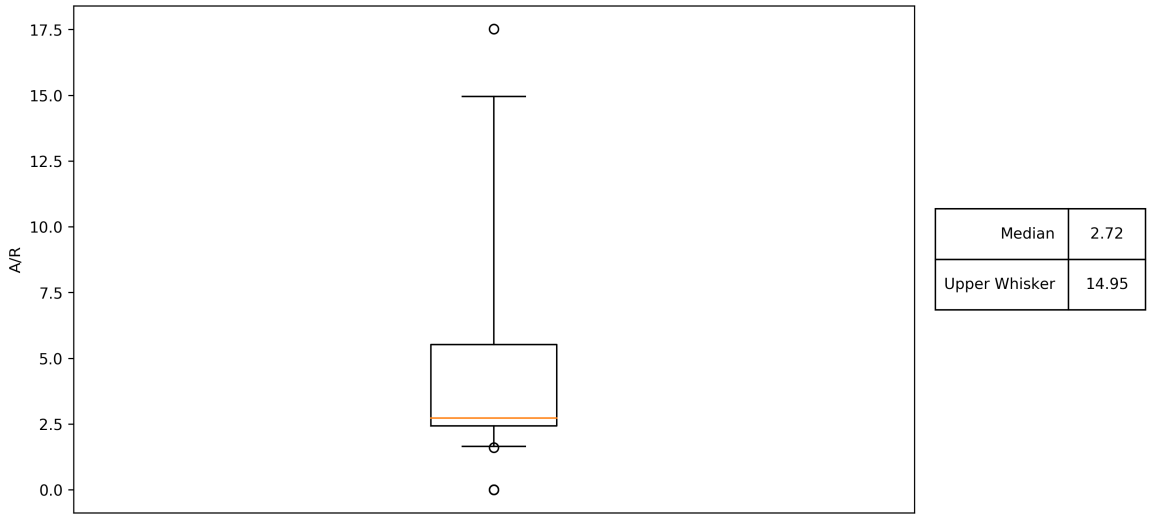
Parameter	# Fields	Acreage	Mean	St. Dev.	Min	Max	Outlier Threshold	No. Outliers
A/R	21	844.0	16.02	49.56	0.0	231.27	14.95	2
A-R	21	844.0	32.93	26.08	-0.29	97.9	51.25	2

Figure 8-1. Histogram of A/R for CHERRY fields in the Coalition.



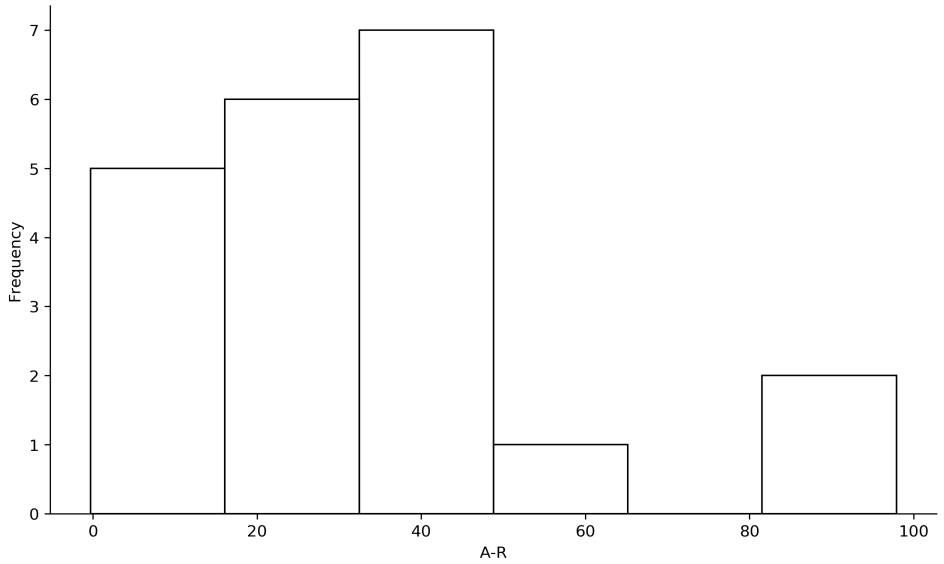
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot.

Figure 8-2. Box and whisker plot of A/R for CHERRY fields in the Coalition.



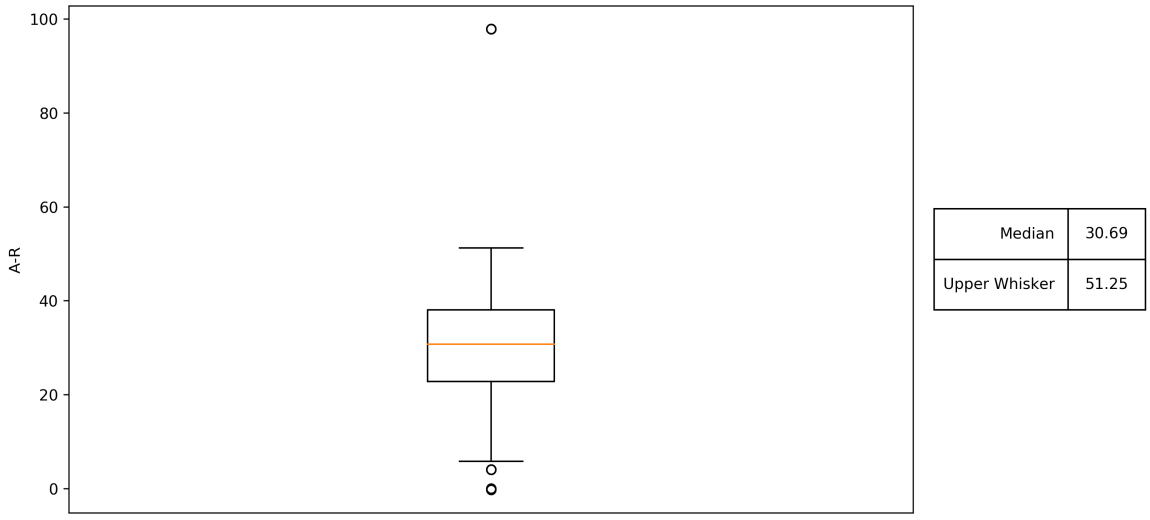
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot. The whiskers are the medcouple values with the upper whisker being the outlier threshold. Dots are outliers.

Figure 8-3. Histogram of A-R for CHERRY fields in the Coalition.



Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot.

Figure 8-4. Box and whisker plot of A-R for CHERRY fields in the Coalition.



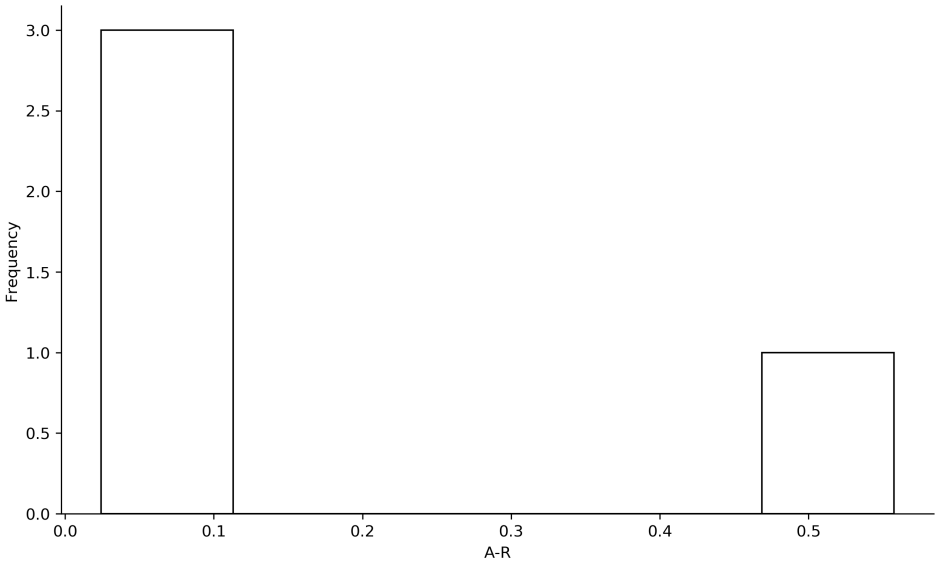
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot. The whiskers are the medcouple values with the upper whisker being the outlier threshold. Dots are outliers.

9. CHESTNUT

Table 9-1. Summary statistics for CHESTNUT fields in Coalition.

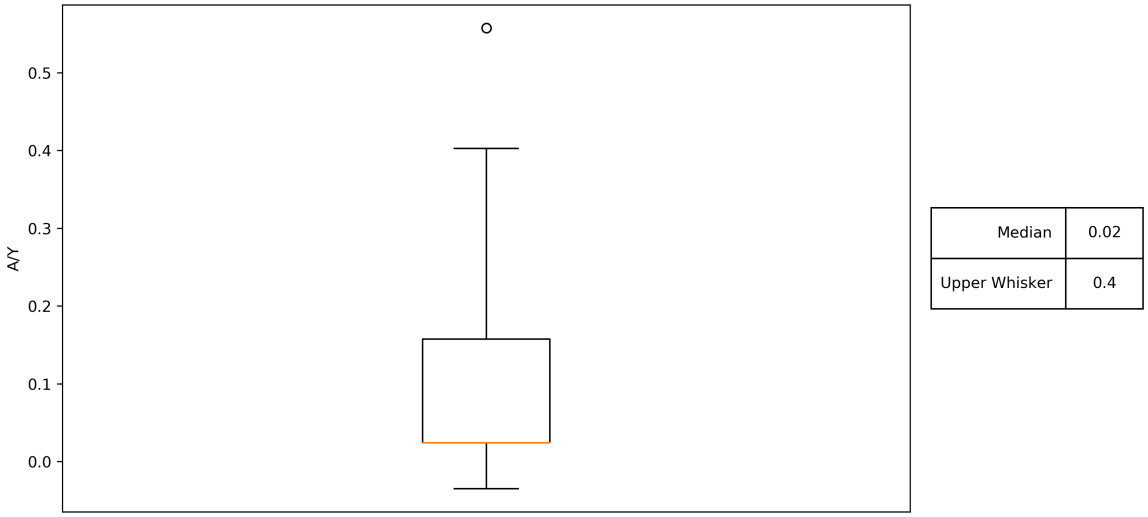
Parameter	# Fields	Acreage	Mean	St. Dev.	Min	Max	Outlier Threshold	No. Outliers
A/Y	4	11.55	0.16	0.27	0.02	0.56	0.4	1

Figure 9-1. Histogram of A/Y for CHESTNUT fields in the Coalition.



Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot

Figure 9-2. Box and whisker plot of A/Y for CHESTNUT fields in the Coalition.



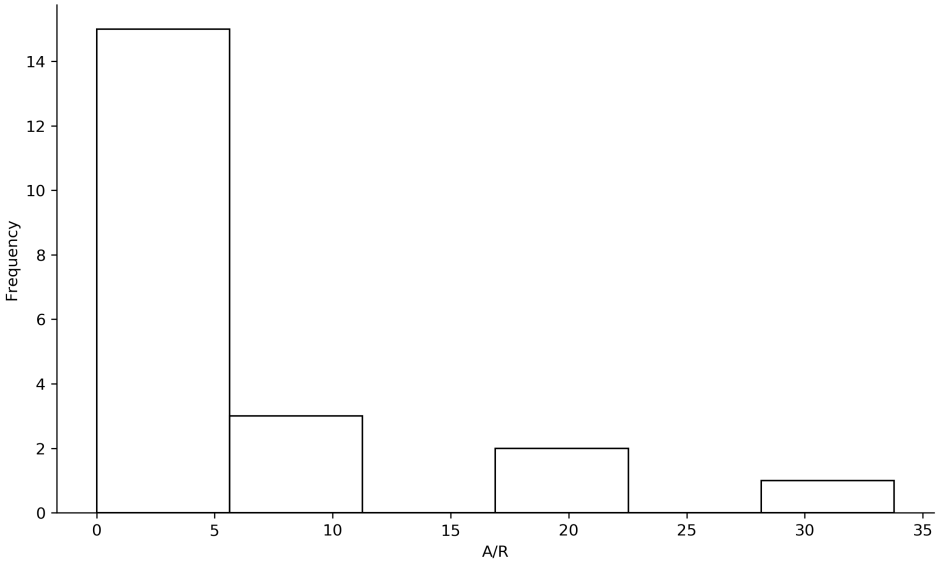
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot
The whiskers are the medcouple values with the upper whisker being the outlier threshold. Dots are outliers.

10. CITRUS

Table 10-1. Summary statistics for CITRUS fields in Coalition.

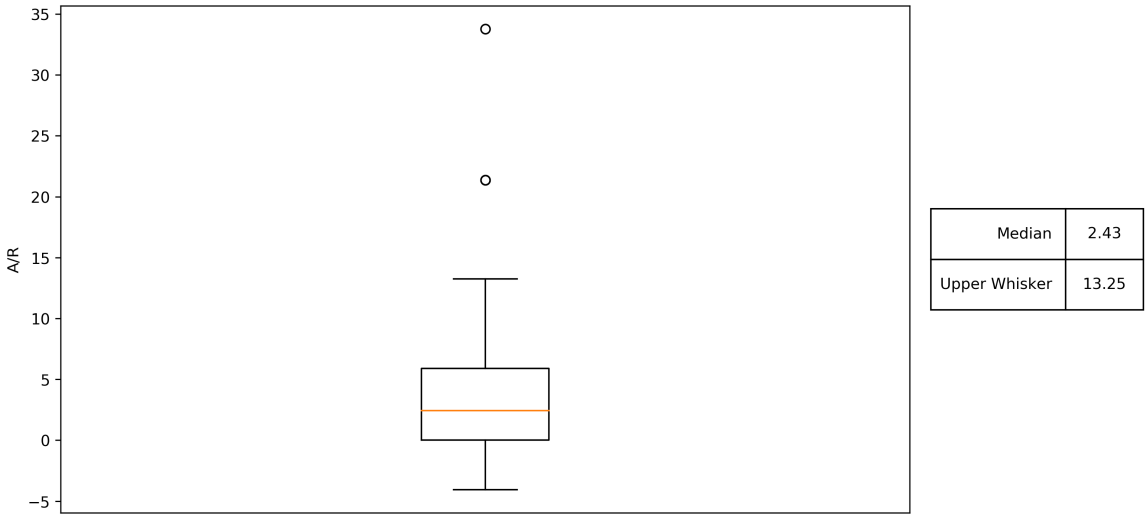
Parameter	# Fields	Acreage	Mean	St. Dev.	Min	Max	Outlier Threshold	No. Outliers
A/R	22	257.04	8.71	16.18	0.0	70.02	13.25	4
A-R	22	257.04	76.49	110.09	-12.67	343.16	254.9	2

Figure 10-1. Histogram of A/R for CITRUS fields in the Coalition.



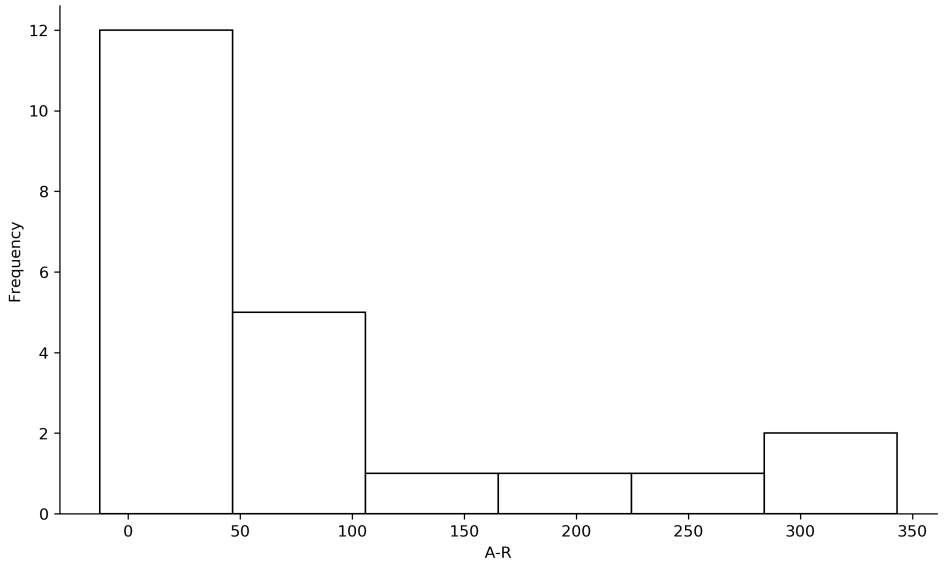
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot.

Figure 10-2. Box and whisker plot of A/R for CITRUS fields in the Coalition.



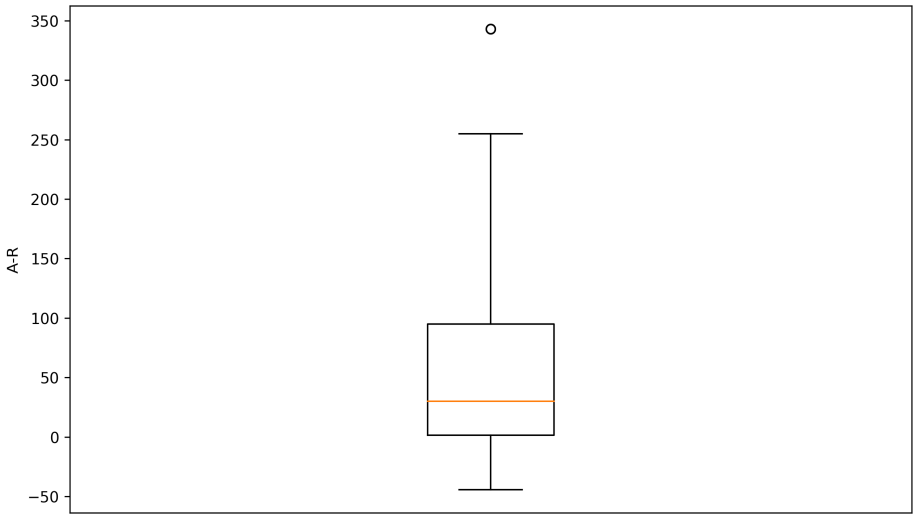
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot. The whiskers are the medcouple values with the upper whisker being the outlier threshold. Dots are outliers.

Figure 10-3. Histogram of A-R for CITRUS fields in the Coalition.



Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot.

Figure 10-4. Box and whisker plot of A-R for CITRUS fields in the Coalition.



Median	29.96
Upper Whisker	254.9

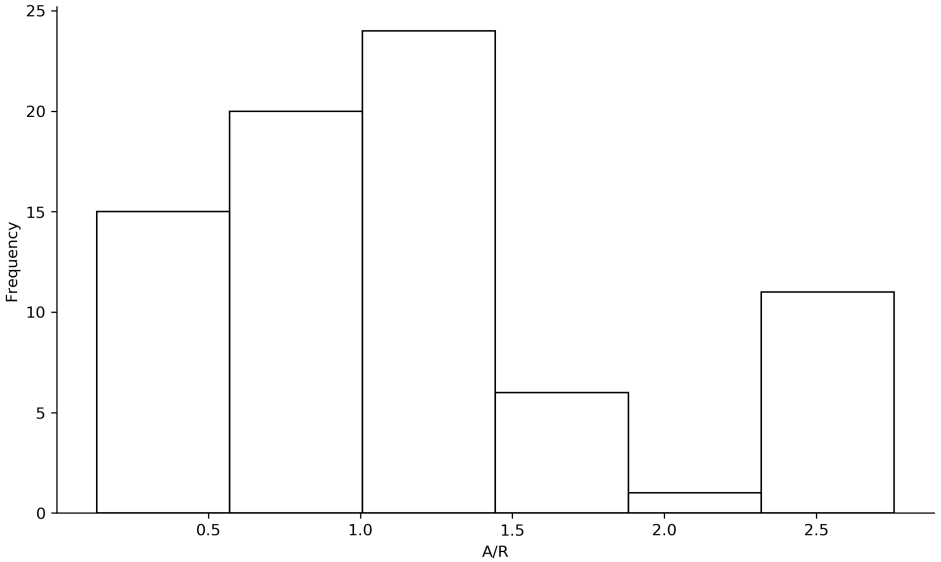
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot. The whiskers are the medcouple values with the upper whisker being the outlier threshold. Dots are outliers.

11. CORN - FODDER/SILAGE

Table 11-1. Summary statistics for CORN - FODDER/SILAGE fields in Coalition.

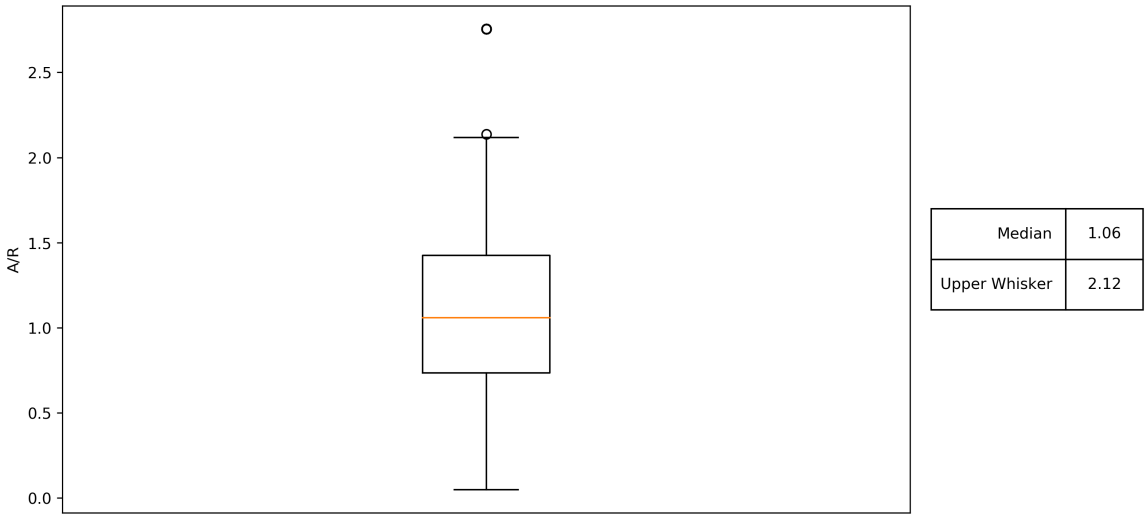
Parameter	# Fields	Acreage	Mean	St. Dev.	Min	Max	Outlier Threshold	No. Outliers
A/R	77	6715.07	1.17	0.8	0.13	2.76	2.12	12
A-R	77	6715.07	-5.65	88.32	-156.8	185.4	160.79	1

Figure 11-1. Histogram of A/R for CORN - FODDER/SILAGE fields in the Coalition.



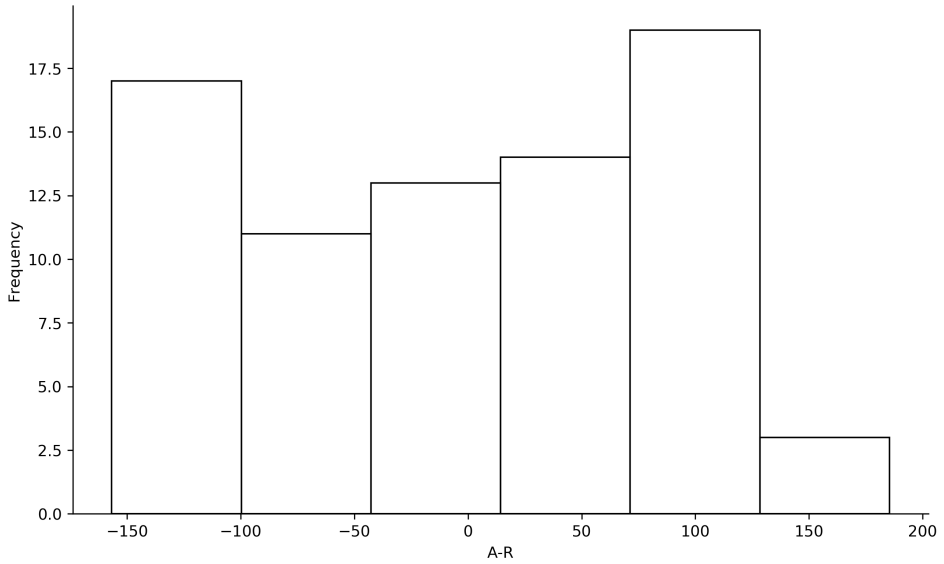
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot.

Figure 11-2. Box and whisker plot of A/R for CORN - FODDER/SILAGE fields in the Coalition.



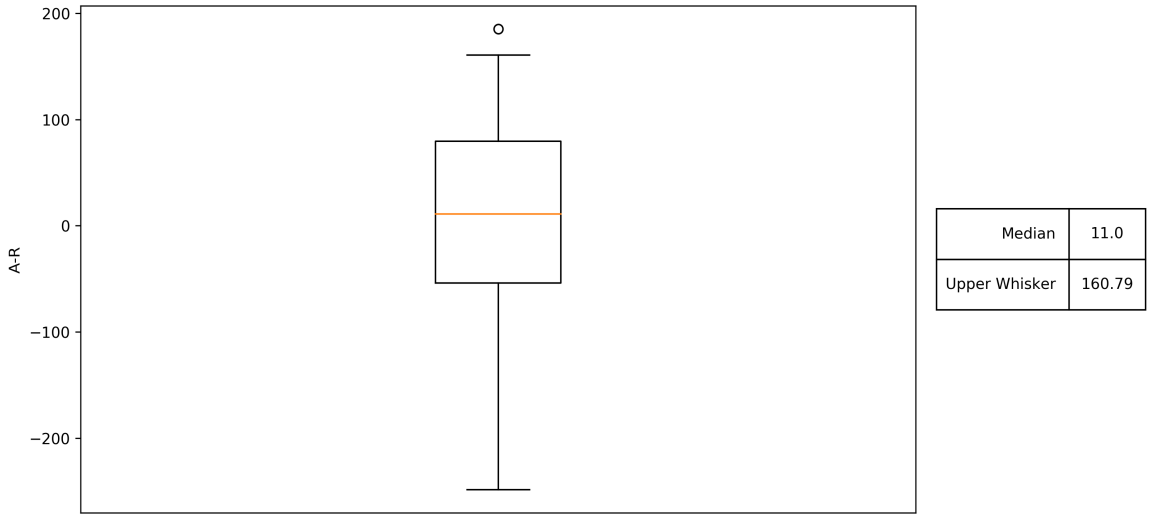
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot. The whiskers are the medcouple values with the upper whisker being the outlier threshold. Dots are outliers.

Figure 11-3. Histogram of A-R for CORN - FODDER/SILAGE fields in the Coalition.



Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot.

Figure 11-4. Box and whisker plot of A-R for CORN - FODDER/SILAGE fields in the Coalition.



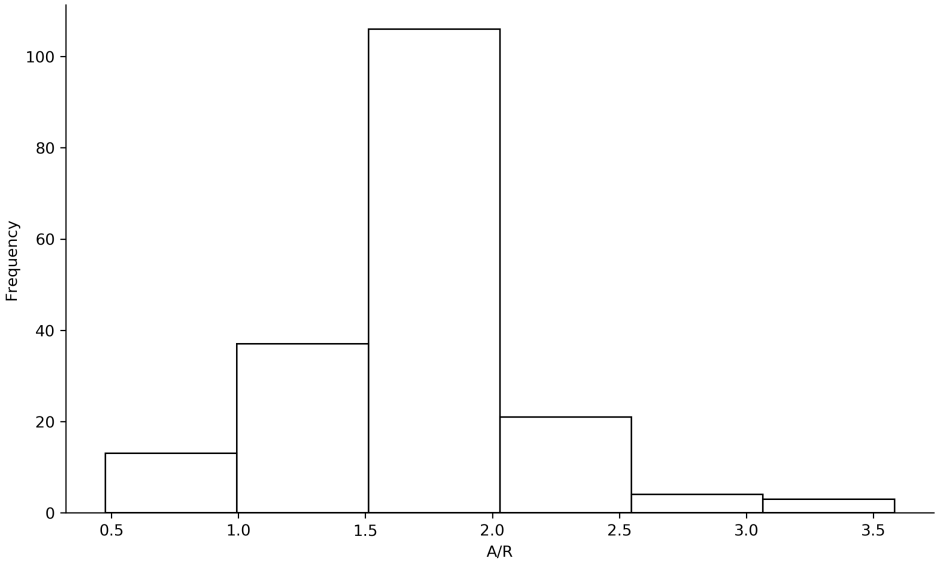
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot. The whiskers are the medcouple values with the upper whisker being the outlier threshold. Dots are outliers.

12. CORN - GRAIN

Table 12-1. Summary statistics for CORN - GRAIN fields in Coalition.

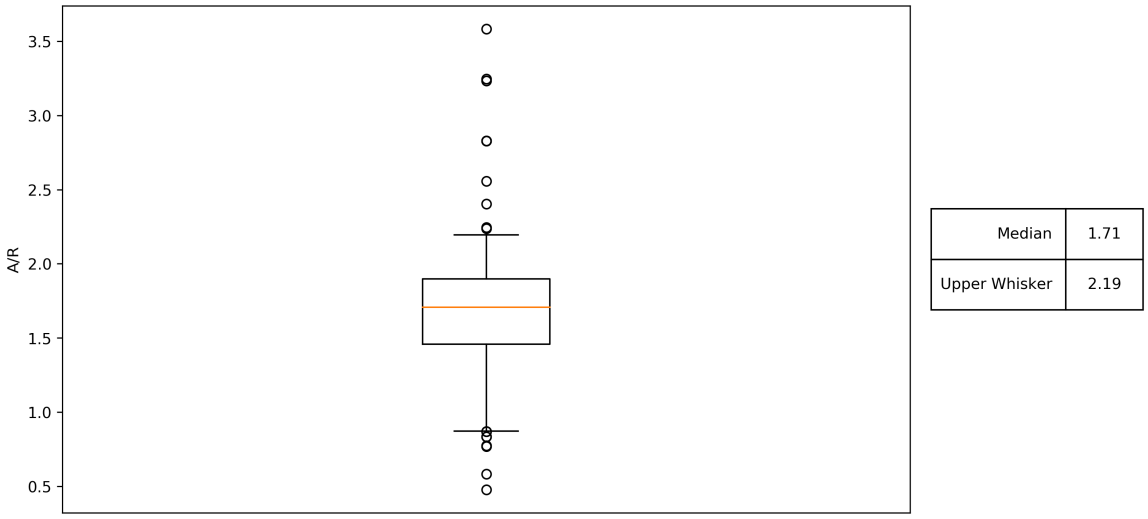
Parameter	# Fields	Acreage	Mean	St. Dev.	Min	Max	Outlier Threshold	No. Outliers
A/R	186	13300.05	2.18	5.05	0.48	55.56	2.19	12
A-R	186	13300.05	95.36	59.45	-88.0	244.36	199.46	3

Figure 12-1. Histogram of A/R for CORN - GRAIN fields in the Coalition.



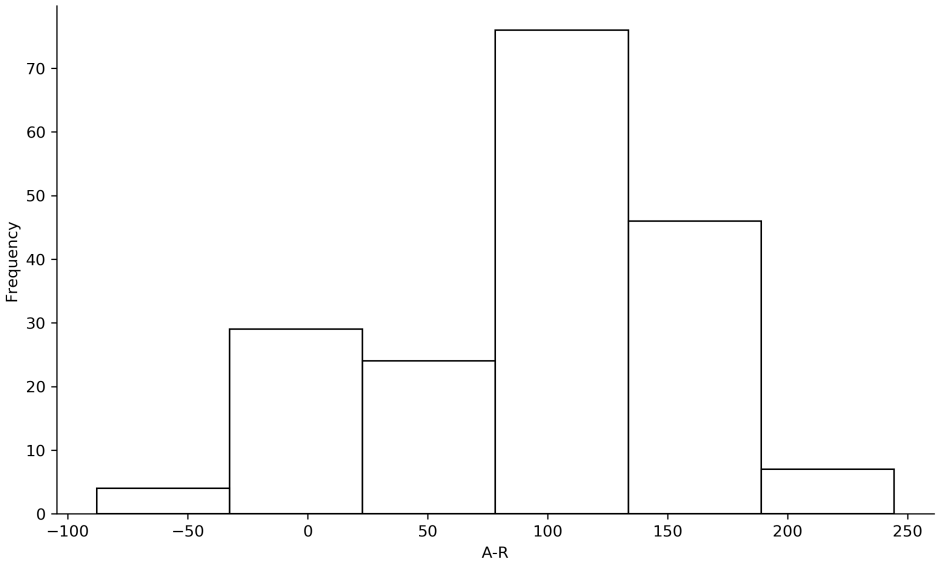
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot.

Figure 12-2. Box and whisker plot of A/R for CORN - GRAIN fields in the Coalition.



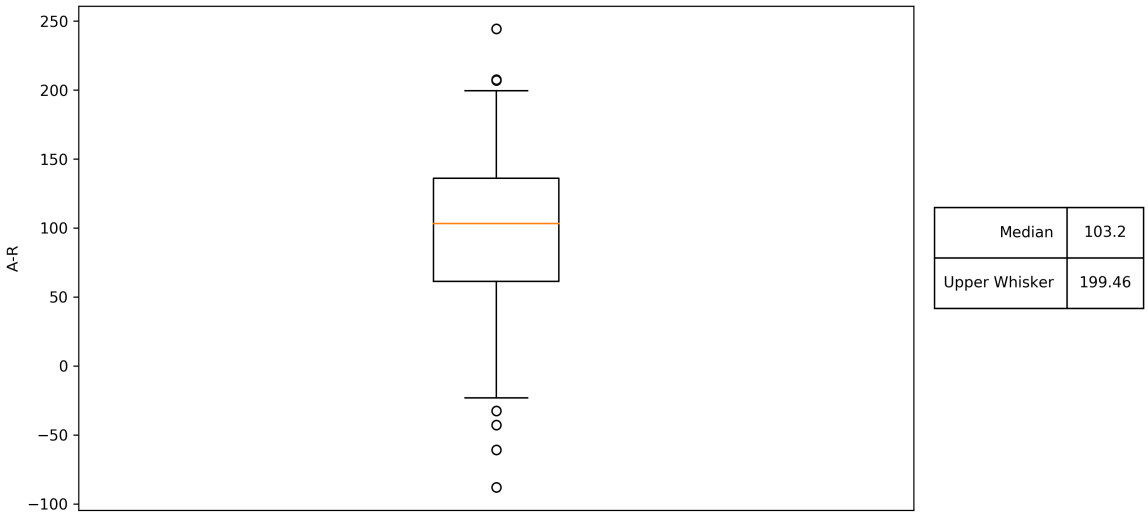
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot. The whiskers are the medcouple values with the upper whisker being the outlier threshold. Dots are outliers.

Figure 12-3. Histogram of A-R for CORN - GRAIN fields in the Coalition.



Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot.

Figure 12-4. Box and whisker plot of A-R for CORN - GRAIN fields in the Coalition.



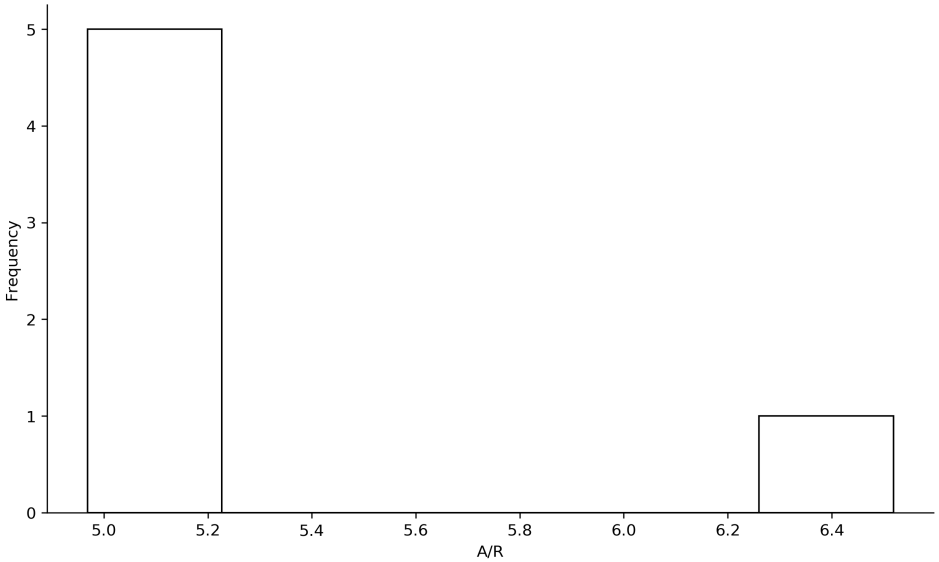
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot. The whiskers are the medcouple values with the upper whisker being the outlier threshold. Dots are outliers.

13. CORN - SWEET

Table 13-1. Summary statistics for CORN - SWEET fields in Coalition.

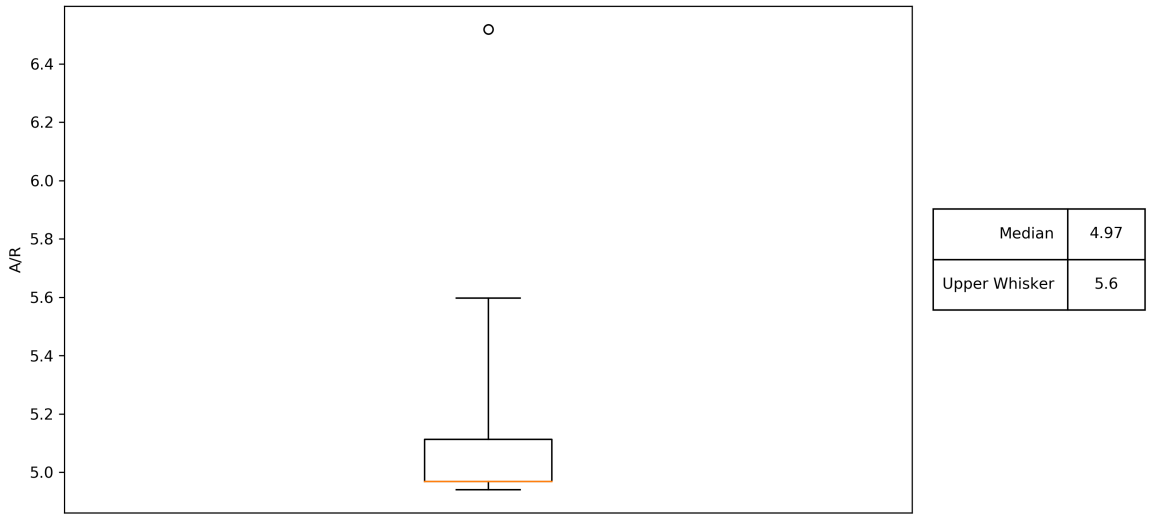
Parameter	# Fields	Acreage	Mean	St. Dev.	Min	Max	Outlier Threshold	No. Outliers
A/R	6	220.5	5.26	0.62	4.97	6.52	5.6	1
A-R	6	220.5	229.71	110.22	59.66	408.06	227.64	5

Figure 13-1. Histogram of A/R for CORN - SWEET fields in the Coalition.



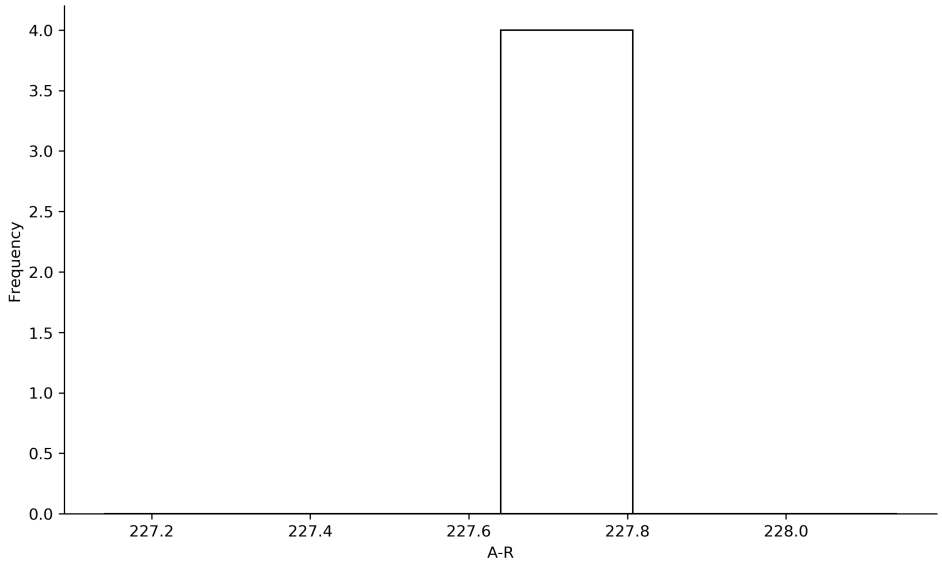
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot.

