



Sacramento Valley Water Quality Coalition

Annual Management Practice Implementation and Nitrogen Management Report

2022 Crop Year

Prepared for
Central Valley Regional Water Quality Control Board

Prepared by
 **LAND IQ**

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LIST OF 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 |
| ANOVA | One-Way Analysis of Variance |
| AUM | Animal Unit Month |
| CV | Coefficient of Variation |
| CY | Crop Year |
| FE | Farm Evaluation |
| GAR | Groundwater Quality Assessment Report |
| GQMP | Groundwater Quality Management Plan |
| GW | Groundwater |
| HVA | High Vulnerability Area |
| INMP | Irrigation and Nitrogen Management Plan |
| ILRP | Irrigated Lands Regulatory Program |
| MC | Medcouple Statistic |
| MPIR | Management Practice Implementation Report |
| MU | Management Unit |
| N | Nitrogen |
| NCWA | Northern California Water Association |
| NR | Not Reported |
| ORDER | General Order No. R5-2014-0030-R1 |
| PLSS | Public Land Survey System |
| R | Nitrogen Removed |
| RWQCB | Regional Water Quality Control Board |
| SSURGO | Soil Survey Geographic Database |
| SQMP | Surface Water Quality Management Plan |
| SVWQC | Sacramento Valley Water Quality Coalition |
| SW | Surface Water |

EXECUTIVE SUMMARY

Subwatersheds within the Sacramento Valley Water Quality Coalition (Coalition) collected Irrigation and Nitrogen Management Plan (INMP) Summary Reports for the 2022 crop year (CY) that were filled out by Coalition members.

The individual Coalition subwatersheds (Subwatersheds) assembled member data and submitted aggregated data for further analysis. The data were reviewed and checked for errors and omissions, and members were contacted to correct any noticeable errors. While a significant effort was made to correct all errors, some errors may have gone undetected. The 2022 CY INMP return rate was approximately 95% of members, with 5,378 members reporting on 22,943 fields and 1,098,373 acres. INMP data that was not reported consisted of 287 members, 933 fields, and 43,008 acres.

Farm Evaluation (FE) data and Groundwater Management Practice Implementation Report (GW MPIR) data for the 2020 CY were submitted with the Coalition's 2021 INMP Summary Report. FE data is not required to be collected again until 2026 for the 2025 CY, and GW MPIR data is not required to be collected again until 2024 for the 2023 CY. Surface water (SW) MPIR data for the 2022 CY are provided in Attachment 1.

The 2022 CY was the second year that three-year (3-yr) ratios were calculated for applied nitrogen (N) and N removed by the crop (R) (A/R), but the first year that fields in low vulnerability areas had 3 years of data since they did not have to begin reporting until the 2020 CY. To be eligible for the 3-yr ratios, a field had to have the following all 3 years:

- Same membership
- Same field ID
- Same crop type
- Orchard at full production age (R rates are not comparable between young and mature orchards)
- Not flagged for zero yield, questionable or exempt data

For perennial crops that met the above criteria, 3-yr A/R was used to determine outliers. For annual crops, single year A/R was used, and any fields that were single year outliers in 2022 and at least one of the two prior years (2020 or 2021) were considered to be outliers. Single year A/R was used for annuals because annual crops are rarely consistent over time and do not meet the eligibility criteria for 3-yr ratios.

A/R and A-R summary statistics were summarized by crop type and are provided in Appendix A. The outlier status and AR results will be provided in individualized feedback reports to each member as part of the Coalition's education and outreach program. There were 18 annual crop fields that were considered outliers and 107 perennial crop fields considered outliers. There were more perennial crop outliers than the previous year since this was the first year that fields in low vulnerability areas had three years of data.

The statistical analysis of A/R by soil drainage class and irrigation method found some significant effects, but the analyses had lower reliability in crops with a small number of observations. Soil drainage class did not appear to have a consistent effect on A/R as the drainage class with the highest A/R varied by crop. Every soil drainage class had the highest mean A/R for at least one crop. For irrigation, the method that had the lowest mean A/R varied by crop with no irrigation method being consistently lower.

1 INTRODUCTION

The Central Valley Regional Water Quality Control Board (RWQCB) developed the Irrigated Lands Regulatory Program (ILRP) 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 General Order No. R5-2014-0030-R1 (Order).

The Sacramento River Watershed Order for members of the Sacramento Valley Water Quality Coalition (Coalition) requires all members to prepare an Irrigation and Nitrogen Management Plan (INMP) annually, and update Farm Evaluations (FE) every five years. The Order requires the Coalition to submit an INMP Summary Report for the previous crop year (CY) and to submit FE data from the most recent FE in Excel workbook format annually. The Coalition is also required to submit a Management Practice Implementation Report (MPIR) in Excel workbook format. The SW component of the MPIR is due every year while the GW component is due every three years.

This Annual Management Practice Implementation and Nitrogen Management Report includes the INMP Summary Report evaluation (Annual Report Components 19 and 20 in the Order), the requirements of which are summarized in Table 1. For INMP, the Coalition is required to summarize member INMP data, including comparisons of the ratio of nitrogen (N) applied to N removed (A/R) and the difference between N applied and N removed (A-R) by crop type for single year and three-year (3-yr) intervals. These statistical comparisons are provided in Appendix A. This year is the second year that comparisons were made with 3-yr A/R ratios, but the first year in which low vulnerability parcels, as identified in the Coalition's 2014 Groundwater Quality Assessment Report (GAR) (CH2M Hill, 2014; CH2M Hill, 2016), were reported on for the entire 3-yr interval. 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. Management practice data from the INMP surveys are provided in Excel workbook format in Attachments 1 and 2, as required in the Order.

The Coalition collected FE data for the 2020 CY and will not have to complete FE surveys again until the 2025 CY. The data received from the 2020 CY FEs was provided by township with the November 2022 Annual Management Practices Report (SVWQC, 2022).

The Coalition collected GW MPIR data for the 2020 CY and submitted an Excel spreadsheet with the November 2021 Annual Management Practices Report (SVWQC, 2021). Per the RWQCB letter sent on August 26, 2021, the groundwater portion of the MPIR spreadsheet should be submitted every third year beginning in 2021; thus, the next GW MPIR data will be submitted in 2024 for the 2023 CY. The 2023 surface water MPIR data is provided in Attachment 1 for Ulatis Creek, Lower Honcut Creek, Lower Snake River, and Pine Creek drainages.

In summary, this report includes the following components:

- INMP Summary Report Evaluation
- Summary of Annual Management Practice Information (INMP and MPIR)
- Annual Management Practice Implementation Data in Excel workbook format (Attachment 1)
- Annual Irrigation and Nitrogen Management Plan Summary Report Data in Excel workbook format (Attachment 2)

Table 1. Summary of Order requirements for Annual Report Components 19 and 20.

| Summary of Requirements for INMP (Report Component No. 19) |
|---|
| Evaluation of A/R and A-R ratios by crop type |
| Evaluation of A/R and A-R by irrigation method, soil conditions, and farm size for each crop type |
| Evaluation of A/R 1-yr and A/R 3-yr differences by crop type |
| Provide mean, standard deviation, histogram, and boxplot for A/R and A-R for each crop type |
| 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 |
| Summary of Requirements for Management Practice Information (Report Component No. 20) |
| Aggregate and summarize FE data by township |
| Provide a quality assessment of the collected information by township (e.g. missing data, potentially incorrect/inaccurate reporting) and a description of corrective actions to be taken |

2 BACKGROUND

The area covered by the Coalition’s Order encompasses all the Sacramento River Watershed. The Coalition is operated as a partnership with 11 local subwatersheds (Subwatersheds) coordinated by the Northern California Water Association (NCWA) (Figure 1). On February 23, 2023, the RWQCB exempted Upper Feather River Subwatershed from the ILRP. 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 Coalition 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.

The Coalition’s low vulnerability areas for threat to groundwater quality from nitrates, as identified in the 2016 Groundwater Quality Assessment Report (GAR) (CH2M Hill, 2016) did not have to begin reporting INMP data until the 2020 CY, whereas the high vulnerability areas (Figure 1) began reporting in

CY 2016. This reporting year (2023) was the first year in which the low vulnerability areas had enough data for calculation of 3-yr A/R ratios.