Figure 13-2. Box and whisker plot of A/R for CORN - SWEET fields in the Coalition.



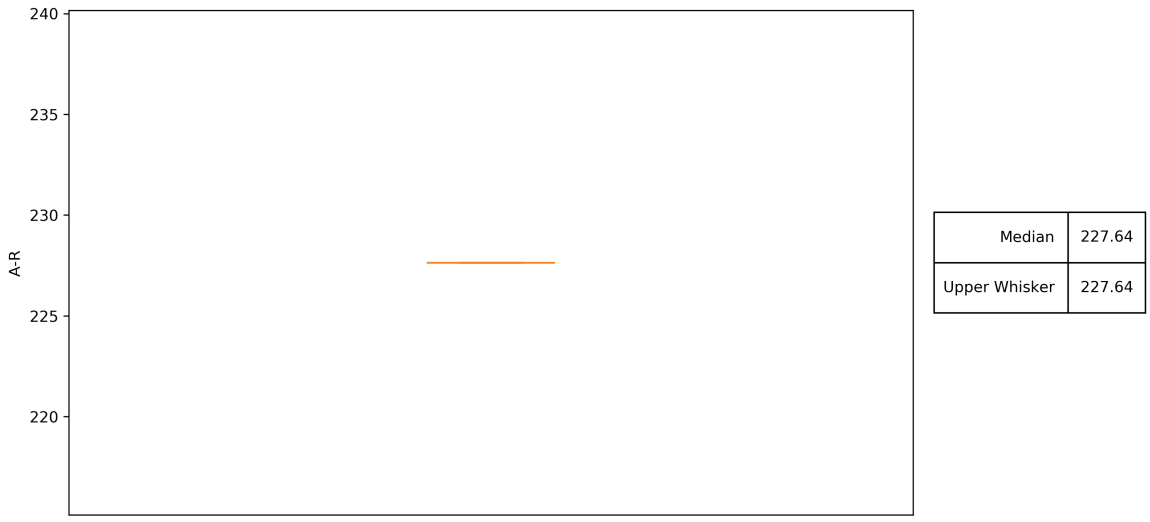
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot. The whiskers are the medcouple values with the upper whisker being the outlier threshold. Dots are outliers.

Figure 13-3. Histogram of A-R for CORN - SWEET fields in the Coalition.



Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot.

Figure 13-4. Box and whisker plot of A-R for CORN - SWEET fields in the Coalition.



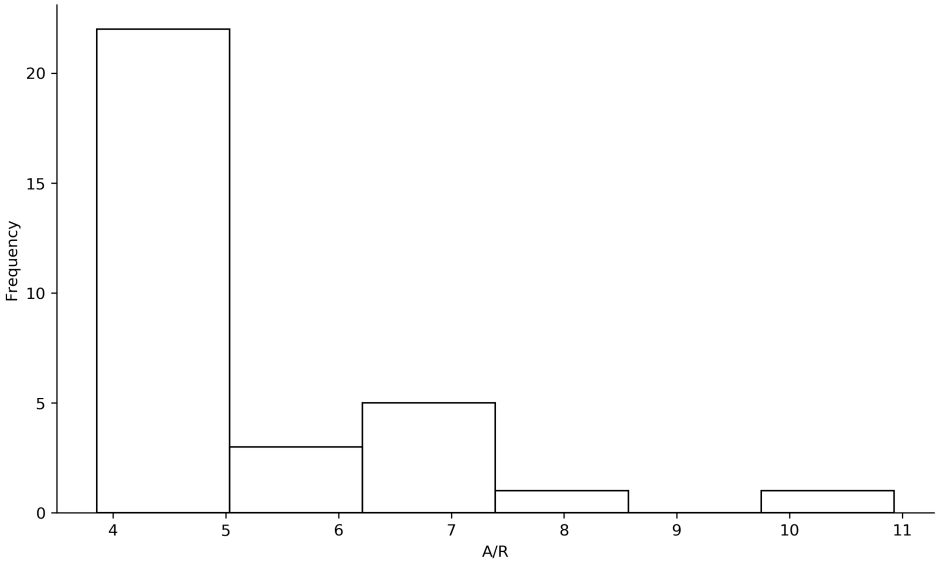
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot. The whiskers are the medcouple values with the upper whisker being the outlier threshold. Dots are outliers.

14. COTTON

Table 14-1. Summary statistics for COTTON fields in Coalition.

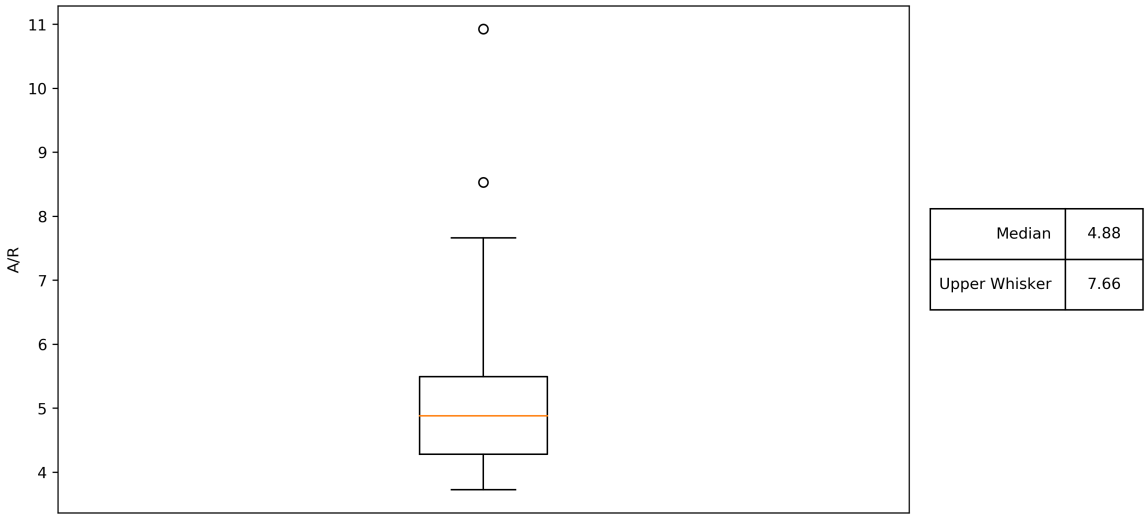
Parameter	# Fields	Acreage	Mean	St. Dev.	Min	Max	Outlier Threshold	No. Outliers
A/R	32	1671.2	5.27	1.47	3.85	10.93	7.66	2
A-R	32	1671.2	131.85	14.18	107.22	159.89	188.08	0

Figure 14-1. Histogram of A/R for COTTON fields in the Coalition.



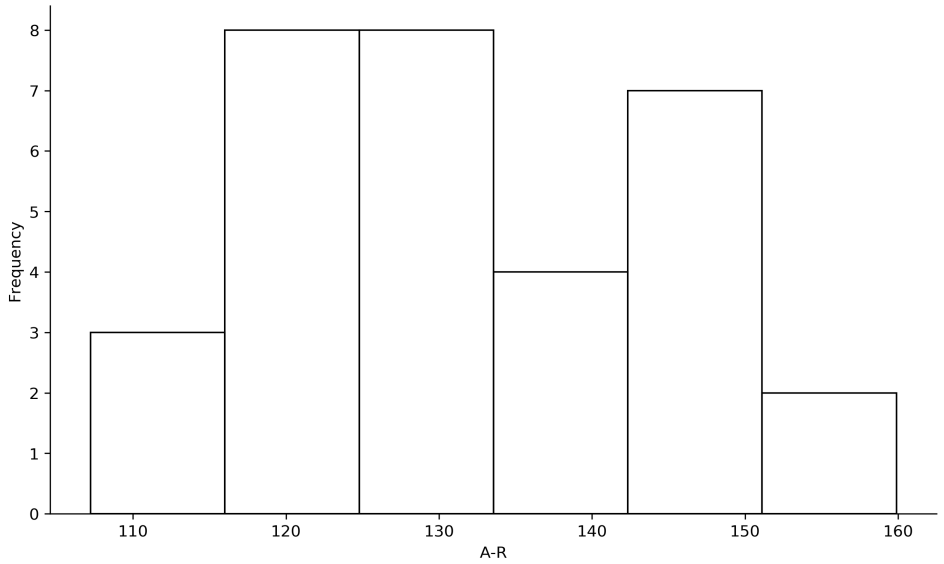
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot.

Figure 14-2. Box and whisker plot of A/R for COTTON fields in the Coalition.



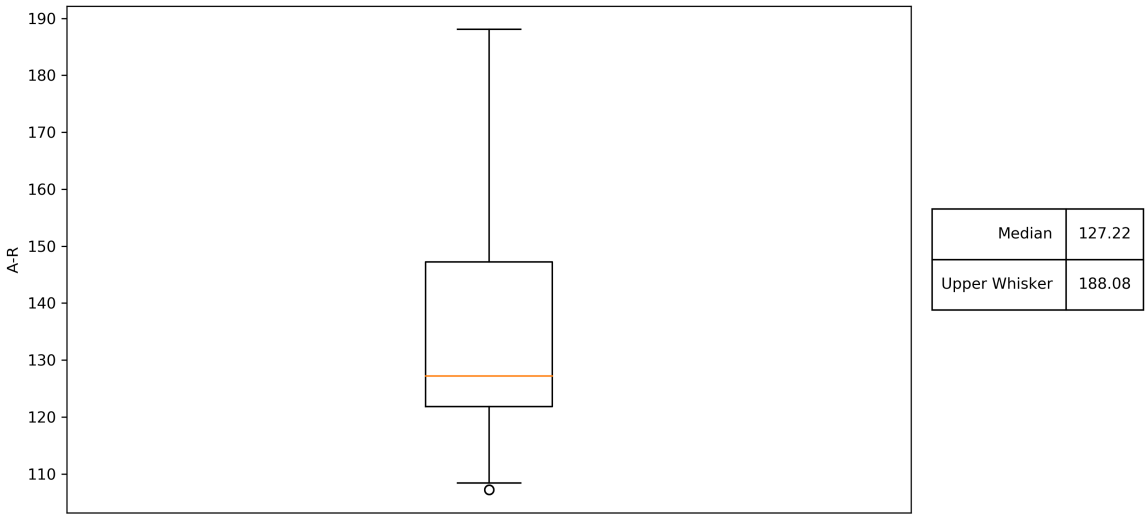
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot. The whiskers are the medcouple values with the upper whisker being the outlier threshold. Dots are outliers.

Figure 14-3. Histogram of A-R for COTTON fields in the Coalition.



Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot.

Figure 14-4. Box and whisker plot of A-R for COTTON fields in the Coalition.



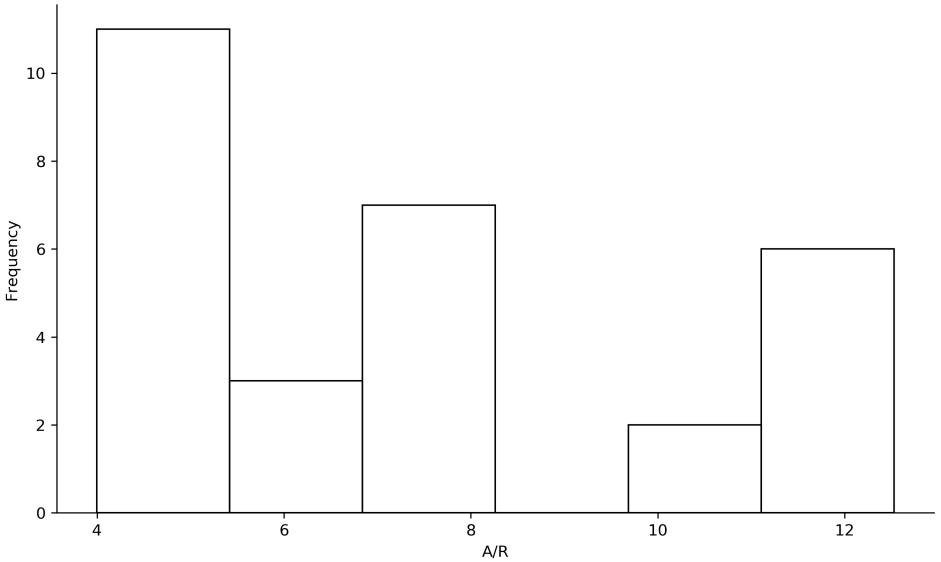
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot. The whiskers are the medcouple values with the upper whisker being the outlier threshold. Dots are outliers.

15. CUCUMBER

Table 15-1. Summary statistics for CUCUMBER fields in Coalition.

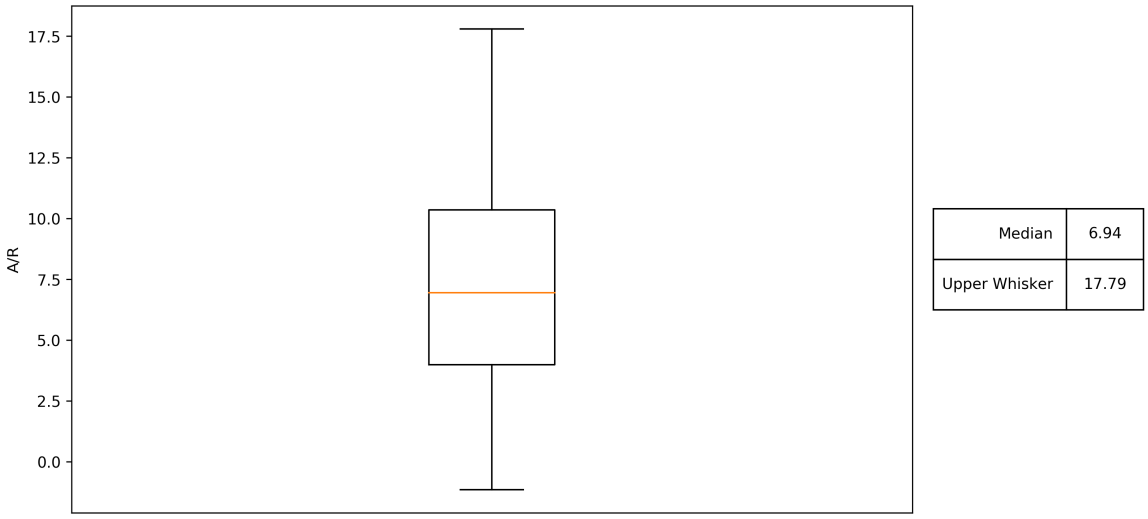
Parameter	# Fields	Acreage	Mean	St. Dev.	Min	Max	Outlier Threshold	No. Outliers
A/R	29	1405.41	7.08	3.15	4.0	12.53	17.79	0
A-R	29	1405.41	119.81	67.9	59.98	229.13	442.61	0

Figure 15-1. Histogram of A/R for CUCUMBER fields in the Coalition.



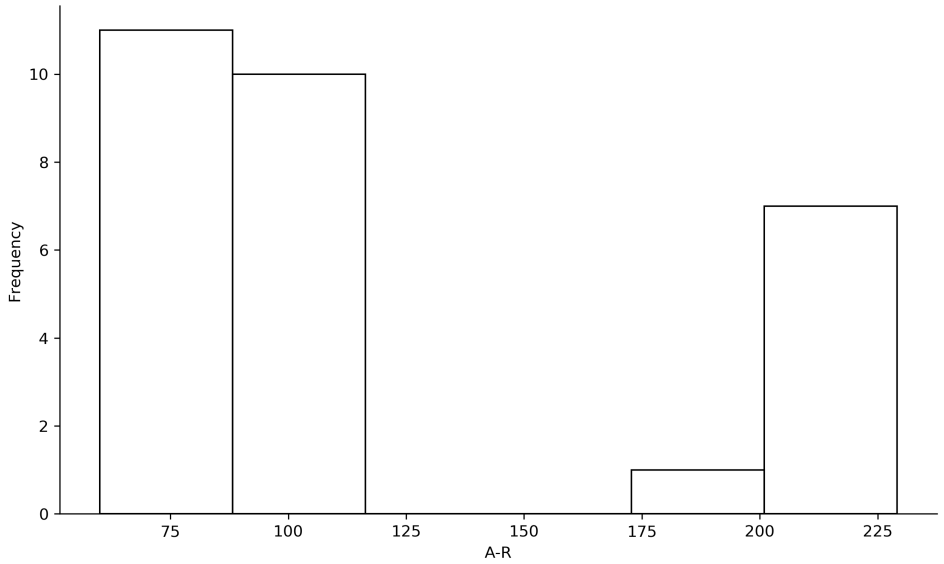
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot.

Figure 15-2. Box and whisker plot of A/R for CUCUMBER fields in the Coalition.



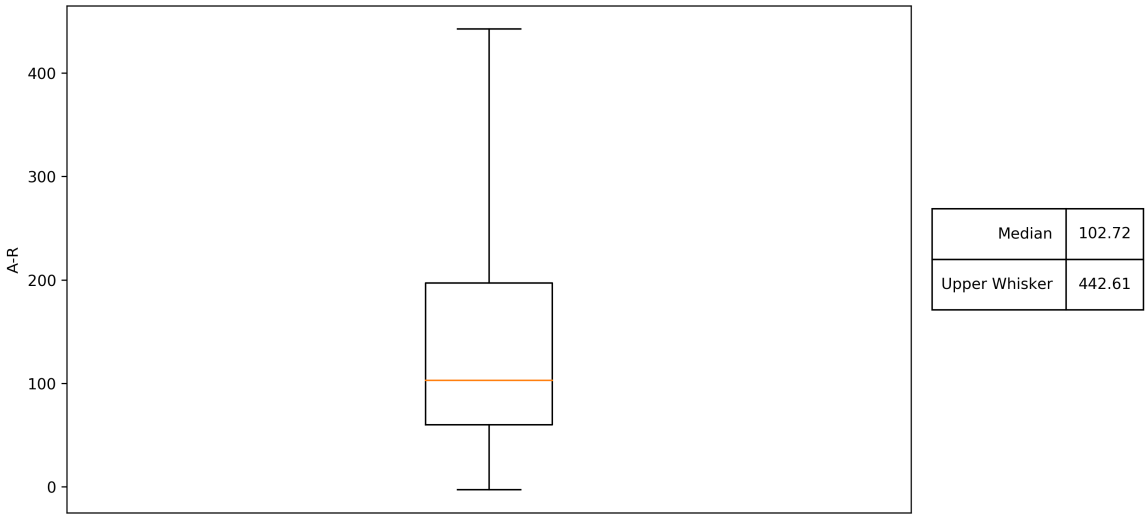
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot. The whiskers are the medcouple values with the upper whisker being the outlier threshold. Dots are outliers.

Figure 15-3. Histogram of A-R for CUCUMBER fields in the Coalition.



Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot.

Figure 15-4. Box and whisker plot of A-R for CUCUMBER fields in the Coalition.



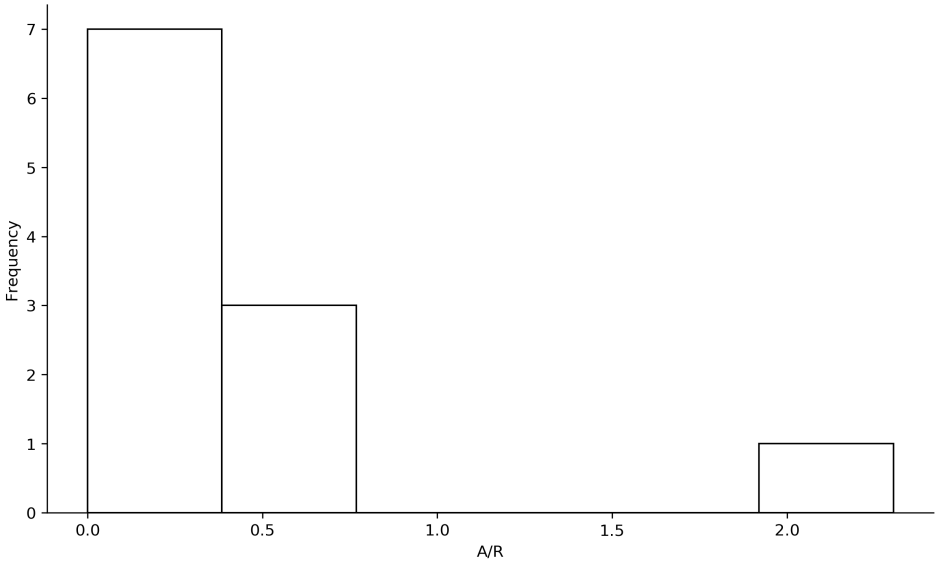
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot. The whiskers are the medcouple values with the upper whisker being the outlier threshold. Dots are outliers.

16. GRAIN HAY

Table 16-1. Summary statistics for GRAIN HAY fields in Coalition.

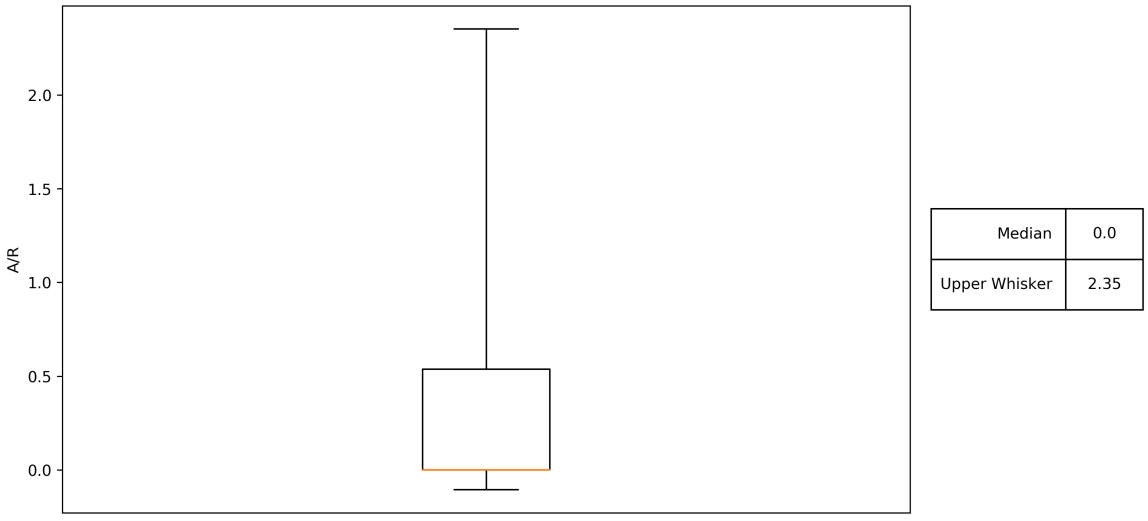
Parameter	# Fields	Acreage	Mean	St. Dev.	Min	Max	Outlier Threshold	No. Outliers
A/R	11	262.79	0.37	0.7	0.0	2.3	2.35	0
A-R	11	262.79	-172.6	239.88	-542.5	56.6	45.96	1

Figure 16-1. Histogram of A/R for GRAIN HAY fields in the Coalition.



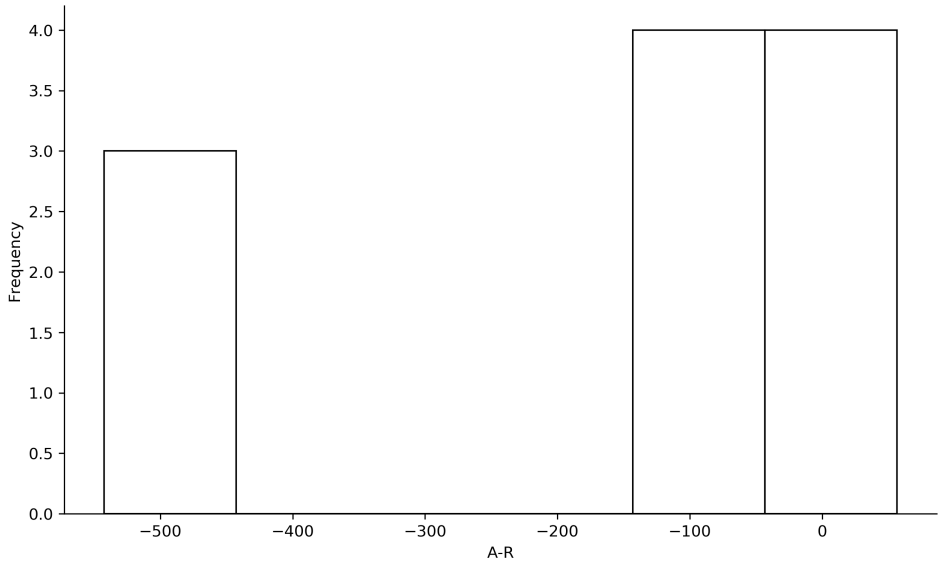
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot.

Figure 16-2. Box and whisker plot of A/R for GRAIN HAY fields in the Coalition.



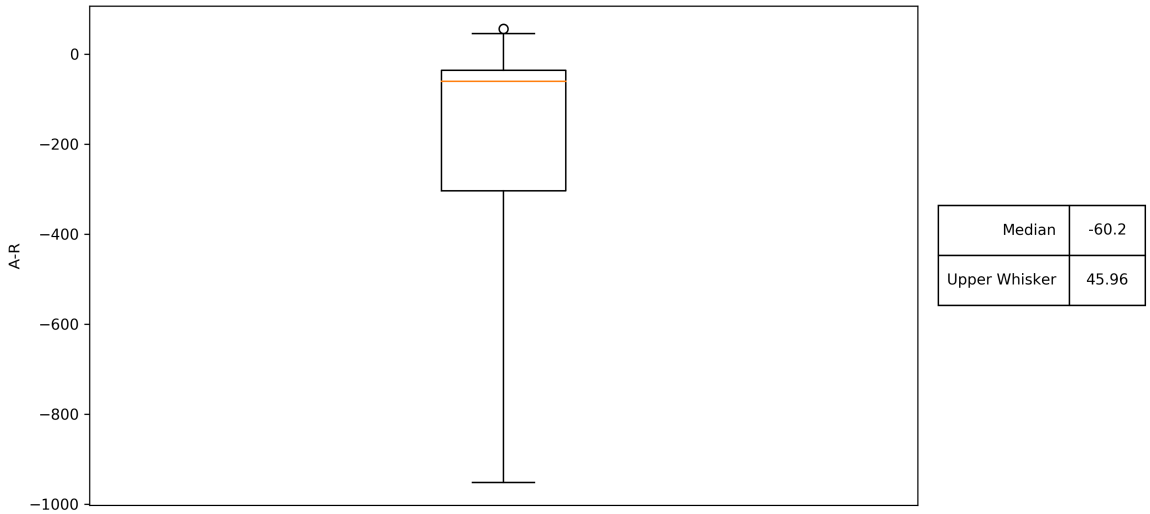
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot. The whiskers are the medcouple values with the upper whisker being the outlier threshold. Dots are outliers.

Figure 16-3. Histogram of A-R for GRAIN HAY fields in the Coalition.



Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot.

Figure 16-4. Box and whisker plot of A-R for GRAIN HAY fields in the Coalition.



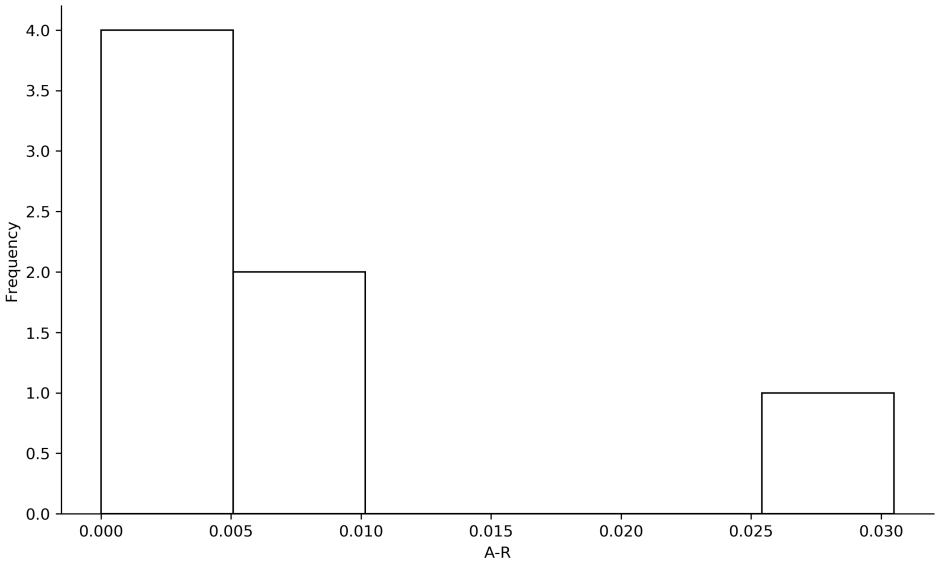
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot. The whiskers are the medcouple values with the upper whisker being the outlier threshold. Dots are outliers.

17. GRAPE - OTHER

Table 17-1. Summary statistics for GRAPE - OTHER fields in Coalition.

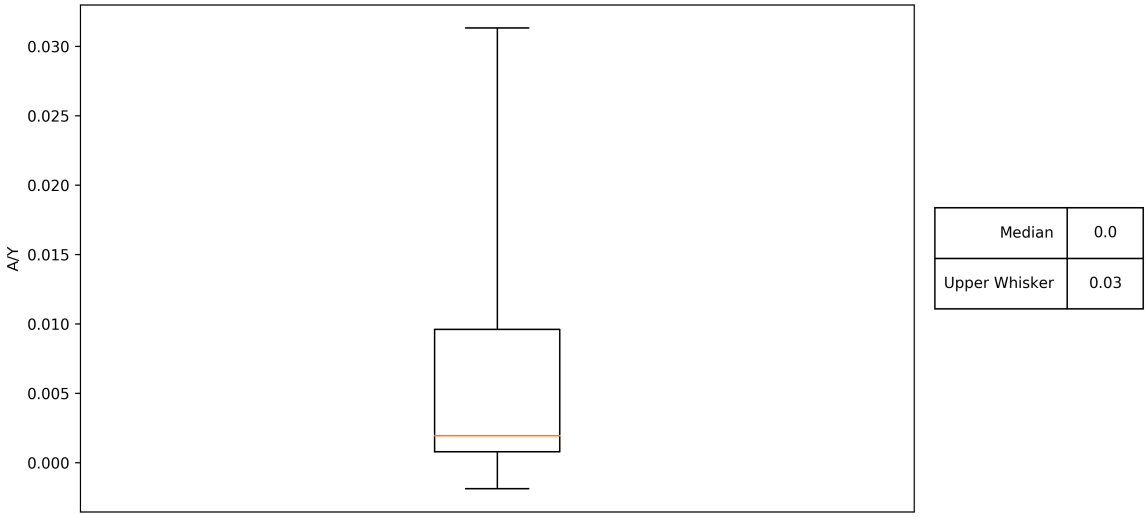
Parameter	# Fields	Acreage	Mean	St. Dev.	Min	Max	Outlier Threshold	No. Outliers
A/Y	7	121.92	0.01	0.01	0.0	0.03	0.03	0

Figure 17-1. Histogram of A/Y for GRAPE - OTHER fields in the Coalition.



Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot

Figure 17-2. Box and whisker plot of A/Y for GRAPE - OTHER fields in the Coalition.



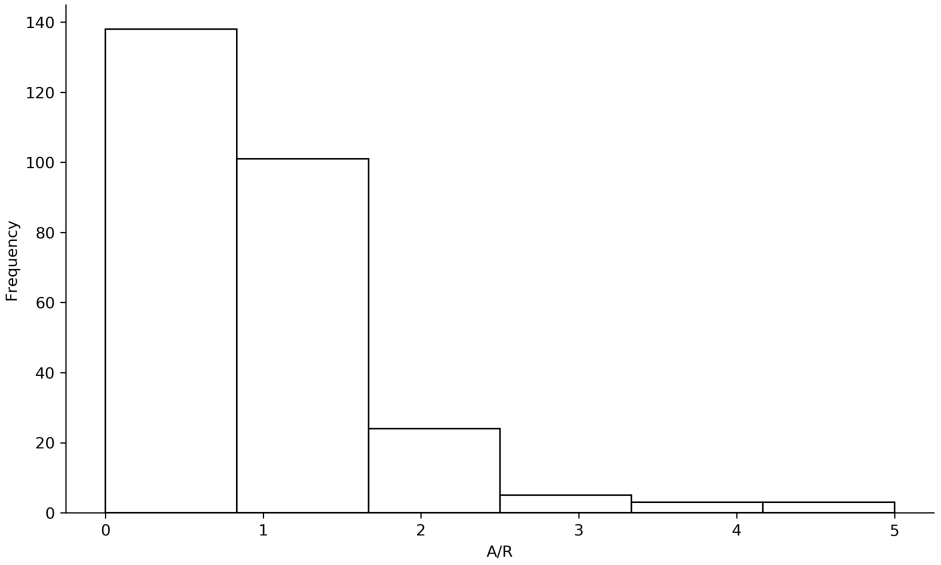
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot
The whiskers are the medcouple values with the upper whisker being the outlier threshold. Dots are outliers.

18. GRAPE - WINE

Table 18-1. Summary statistics for GRAPE - WINE fields in Coalition.

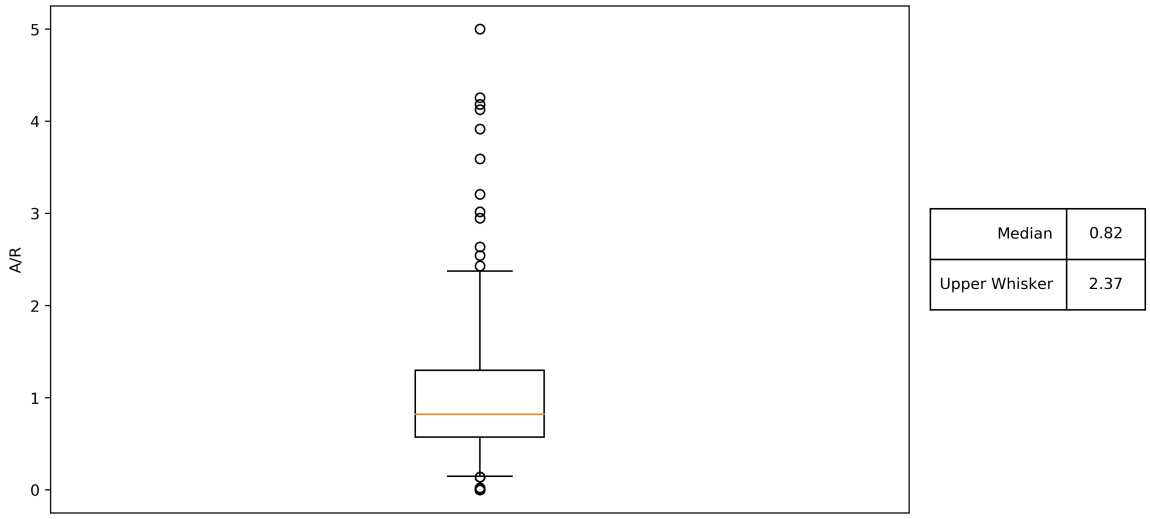
Parameter	# Fields	Acreage	Mean	St. Dev.	Min	Max	Outlier Threshold	No. Outliers
A/R	274	17334.83	0.99	0.8	0.0	5.0	2.37	12
A-R	274	17334.83	-0.7	20.07	-72.0	84.63	28.19	20

Figure 18-1. Histogram of A/R for GRAPE - WINE fields in the Coalition.



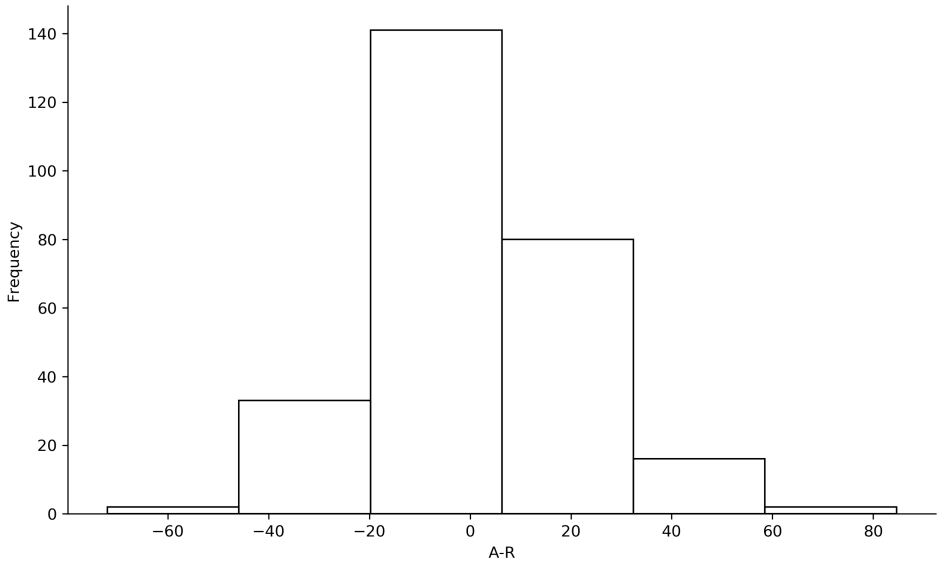
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot.

Figure 18-2. Box and whisker plot of A/R for GRAPE - WINE fields in the Coalition.



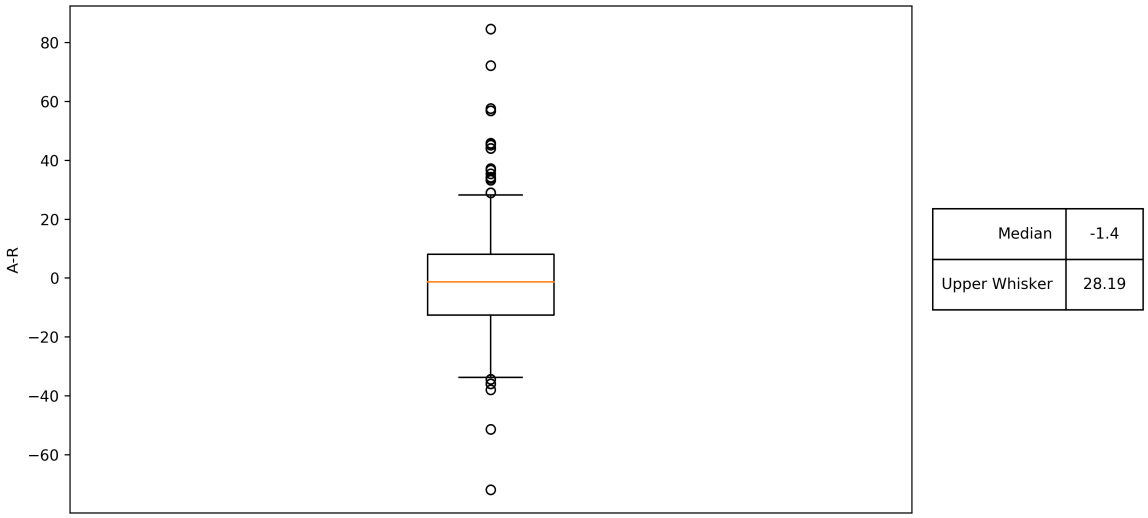
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot. The whiskers are the medcouple values with the upper whisker being the outlier threshold. Dots are outliers.

Figure 18-3. Histogram of A-R for GRAPE - WINE fields in the Coalition.



Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot.