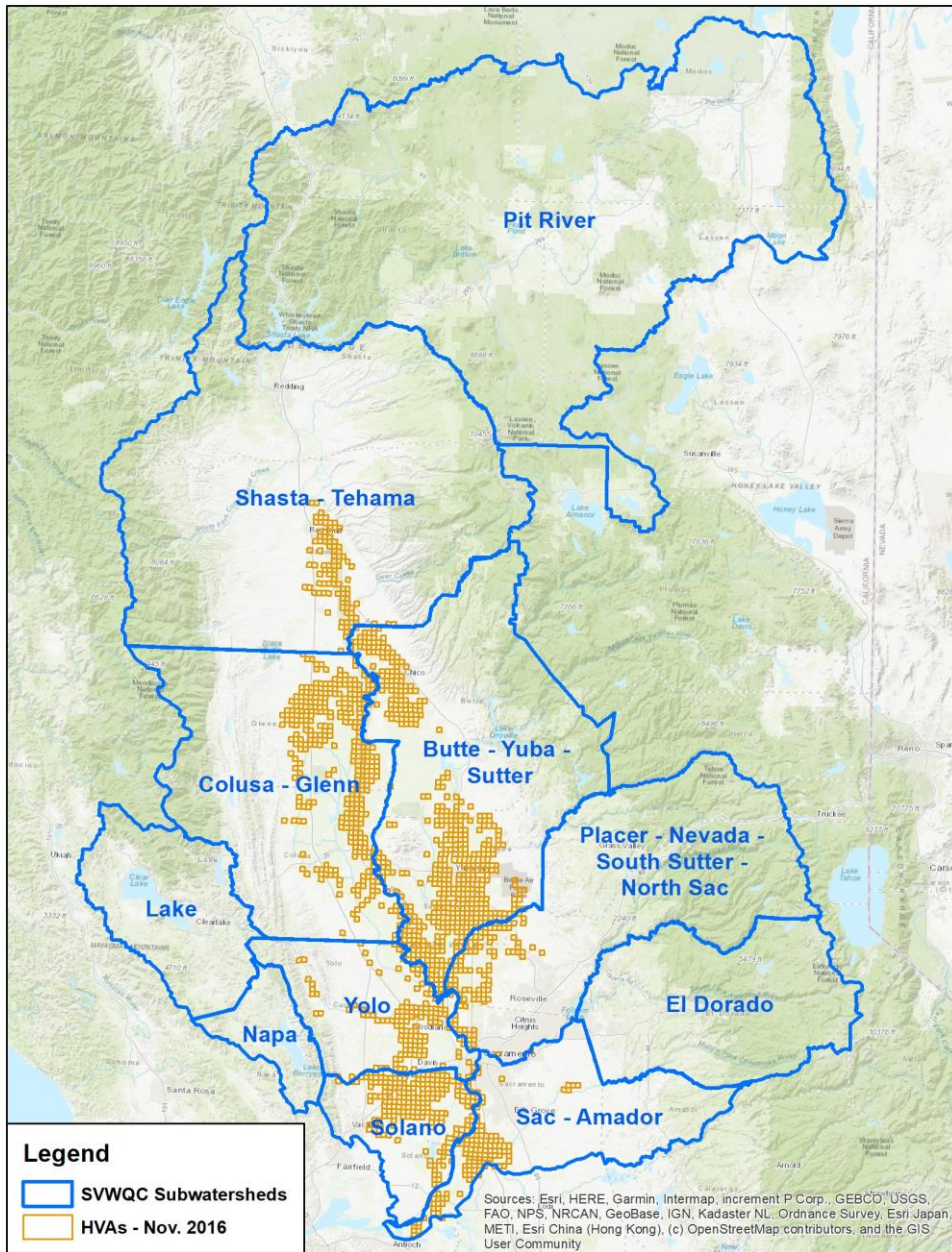


Figure 1. Subwatersheds and High Vulnerability Areas (HVAs) within Coalition.

3 FARM EVALUATION

The FE data for the 2020 CY was included in the November 2021 Annual Management Practices Report (SVWQC, 2021). As of the 2021 report, 94% of members had completed FE surveys.

4 INMP SUMMARY REPORT EVALUATION

This section of the report summarizes the INMP Summary Report evaluation. The initial steps included data collection, quality assessment, and clean-up. Following collection and clean-up of the INMP data, any remaining fields with questionable values were excluded from the statistical analysis. After exclusion of questionable data, single-year and multi-year AR ratios (A/R and A-R) were calculated, and the data was joined to county parcel shapefiles to determine spatial information. The data was then evaluated for A/R outliers for each crop type, and the effect of soil and irrigation method on A/R was evaluated.

4.1 SUMMARY OF MEMBER DATA COLLECTION

On the INMP Summary Reports, members report irrigation and N data for each field, including crop, irrigated acres, N applied (A), yield (Y), planting year, irrigation method, and efficiency practices utilized for irrigation and N. Most members are in subwatersheds that use online reporting systems. Members submitted INMP Summary Reports to the Subwatershed in which their fields are located, which were then exported to a spreadsheet, if collected online, or manually entered into a standardized MS Excel template if collected via paper form.

The completion statistics for the 2022 CY INMP Summary Reports are shown in Table 2. INMP data was received for 22,943 fields representing 5,378 members and 1,098,373 acres. INMP data that was not reported consisted of 933 fields, 287 members, and 43,008 acres. The overall member completion percentage of INMP Summary Reports for the 2022 CY was 95%.

Table 2. Status of INMP summary reports received.

| INMP Submission Status | Members ^a | Fields | Acres |
|------------------------|----------------------|--------------|-----------------|
| Not Submitted | 287 (5%) | 933 (4%) | 43,008 (4%) |
| Submitted | 5,378 (95%) | 22,943 (96%) | 1,098,373 (96%) |

Notes:

- a. A member can be included in both the submitted and not submitted count if they did not report on all their required fields.

4.2 SUMMARY OF MEMBER DATA QUALITY EVALUATION

The Coalition initially checked all returned forms for completeness and flagged any potential errors. Any INMP 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 and corrections applied included:

1. Incomplete reporting of all information required on the INMP Summary Report or reporting multiple values for yield and N applied within a single field.
2. Amount of N fertilizer applied per acre was greater than 450 lbs/acre, which is the maximum realistic 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, total

N applied for the field instead of per acre, or total N for compost instead of plant available N for the crop year. If total N was reported for compost, it was estimated that 1% of the reported value would be plant available if not specified by the member (Lloyd et al., 2022).

3. Production unit was not correct (e.g., tons was listed when the actual unit was pounds (lbs)) or was provided on a volume basis rather than a 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 3).
4. Yield was much higher or lower than the typical range of values for the given crop, as shown in Appendix C. The high yield flags were typically the result of either a transcription error, failure to convert yield units to lbs, or using total yield instead of per acre values. The low yield flags could be legitimate if there was crop failure, fewer harvests than normal (i.e., alfalfa with one cutting), or they could indicate an error in the crop type reported such as seed crops that were not marked as such.
5. Yield was 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 if different than the default on their INMP Summary Reports, but some members did not fill this out or entered an incorrect basis. All reported yields were converted, where possible, to the default reporting basis for the crops listed in Table 4. If the yield basis conversion resulted in a more unreasonable yield value than the originally reported yield, the original value was kept.
6. The planting year or crop age was unlikely given the reported yield (i.e. a young orchard with a high yield).
7. 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.
8. Member reported field ID or account ID, which is used to track fields over time, had a typo or did not match the format used in prior years for subwatersheds reporting via paper forms.

For members reporting online, corrections were made through the webtool by either the member or Subwatershed staff. After the initial data flagging and review period, the dataset was reviewed a final time. The final dataset included some late submissions that were not captured during the initial review.

Table 3. Estimated yield unit weights for conversion from volumetric units.

| Crop | Volumetric Yield Unit | Estimated Yield Unit Weight |
|-----------|-------------------------|-----------------------------|
| Apple | bin | 900 lbs |
| Orange | bin | 900 lbs |
| Kiwifruit | tray | 7 lbs |
| Pasture | animal unit month (AUM) | 1,000 lbs |
| Cotton | bale | 500 lbs |

Table 4. 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 | 0.82 |
| Pecan | kernel | in-shell | 2 |
| Prune | fresh fruit | dried fruit | 0.33 |

4.3 DATA EXCLUSIONS

After outreach was completed, fields with any of the following criteria were excluded from the statistical analysis:

1. Exempt crops (rice, non-irrigated crops, fallow, pasture with no N applied, or aquaculture)
2. Missing a required parameter for analysis (crop, N applied, yield, or yield unit)
3. N applied greater than 600 lbs/acre (lower threshold of 450 lbs/ac was used for member follow-up during QC)
4. Yield values above or below the reasonable range for the reported crop, shown in Appendix C
5. Zero yield or non-bearing

4.4 NITROGEN REMOVED DATA SOURCES AND PROCEDURES

After data exclusion, A/R and A-R were calculated for all remaining records, where possible. For crops where R could not be calculated, A/Y was calculated instead. 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)*

- *Nitrogen concentrations in harvested plant parts - March 2021 update (Geisseler, 2021)*

These reports include information on N removal values for each crop as shown in Table 5, and include 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 is presented in the detailed discussion of each crop.

While Geisseler (2016; 2021) 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 need 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; 2021) are used in this analysis because they are the best available sources of data, but they should not be considered definitive for all crops, and they should be expected to change and improve over time.

The N accumulated in the perennial tissues of permanent crops, which can vary by age, is also added to the amount of N removed, where values are available. Currently, Geisseler (2016; 2021) only provides values for almonds for perennial tissue accumulation, which are listed by orchard age in Table 6. These values were added to the N removed for the 2022 CY for any almond orchards with planting year reported. If planting year was not reported for an almond orchard, the perennial tissue N removed was not included in the AR ratios.

Table 5. N removed (R) conversion factors.