Figure 18-4. Box and whisker plot of A-R for GRAPE - WINE fields in the Coalition.



Median	-1.4
Upper Whisker	28.19

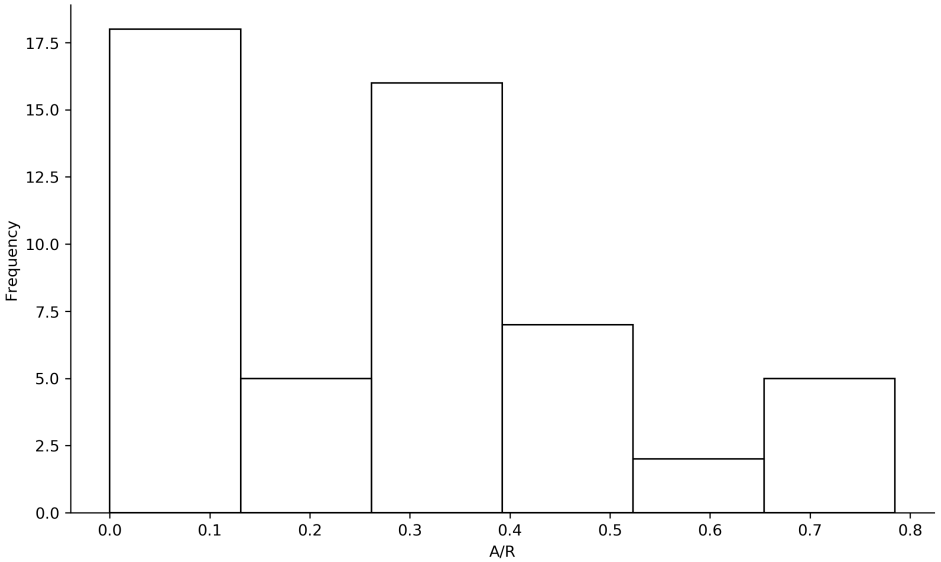
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot. The whiskers are the medcouple values with the upper whisker being the outlier threshold. Dots are outliers.

19. HAY/FORAGE

Table 19-1. Summary statistics for HAY/FORAGE fields in Coalition.

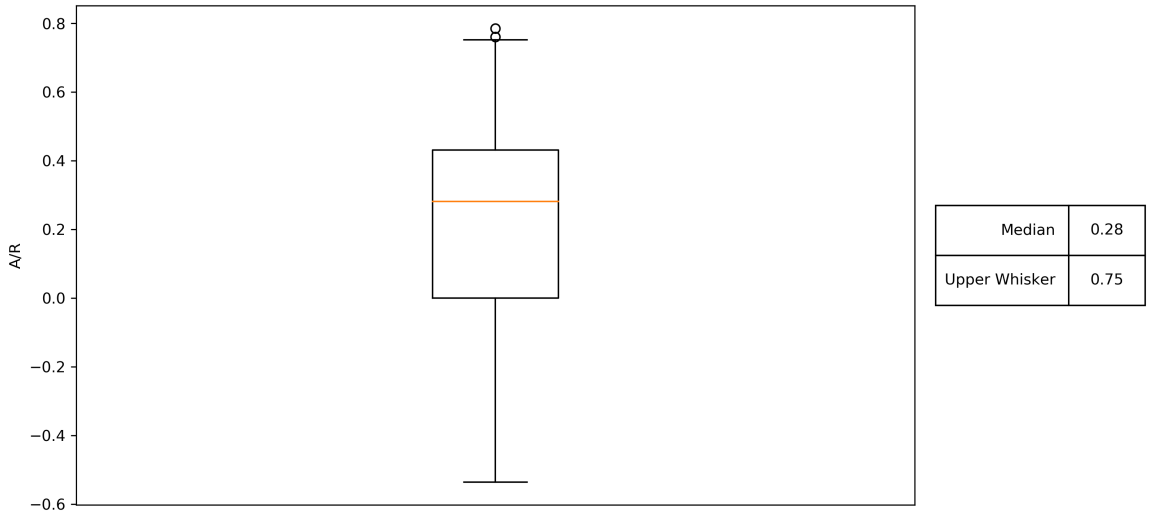
Parameter	# Fields	Acreage	Mean	St. Dev.	Min	Max	Outlier Threshold	No. Outliers
A/R	53	1924.93	0.27	0.24	0.0	0.78	0.75	2
A-R	53	1924.93	-139.98	76.13	-320.4	-0.01	-0.45	2

Figure 19-1. Histogram of A/R for HAY/FORAGE fields in the Coalition.



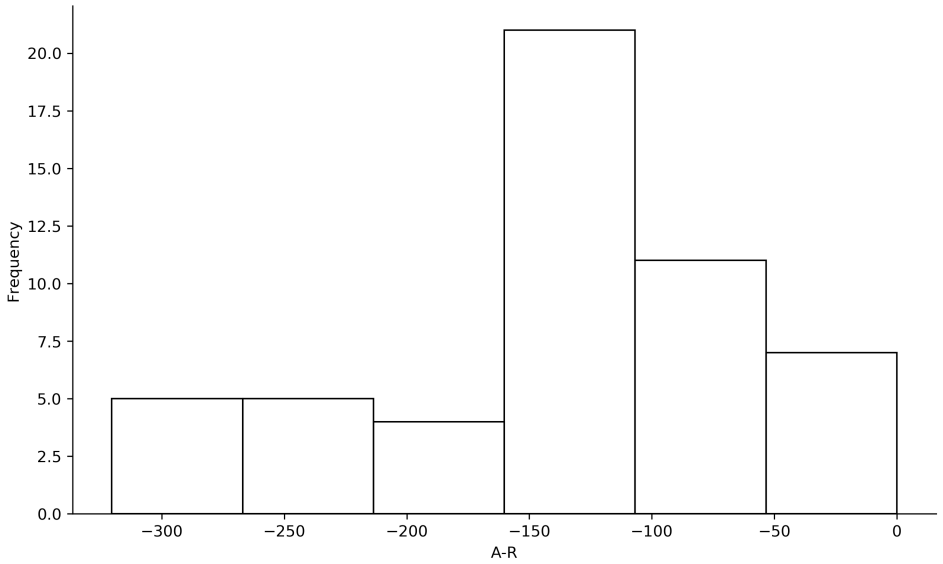
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot.

Figure 19-2. Box and whisker plot of A/R for HAY/FORAGE fields in the Coalition.



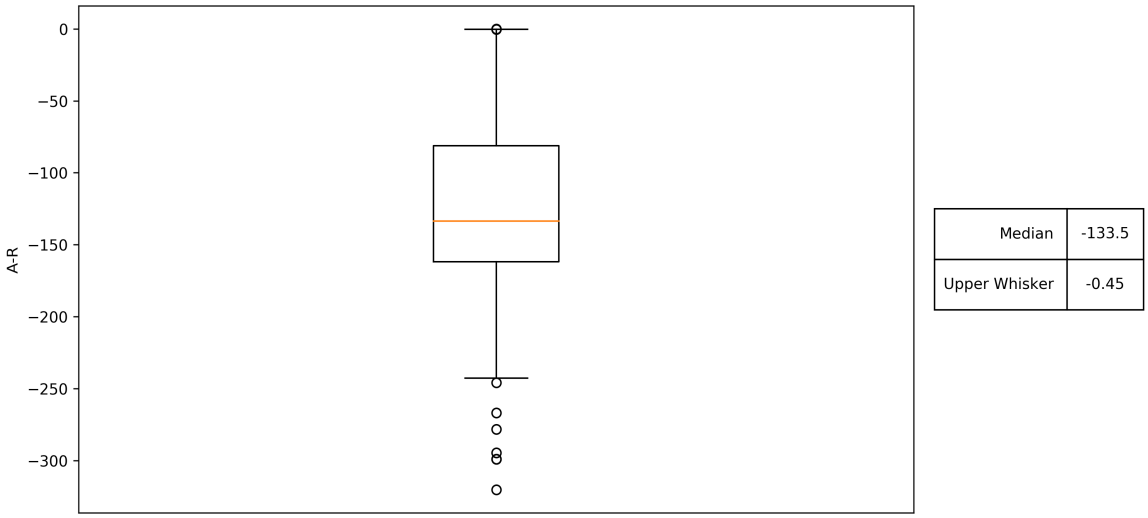
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot. The whiskers are the medcouple values with the upper whisker being the outlier threshold. Dots are outliers.

Figure 19-3. Histogram of A-R for HAY/FORAGE fields in the Coalition.



Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot.

Figure 19-4. Box and whisker plot of A-R for HAY/FORAGE fields in the Coalition.



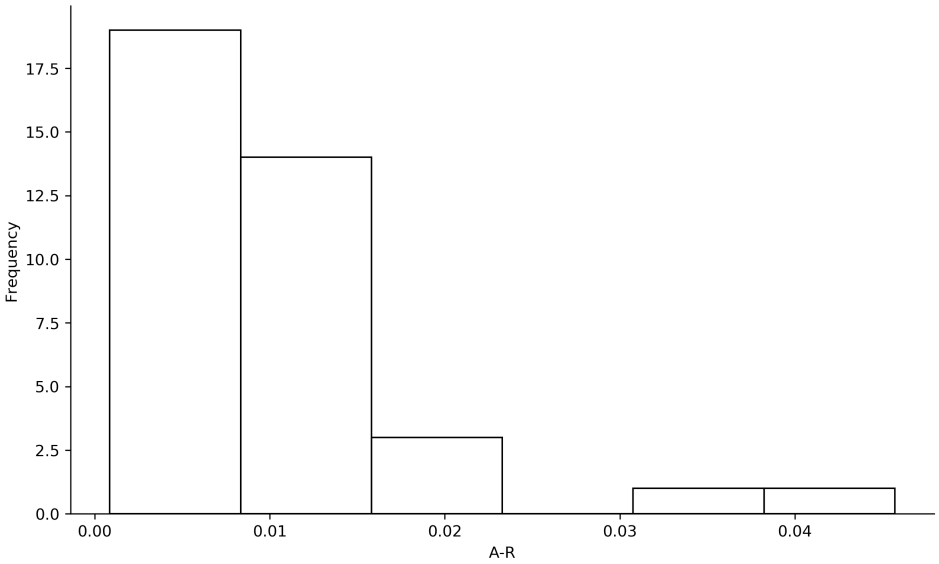
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot. The whiskers are the medcouple values with the upper whisker being the outlier threshold. Dots are outliers.

20. KIWI

Table 20-1. Summary statistics for KIWI fields in Coalition.

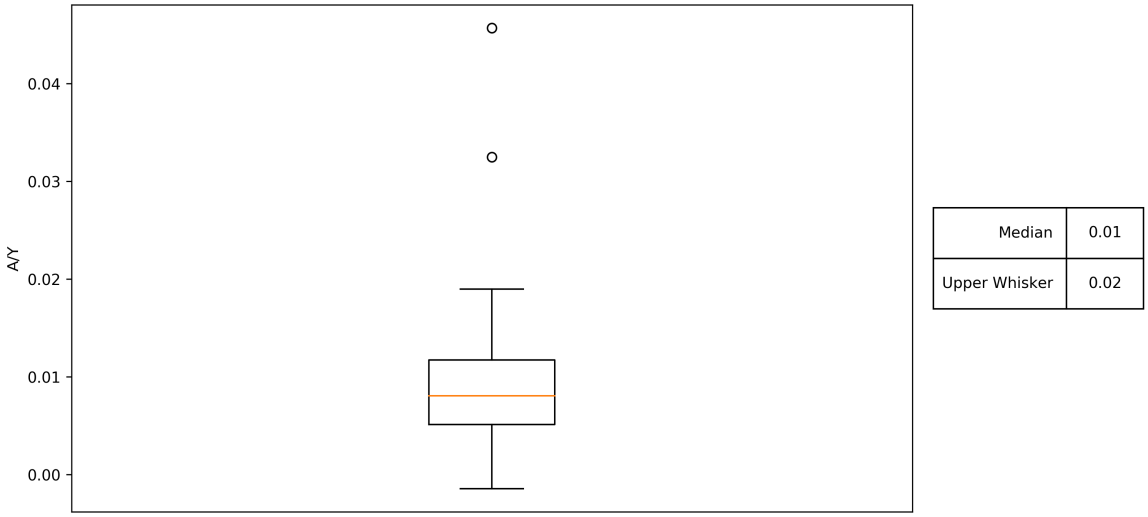
Parameter	# Fields	Acreage	Mean	St. Dev.	Min	Max	Outlier Threshold	No. Outliers
A/Y	40	1400.63	0.17	1.0	0.0	6.31	0.02	4

Figure 20-1. Histogram of A/Y for KIWI fields in the Coalition.



Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot

Figure 20-2. Box and whisker plot of A/Y for KIWI fields in the Coalition.



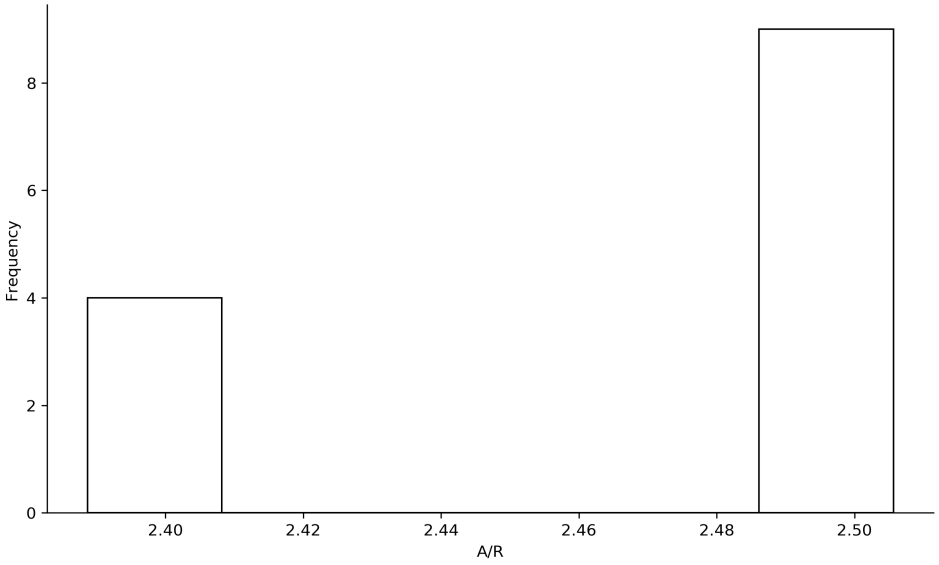
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot
The whiskers are the medcouple values with the upper whisker being the outlier threshold. Dots are outliers.

21. MELON

Table 21-1. Summary statistics for MELON fields in Coalition.

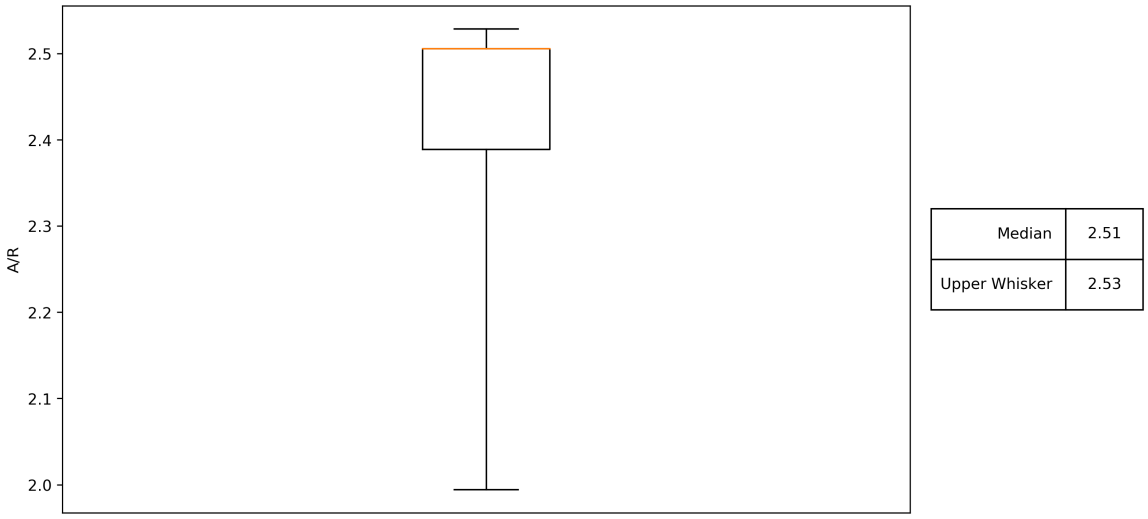
Parameter	# Fields	Acreage	Mean	St. Dev.	Min	Max	Outlier Threshold	No. Outliers
A/R	13	518.14	2.47	0.06	2.39	2.51	2.53	0
A-R	13	518.14	80.95	32.57	60.09	127.9	356.76	0

Figure 21-1. Histogram of A/R for MELON fields in the Coalition.



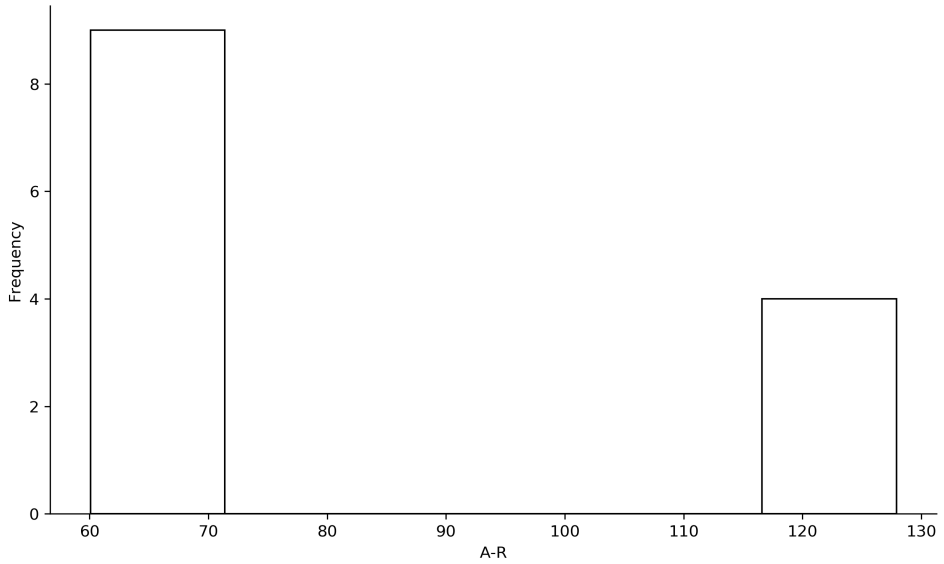
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot.

Figure 21-2. Box and whisker plot of A/R for MELON fields in the Coalition.



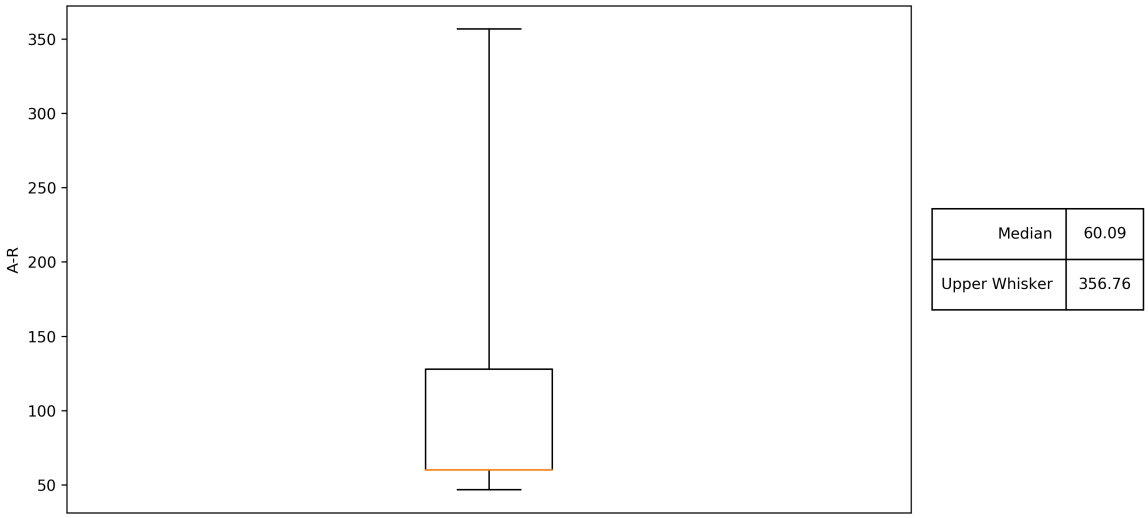
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot. The whiskers are the medcouple values with the upper whisker being the outlier threshold. Dots are outliers.

Figure 21-3. Histogram of A-R for MELON fields in the Coalition.



Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot.

Figure 21-4. Box and whisker plot of A-R for MELON fields in the Coalition.



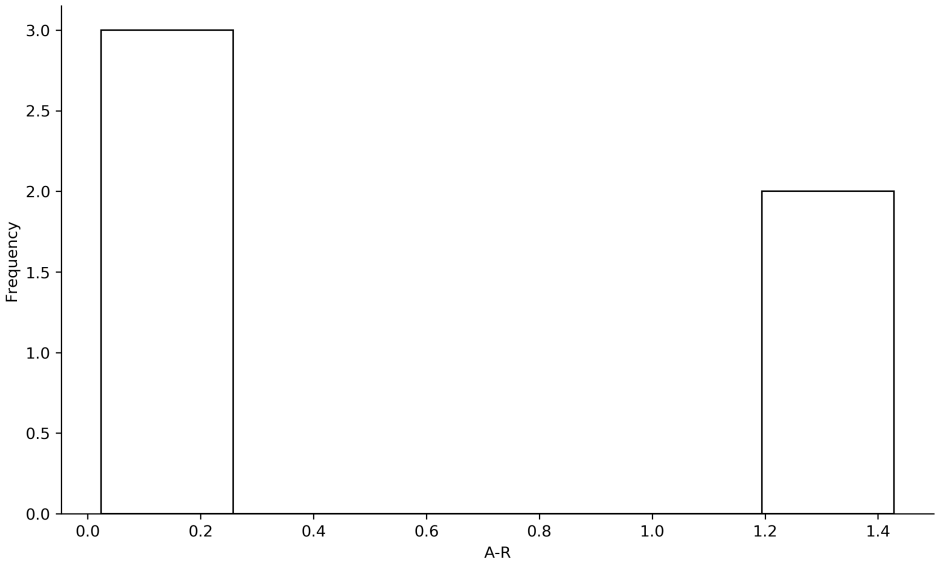
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot. The whiskers are the medcouple values with the upper whisker being the outlier threshold. Dots are outliers.

22. MILLET

Table 22-1. Summary statistics for MILLET fields in Coalition.

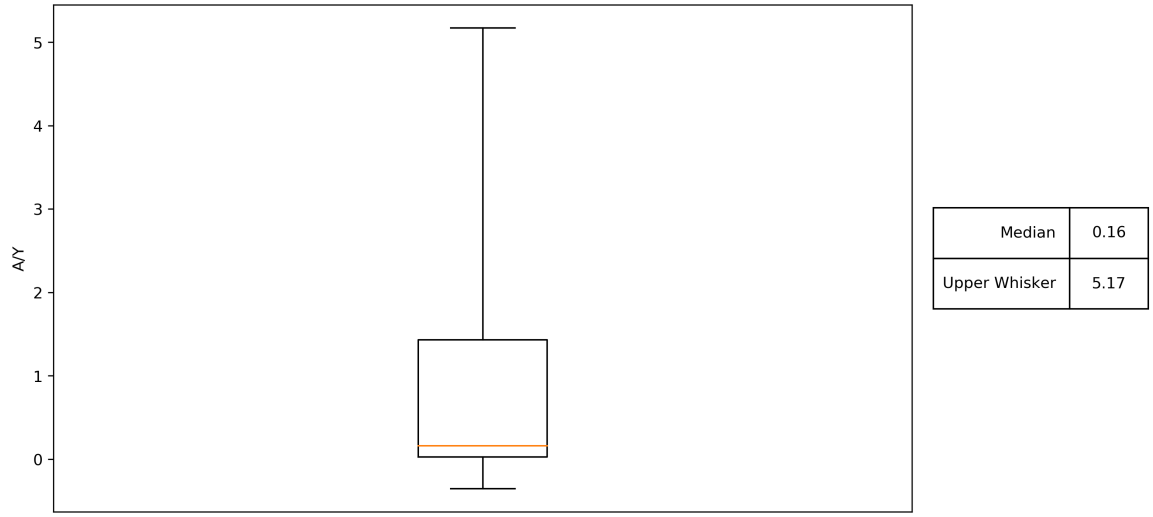
Parameter	# Fields	Acreage	Mean	St. Dev.	Min	Max	Outlier Threshold	No. Outliers
A/Y	5	329.39	0.61	0.75	0.02	1.43	5.17	0

Figure 22-1. Histogram of A/Y for MILLET fields in the Coalition.



Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot

Figure 22-2. Box and whisker plot of A/Y for MILLET fields in the Coalition.



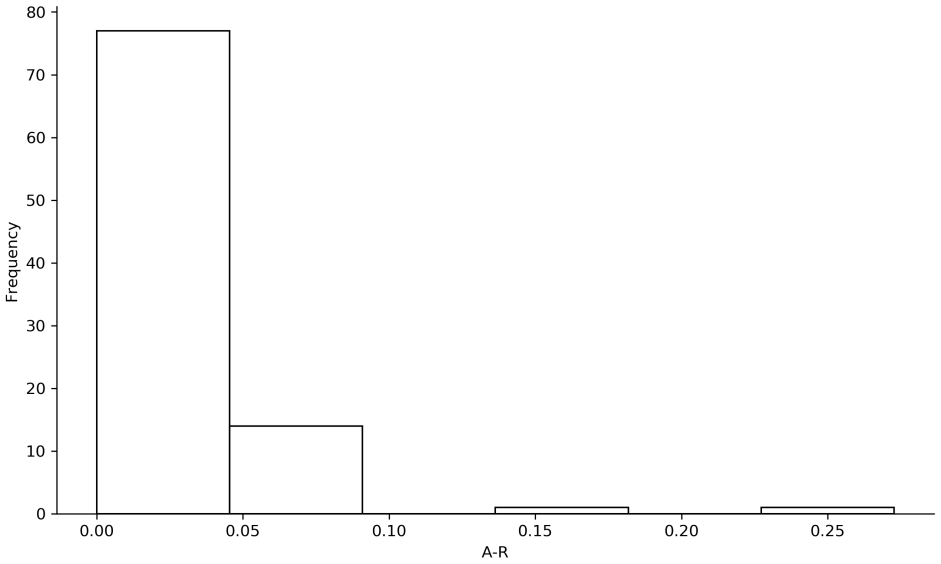
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot
The whiskers are the medcouple values with the upper whisker being the outlier threshold. Dots are outliers.

23. MISC FRUIT TREE

Table 23-1. Summary statistics for MISC FRUIT TREE fields in Coalition.

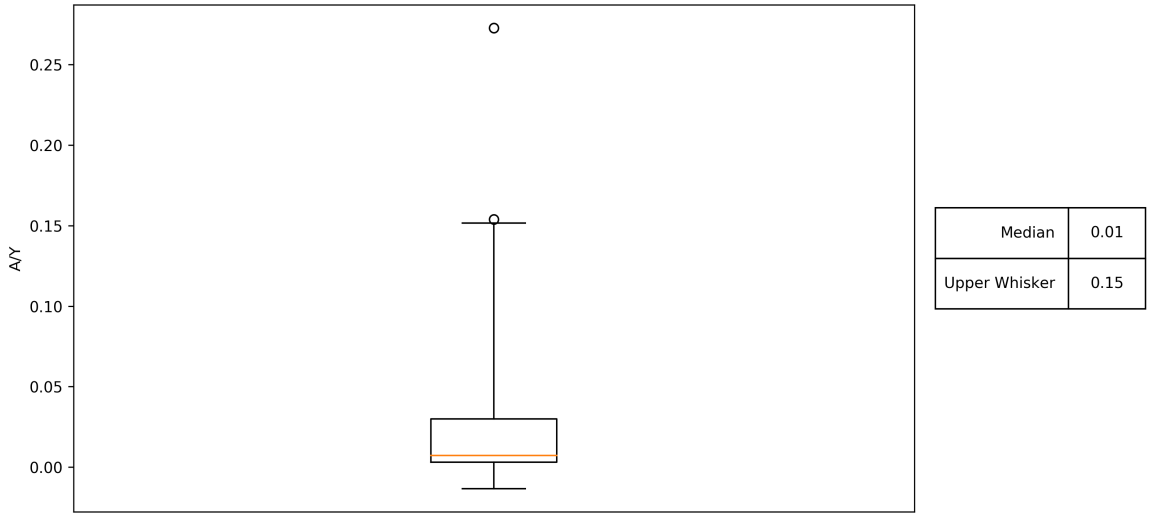
Parameter	# Fields	Acreage	Mean	St. Dev.	Min	Max	Outlier Threshold	No. Outliers
A/Y	106	3438.52	47.83	485.59	0.0	5000.0	0.15	15

Figure 23-1. Histogram of A/Y for MISC FRUIT TREE fields in the Coalition.



Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot

Figure 23-2. Box and whisker plot of A/Y for MISC FRUIT TREE fields in the Coalition.



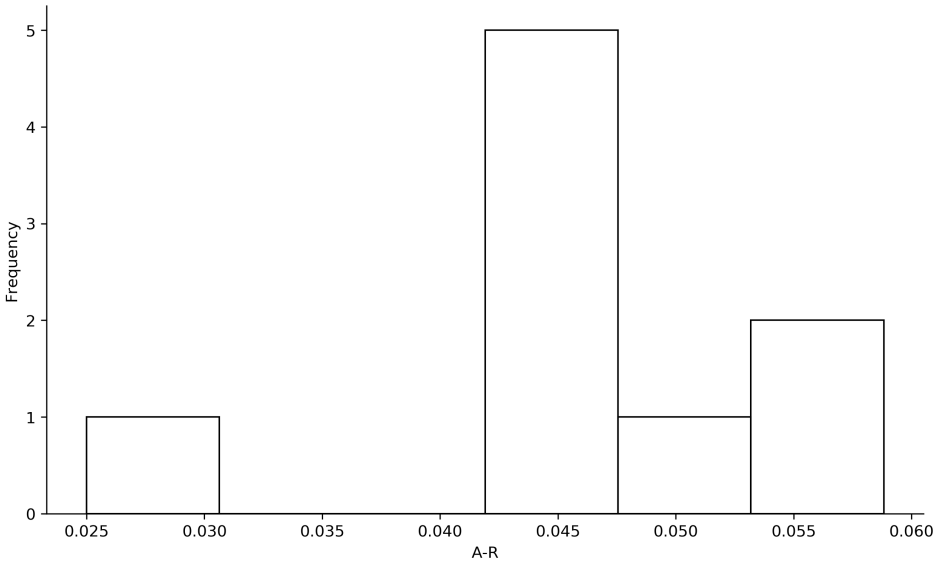
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot
The whiskers are the medcouple values with the upper whisker being the outlier threshold. Dots are outliers.

24. MISC NUT TREE

Table 24-1. Summary statistics for MISC NUT TREE fields in Coalition.

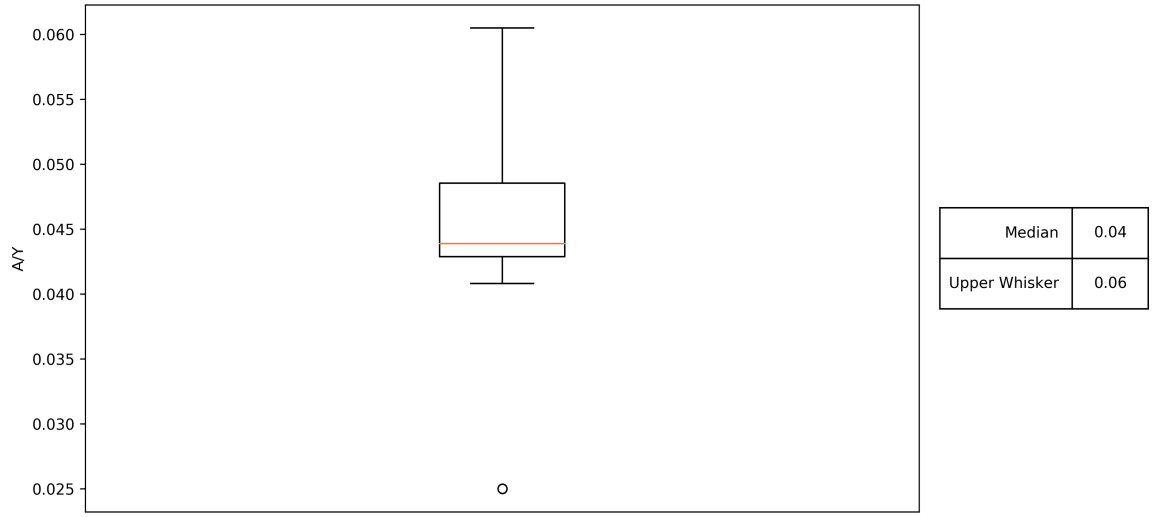
Parameter	# Fields	Acreage	Mean	St. Dev.	Min	Max	Outlier Threshold	No. Outliers
A/Y	9	439.9	0.05	0.01	0.02	0.06	0.06	0

Figure 24-1. Histogram of A/Y for MISC NUT TREE fields in the Coalition.



Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot

Figure 24-2. Box and whisker plot of A/Y for MISC NUT TREE fields in the Coalition.



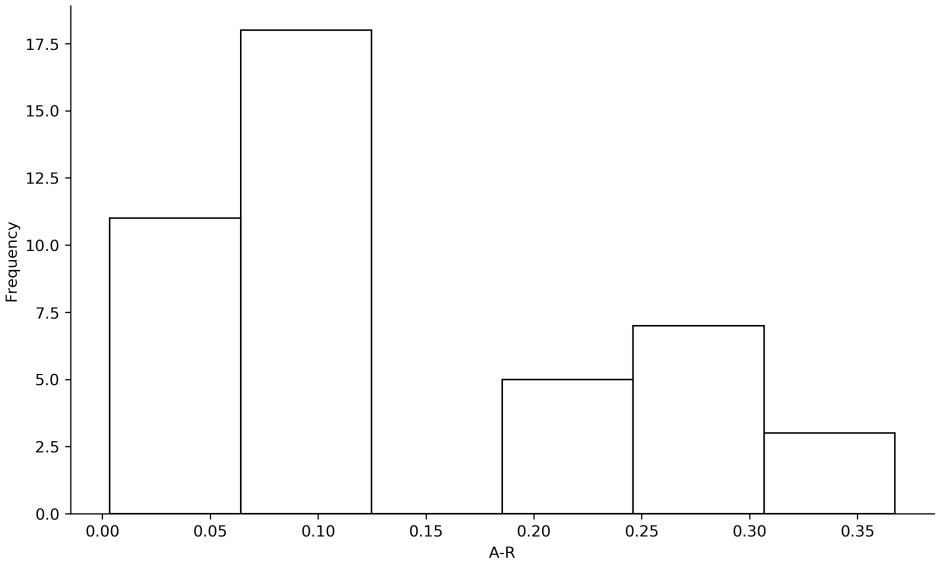
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot
The whiskers are the medcouple values with the upper whisker being the outlier threshold. Dots are outliers.

25. MISC ROW CROP

Table 25-1. Summary statistics for MISC ROW CROP fields in Coalition.

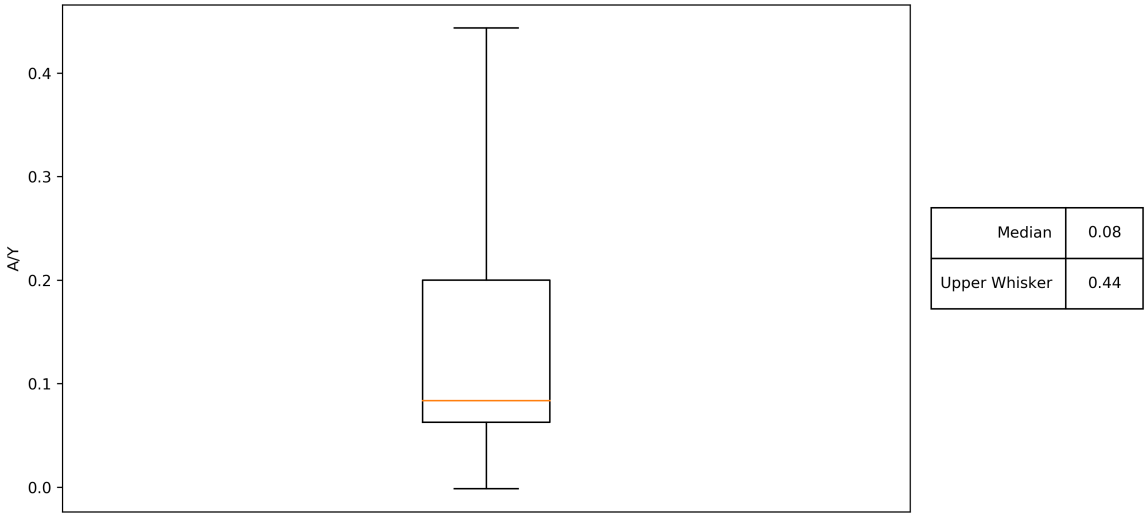
Parameter	# Fields	Acreage	Mean	St. Dev.	Min	Max	Outlier Threshold	No. Outliers
A/Y	44	3547.87	0.13	0.12	0.0	0.37	0.44	0

Figure 25-1. Histogram of A/Y for MISC ROW CROP fields in the Coalition.



Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot

Figure 25-2. Box and whisker plot of A/Y for MISC ROW CROP fields in the Coalition.



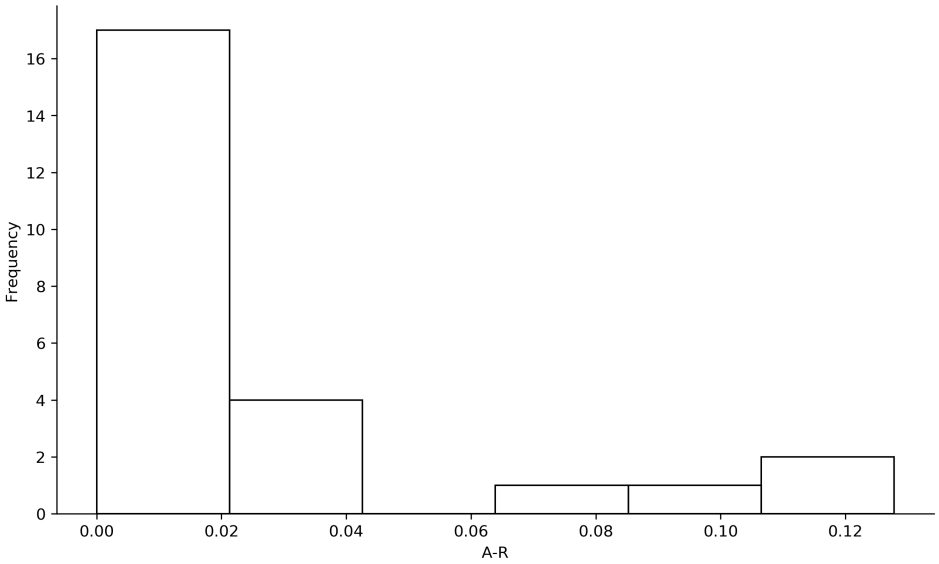
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot
The whiskers are the medcouple values with the upper whisker being the outlier threshold. Dots are outliers.

26. MISC VEGETABLE

Table 26-1. Summary statistics for MISC VEGETABLE fields in Coalition.