| Crop | No. of Observations | | CV (%) | R Conversion Factor (lbs N/ lbs yield) | Yield Basis |
|---------------------------|---------------------|-------|--------|---|----------------|
| | CA | Total | | | |
| Field Crops | | | | | |
| Alfalfa – Hay | 49 | 49 | 12.5 | 0.03115 | 12% moisture |
| Alfalfa – Silage | 6 | 6 | 17.5 | 0.01200 | 65% moisture |
| Barley – Grain | 4 | 61 | 14.6 | 0.01680 | 12% moisture |
| Barley – Straw | 0 | 970 | 31.3 | 0.00770 | 12% moisture |
| Beans, Dry – Blackeye | 1 | 164 | 10.4 | 0.03650 | 12% moisture |
| Beans, Dry – Garbanzo | 2 | 108 | 11.3 | 0.03360 | 12% moisture |
| Beans, Dry – Lima | 2 | 75 | 5.4 | 0.03615 | 12% moisture |
| Corn – Grain | 0 | 1,775 | 20.8 | 0.01200 | 15.5% moisture |
| Corn – Silage | 96 | 96 | 10.9 | 0.00377 | 70% moisture |
| Cotton | 49 | 49 | 16.1 | 0.06200 | lint |
| Fescue, Tall – Hay | 260 | 260 | 16.2 | 0.02540 | 12% moisture |
| Oat – Grain | 0 | 134 | 9.6 | 0.01885 | 12% moisture |
| Oat – Straw | 2 | 526 | 34.7 | 0.00740 | 12% moisture |
| Oat – Hay | 49 | 49 | 18.2 | 0.01085 | 12% moisture |
| Orchard Grass – Hay | 60 | 60 | 20 | 0.02725 | 12% moisture |
| Ryegrass, Perennial – Hay | 60 | 60 | 16.8 | 0.02745 | 12% moisture |
| Safflower | 140 | 140 | 10.2 | 0.02585 | 8% moisture |
| Sorghum – Grain | 0 | 256 | 29.7 | 0.01650 | 13.5% moisture |
| Sorghum – Silage | 260 | 260 | 21 | 0.00367 | 65% moisture |
| Sunflower | 24 | 24 | 11.1 | 0.03160 | 8% moisture |
| Triticale – Grain | 51 | 51 | 13 | 0.02020 | 12% moisture |
| Triticale – Straw | 0 | 102 | 38.3 | 0.00575 | 12% moisture |
| Triticale – Silage | 19 | 19 | 13.7 | 0.00452 | 70% moisture |
| Wheat, Common – Grain | 113 | 113 | 10.3 | 0.02150 | 12% moisture |
| Wheat – Straw | 3 | 494 | 33 | 0.00690 | 12% moisture |
| Wheat – Silage | 39 | 39 | 18.6 | 0.00525 | 70% moisture |
| Wheat, Durum – Grain | 41 | 41 | 3.7 | 0.02105 | 12% moisture |
| Vegetables | | | | | |
| Asparagus | 2 | 19 | 14 | 0.00293 | fresh spears |
| Beans, Green | 1 | 122 | 25.7 | 0.00289 | fresh weight |
| Broccoli | 15 | 46 | 20.4 | 0.00560 | fresh weight |
| Carrots | 64 | 64 | 22.7 | 0.00140 | fresh weight |
| Corn, Sweet | 0 | 50 | 13.1 | 0.00359 | fresh ears |

| Crop | No. of Observations | | CV (%) | R Conversion Factor (lbs N/ lbs yield) | Yield Basis |
|-------------------------------|---------------------|-------|--------|---|-----------------|
| | CA | Total | | | |
| Cucumbers | 1 | 10 | 17.4 | 0.00108 | fresh weight |
| Garlic | 1 | 12 | 19.5 | 0.00755 | fresh weight |
| Lettuce, Iceberg | 45 | 68 | 16.7 | 0.00132 | fresh weight |
| Lettuce, Romaine | 14 | 26 | 13.7 | 0.00181 | fresh weight |
| Melons, Cantaloupe | 1 | 31 | 15.5 | 0.00244 | melons |
| Melons, Honeydew | 1 | 12 | 22.1 | 0.00148 | melons |
| Melons, Watermelons | 1 | 6 | 23.9 | 0.00070 | melons |
| Onions | 13 | 45 | 19.7 | 0.00197 | fresh weight |
| Pepper, Bell | 6 | 40 | 7.9 | 0.00166 | fresh weight |
| Potatoes | 5 | 64 | 13.6 | 0.00312 | fresh weight |
| Pumpkin | 1 | 13 | 10.1 | 0.00368 | fresh weight |
| Squash | 11 | 74 | 22.4 | 0.00184 | fresh weight |
| Sweet Potatoes | 11 | 23 | 16.8 | 0.00237 | fresh weight |
| Tomatoes, Fresh Market | 1 | 34 | 16.5 | 0.00131 | fresh weight |
| Tomatoes, Processing | 195 | 195 | 15.0 | 0.00146 | fresh weight |
| Tree and Vine Crops | | | | | |
| Almonds | 31 | 31 | 4.1 | 0.06800 | kernels |
| Apples | 1 | 132 | 35.1 | 0.00054 | fruits |
| Apricots | 1 | 22 | 114 | 0.00278 | fruits |
| Cherries | 1 | 24 | 19.8 | 0.00221 | fruits |
| Figs | 1 | 19 | 18.1 | 0.00127 | fruits |
| Grapefruit | 26 | 27 | 7.8 | 0.00148 | fruits |
| Grapes – Raisins | 16 | 19 | 5.8 | 0.00505 | 15% moisture |
| Grapes – Table | 16 | 19 | 5.8 | 0.00113 | grapes |
| Grapes – Wine | 8 | 38 | 13 | 0.00180 | grapes |
| Lemons | 21 | 22 | 10 | 0.00129 | fruits |
| Nectarines | 31 | 41 | 27.1 | 0.00182 | fruits |
| Olives | 6 | 29 | 22.8 | 0.00314 | fruits |
| Oranges | 26 | 82 | 10.9 | 0.00148 | fruits |
| Peaches | 81 | 81 | 19.0 | 0.00152 | fruits |
| Pears | 1 | 64 | 17.9 | 0.00065 | fruits |
| Pistachios (CPC) ^e | 11 | 11 | 3.5 | 0.02805 | dry yield (CPC) |
| Pistachios (gross) | 156 | 156 | 21.6 | 0.01020 | green weight |
| Plums | 24 | 24 | 14.5 | 0.00114 | fruits |
| Pomegranate | 0 | 7 | 15 | 0.00200 | fruits |

| Crop | No. of Observations | | CV (%) | R Conversion Factor (lbs N/ lbs yield) | Yield Basis |
|------------|---------------------|-------|--------|---|--------------|
| | CA | Total | | | |
| Prunes | 18 | 18 | 16.3 | 0.00560 | dried fruits |
| Tangerines | 1 | 2 | 29.2 | 0.00127 | fruits |
| Walnuts | 24 | 24 | 10.9 | 0.01590 | in-shell |

Notes:

- a. Conversion factors are calculated from N concentrations expressed in lbs/ton at a moisture content common for crops at harvest.
- b. The calculated value for N removed is only accurate on a multi-year basis and may not be accurate for a specific year.
- c. For perennial crops, N accumulation in perennial tissue is not included in the value, except for almonds.
- d. 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 because it does not include the N in cull or trash.
- e. California Pistachio Commission (CPC) assessed yield is adjusted to 5% moisture and includes the weight of edible, split nuts containing kernels, shelling stock (both kernels and shells), and unsplit nuts containing kernels. Culls such as nuts with insect damage, dark stains, adhering hulls, and other rejects are not included in CPC-assessed yield determinations.

Table 6. Perennial tissue N removed.

| Crop | Age (years) | N demand for leaf and woody biomass (lbs/acre) |
|------------------|-------------|--|
| Almond | 1 | 30 |
| | 2 | 55 |
| | 3 | 65 |
| | 4 | 55 |
| | 5 | 45 |
| | 6-15 | 10 |
| | 16-25 | 30 |
| Other Perennials | -- | Not Available |

4.5 JOINING 2022 CY DATA TO PAST YEARS' DATA

The 2022 CY INMP data was joined to the 2020 CY and 2021 CY INMP data using field IDs to allow calculation of 3-yr AR ratios for eligible fields. For data reported electronically, the field IDs are auto-assigned and should not change over time. For data reported via paper form, the field IDs are reported by the grower and can have errors if the same ID is not used over time. For field IDs reported via paper form that did not have a match, the data was reviewed manually to attempt to match the field to the correct field ID from past years. While most of these errors are thought to have been fixed, there are some that were unable to be corrected.

4.6 SPATIAL JOIN

The INMP data was joined to county parcel shapefiles and the parameters used in the statistical analysis or required data deliverables were determined via spatial join in GIS. Parcel data was obtained for the most recent year available from each county where INMP data was reported, excluding portions of Modoc, Lassen, and Sierra counties where parcel data was not available. The INMP data was joined to the county parcel shapefiles using a combination of APN and county, since some counties share the same APNs. Many of the INMP APNs had to be reformatted to match the format of the parcel shapefiles. If a join match could not be found or if parcel data was not available, then the join parameters were left blank. There were 1,575 fields submitted that could not be matched to the county parcel shapefiles, so these fields do not have township or soil information.

For the INMP records that could be mapped, the following parameters were determined via spatial join in GIS:

- Township and range –assigned based on the centroid of the parcel using the Public Land Survey System (PLSS) dataset from the California Department of Conservation Geologic Energy Management Division (CalGEM) (<https://gis.data.ca.gov/datasets/cadoc::public-land-survey-system-plss-sections/about>)
- Groundwater basin and sub-basin – assigned based on the centroid of the parcel using the California Department of Water Resources (DWR) Bulletin 118 groundwater basins
- Soil type – ready-to-use USDA Soil Survey Geographic Database (SSURGO) information packaged by ESRI was obtained and parcels were assigned to the SSURGO polygon with the largest overlap (<https://www.arcgis.com/apps/View/index.html?appid=cdc49bd63ea54dd2977f3f2853e07fff>)

4.7 OUTLIER ANALYSIS

The INMP data was analyzed for statistical outliers with different methods for perennials vs. annuals. For perennial crops, 3-yr A/R was used. The 3-yr A/R is the sum of the total N applied for 2020 – 2022 divided by the sum of R for 2020 – 2022. For annuals a different method was developed using single-year A/R because most of the annual crop fields did not have the same crop over time. The analysis was done at the Coalition level for each crop type following the procedure described below. All analyses were performed using Python.

4.7.1 CROP GROUPING

The Coalition grouped 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 were 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 in 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. This was used to separate orchards at full production age from younger orchards for statistical analysis. Since younger orchards generally have lower yields, the N removed rates are not comparable to orchards at full production. Only the orchards at full production age were analyzed for outliers. Since approximately 41% of the perennial crop fields did not have a planting year reported, orchards without a planting year were assumed to be at full production. The age thresholds used to determine full production age are shown in Table 8 and were developed from a combination of UCCE publications and expert opinion (A. Fulton - UCCE, personal communication). For almonds and walnuts, if a yield was not reasonable for the planting year (i.e. 3-yr old almonds with yield >2,000 lbs/ac), the field was still included in the outlier analysis and not marked as young since the planting year was suspect.