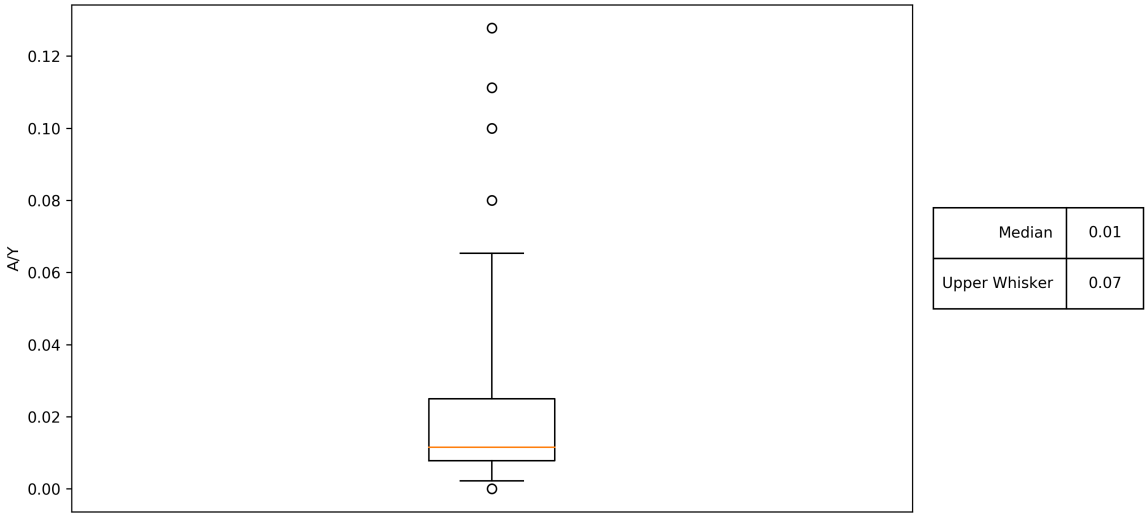
Parameter	# Fields	Acreage	Mean	St. Dev.	Min	Max	Outlier Threshold	No. Outliers
A/Y	25	517.27	0.03	0.04	0.0	0.13	0.07	4

Figure 26-1. Histogram of A/Y for MISC VEGETABLE fields in the Coalition.



Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot

Figure 26-2. Box and whisker plot of A/Y for MISC VEGETABLE fields in the Coalition.



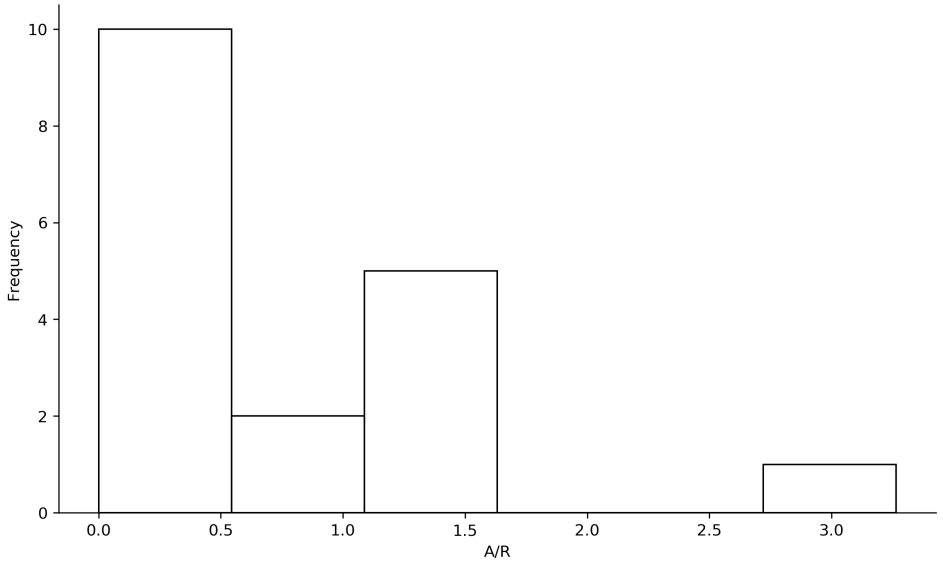
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot
The whiskers are the medcouple values with the upper whisker being the outlier threshold. Dots are outliers.

27. OAT - FODDER/SILAGE

Table 27-1. Summary statistics for OAT - FODDER/SILAGE fields in Coalition.

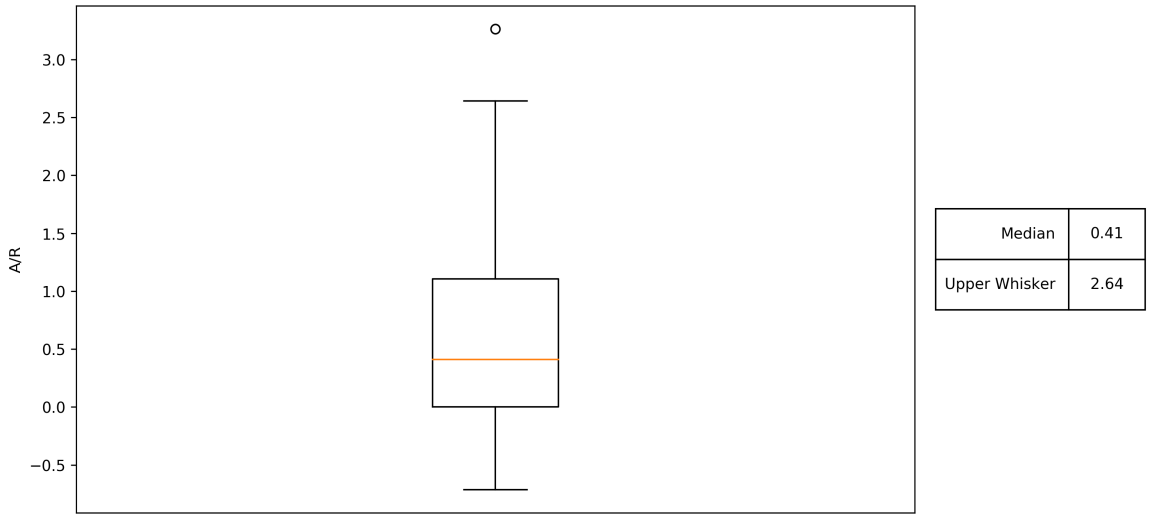
Parameter	# Fields	Acreage	Mean	St. Dev.	Min	Max	Outlier Threshold	No. Outliers
A/R	18	980.69	0.64	0.84	0.0	3.26	2.64	1
A-R	18	980.69	-39.17	58.0	-173.6	58.96	108.79	0

Figure 27-1. Histogram of A/R for OAT - FODDER/SILAGE fields in the Coalition.



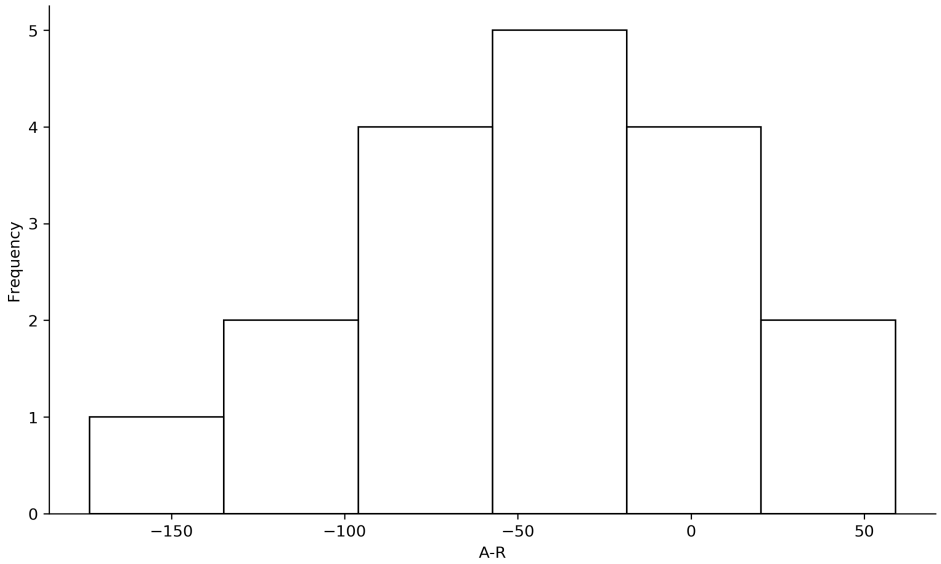
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot.

Figure 27-2. Box and whisker plot of A/R for OAT - FODDER/SILAGE fields in the Coalition.



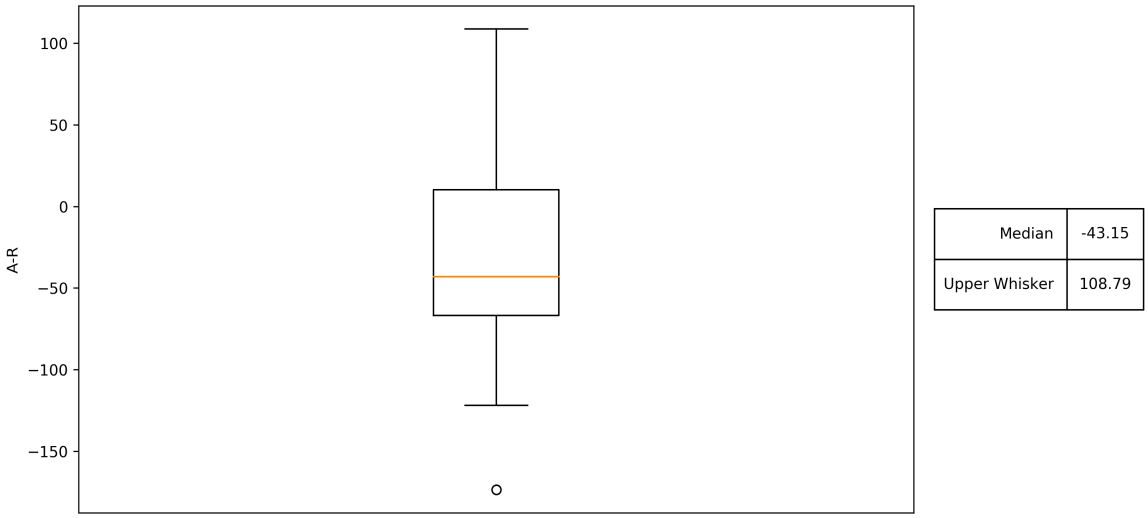
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot. The whiskers are the medcouple values with the upper whisker being the outlier threshold. Dots are outliers.

Figure 27-3. Histogram of A-R for OAT - FODDER/SILAGE fields in the Coalition.



Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot.

Figure 27-4. Box and whisker plot of A-R for OAT - FODDER/SILAGE fields in the Coalition.



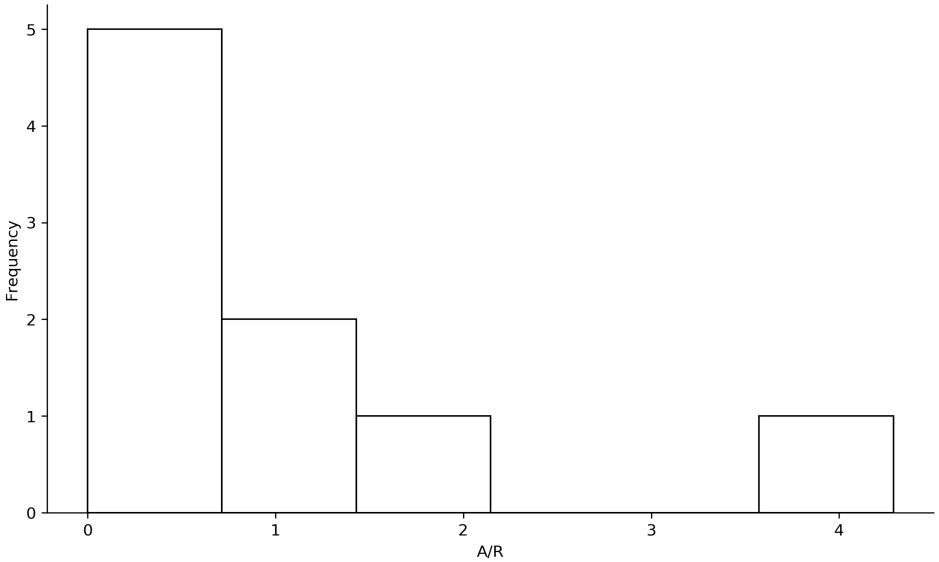
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot. The whiskers are the medcouple values with the upper whisker being the outlier threshold. Dots are outliers.

28. OAT - GRAIN

Table 28-1. Summary statistics for OAT - GRAIN fields in Coalition.

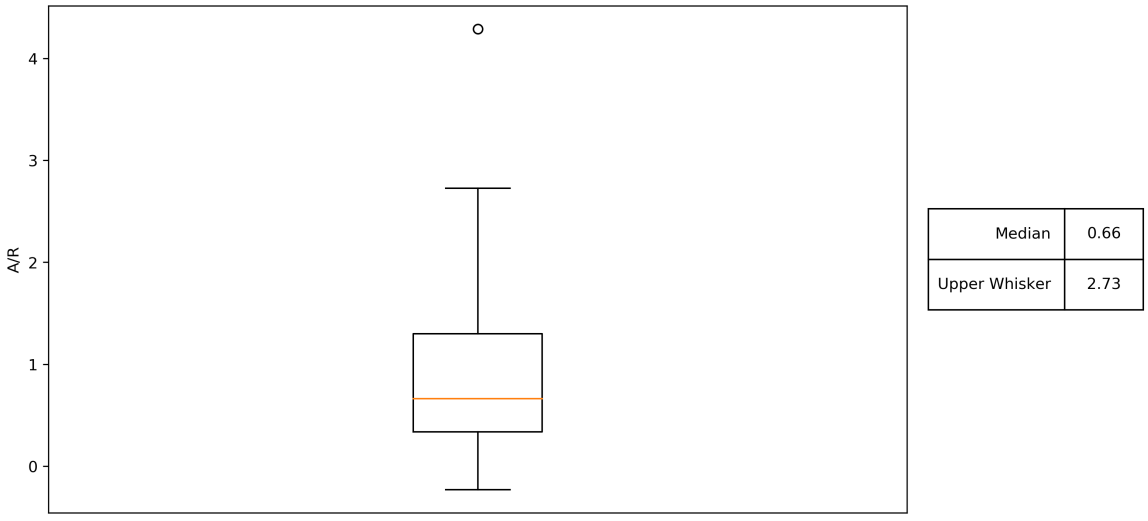
Parameter	# Fields	Acreage	Mean	St. Dev.	Min	Max	Outlier Threshold	No. Outliers
A/R	9	366.0	1.1	1.37	0.0	4.29	2.73	1
A-R	9	366.0	-21.89	69.19	-113.1	103.52	127.61	0

Figure 28-1. Histogram of A/R for OAT - GRAIN fields in the Coalition.



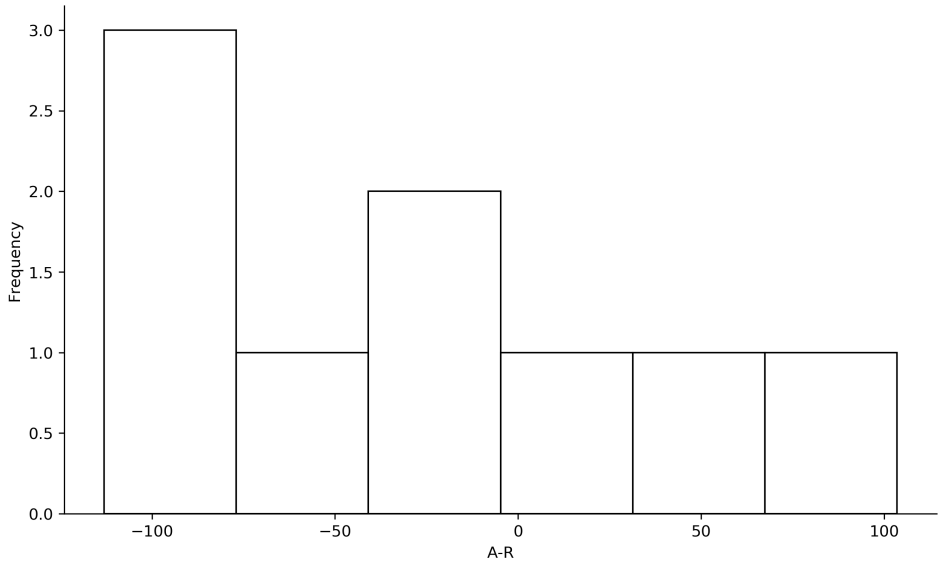
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot.

Figure 28-2. Box and whisker plot of A/R for OAT - GRAIN fields in the Coalition.



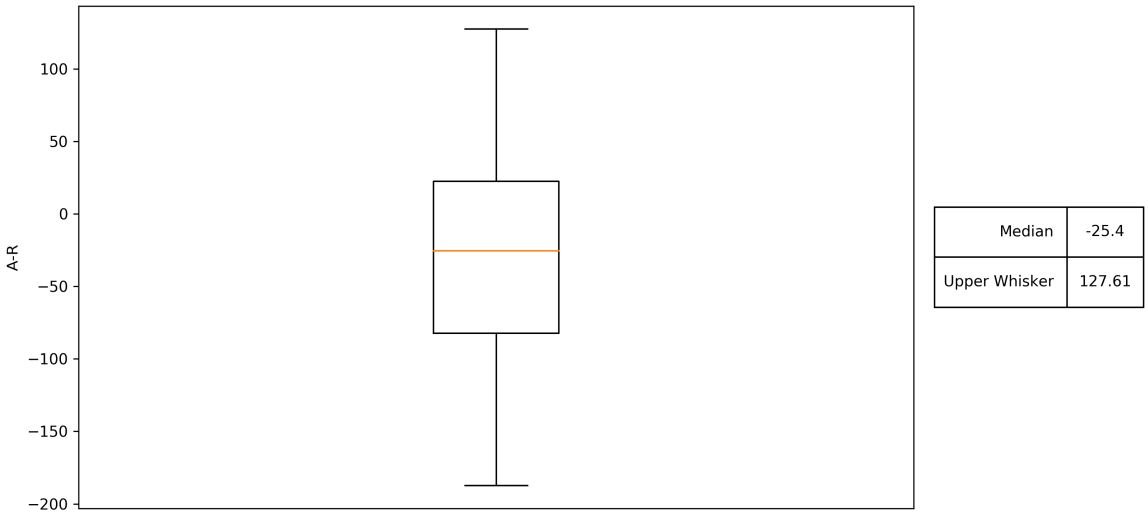
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot. The whiskers are the medcouple values with the upper whisker being the outlier threshold. Dots are outliers.

Figure 28-3. Histogram of A-R for OAT - GRAIN fields in the Coalition.



Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot.

Figure 28-4. Box and whisker plot of A-R for OAT - GRAIN fields in the Coalition.



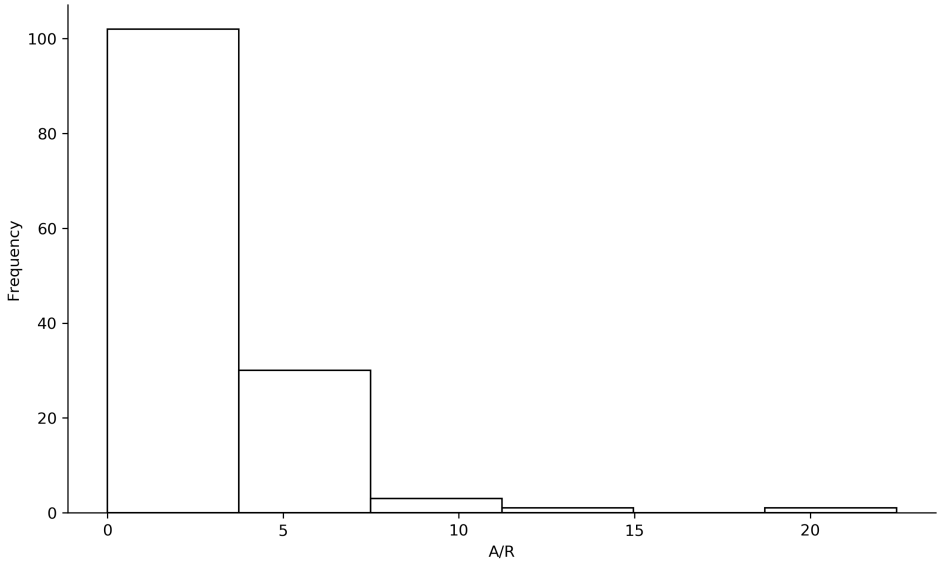
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot. The whiskers are the medcouple values with the upper whisker being the outlier threshold. Dots are outliers.

29. OLIVE

Table 29-1. Summary statistics for OLIVE fields in Coalition.

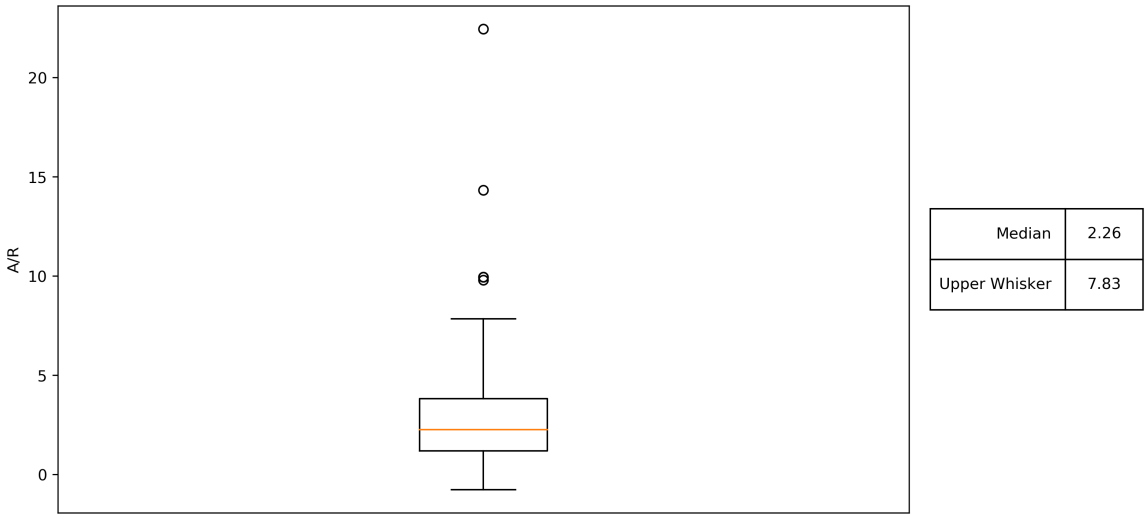
Parameter	# Fields	Acreage	Mean	St. Dev.	Min	Max	Outlier Threshold	No. Outliers
A/R	138	6991.57	33.15	355.76	0.0	4181.95	7.83	6
A-R	138	6991.57	45.59	57.21	-67.2	251.16	96.66	18

Figure 29-1. Histogram of A/R for OLIVE fields in the Coalition.



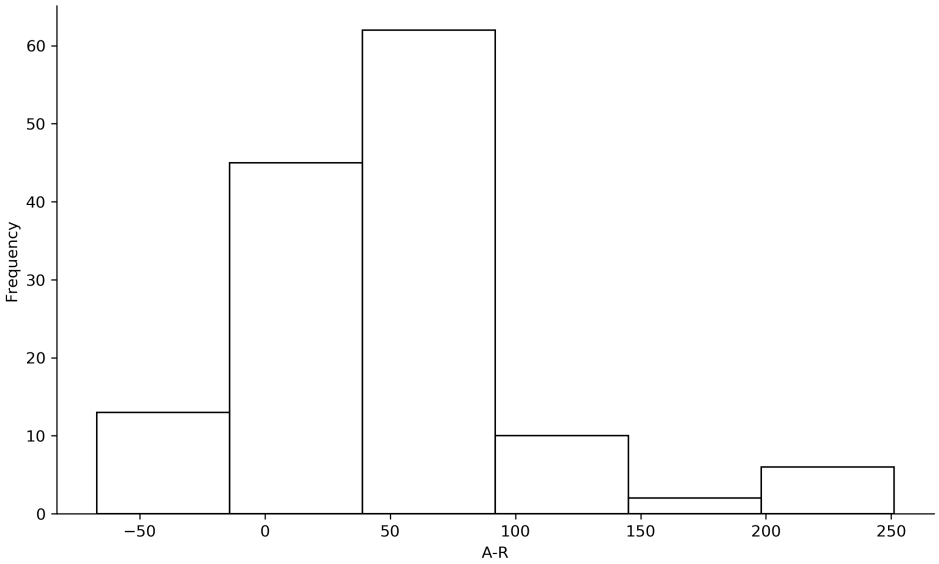
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot.

Figure 29-2. Box and whisker plot of A/R for OLIVE fields in the Coalition.



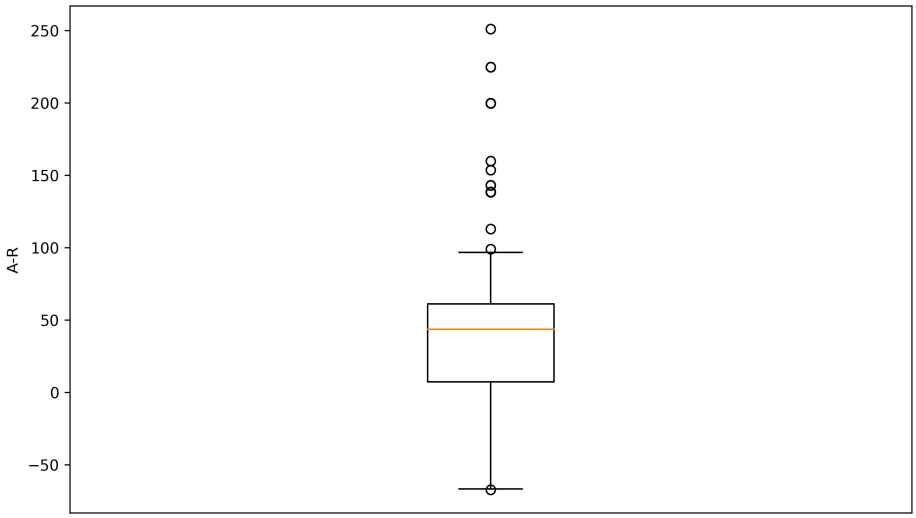
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot. The whiskers are the medcouple values with the upper whisker being the outlier threshold. Dots are outliers.

Figure 29-3. Histogram of A-R for OLIVE fields in the Coalition.



Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot.

Figure 29-4. Box and whisker plot of A-R for OLIVE fields in the Coalition.



Median	43.55
Upper Whisker	96.66

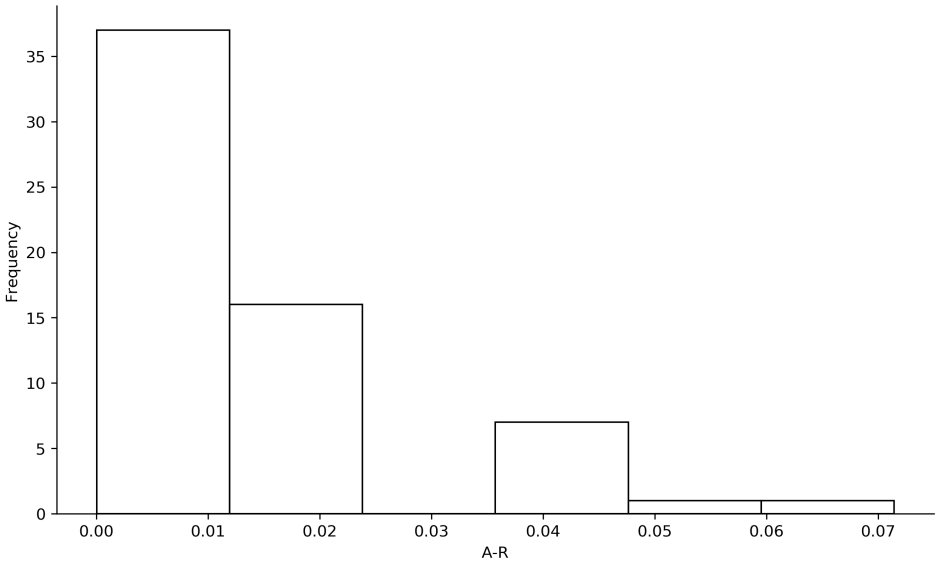
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot. The whiskers are the medcouple values with the upper whisker being the outlier threshold. Dots are outliers.

30. PASTURE

Table 30-1. Summary statistics for PASTURE fields in Coalition.

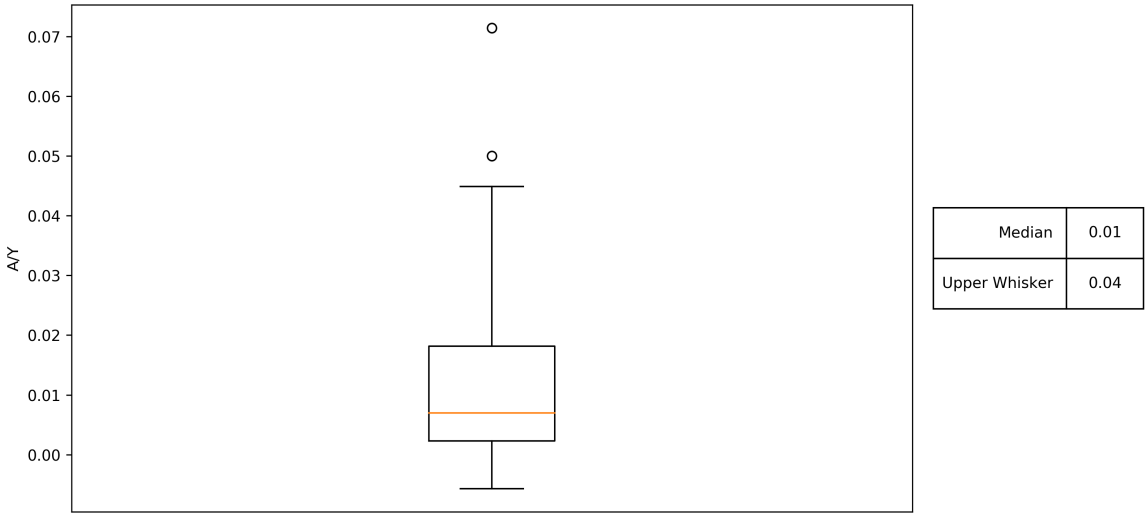
Parameter	# Fields	Acreage	Mean	St. Dev.	Min	Max	Outlier Threshold	No. Outliers
A/Y	62	4399.85	0.01	0.01	0.0	0.07	0.04	2

Figure 30-1. Histogram of A/Y for PASTURE fields in the Coalition.



Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot

Figure 30-2. Box and whisker plot of A/Y for PASTURE fields in the Coalition.



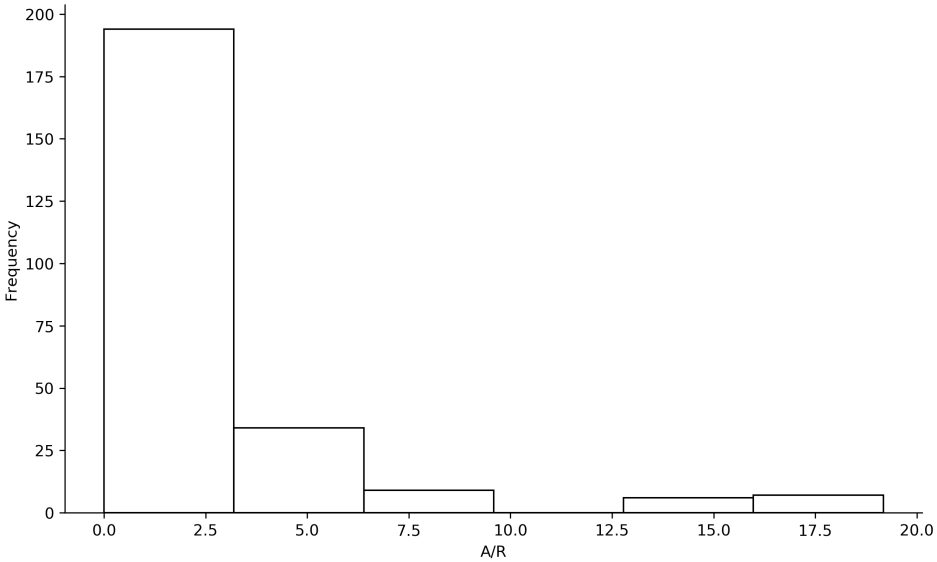
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot
The whiskers are the medcouple values with the upper whisker being the outlier threshold. Dots are outliers.

31. PEACH/NECTARINE

Table 31-1. Summary statistics for PEACH/NECTARINE fields in Coalition.

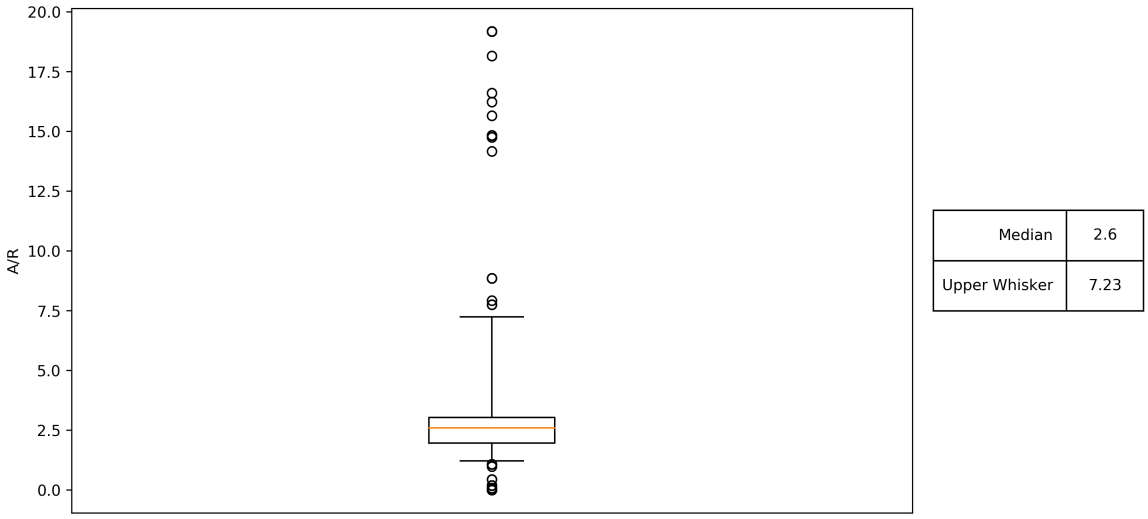
Parameter	# Fields	Acreage	Mean	St. Dev.	Min	Max	Outlier Threshold	No. Outliers
A/R	277	7066.62	133.58	1178.15	0.0	13274.34	7.23	45
A-R	277	7066.62	78.25	67.99	-41.98	497.65	143.23	32

Figure 31-1. Histogram of A/R for PEACH/NECTARINE fields in the Coalition.



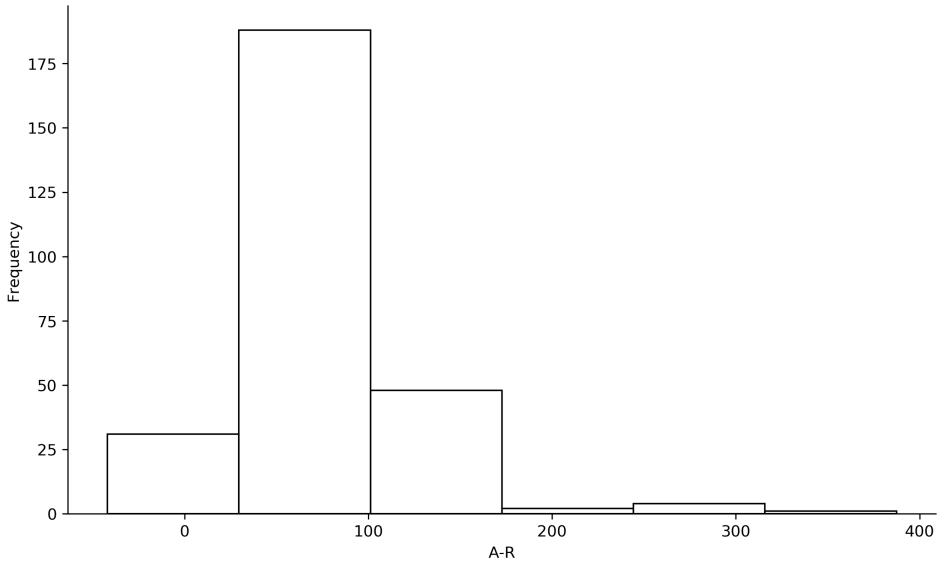
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot.

Figure 31-2. Box and whisker plot of A/R for PEACH/NECTARINE fields in the Coalition.



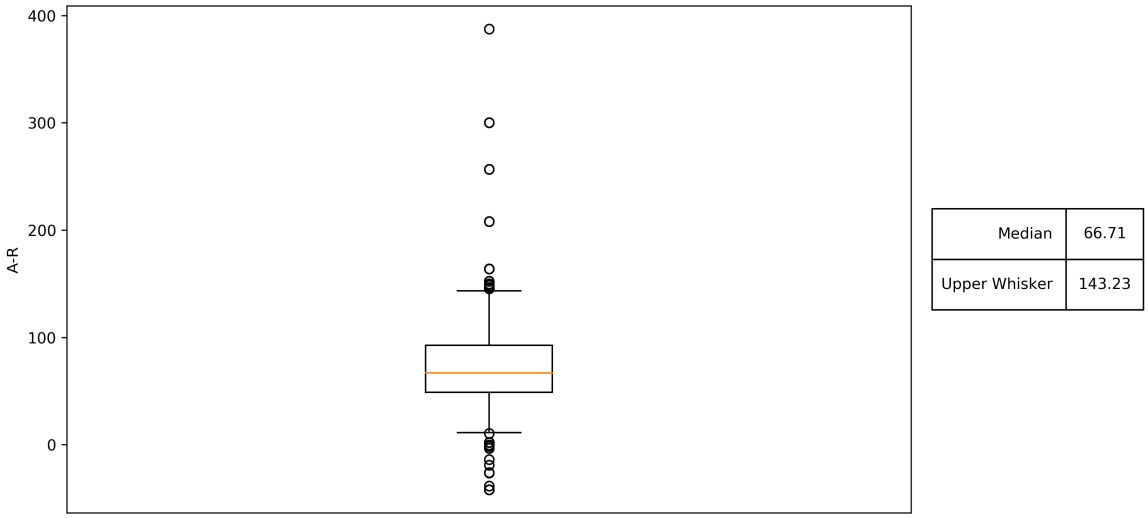
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot. The whiskers are the medcouple values with the upper whisker being the outlier threshold. Dots are outliers.

Figure 31-3. Histogram of A-R for PEACH/NECTARINE fields in the Coalition.



Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot.

Figure 31-4. Box and whisker plot of A-R for PEACH/NECTARINE fields in the Coalition.



Median	66.71
Upper Whisker	143.23

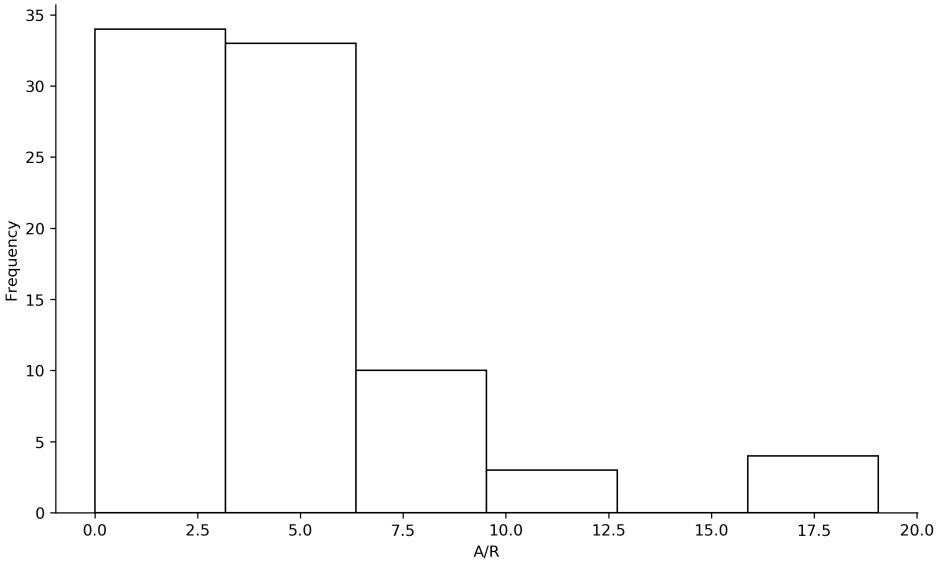
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot. The whiskers are the medcouple values with the upper whisker being the outlier threshold. Dots are outliers.