Table 7. Crop types for 2022 CY grouped into different categories for statistical analysis.

| Specific Crop | Crop Grouping for Analysis |
|-------------------|----------------------------|
| Pea - Field | Bean Dry |
| Blackberry | Berry |
| Blueberry | Berry |
| Mandarin | Citrus |
| Orange | Citrus |
| Grass Hay | Hay/Forage |
| Melon – Honeydew | Melon |
| Mulberry | Misc. Fruit Tree |
| Olive – Oil | Olive |
| Olive – Table | Olive |
| Kale – Seed | Seed Crop |
| Onion – Seed | Seed Crop |
| Sudangrass – Seed | Seed Crop |
| Radish – Seed | Seed Crop |
| Cucumber Seed | Vine Seed |
| Melon – Seed | Vine Seed |
| Pumpkin Seed | Vine Seed |
| Squash – Seed | Vine Seed |
| Watermelon – Seed | Vine Seed |

Table 8. Orchard full production ages.

| Crop | Full Production Age (yrs) | No. Analyzed Fields Below Full Production Age |
|------------------------------|---------------------------|---|
| Almond | 6 | 260 (7%) |
| Cherry | 9 | 0 |
| Citrus ^a | 8 | 1 (1%) |
| Grape – Wine | 4 | 56 (4%) |
| Kiwi | 6 | 1 (2%) |
| Olive ^b | 5 | 7 (2%) |
| Peach/Nectarine ^c | 7 | 11 (3%) |
| Pear | 8 | 4 (2%) |
| Pecan | 8 | 7 (11%) |
| Pistachio | 9 | 26 (21%) |
| Plum/Pluot | 5 | 0 |
| Prune | 8 | 52 (7%) |
| Walnut | 8 | 290 (6%) |

Notes:

- a. Citrus value based on mandarins
- b. Olive value based on high density oil olives
- c. Peach/nectarine value based on processing varieties. Fresh pick varieties mature around year 5. The Coalition did not require members to identify peach/nectarine varieties on their INMP summary reports.

4.7.2 OUTLIER METHOD

For perennial crops, 3-yr ratios were calculated for A/R and A-R using INMP data from the 2020 – 2022 CY. This was the first year that the low vulnerability areas had 3 years of data. To be eligible for the 3-yr ratios, perennials had to have the following all 3 years:

- Same membership – multi-year ratios are meant to evaluate an individual grower’s management
- Same field ID – data is reported at the field level by members as required by the Order
- Same crop type – different crops have different N use efficiencies and different management practices, so this criterion ensures that a member’s management practices are being evaluated rather than the type of crop being grown.
- Orchard at full production age – young orchards generally have lower yields and higher average A/R values compared to full production orchards, so it is not fair to compare them to mature crops as the outliers will be skewed towards younger fields.
- No flags for zero yield, questionable or exempt data – AR ratios cannot be calculated if yield is zero, and questionable data are excluded since these are generally reporting errors and are not accurate data.
- Crop has a nitrogen removal coefficient – this is required to calculate A/R and A - R

Out of the 13,234 perennials that did not have a flag and were mature for the 2022 CY (Table 10), 8,997 (68%) were eligible using these criteria.

For annual crops, 3-yr ratios were not used since most annual fields do not have the same crop type three years in a row. For example, only 7 of the 449 sunflower fields analyzed met the 3-yr eligibility criteria, mainly because of a change in crop type. Thus, for annual crops a different method was developed to identify outliers than for perennial crops. The two methods used were:

- Annual crops – single year A/R ratios were used, and outliers were considered any fields that were single year outliers in 2022 and in at least one of the two prior years (2020 or 2021) for any crop.
- Perennial crops – 3-yr A/R ratios were used and the fields that were not eligible in one or more of the three years were disqualified.

Only high outliers represent potential over-application of N fertilizer and were counted as outliers. For both the annual and perennial crops, the outlier thresholds were calculated the same way using pooled 1-year A/R ratios from CY 2020 through 2022 to provide a larger sample size than if only fields with 3-yr ratios or single-year ratios for 2022 were used. The multi-year outlier thresholds were then compared to 3-yr ratios for perennial crops to identify 3-yr outliers and the 2020 – 2022 single year ratios for annual crops to identify fields that were outliers in 2022 and one or more prior years. The list of which crops used the single year vs. multi-year ratios for outlier determination is provided in Table 9.

The outlier threshold was calculated for each crop grouping via the adjusted boxplot method of Hubert and Vandervieren (2008). This method adjusts the outlier threshold for skewness using the medcouple statistic (MC). When the data distribution is perfectly symmetrical (not skewed), $MC = 0$ and the upper threshold is the standard method of $Q3 + 1.5 * IQR$ from Tukey (1977). For any crops (annuals or perennials) that had less than 20 fields for the 2022 CY, outliers were not calculated because of the small sample size that limits the reliability of the analysis.