32. PEAR

Table 32-1. Summary statistics for PEAR fields in Coalition.

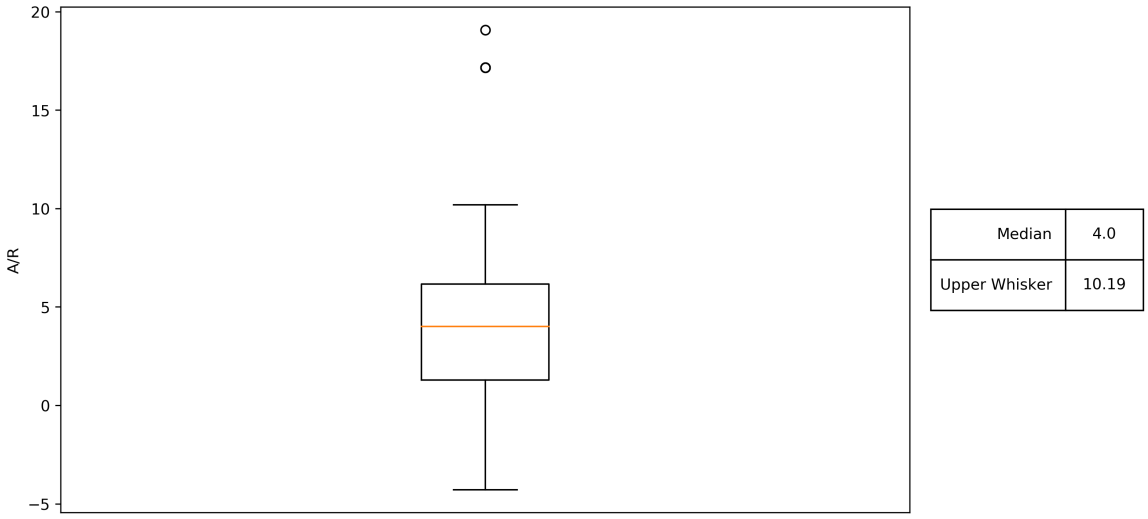
Parameter	# Fields	Acreage	Mean	St. Dev.	Min	Max	Outlier Threshold	No. Outliers
A/R	84	3791.3	4.39	4.03	0.0	19.06	10.19	4
A-R	84	3791.3	68.42	70.07	-33.2	291.94	205.41	3

Figure 32-1. Histogram of A/R for PEAR fields in the Coalition.



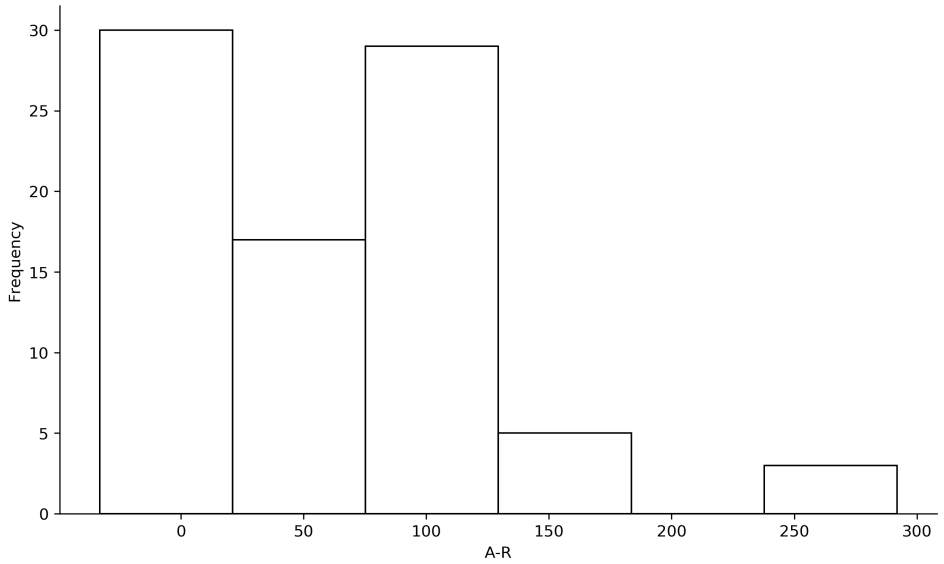
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot.

Figure 32-2. Box and whisker plot of A/R for PEAR fields in the Coalition.



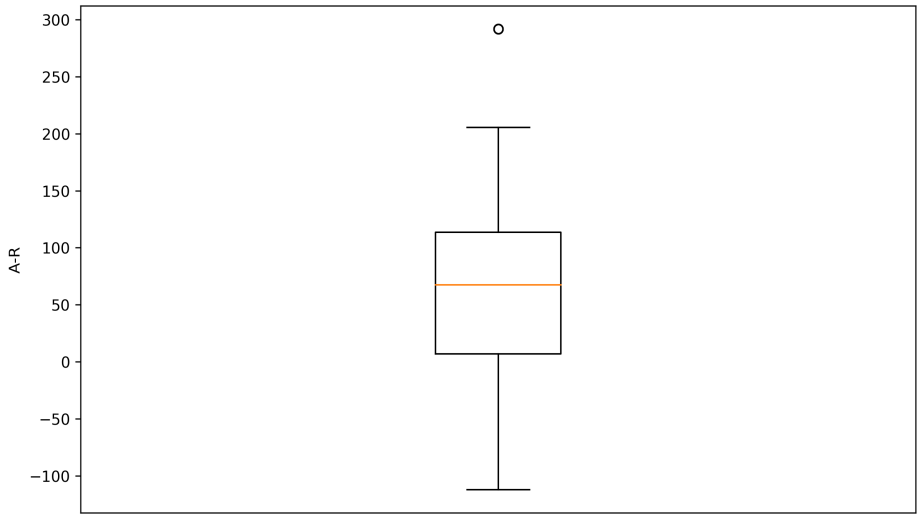
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot. The whiskers are the medcouple values with the upper whisker being the outlier threshold. Dots are outliers.

Figure 32-3. Histogram of A-R for PEAR fields in the Coalition.



Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot.

Figure 32-4. Box and whisker plot of A-R for PEAR fields in the Coalition.



Median	67.44
Upper Whisker	205.41

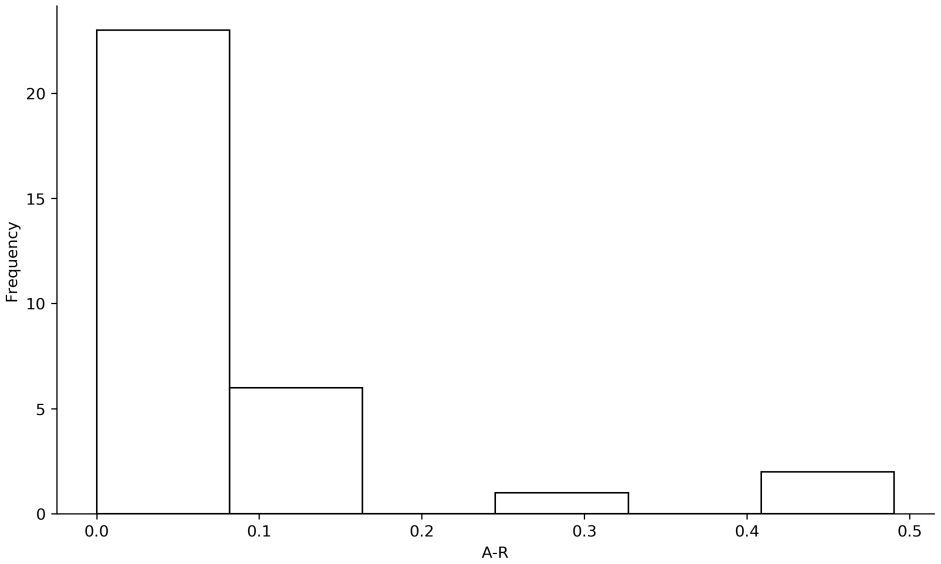
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot. The whiskers are the medcouple values with the upper whisker being the outlier threshold. Dots are outliers.

33. PECAN

Table 33-1. Summary statistics for PECAN fields in Coalition.

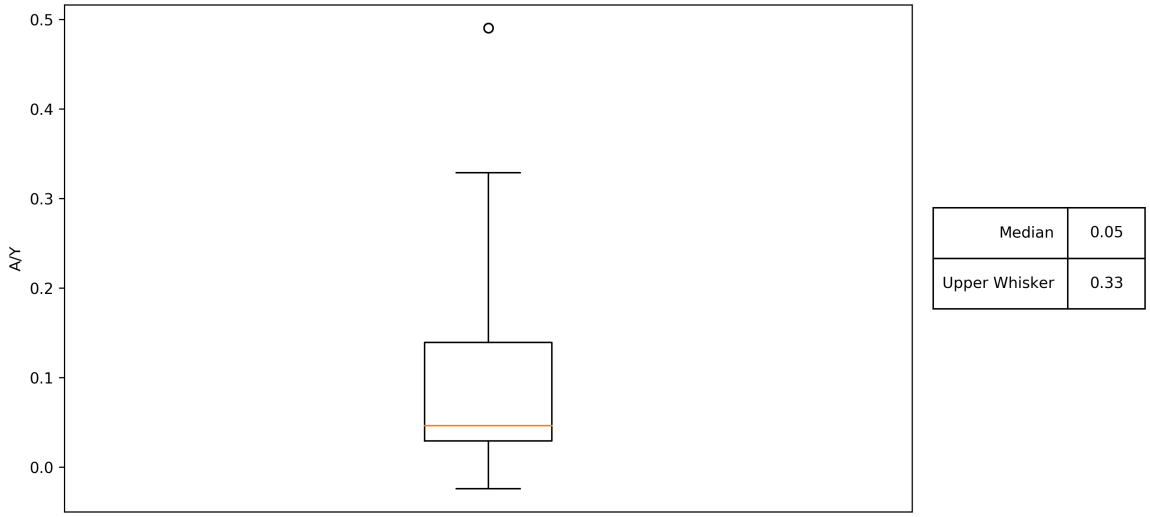
Parameter	# Fields	Acreage	Mean	St. Dev.	Min	Max	Outlier Threshold	No. Outliers
A/Y	32	927.43	0.09	0.12	0.0	0.49	0.33	2

Figure 33-1. Histogram of A/Y for PECAN fields in the Coalition.



Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot

Figure 33-2. Box and whisker plot of A/Y for PECAN fields in the Coalition.



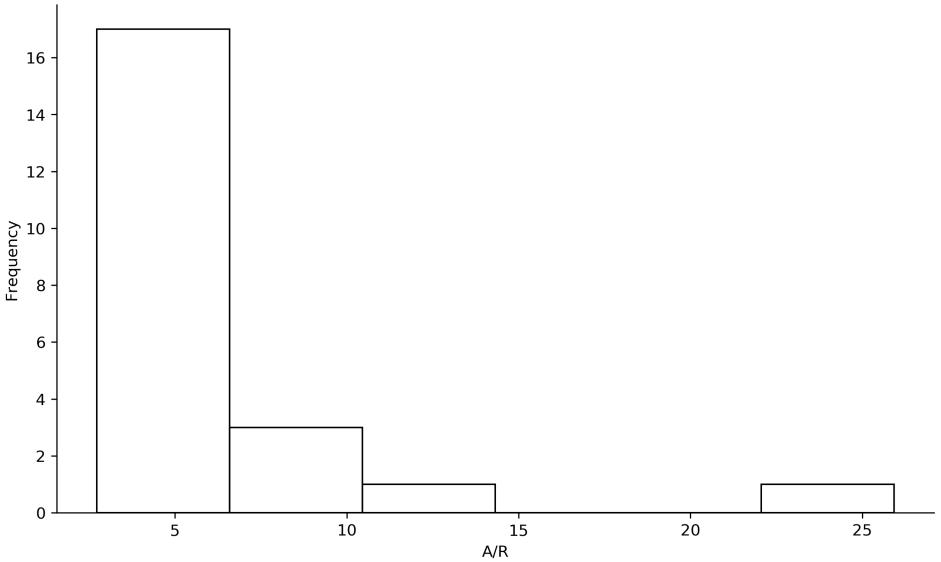
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot
The whiskers are the medcouple values with the upper whisker being the outlier threshold. Dots are outliers.

34. PEPPER

Table 34-1. Summary statistics for PEPPER fields in Coalition.

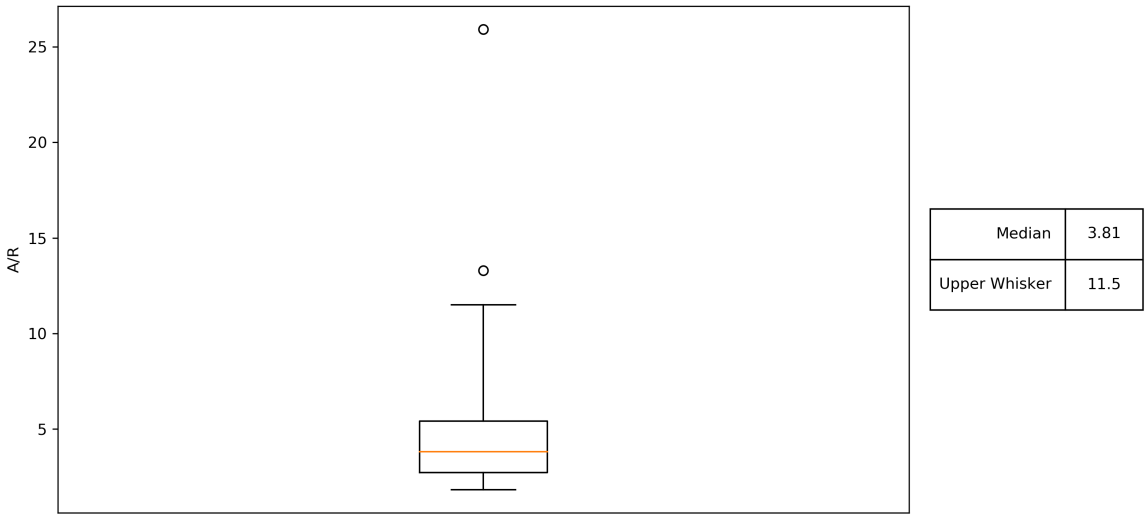
Parameter	# Fields	Acreage	Mean	St. Dev.	Min	Max	Outlier Threshold	No. Outliers
A/R	22	781.68	5.81	5.26	2.72	25.93	11.5	2
A-R	22	781.68	179.14	51.26	126.48	299.28	301.78	0

Figure 34-1. Histogram of A/R for PEPPER fields in the Coalition.



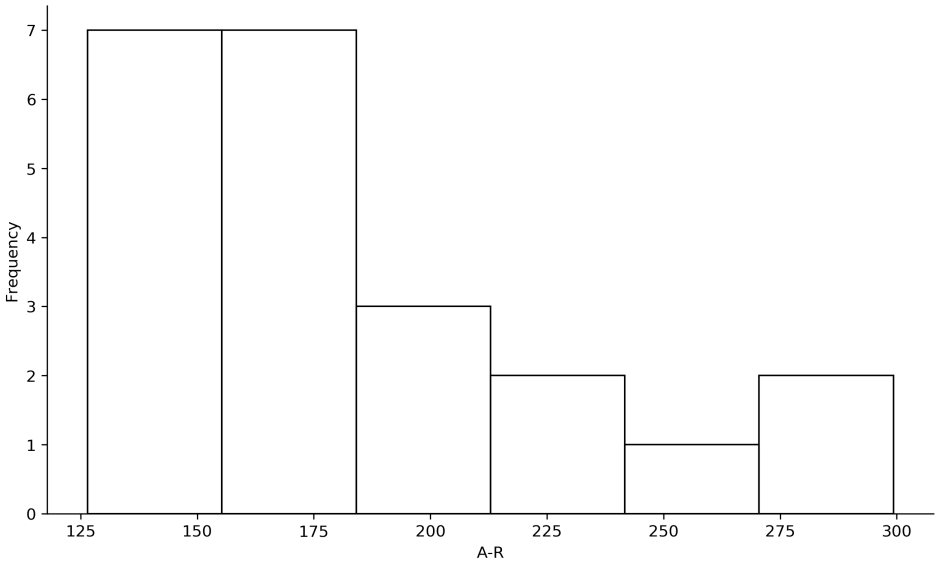
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot.

Figure 34-2. Box and whisker plot of A/R for PEPPER fields in the Coalition.



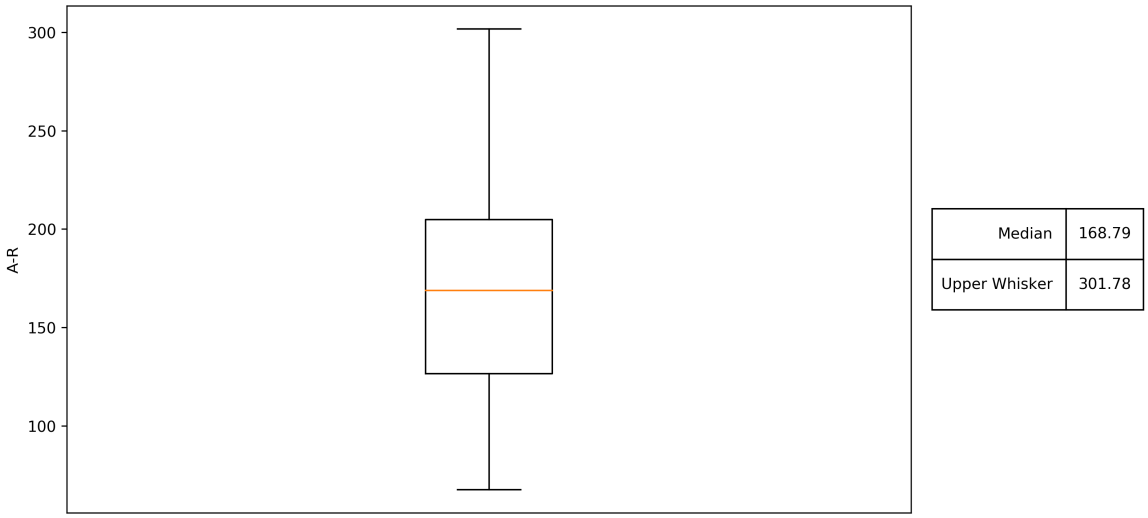
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot. The whiskers are the medcouple values with the upper whisker being the outlier threshold. Dots are outliers.

Figure 34-3. Histogram of A-R for PEPPER fields in the Coalition.



Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot.

Figure 34-4. Box and whisker plot of A-R for PEPPER fields in the Coalition.



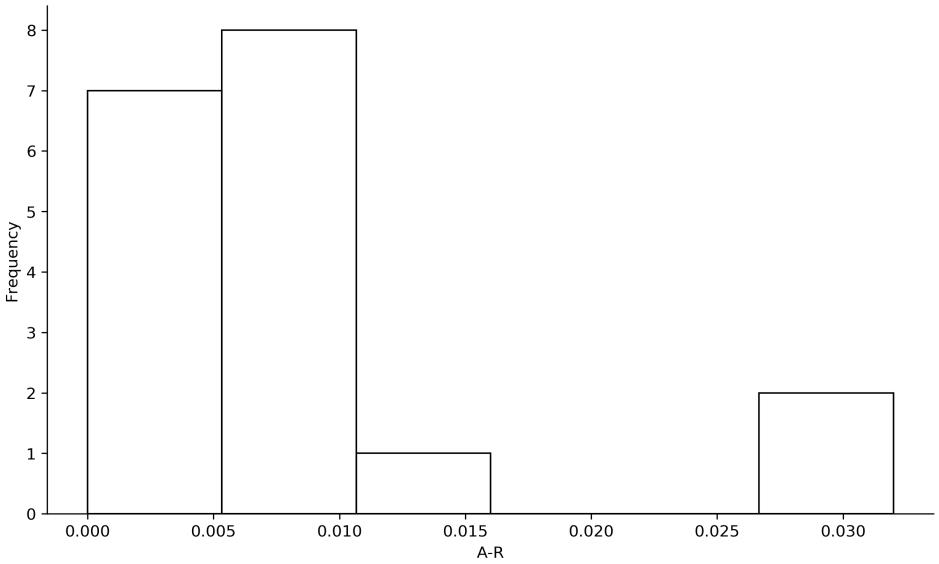
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot. The whiskers are the medcouple values with the upper whisker being the outlier threshold. Dots are outliers.

35. PERSIMMON

Table 35-1. Summary statistics for PERSIMMON fields in Coalition.

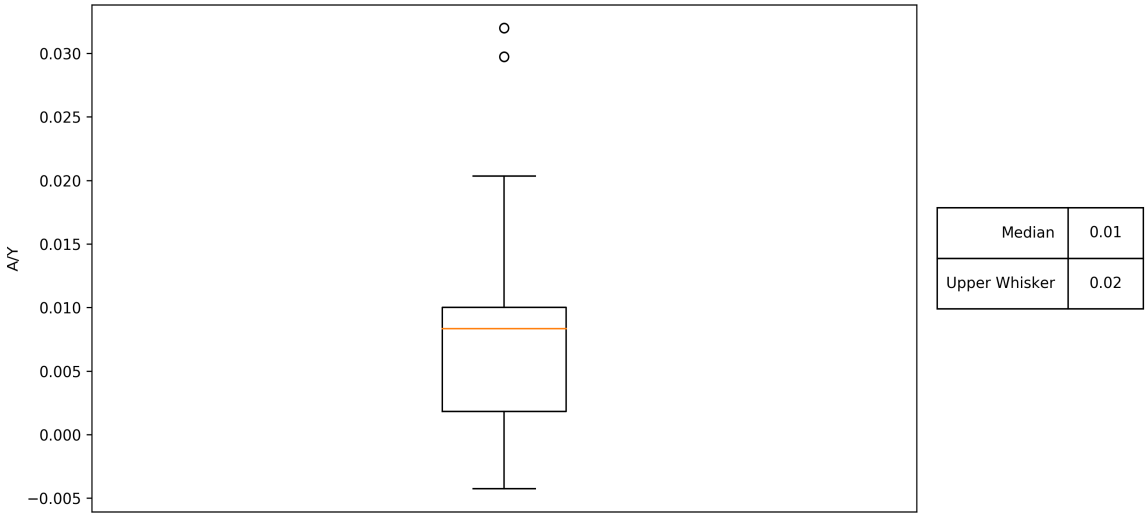
Parameter	# Fields	Acreage	Mean	St. Dev.	Min	Max	Outlier Threshold	No. Outliers
A/Y	20	341.04	0.06	0.22	0.0	0.97	0.02	4

Figure 35-1. Histogram of A/Y for PERSIMMON fields in the Coalition.



Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot

Figure 35-2. Box and whisker plot of A/Y for PERSIMMON fields in the Coalition.



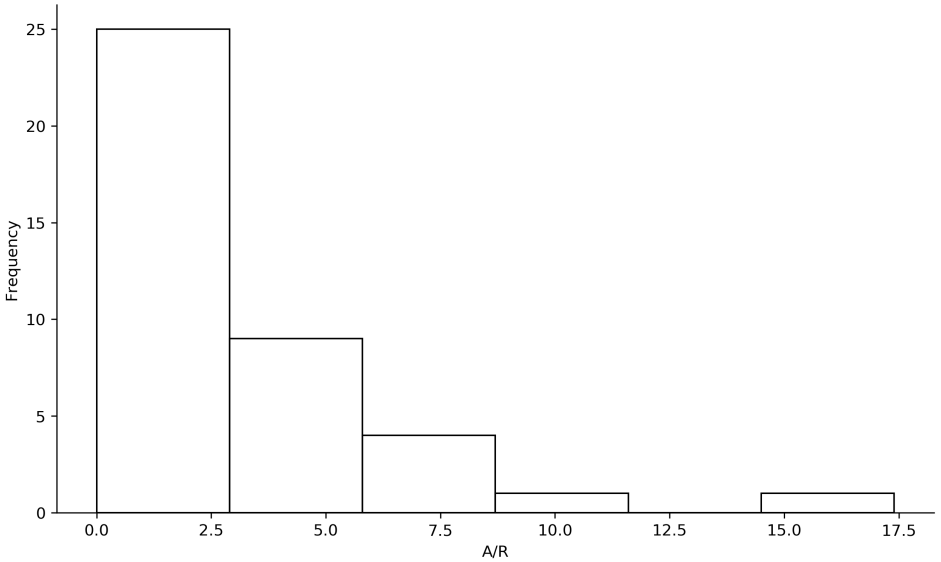
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot
The whiskers are the medcouple values with the upper whisker being the outlier threshold. Dots are outliers.

36. PISTACHIO

Table 36-1. Summary statistics for PISTACHIO fields in Coalition.

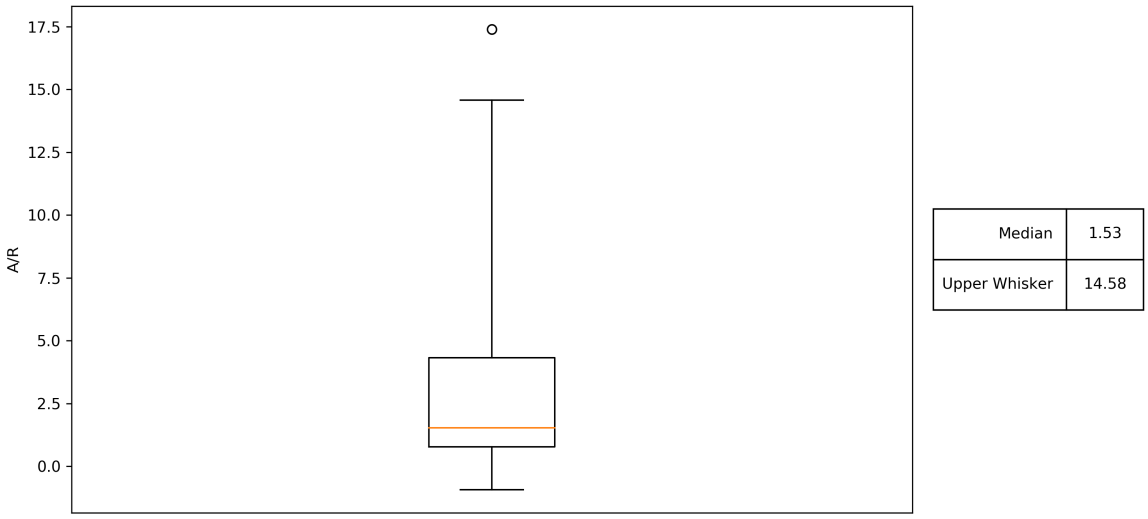
Parameter	# Fields	Acreage	Mean	St. Dev.	Min	Max	Outlier Threshold	No. Outliers
A/R	41	1732.9	94.48	586.39	0.0	3757.58	14.58	2
A-R	41	1732.9	54.01	91.2	-70.51	374.31	239.66	1

Figure 36-1. Histogram of A/R for PISTACHIO fields in the Coalition.



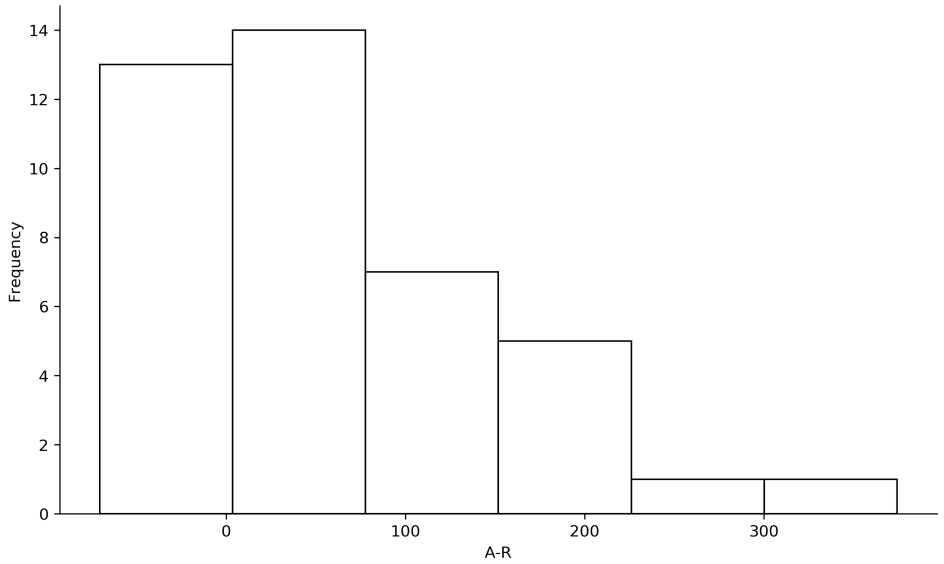
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot.

Figure 36-2. Box and whisker plot of A/R for PISTACHIO fields in the Coalition.



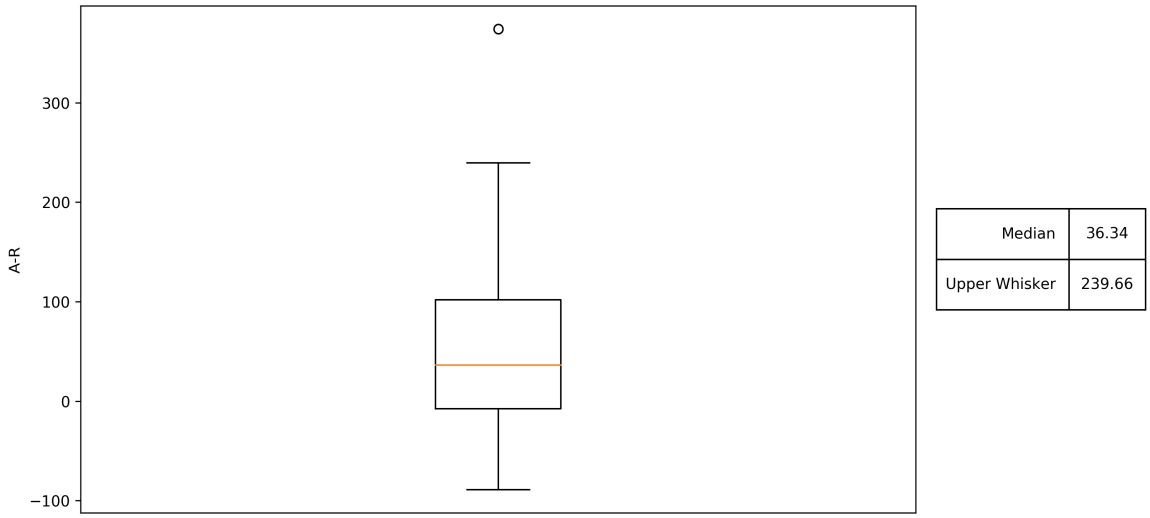
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot. The whiskers are the medcouple values with the upper whisker being the outlier threshold. Dots are outliers.

Figure 36-3. Histogram of A-R for PISTACHIO fields in the Coalition.



Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot.

Figure 36-4. Box and whisker plot of A-R for PISTACHIO fields in the Coalition.



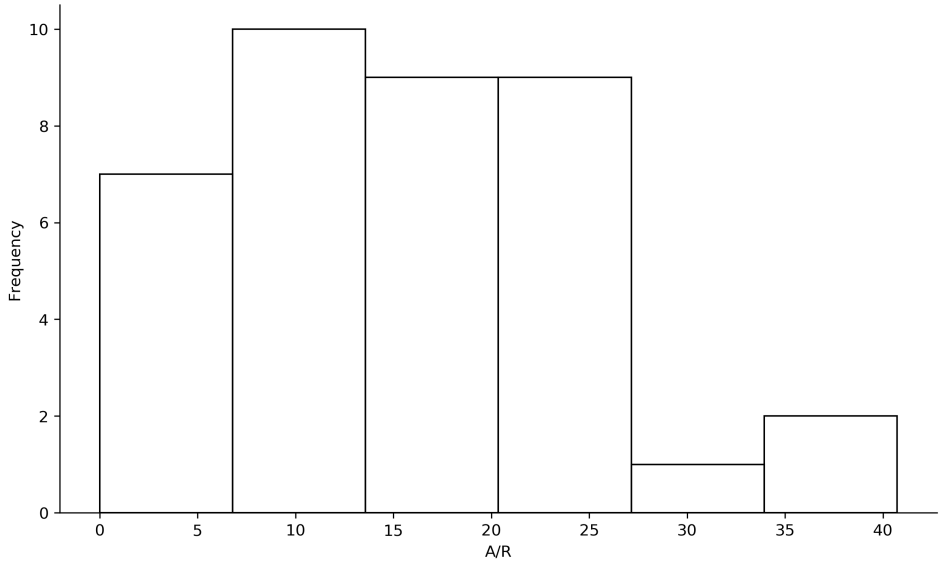
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot. The whiskers are the medcouple values with the upper whisker being the outlier threshold. Dots are outliers.

37. PLUM/PLUOT

Table 37-1. Summary statistics for PLUM/PLUOT fields in Coalition.

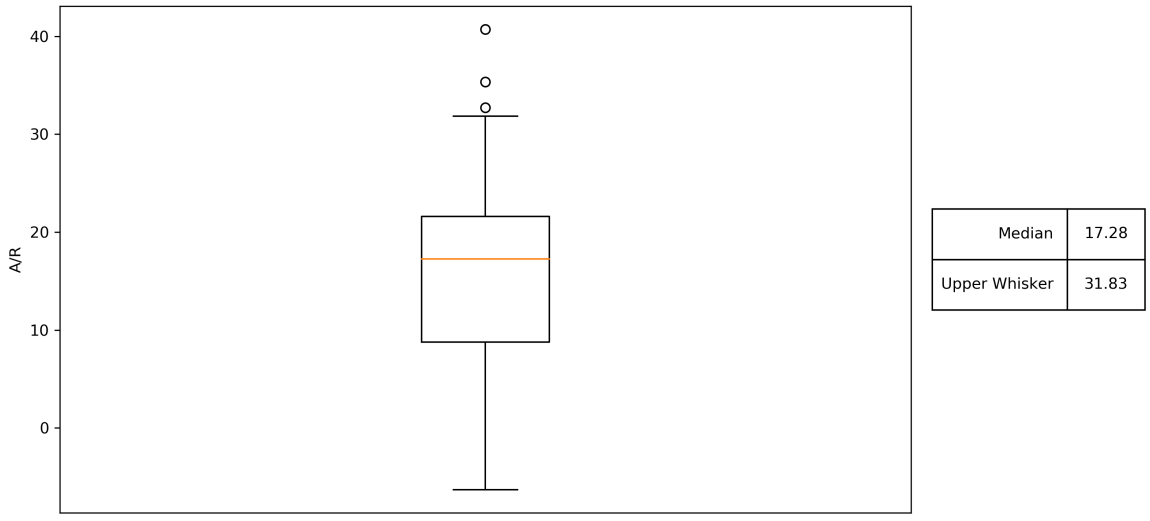
Parameter	# Fields	Acreage	Mean	St. Dev.	Min	Max	Outlier Threshold	No. Outliers
A/R	40	1320.53	92.5	463.21	0.0	2944.64	31.83	5
A-R	40	1320.53	82.45	50.26	-21.18	237.83	117.09	2

Figure 37-1. Histogram of A/R for PLUM/PLUOT fields in the Coalition.



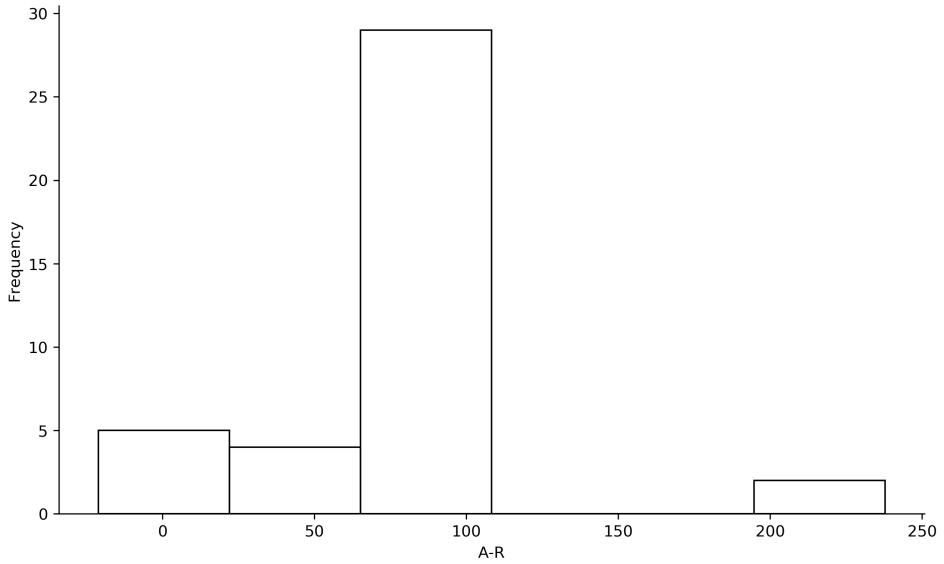
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot.

Figure 37-2. Box and whisker plot of A/R for PLUM/PLUOT fields in the Coalition.



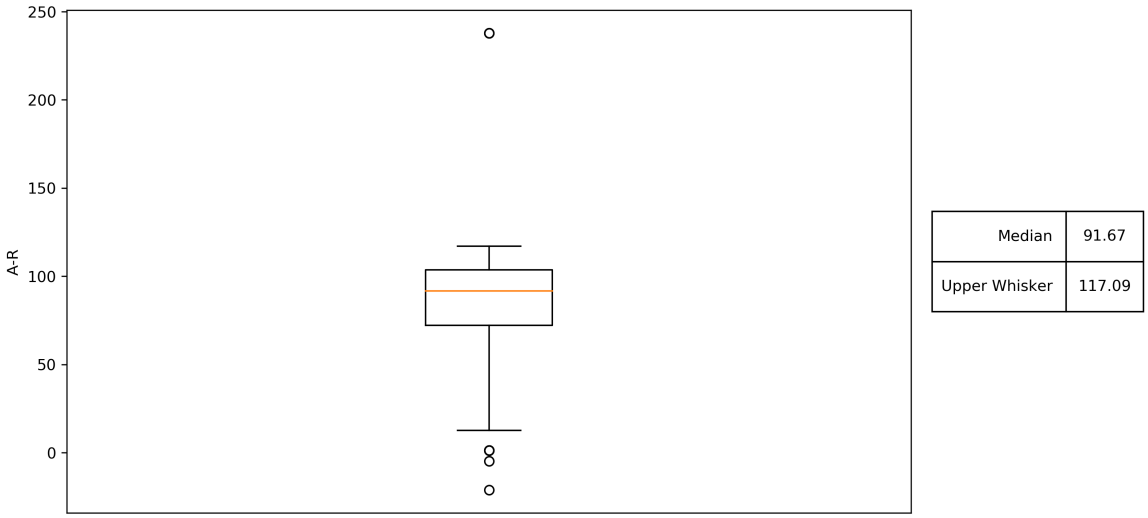
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot. The whiskers are the medcouple values with the upper whisker being the outlier threshold. Dots are outliers.

Figure 37-3. Histogram of A-R for PLUM/PLUOT fields in the Coalition.



Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot.

Figure 37-4. Box and whisker plot of A-R for PLUM/PLUOT fields in the Coalition.



Median	91.67
Upper Whisker	117.09

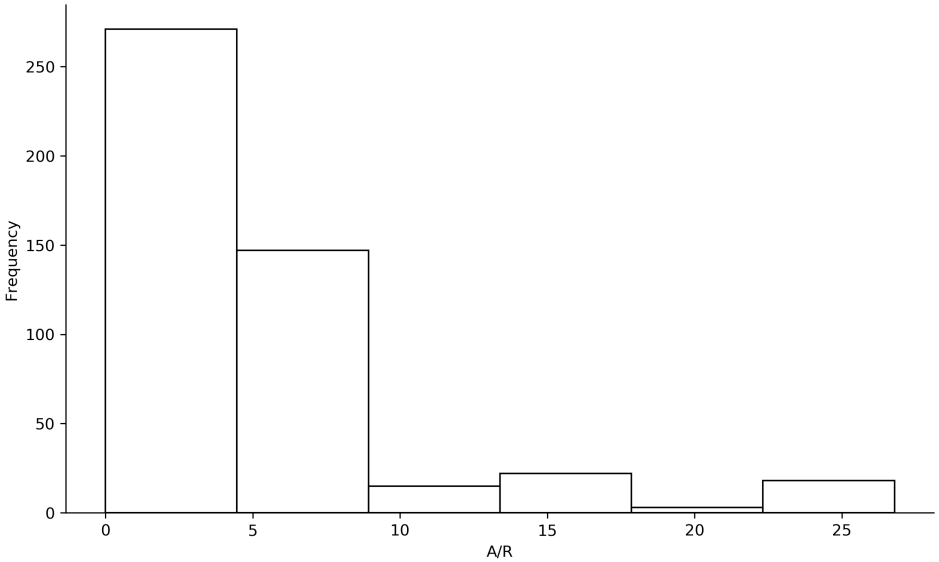
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot. The whiskers are the medcouple values with the upper whisker being the outlier threshold. Dots are outliers.

38. PRUNE

Table 38-1. Summary statistics for PRUNE fields in Coalition.

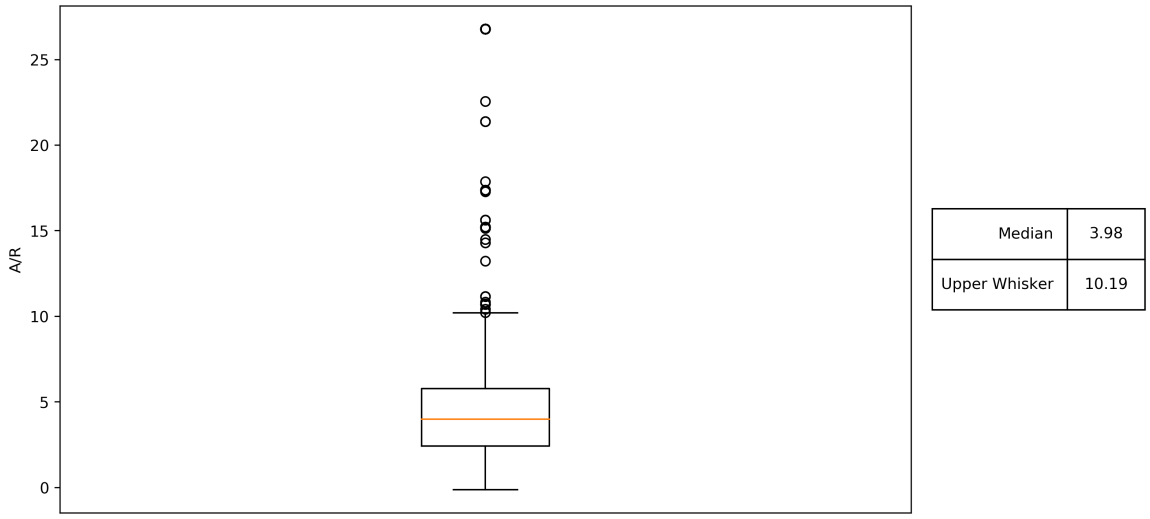
Parameter	# Fields	Acreage	Mean	St. Dev.	Min	Max	Outlier Threshold	No. Outliers
A/R	487	19550.92	43.6	488.72	0.0	8928.57	10.19	64
A-R	487	19550.92	78.27	70.1	-56.0	584.97	172.6	25

Figure 38-1. Histogram of A/R for PRUNE fields in the Coalition.



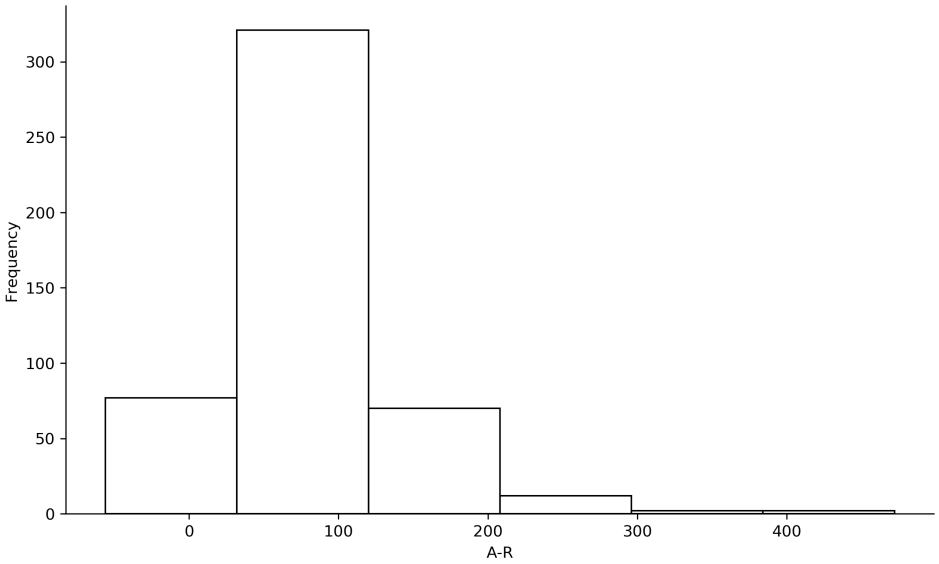
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot.

Figure 38-2. Box and whisker plot of A/R for PRUNE fields in the Coalition.



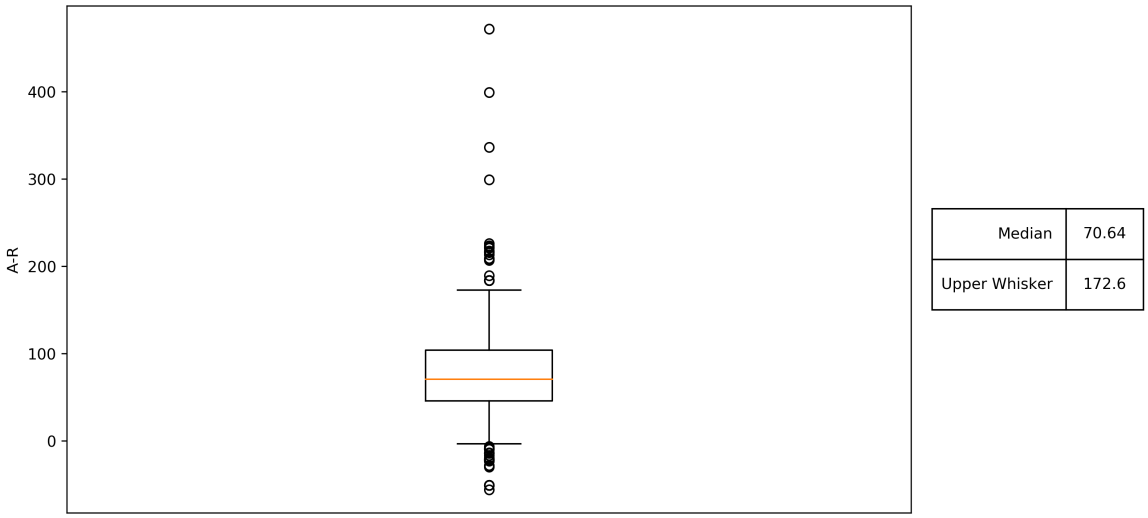
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot. The whiskers are the medcouple values with the upper whisker being the outlier threshold. Dots are outliers.

Figure 38-3. Histogram of A-R for PRUNE fields in the Coalition.



Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot.

Figure 38-4. Box and whisker plot of A-R for PRUNE fields in the Coalition.



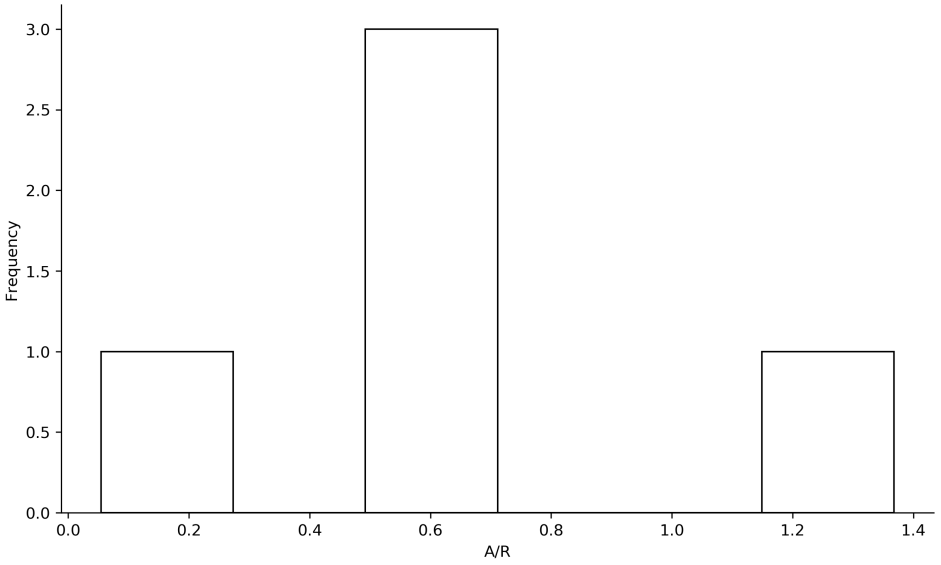
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot. The whiskers are the medcouple values with the upper whisker being the outlier threshold. Dots are outliers.

39. PUMPKIN

Table 39-1. Summary statistics for PUMPKIN fields in Coalition.

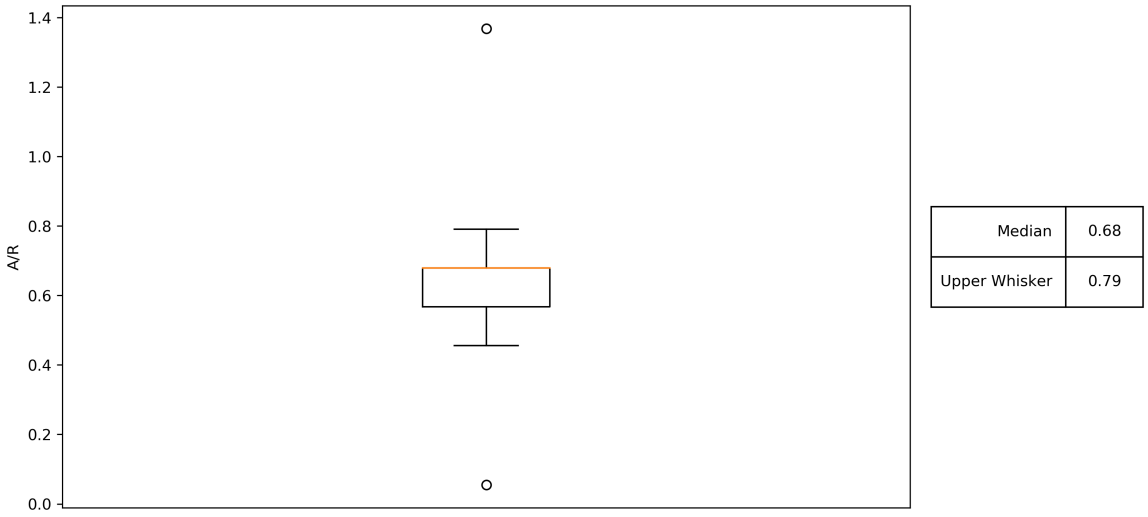
Parameter	# Fields	Acreage	Mean	St. Dev.	Min	Max	Outlier Threshold	No. Outliers
A/R	5	23.2	0.67	0.47	0.05	1.37	0.79	1
A-R	5	23.2	-42.91	81.4	-174.0	39.28	22.98	1

Figure 39-1. Histogram of A/R for PUMPKIN fields in the Coalition.



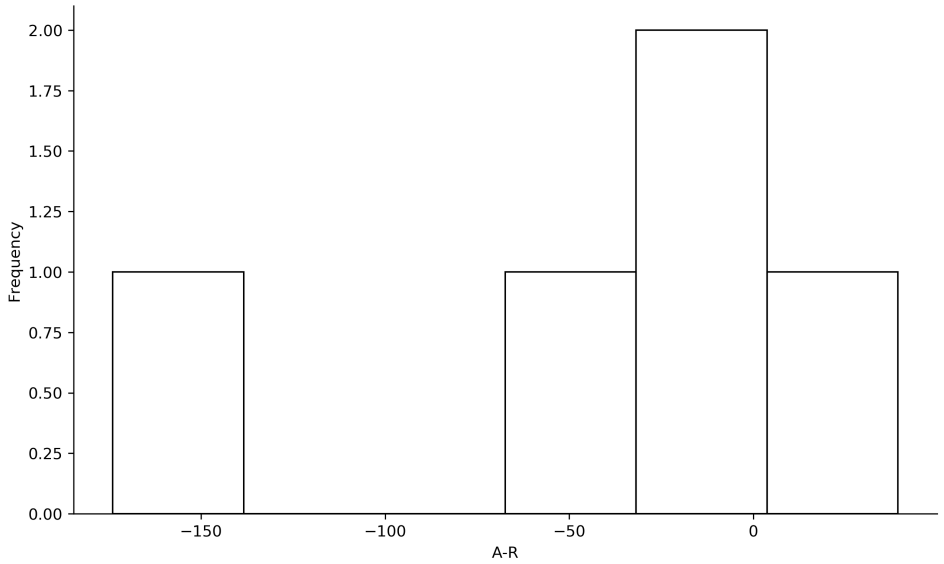
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot.

Figure 39-2. Box and whisker plot of A/R for PUMPKIN fields in the Coalition.



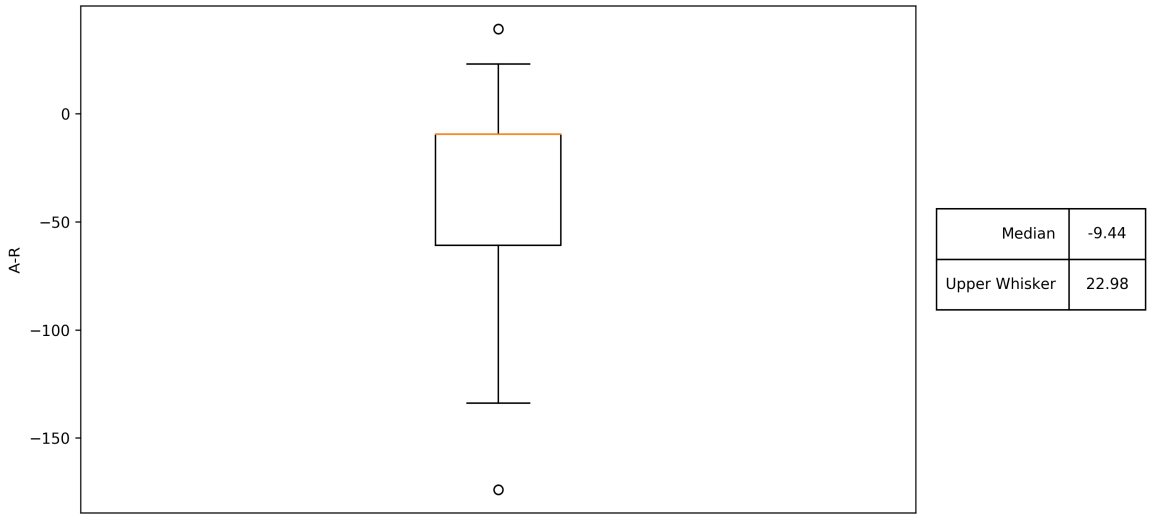
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot. The whiskers are the medcouple values with the upper whisker being the outlier threshold. Dots are outliers.

Figure 39-3. Histogram of A-R for PUMPKIN fields in the Coalition.



Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot.

Figure 39-4. Box and whisker plot of A-R for PUMPKIN fields in the Coalition.



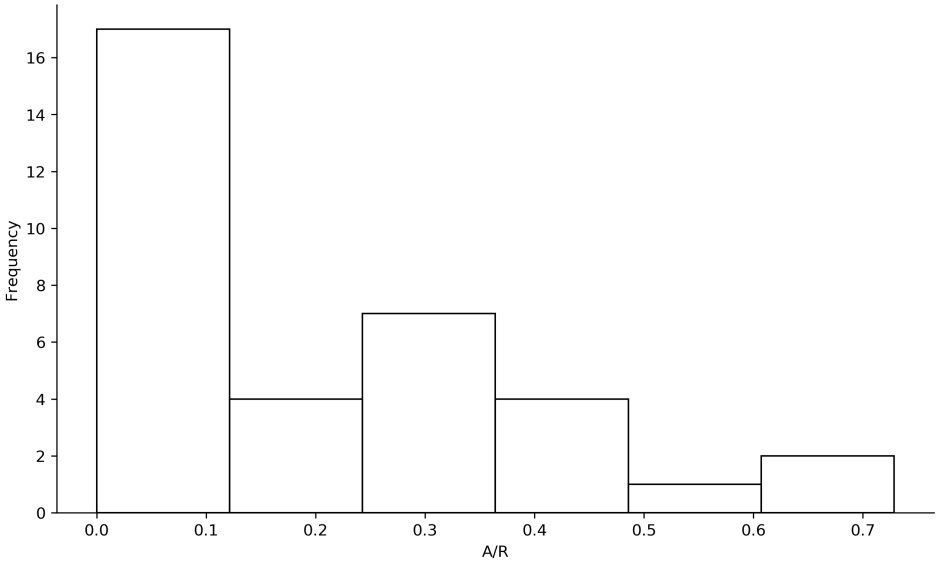
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot. The whiskers are the medcouple values with the upper whisker being the outlier threshold. Dots are outliers.

40. RYEGRASS

Table 40-1. Summary statistics for RYEGRASS fields in Coalition.

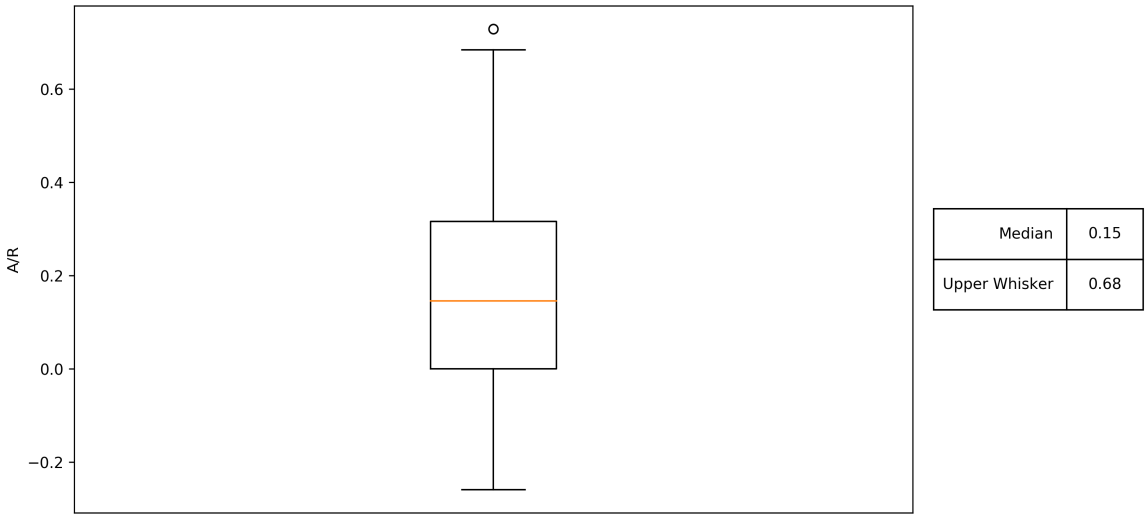
Parameter	# Fields	Acreage	Mean	St. Dev.	Min	Max	Outlier Threshold	No. Outliers
A/R	35	1200.59	0.18	0.21	0.0	0.73	0.68	1
A-R	35	1200.59	-128.44	52.78	-234.5	-29.8	-45.83	2

Figure 40-1. Histogram of A/R for RYEGRASS fields in the Coalition.



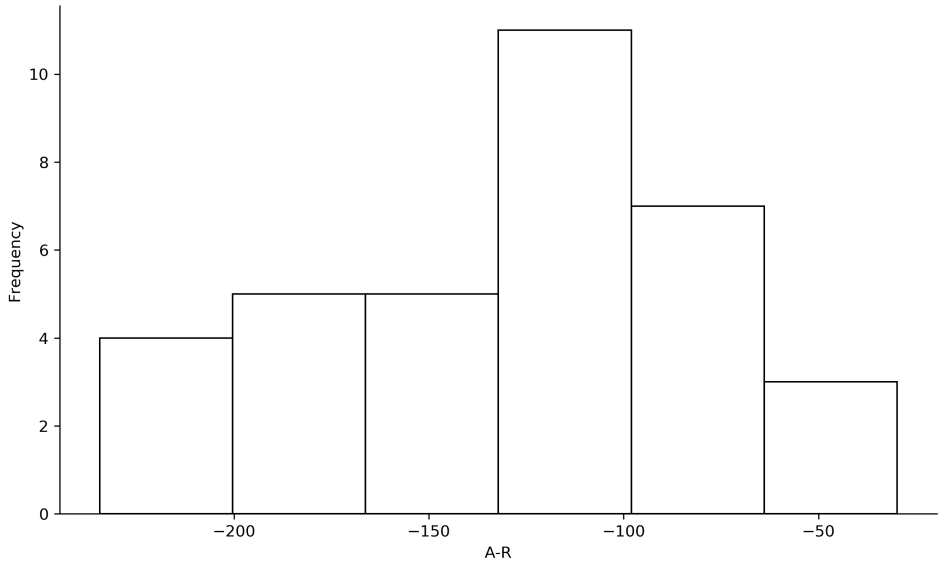
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot.

Figure 40-2. Box and whisker plot of A/R for RYEGRASS fields in the Coalition.



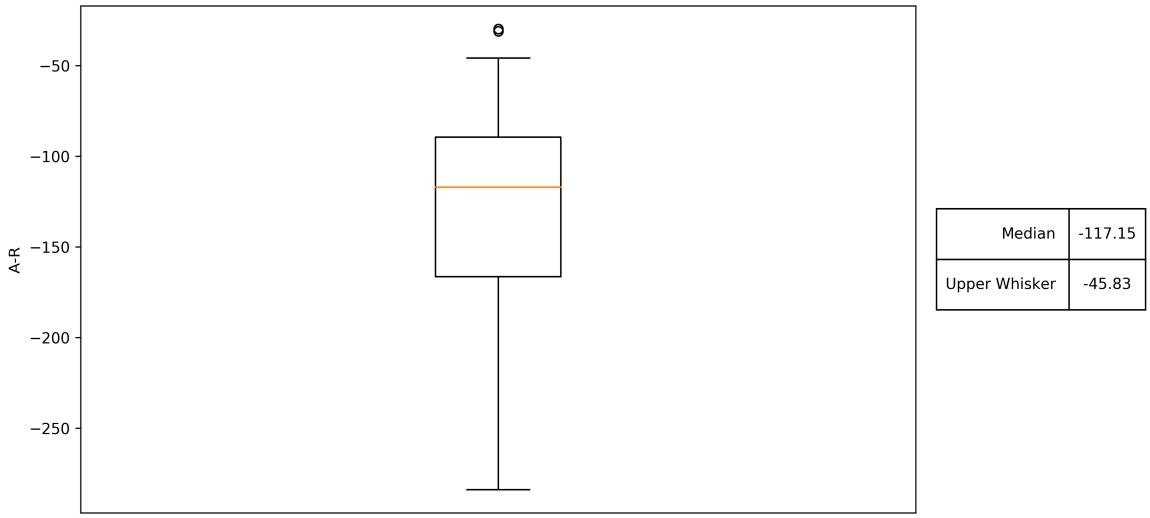
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot. The whiskers are the medcouple values with the upper whisker being the outlier threshold. Dots are outliers.

Figure 40-3. Histogram of A-R for RYEGRASS fields in the Coalition.



Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot.

Figure 40-4. Box and whisker plot of A-R for RYEGRASS fields in the Coalition.



Median	-117.15
Upper Whisker	-45.83

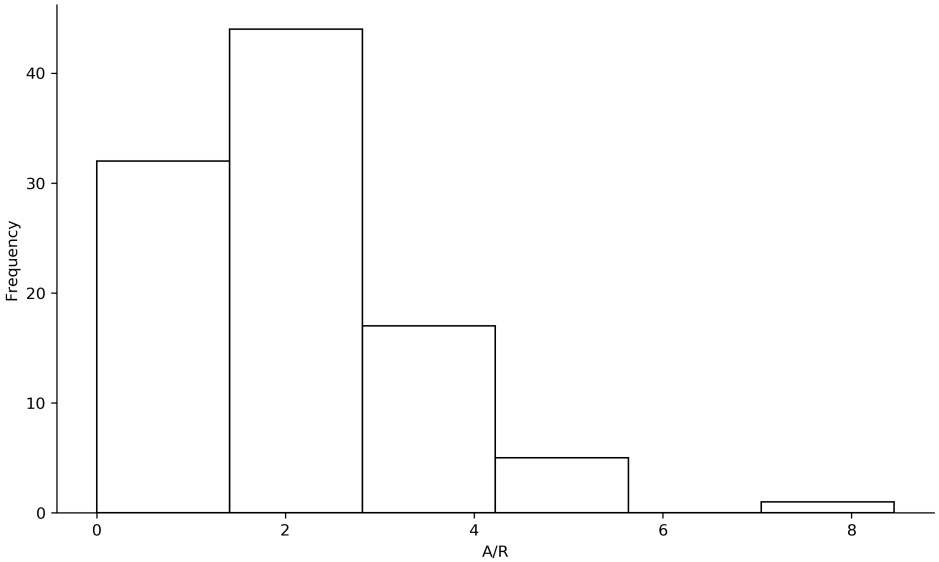
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot. The whiskers are the medcouple values with the upper whisker being the outlier threshold. Dots are outliers.

41. SAFFLOWER

Table 41-1. Summary statistics for SAFFLOWER fields in Coalition.

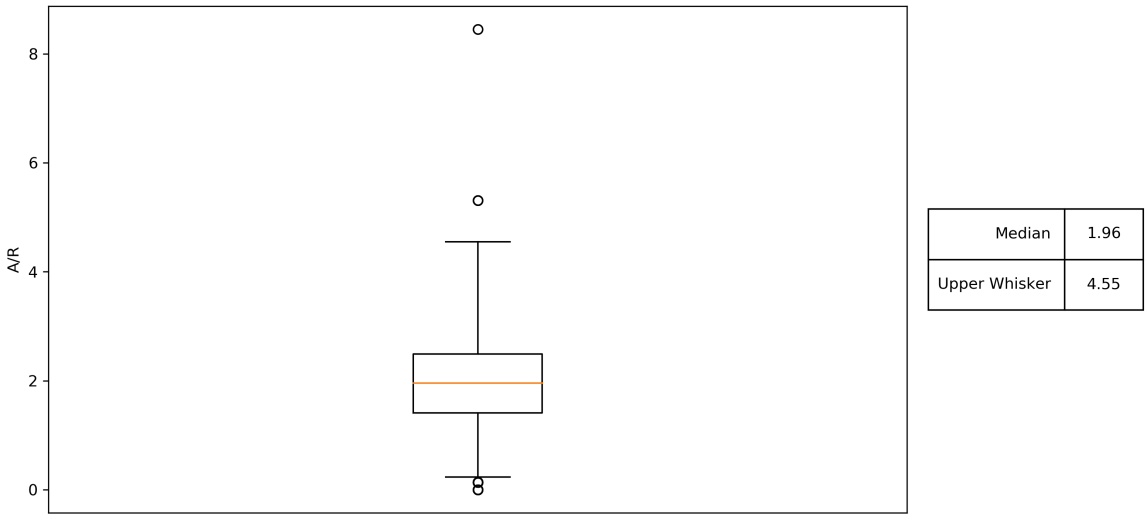
Parameter	# Fields	Acreage	Mean	St. Dev.	Min	Max	Outlier Threshold	No. Outliers
A/R	102	4547.23	67.41	460.77	0.0	3309.33	4.55	6
A-R	102	4547.23	42.95	47.77	-85.2	142.06	98.58	8

Figure 41-1. Histogram of A/R for SAFFLOWER fields in the Coalition.



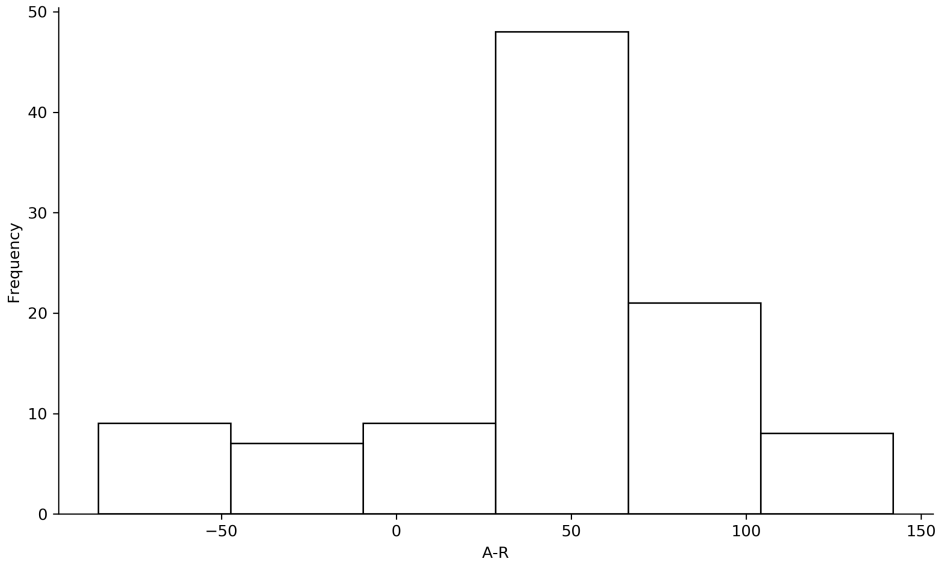
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot.

Figure 41-2. Box and whisker plot of A/R for SAFFLOWER fields in the Coalition.



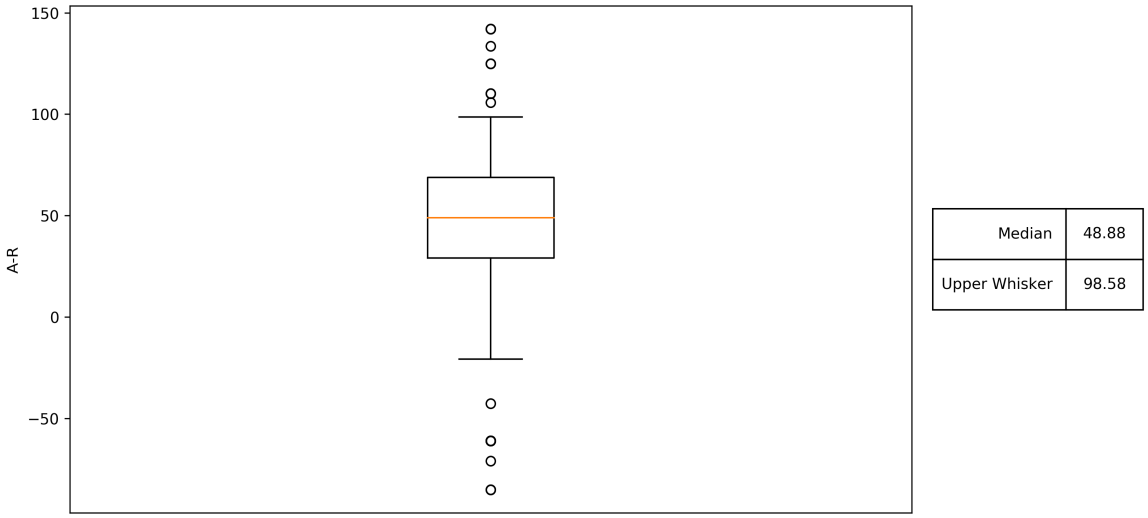
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot. The whiskers are the medcouple values with the upper whisker being the outlier threshold. Dots are outliers.

Figure 41-3. Histogram of A-R for SAFFLOWER fields in the Coalition.



Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot.

Figure 41-4. Box and whisker plot of A-R for SAFFLOWER fields in the Coalition.



Median	48.88
Upper Whisker	98.58

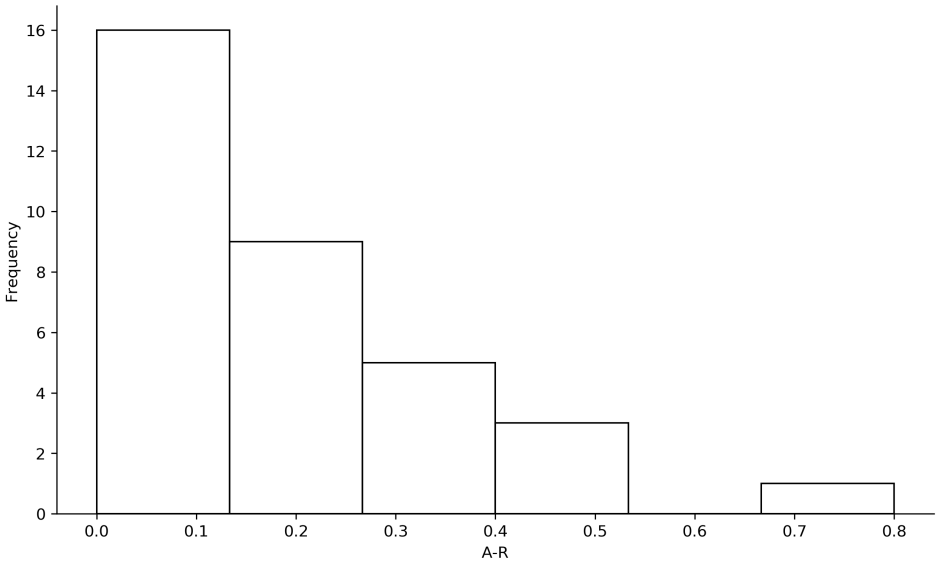
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot. The whiskers are the medcouple values with the upper whisker being the outlier threshold. Dots are outliers.

42. SEED CROP

Table 42-1. Summary statistics for SEED CROP fields in Coalition.

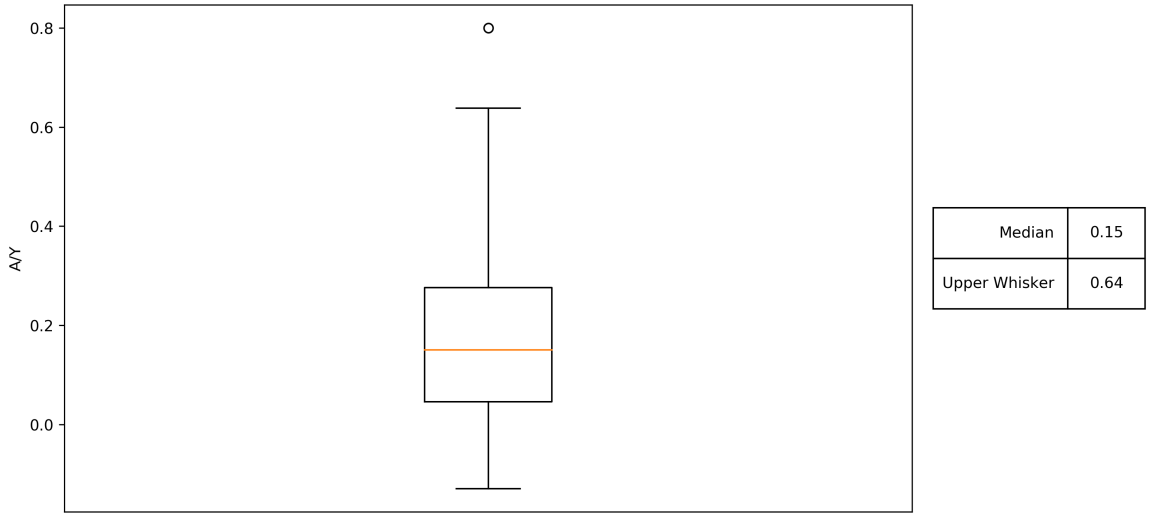
Parameter	# Fields	Acreage	Mean	St. Dev.	Min	Max	Outlier Threshold	No. Outliers
A/Y	35	1721.27	0.26	0.43	0.0	2.5	0.64	2

Figure 42-1. Histogram of A/Y for SEED CROP fields in the Coalition.



Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot

Figure 42-2. Box and whisker plot of A/Y for SEED CROP fields in the Coalition.



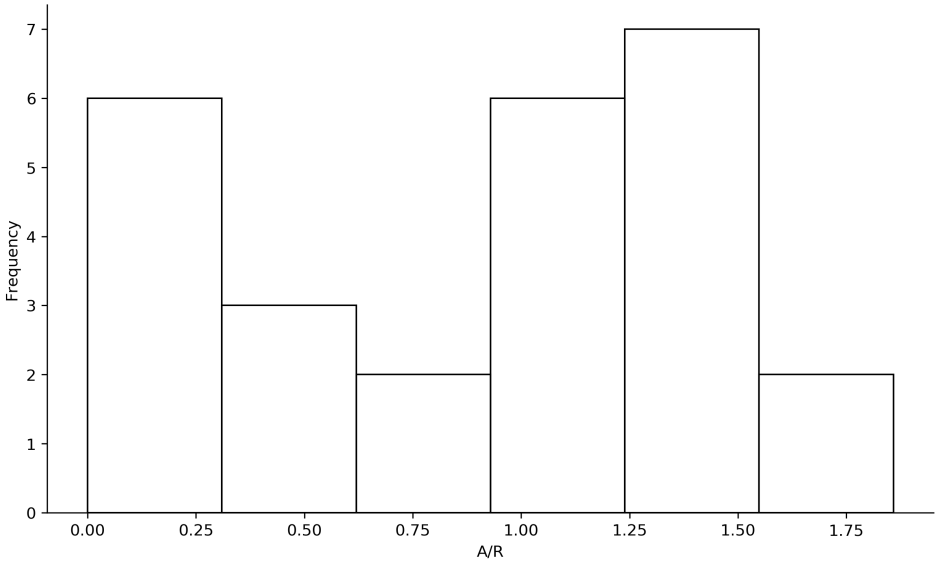
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot
The whiskers are the medcouple values with the upper whisker being the outlier threshold. Dots are outliers.

43. SORGHUM/MILO

Table 43-1. Summary statistics for SORGHUM/MILO fields in Coalition.

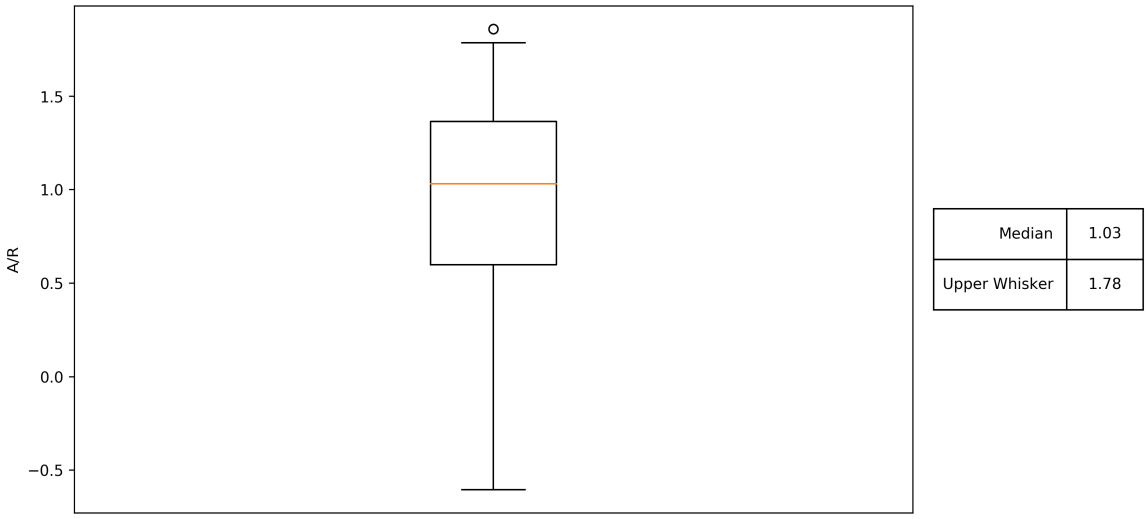
Parameter	# Fields	Acreage	Mean	St. Dev.	Min	Max	Outlier Threshold	No. Outliers
A/R	26	1071.73	0.89	0.6	0.0	1.86	1.78	1
A-R	26	1071.73	-9.6	52.54	-96.69	62.72	87.71	0

Figure 43-1. Histogram of A/R for SORGHUM/MILO fields in the Coalition.



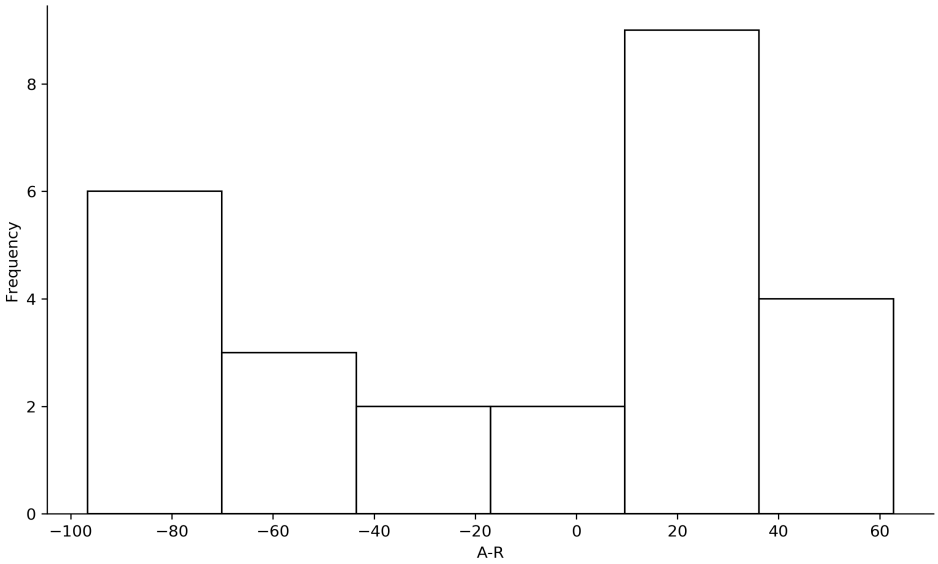
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot.

Figure 43-2. Box and whisker plot of A/R for SORGHUM/MILO fields in the Coalition.



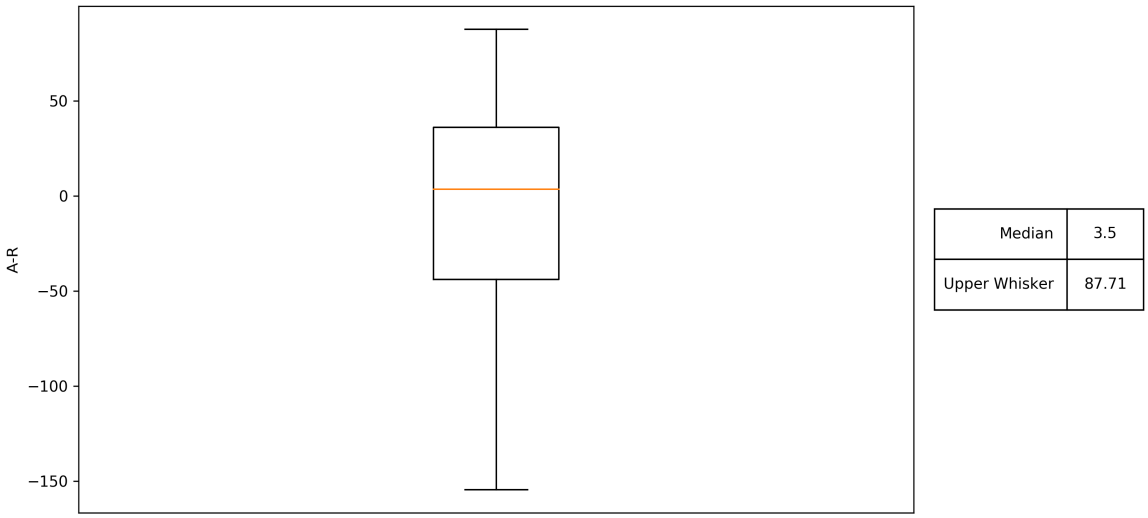
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot. The whiskers are the medcouple values with the upper whisker being the outlier threshold. Dots are outliers.

Figure 43-3. Histogram of A-R for SORGHUM/MILO fields in the Coalition.



Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot.

Figure 43-4. Box and whisker plot of A-R for SORGHUM/MILO fields in the Coalition.



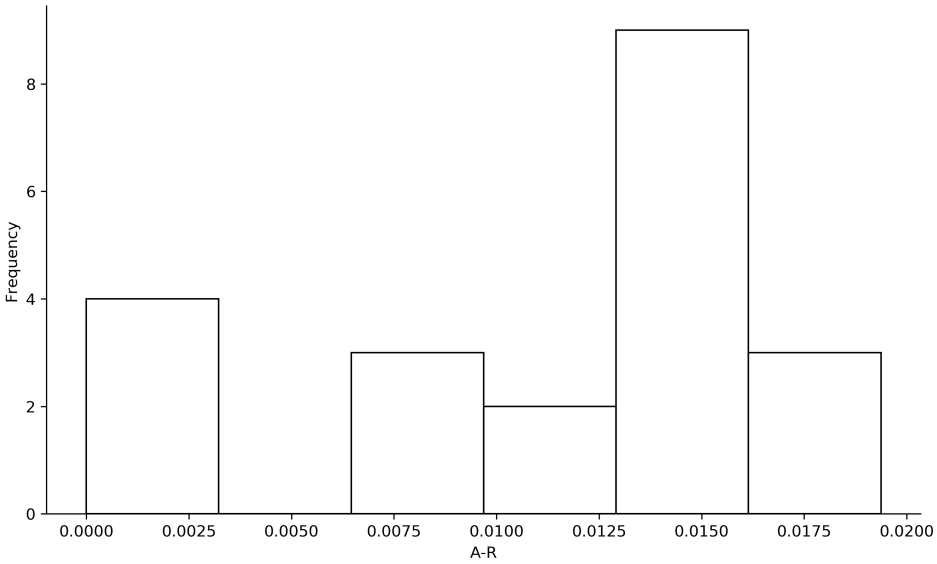
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot. The whiskers are the medcouple values with the upper whisker being the outlier threshold. Dots are outliers.

44. SUDAN GRASS

Table 44-1. Summary statistics for SUDAN GRASS fields in Coalition.

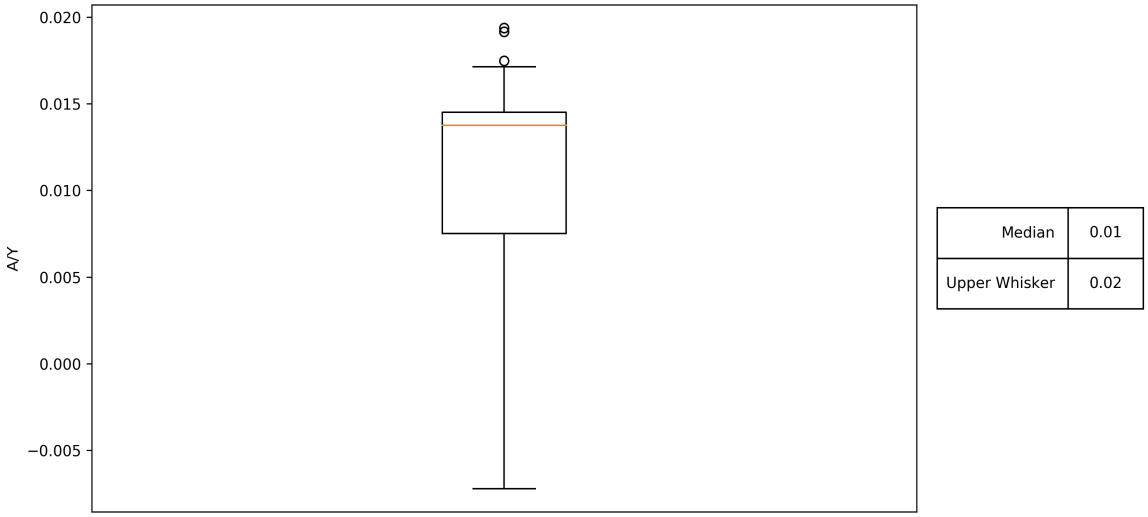
Parameter	# Fields	Acreage	Mean	St. Dev.	Min	Max	Outlier Threshold	No. Outliers
A/Y	21	811.56	0.01	0.01	0.0	0.02	0.02	3

Figure 44-1. Histogram of A/Y for SUDAN GRASS fields in the Coalition.



Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot

Figure 44-2. Box and whisker plot of A/Y for SUDAN GRASS fields in the Coalition.



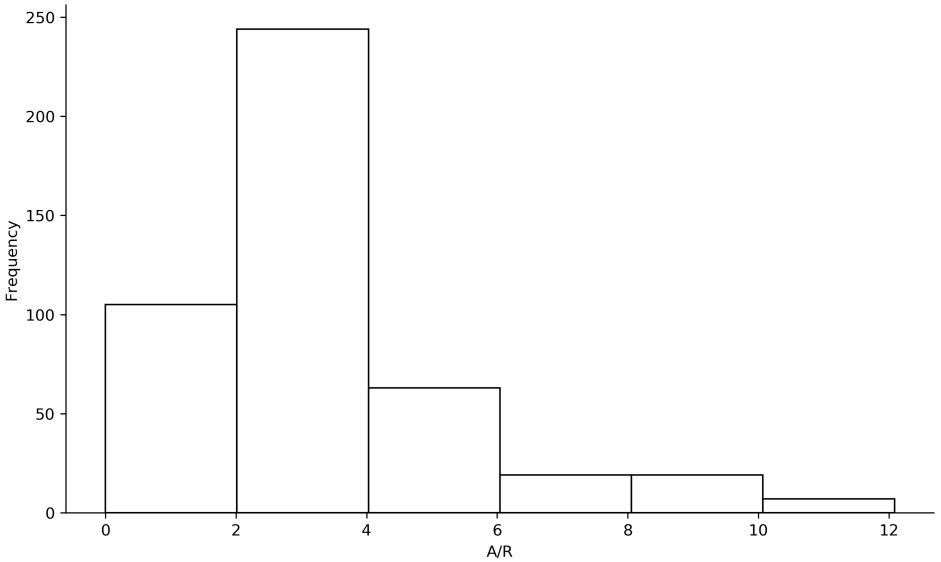
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot
The whiskers are the medcouple values with the upper whisker being the outlier threshold. Dots are outliers.

45. SUNFLOWER

Table 45-1. Summary statistics for SUNFLOWER fields in Coalition.

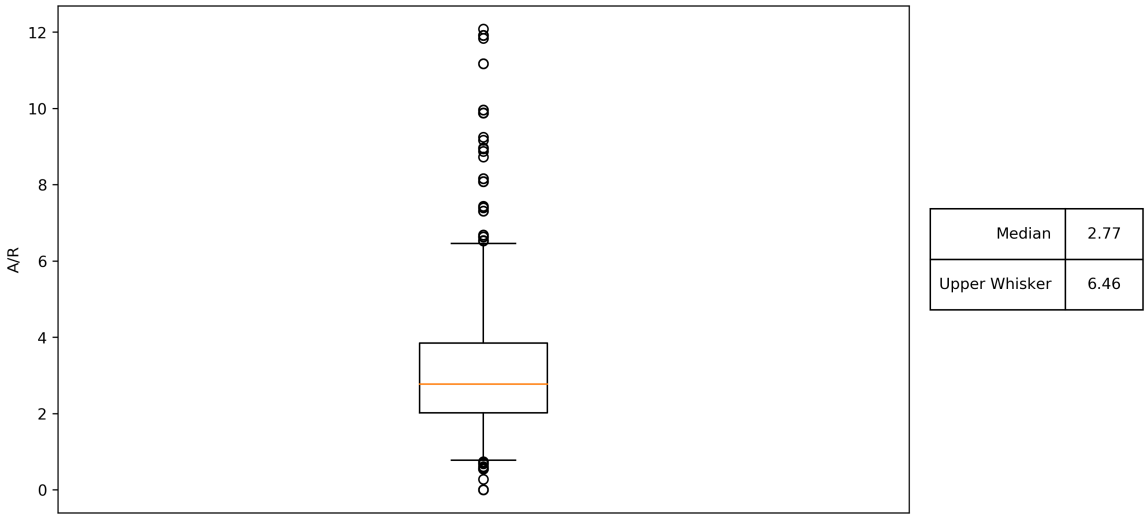
Parameter	# Fields	Acreage	Mean	St. Dev.	Min	Max	Outlier Threshold	No. Outliers
A/R	459	21882.94	3.49	4.03	0.0	73.94	6.46	42
A-R	459	21882.94	61.74	39.65	-78.2	214.95	139.07	4

Figure 45-1. Histogram of A/R for SUNFLOWER fields in the Coalition.



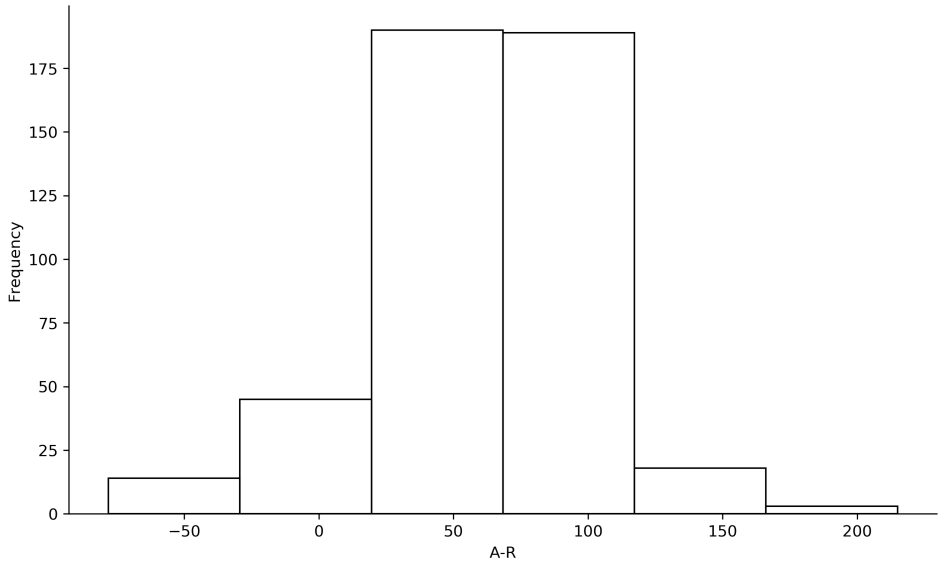
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot.

Figure 45-2. Box and whisker plot of A/R for SUNFLOWER fields in the Coalition.



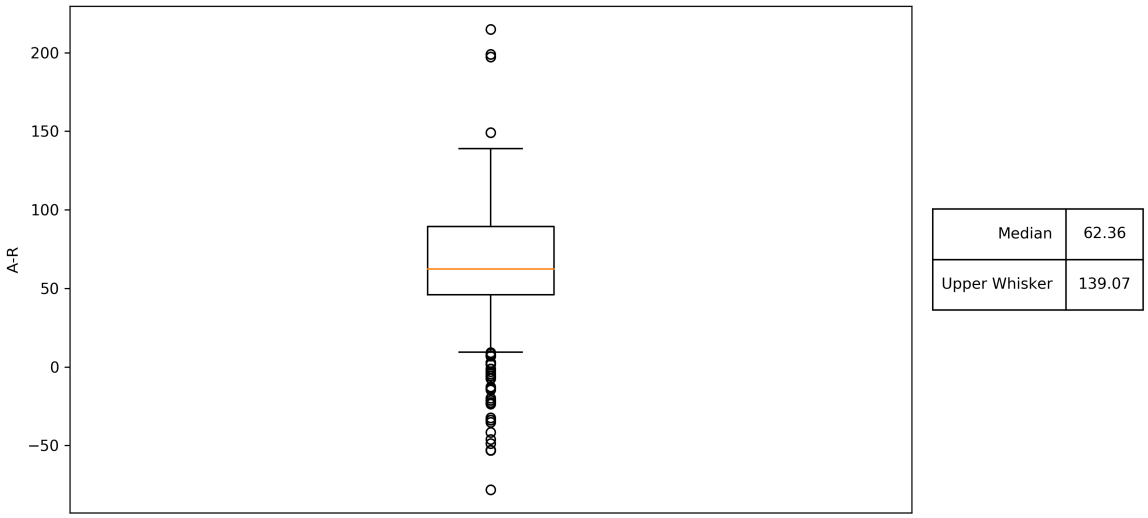
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot. The whiskers are the medcouple values with the upper whisker being the outlier threshold. Dots are outliers.

Figure 45-3. Histogram of A-R for SUNFLOWER fields in the Coalition.



Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot.

Figure 45-4. Box and whisker plot of A-R for SUNFLOWER fields in the Coalition.



Median	62.36
Upper Whisker	139.07

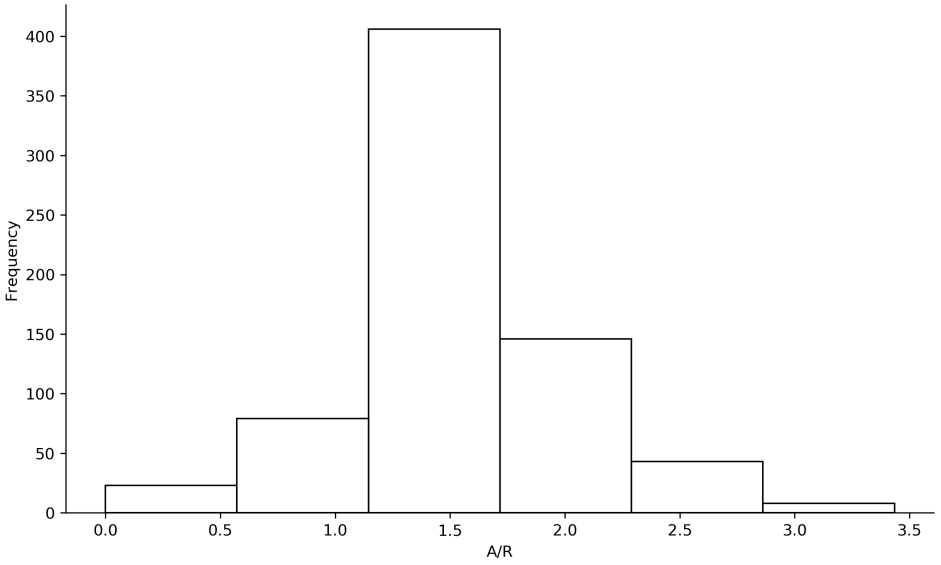
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot. The whiskers are the medcouple values with the upper whisker being the outlier threshold. Dots are outliers.

46. TOMATO - PROCESSING

Table 46-1. Summary statistics for TOMATO - PROCESSING fields in Coalition.

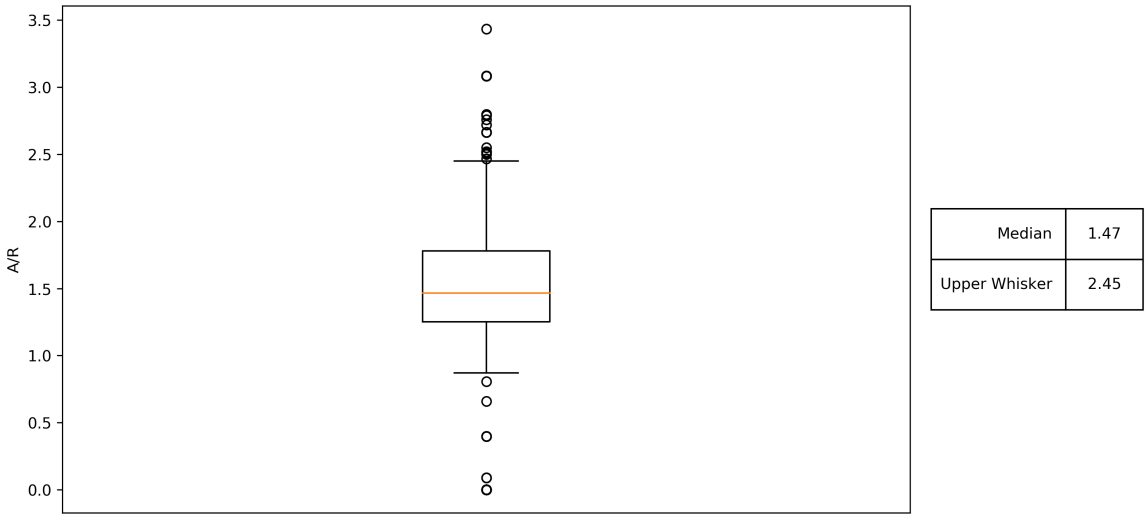
Parameter	# Fields	Acreage	Mean	St. Dev.	Min	Max	Outlier Threshold	No. Outliers
A/R	706	37216.45	1.54	0.68	0.0	14.18	2.45	27
A-R	706	37216.45	64.77	59.15	-196.56	258.06	162.91	26

Figure 46-1. Histogram of A/R for TOMATO - PROCESSING fields in the Coalition.



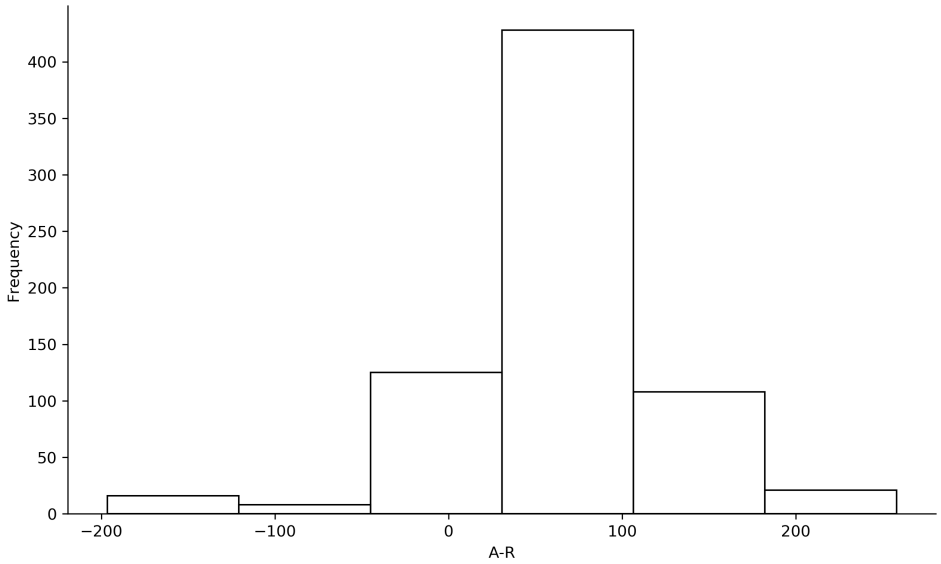
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot.

Figure 46-2. Box and whisker plot of A/R for TOMATO - PROCESSING fields in the Coalition.



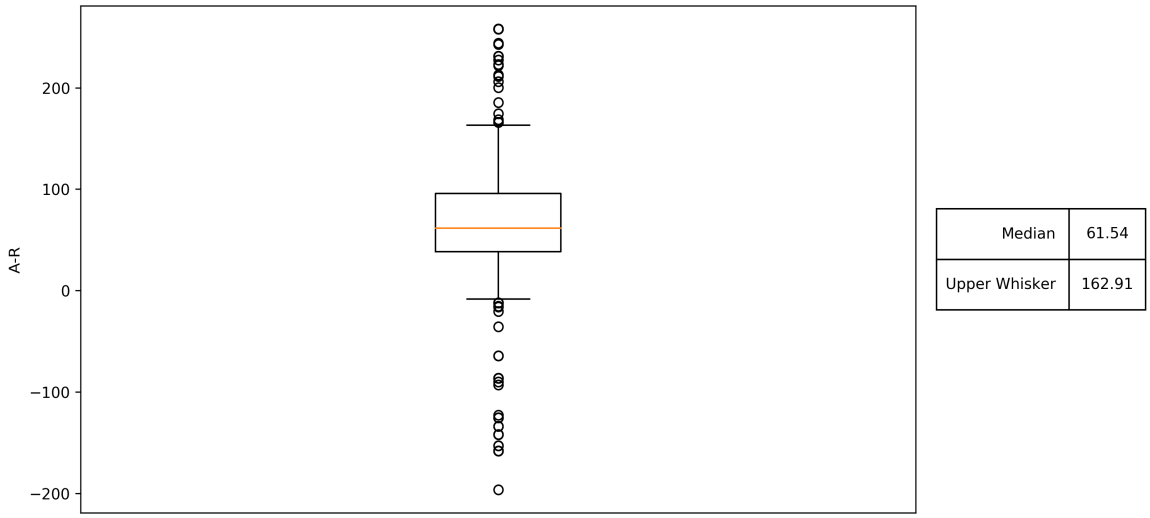
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot. The whiskers are the medcouple values with the upper whisker being the outlier threshold. Dots are outliers.

Figure 46-3. Histogram of A-R for TOMATO - PROCESSING fields in the Coalition.



Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot.

Figure 46-4. Box and whisker plot of A-R for TOMATO - PROCESSING fields in the Coalition.



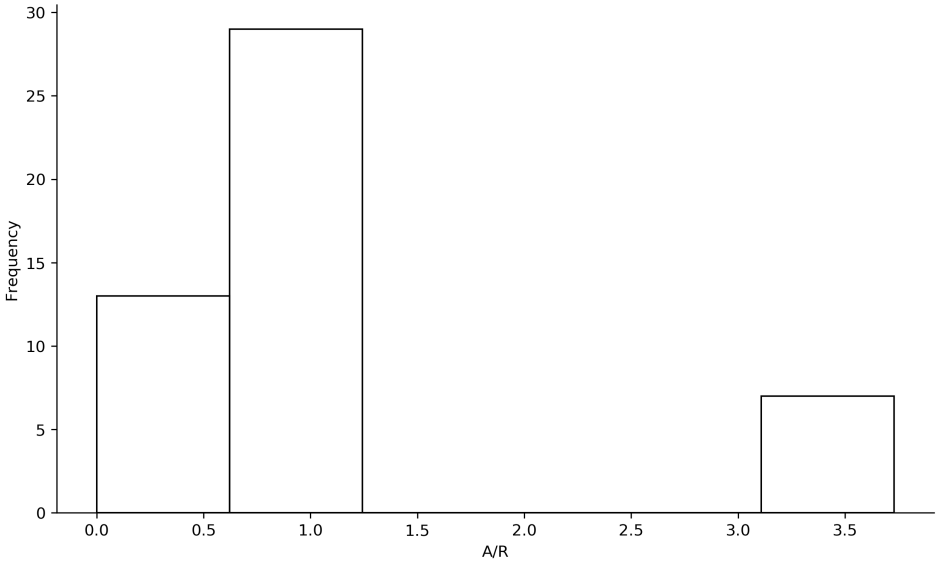
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot. The whiskers are the medcouple values with the upper whisker being the outlier threshold. Dots are outliers.

47. TRITICALE

Table 47-1. Summary statistics for TRITICALE fields in Coalition.

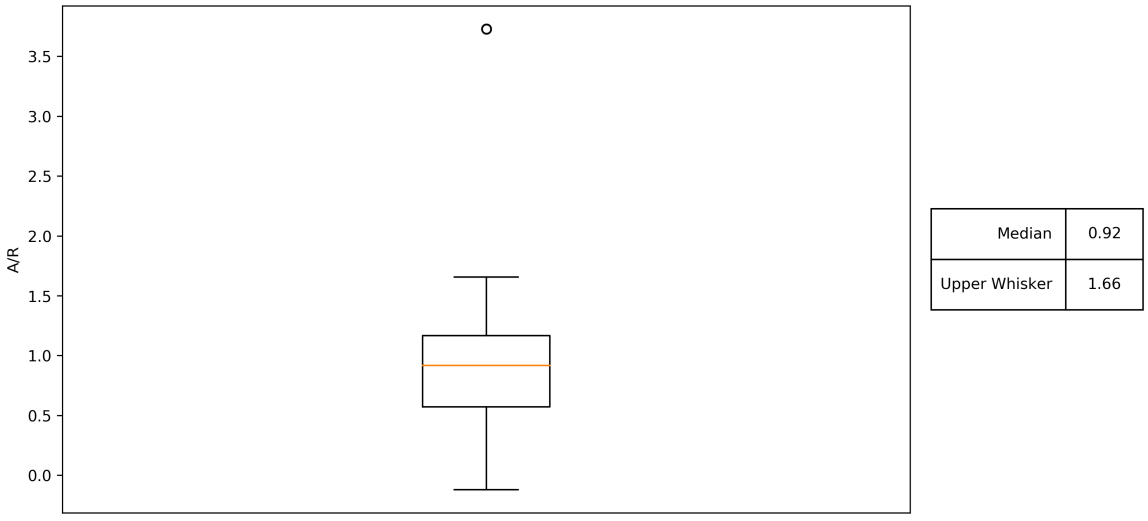
Parameter	# Fields	Acreage	Mean	St. Dev.	Min	Max	Outlier Threshold	No. Outliers
A/R	49	1666.17	1.2	1.09	0.0	3.73	1.66	7
A-R	49	1666.17	-7.37	61.12	-121.2	110.27	79.99	7

Figure 47-1. Histogram of A/R for TRITICALE fields in the Coalition.



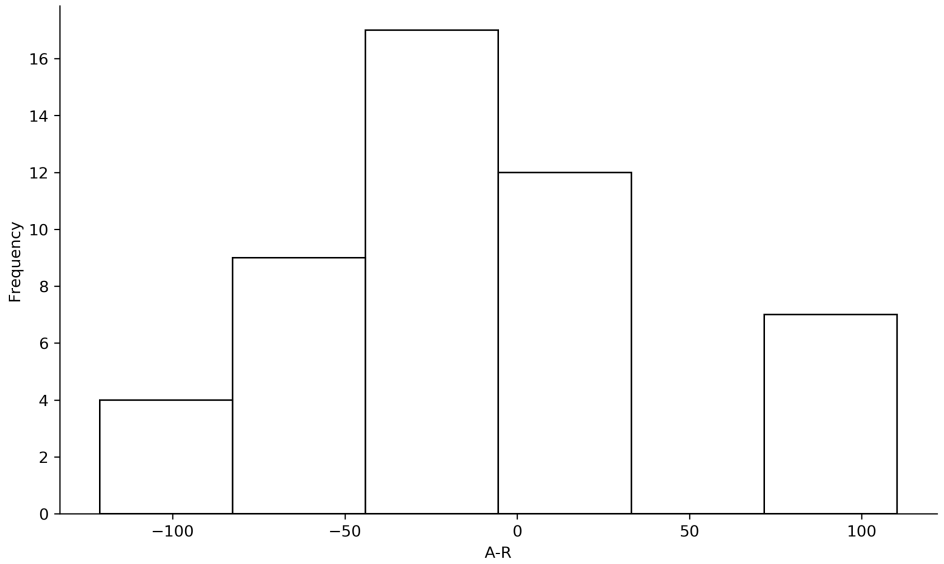
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot.

Figure 47-2. Box and whisker plot of A/R for TRITICALE fields in the Coalition.



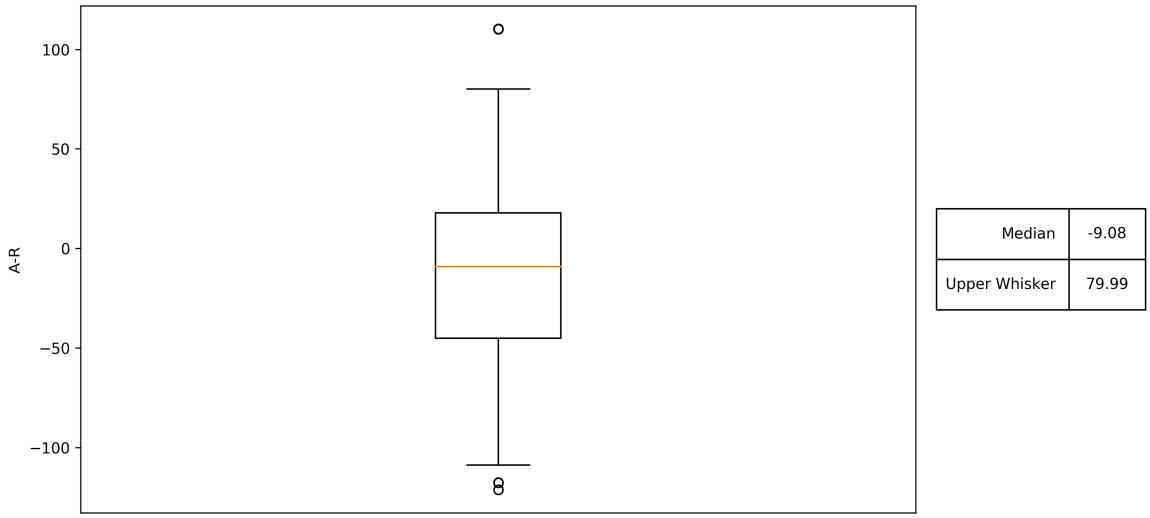
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot. The whiskers are the medcouple values with the upper whisker being the outlier threshold. Dots are outliers.

Figure 47-3. Histogram of A-R for TRITICALE fields in the Coalition.



Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot.

Figure 47-4. Box and whisker plot of A-R for TRITICALE fields in the Coalition.



Median	-9.08
Upper Whisker	79.99

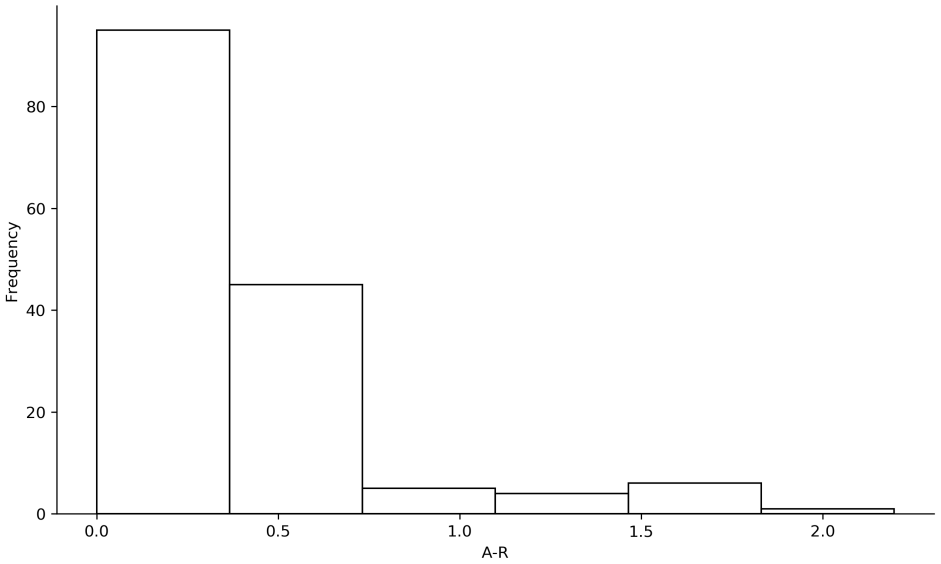
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot. The whiskers are the medcouple values with the upper whisker being the outlier threshold. Dots are outliers.

48. VINE SEED

Table 48-1. Summary statistics for VINE SEED fields in Coalition.

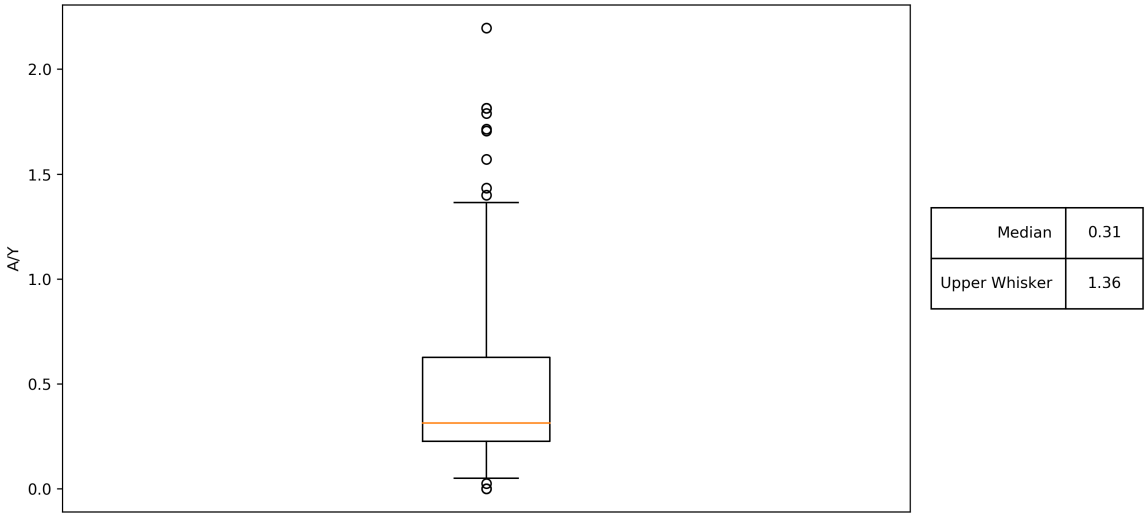
Parameter	# Fields	Acreage	Mean	St. Dev.	Min	Max	Outlier Threshold	No. Outliers
A/Y	156	5362.91	0.45	0.39	0.0	2.2	1.36	9

Figure 48-1. Histogram of A/Y for VINE SEED fields in the Coalition.



Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot

Figure 48-2. Box and whisker plot of A/Y for VINE SEED fields in the Coalition.



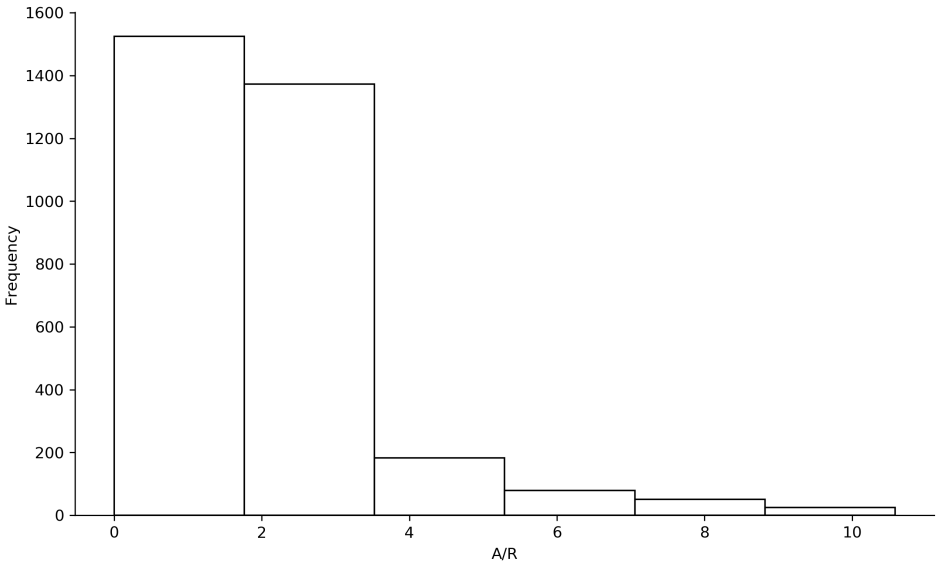
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot
The whiskers are the medcouple values with the upper whisker being the outlier threshold. Dots are outliers.

49. WALNUT

Table 49-1. Summary statistics for WALNUT fields in Coalition.

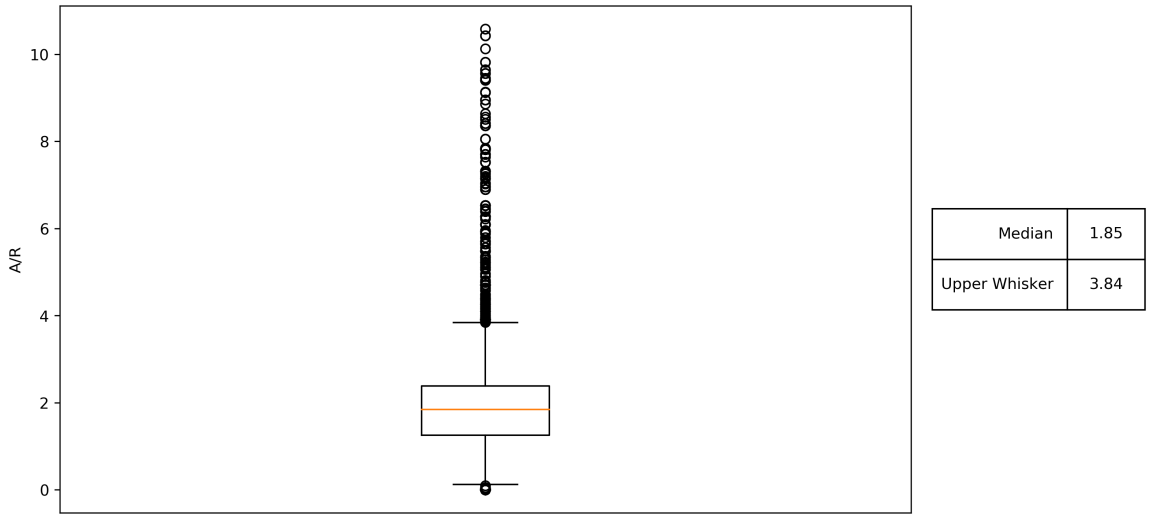
Parameter	# Fields	Acreage	Mean	St. Dev.	Min	Max	Outlier Threshold	No. Outliers
A/R	3309	137525.84	7.57	127.65	0.0	6792.06	3.84	380
A-R	3309	137525.84	51.28	66.37	-159.5	557.19	128.94	268

Figure 49-1. Histogram of A/R for WALNUT fields in the Coalition.



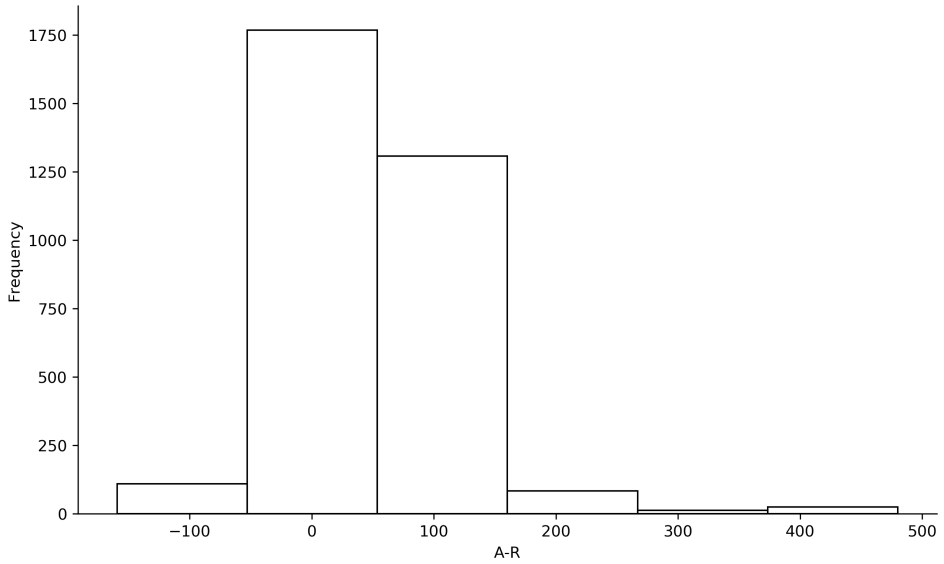
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot.

Figure 49-2. Box and whisker plot of A/R for WALNUT fields in the Coalition.



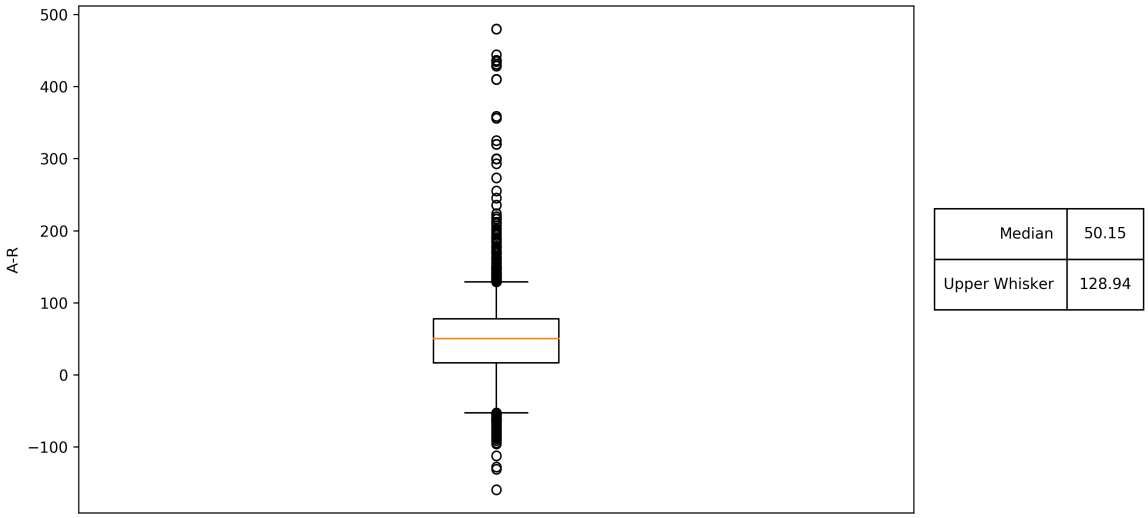
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot. The whiskers are the medcouple values with the upper whisker being the outlier threshold. Dots are outliers.

Figure 49-3. Histogram of A-R for WALNUT fields in the Coalition.



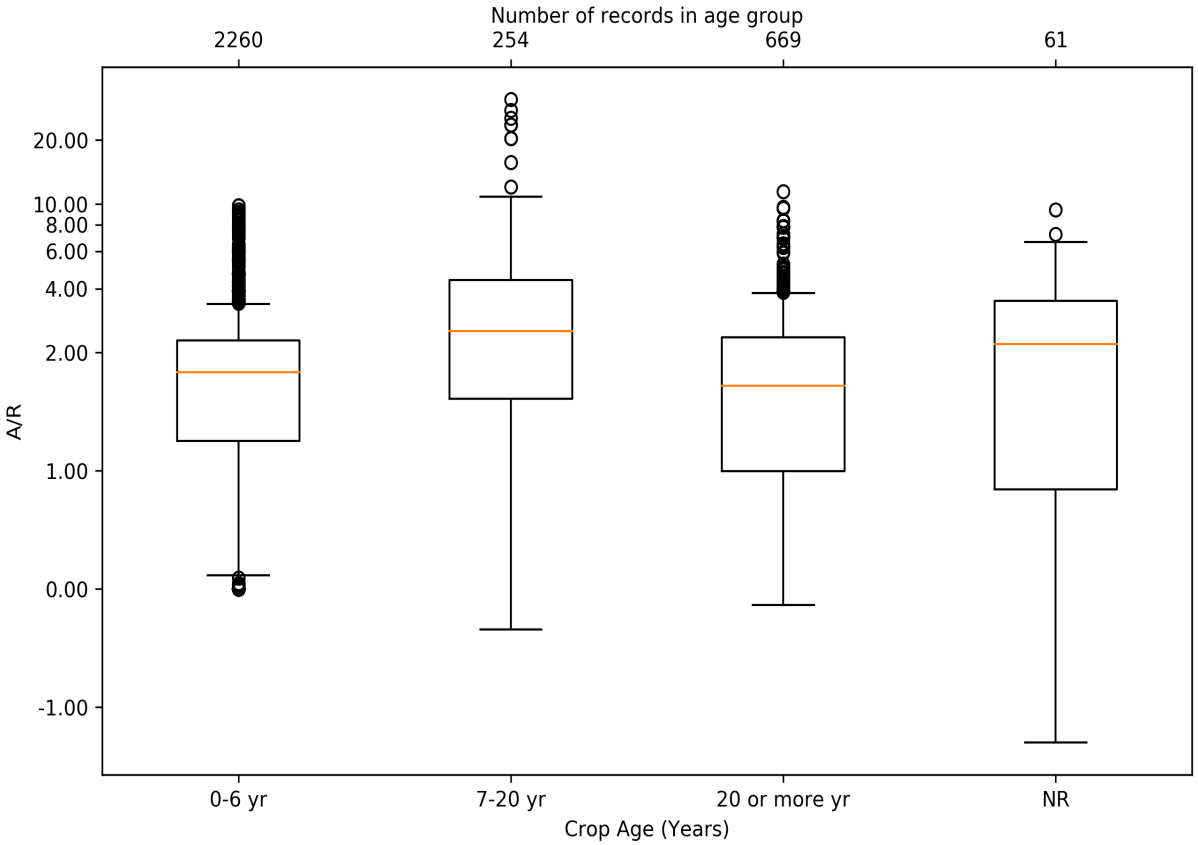
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot.

Figure 49-4. Box and whisker plot of A-R for WALNUT fields in the Coalition.



Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot. The whiskers are the medcouple values with the upper whisker being the outlier threshold. Dots are outliers.

Figure 49-5. Box and whisker plot of A/R for WALNUT fields in the Coalition by age



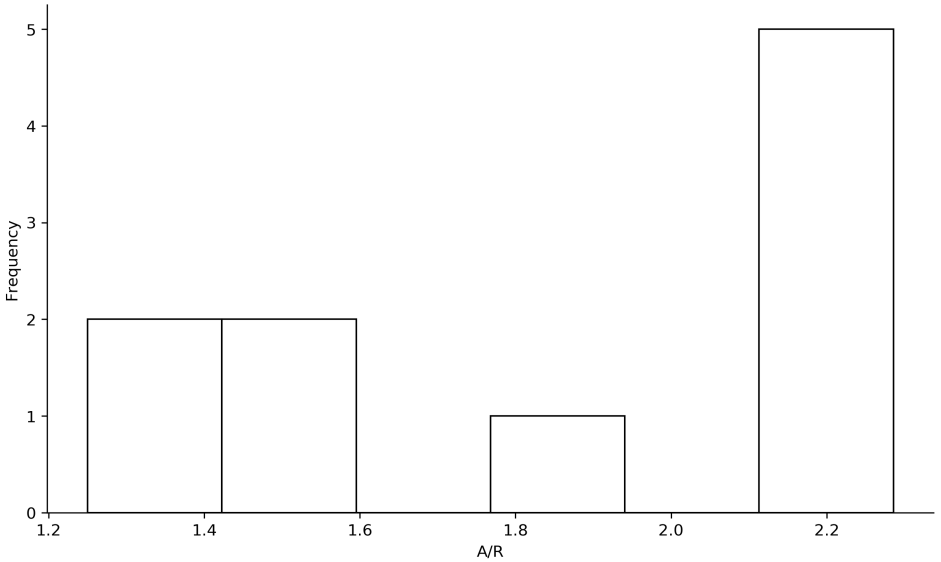
Values >2x the difference between the upper and lower whisker not shown to avoid skewing of plot.

50. WHEAT - FODDER/SILAGE

Table 50-1. Summary statistics for WHEAT - FODDER/SILAGE fields in Coalition.

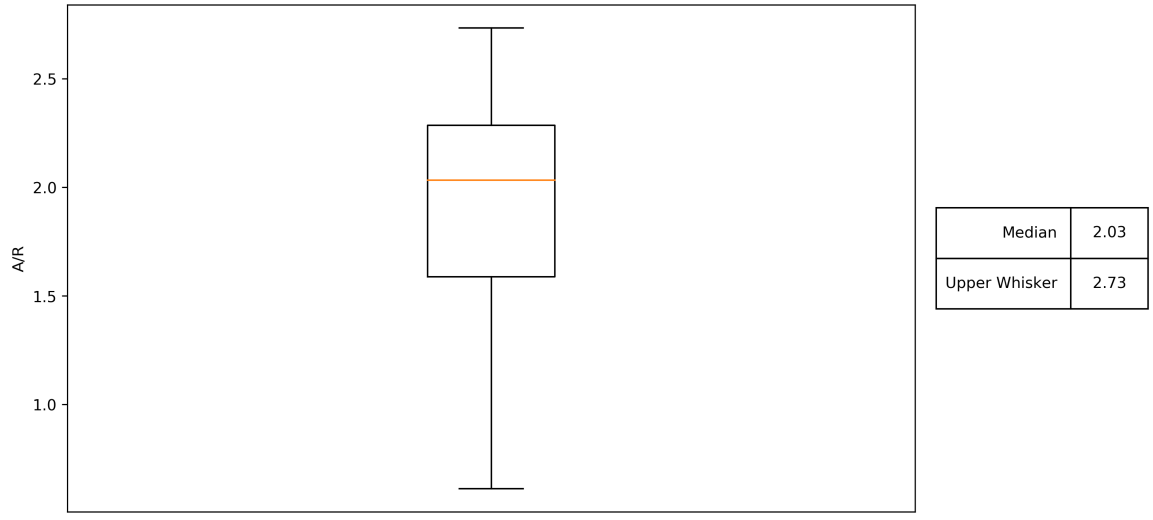
Parameter	# Fields	Acreage	Mean	St. Dev.	Min	Max	Outlier Threshold	No. Outliers
A/R	10	352.03	1.89	0.45	1.25	2.29	2.73	0
A-R	10	352.03	45.78	24.54	10.5	67.5	92.56	0

Figure 50-1. Histogram of A/R for WHEAT - FODDER/SILAGE fields in the Coalition.



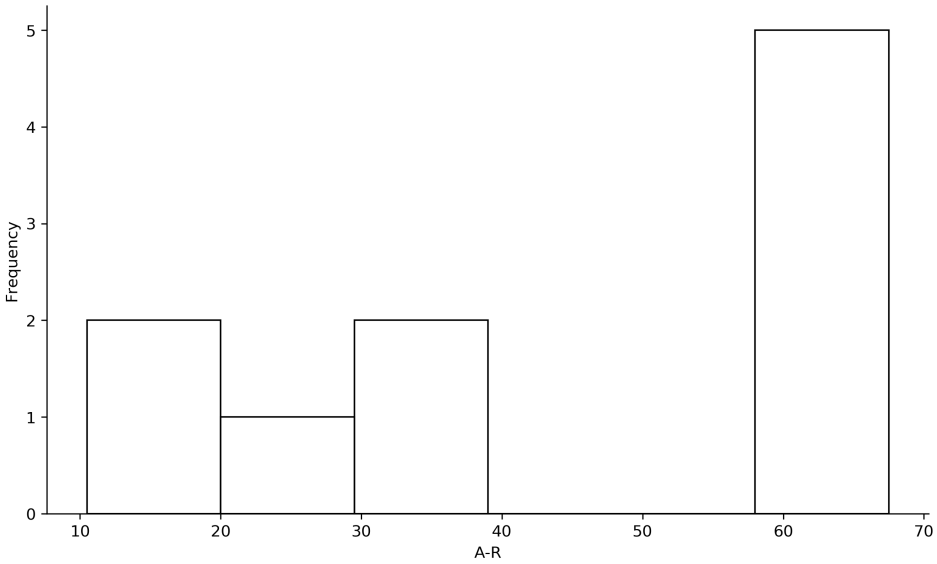
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot.

Figure 50-2. Box and whisker plot of A/R for WHEAT - FODDER/SILAGE fields in the Coalition.



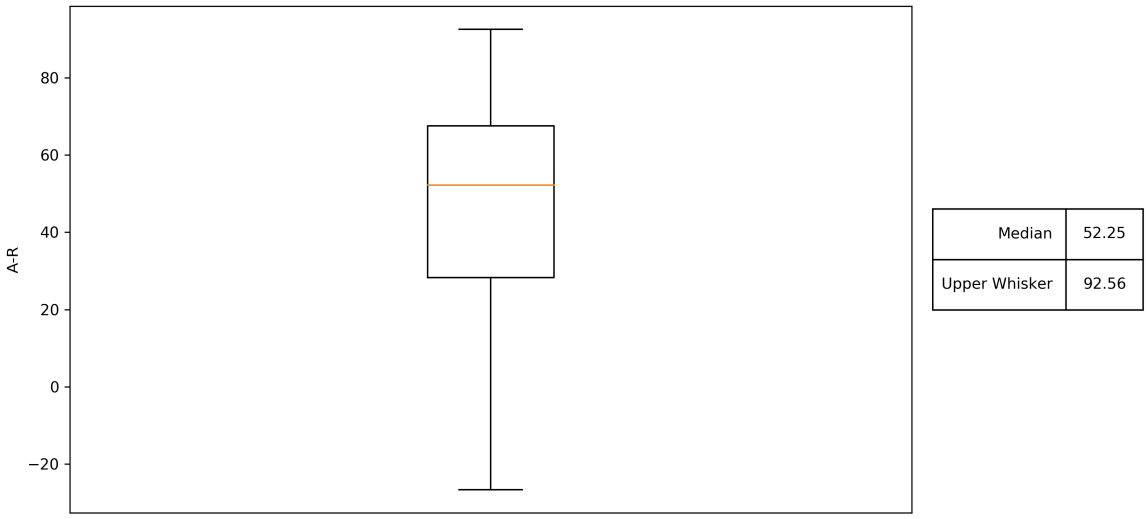
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot. The whiskers are the medcouple values with the upper whisker being the outlier threshold. Dots are outliers.

Figure 50-3. Histogram of A-R for WHEAT - FODDER/SILAGE fields in the Coalition.



Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot.

Figure 50-4. Box and whisker plot of A-R for WHEAT - FODDER/SILAGE fields in the Coalition.



Median	52.25
Upper Whisker	92.56

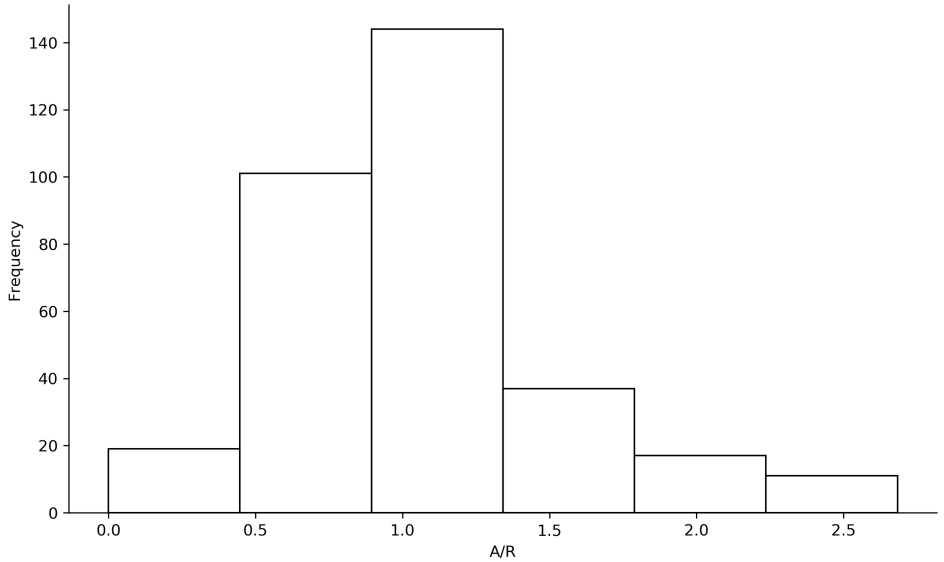
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot. The whiskers are the medcouple values with the upper whisker being the outlier threshold. Dots are outliers.

51. WHEAT - GRAIN

Table 51-1. Summary statistics for WHEAT - GRAIN fields in Coalition.

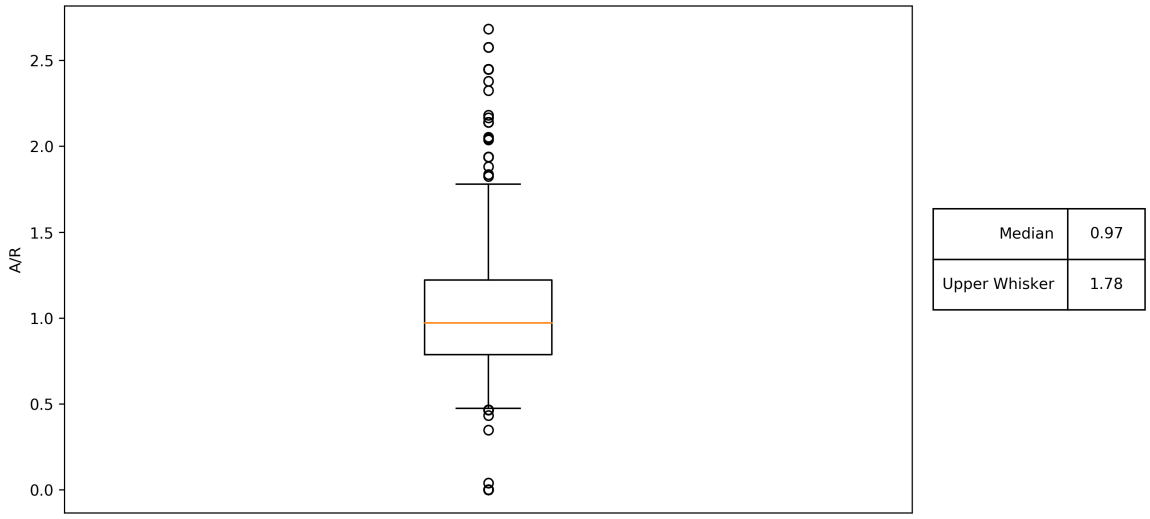
Parameter	# Fields	Acreage	Mean	St. Dev.	Min	Max	Outlier Threshold	No. Outliers
A/R	329	14968.94	1.04	0.49	0.0	2.68	1.78	28
A-R	329	14968.94	-2.92	43.98	-133.3	122.38	72.73	10

Figure 51-1. Histogram of A/R for WHEAT - GRAIN fields in the Coalition.



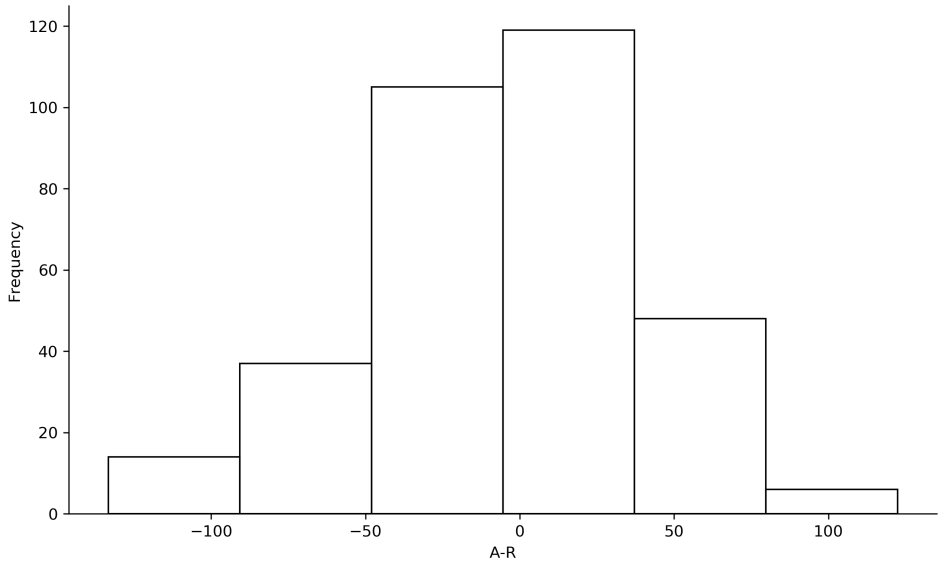
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot.

Figure 51-2. Box and whisker plot of A/R for WHEAT - GRAIN fields in the Coalition.



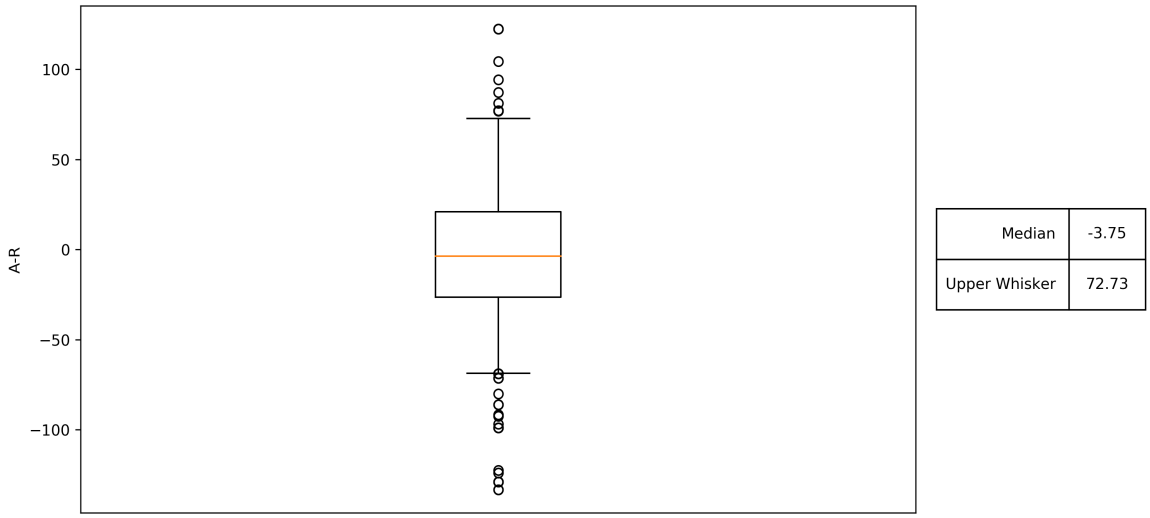
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot. The whiskers are the medcouple values with the upper whisker being the outlier threshold. Dots are outliers.

Figure 51-3. Histogram of A-R for WHEAT - GRAIN fields in the Coalition.



Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot.

Figure 51-4. Box and whisker plot of A-R for WHEAT - GRAIN fields in the Coalition.



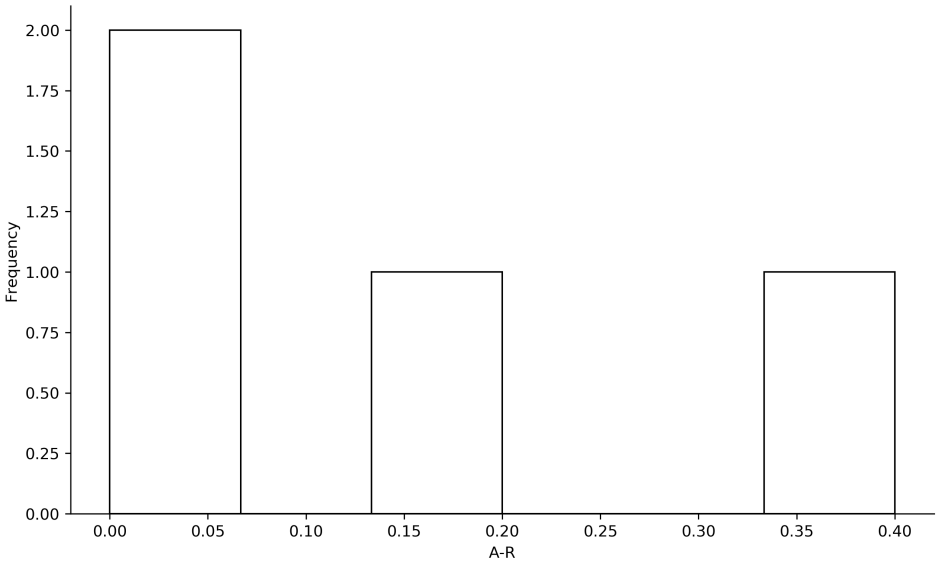
Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot. The whiskers are the medcouple values with the upper whisker being the outlier threshold. Dots are outliers.

52. WHEAT - NR

Table 52-1. Summary statistics for WHEAT - NR fields in Coalition.

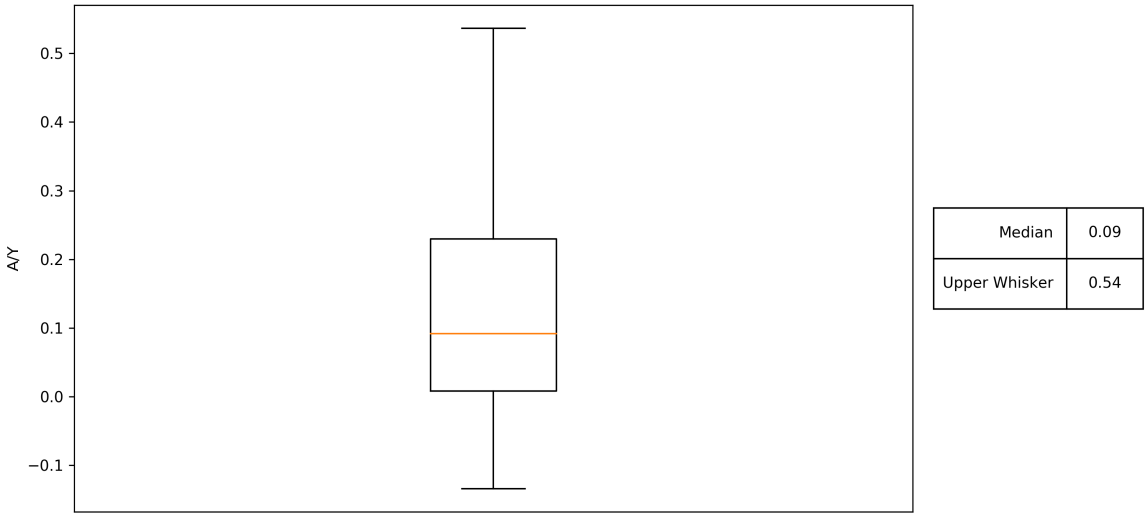
Parameter	# Fields	Acreage	Mean	St. Dev.	Min	Max	Outlier Threshold	No. Outliers
A/Y	4	486.9	0.15	0.19	0.0	0.4	0.54	0

Figure 52-1. Histogram of A/Y for WHEAT - NR fields in the Coalition.



Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot

Figure 52-2. Box and whisker plot of A/Y for WHEAT - NR fields in the Coalition.



Values >3x the difference between the upper and lower whisker not shown to avoid skewing of plot
The whiskers are the medcouple values with the upper whisker being the outlier threshold. Dots are outliers.

53. OTHER CROPS

Table 53-1. Summary statistics for crops with limited representation in the Coalition

For crops with less than four unique values, no summary statistics could be calculated.

Crop	Parameter	# Fields	Acreage	Mean	St. Dev.	Min	Max
CORN - POPCORN	A/Y	1	110.0	0.03		0.03	0.03
RICE - WILD	A/Y	1	61.0	0.05		0.05	0.05
POMEGRANATE	A/R	2	20.5	0.66	0.93	0.0	1.32
	A-R	2	20.5	23.05	35.28	-1.9	48.0
CORN - NR	A/Y	2	69.9	0.01	0.01	0.0	0.02
WINTER GRAIN	A/Y	1	32.9	0.02		0.02	0.02
HERB/SPICE	A/Y	2	21.9	0.15	0.21	0.0	0.3
LAVENDER	A/Y	1	1.0	0.0		0.0	0.0
DICHONDRA	A/Y	2	118.0	0.09	0.13	0.0	0.18
GRAPE - TABLE	A/R	1	2.0	13.5		13.5	13.5
	A-R	1	2.0	132.03		132.03	132.03
RESEARCH	A/Y	1	0.5	0.16		0.16	0.16
GRAPE ROOTSTOCK	A/Y	3	139.0	0.03	0.01	0.02	0.04
FIG	A/R	2	31.7	0.0	0.0	0.0	0.0
	A-R	2	31.7	-10.18	7.21	-15.28	-5.08
HOPS	A/Y	2	11.55	0.0	0.0	0.0	0.0
TURF	A/Y	3	220.93	36.25	1.79	34.46	38.04
CHRISTMAS TREE	A/Y	2	53.0	0.0	0.0	0.0	0.0
OKRA	A/Y	1	20.0	0.06		0.06	0.06
WATERMELON	A/R	1	19.0	4.2		4.2	4.2
	A-R	1	19.0	111.25		111.25	111.25
OTHER	A/Y	2	39.0	0.02	0.03	0.0	0.04
TOMATO - FRESH MARKET	A/R	2	32.0	0.0	0.0	0.0	0.0
	A-R	2	32.0	-104.92	146.91	-208.8	-1.04
COVER CROP	A/Y	1	15.0	0.0		0.0	0.0
HEMP	A/Y	1	9.0	0.0		0.0	0.0
BEAN - GREEN	A/R	2	169.0	15.9	18.14	3.08	28.73
	A-R	2	169.0	97.12	61.0	53.99	140.25
WINTER VEGETABLE	A/Y	1	100.0	0.2		0.2	0.2

APPENDIX B

EXAMPLE MEMBER FEEDBACK REPORT

Sacramento Valley Water Quality Coalition
2019 Nitrogen Management Plan Summary Report Results

Owner ID: XXXXXX **Owner Name: XXXXX**
Reporter ID: XXXX **Reporter Name: XXXX**

Crop: CORN

These results represent information you provided on your 2019 Nitrogen Management Plan Summary Report comparing your Nitrogen *Applied* to your Nitrogen *Removed* (A/R and A – R) to other fields of the same crop in the Sacramento Valley Water Quality Coalition. For more detailed information, please refer to the cover letter included with your 2019 Nitrogen Management Plan Summary Results.

The table below shows your results and the average results for the whole Coalition for fields of the same crop:

Columns 1 & 2: Your Applied pounds of Nitrogen per acre compared to the average pounds of Nitrogen Applied per acre in the Coalition for your crop.
Columns 3, 4, 5: Your Nitrogen *Applied* divided by Nitrogen *Removed* (A/R) compared to the average A/R in the Coalition and the A/R outlier threshold.
Columns 6, 7: Your Nitrogen *Applied* minus Nitrogen *Removed* (A – R) compared to the average A – R in the Coalition.
Column 8: The total number of fields analyzed in the Coalition for your crop.

Table 1. Your Results Compared to the Coalition (Sacramento Valley)

APN	# Irrigated Acres	(1) N Applied (lb/ac)	(2) Coalition Average[1] N Applied (lb/ac)	(3) A/R	(4) Coalition Average[1] A/R	(5) A/R Outlier Threshold	(6) A−R	(7) Coalition Average[1] A−R	(8) # of Fields in Coalition
000-000-000-000	77	500	180	0.0090	0.0055	0.0087	100	50	400
000-000-000-000	60	200	180	N/A	N/A	N/A	N/A	N/A	400

A/R Status Color Key

Outlier in Coalition[3] | High in Coalition (>75% of fields) | Average in Coalition (<75% of fields) | Not Enough Data

The A/R status color shows how your fields compare to others of the same crop across the whole Coalition. If your A/R values are greater than the outlier threshold for the Coalition, that is considered to be an "outlier" value. If your value is less than this threshold but greater than 75% of all fields in the Coalition of the same crop, it is considered high. If your value is less than 75% of all fields in the Coalition for your crop, then it is average or low. In some cases, there were not enough data points to calculate outliers. N/A means your crop does not have an R coefficient for calculating N removed.

Each field was analyzed separately. If multiple APNs were reported for a single field, only the first APN listed was analyzed and is shown in the table.

Notes:
1. Average is calculated using median value
2. A/R Value: The purpose of this value is to estimate the amount of residual Nitrogen available to leach to groundwater. The A/R value (total Applied N divided by N Removed), was calculated using published N removal values from: *Nitrogen concentrations in harvested plant parts - A literature overview (Geisseler, 2016)* (http://geisseler.ucdavis.edu/Geisseler_Report_2016_12_02.pdf). This publication documents the best available information, but values are expected to be updated and modified as new information becomes available. For many crops, the publication indicates only few if any values could be found, while for others extensive datasets were available.
3. Outlier fields have an A/R value that is greater than the outlier threshold. The outlier threshold is generally the 75th percentile plus 1.5 x the distance between the 25th and 75th

percentiles. This distance is called the interquartile range and is used to measure how spread out the results are. Some modifications to the calculation are made if the data distribution for a crop is skewed following the procedure of Hubert and Vandervieren (2008).

APPENDIX C

MAXIMUM YIELDS BY CROP TYPE FOR DATA EXCLUSION

Crop	Yield Exclusion Threshold (lbs/ac)
ALFALFA	30,000
ALFALFA - SEED	3,000
ALMOND	10,000
APPLE	70,000
APRICOT/APRIUM	70,000
ASPARAGUS	10,000
BARLEY	50,000
BARLEY - FODDER/SILAGE	50,000
BARLEY - GRAIN	20,000
BEAN - GREEN	50,000
BEAN DRY	10,000
BEET	75,000
BERRY	50,000
BLACKBERRY	50,000
BLUEBERRY	50,000
BROCCOLI	50,000
CABBAGE - SEED	3,000
CABBAGE	50,000
CANOLA	10,000
CARROT	100,000
CHERRY	30,000
CHESTNUT	30,000
CILANTRO	50,000
CITRUS	70,000
CORN	100,000
CORN - FODDER/SILAGE	100,000
CORN - GRAIN	20,000
CORN - POPCORN	20,000
CORN - SWEET	50,000
COTTON	10,000
CUCUMBER	120,000
CUCUMBER - SEED	3,000
FIG	50,000
FILBERT/HAZELNUT	10,000
FORAGE/HAY	50,000
GARLIC	50,000
GRAIN HAY	50,000
GRAPE - TABLE	70,000
GRAPE - WINE	40,000
GRASS HAY	50,000
HAY/FORAGE	50,000
KALE	50,000
KIWI	50,000
KOHLRABI	50,000
LEEK	75,000

Crop	Yield Exclusion Threshold (lbs/ac)
MELON	100,000
MELON - SEED	3,000
MELON - HONEYDEW	100,000
MELON - CANTALOUPE	100,000
MILLET	50,000
MISC FIELD CROPS	100,000
MISC FRUIT TREE	75,000
MISC NUT TREE	50,000
MISC ROW CROP	100,000
MISC VEGETABLE	100,000
OAT	50,000
OAT - GRAIN	20,000
OAT - FODDER/SILAGE	50,000
OKRA	50,000
OLIVE	50,000
ONION	75,000
ONION - SEED	3,000
ORANGE	70,000
PEA	50,000
PEACH/NECTARINE	75,000
PEAR	75,000
PECAN	10,000
PEPPER	75,000
PERSIMMON	50,000
PISTACHIO	10,000
PLUM/PLUOT	75,000
POMEGRANATE	75,000
POTATO	75,000
PRUNE	20,000
PUMPKIN - SEED	3,000
PUMPKIN	75,000
RADISH	50,000
RASPBERRY	50,000
RICE	10,000
RICE - WILD	10,000
RYEGRASS	50,000
SAFFLOWER	10,000
SEED CROP	3,000
SORGHUM/MILO	70,000
SQUASH	75,000
SQUASH - SEED	3,000
STRAWBERRY	90,000
SUDAN GRASS - SEED	3,000
SUDAN GRASS	50,000
SUNFLOWER	10,000

Crop	Yield Exclusion Threshold (lbs/ac)
TOMATO - FRESH MARKET	200,000
TOMATO - PROCESSING	200,000
TRITICALE	50,000
TURNIP	70,000
VEGETABLE SEED	3,000
VETCH	20,000
VINE SEED	3,000
WALNUT	10,000
WATERMELON	100,000
WATERMELON - SEED	3,000
WHEAT	50,000
WHEAT - GRAIN	20,000
WHEAT - FODDER/SILAGE	50,000

Note:

Maximum yield thresholds estimated from a variety of sources including CDFA prc
statistics, UCCE cost studies and literature, and previous years NMP data

APPENDIX D

ANNUAL NITROGEN MANAGEMENT PLAN SUMMARY REPORT DATA

Excel spreadsheet provided electronically