Table 9. Outlier methods for perennial and annual crops

| Crop Type | Outlier Method | Dataset Used to Calculate Outlier Threshold |
|---------------------|---|---|
| Perennials | 3-yr A/R above outlier threshold for eligible fields with same crop type | Pooled single year A/R for all fields of the same crop between 2020 – 2022 CY |
| Tree and vine crops | | |
| Asparagus | | |
| Alfalfa | | |
| Grass Hay | | |
| Annuals | 1-yr A/R above outlier threshold for 2022 CY and for any past crops grown on same field for 2020 OR 2021 CY | |
| Vegetables | | |
| Field Crops | | |
| Grain Hay | | |

4.8 SUMMARY STATISTICS

The INMP summary statistics required by the Order were calculated for each crop type grouping and included the mean, standard deviation, minimum/maximum values, histogram plots, and box and whisker plots (boxplots) for A/R and A-R. The number of outliers for A/R, using the methods described above, was also included. For crops without R values, A/Y values are shown instead of A/R and A-R. Non-bearing or zero yield fields were not included in the statistics since A/R cannot be calculated for these fields. Young orchards did not have outliers calculated, but the other summary statistics are presented. Crops with less than 20 fields for the 2022 CY or unspecified crop categories (e.g., “other”, “misc. fruit tree”) did not have boxplots or outliers calculated due to the small sample size or mix of crops and are provided in tabular format.

The boxplots were generated using the standard method of Tukey (1977) while the red dashed line shows the outlier threshold, which was determined using the method of Hubert and Vandervieren (2008) with the pooled 2020 – 2022 single year A/R dataset. To avoid skewing the display of the boxplots and histograms, values greater than three times the difference between the upper and lower whisker, using the Tukey (1977) method, are not shown; however, they were still included in the calculation of outliers. An interpretation diagram for the boxplot is provided in Figure 2. Outliers for perennial crops are dots above the red dashed line on the 3-yr A/R plot. For annual crops, dots above the red dashed line that were also outliers in 2020 or 2021 for any crop grown on that field are counted as multi-year outliers.

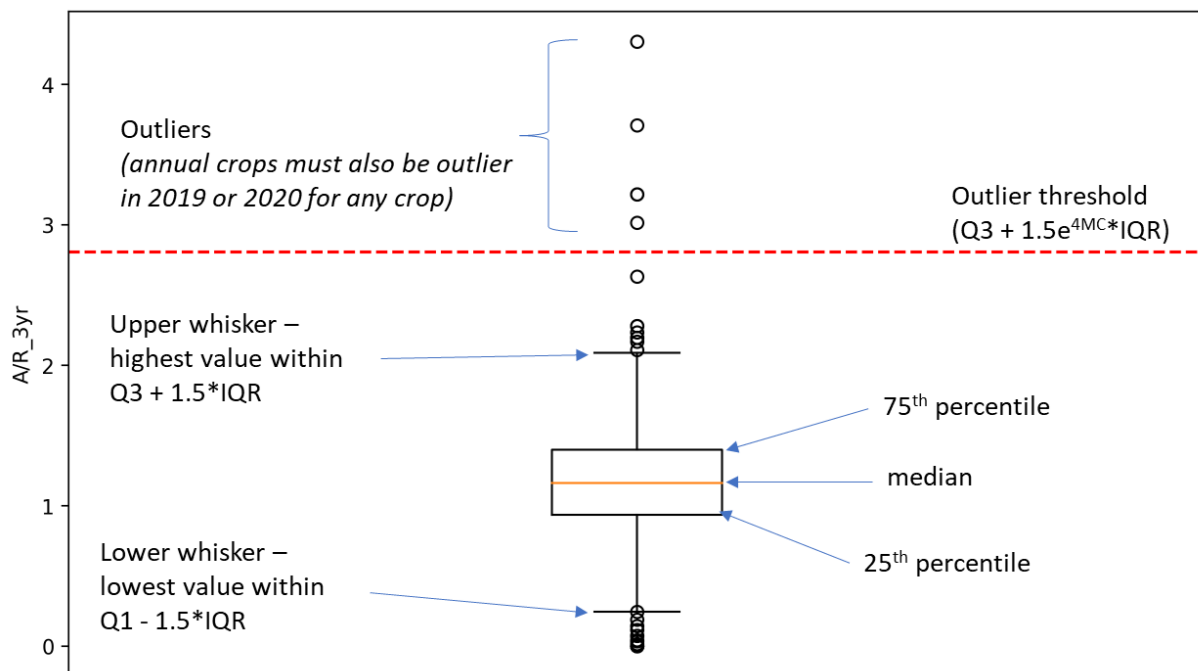


Figure 2. Interpretation diagram for box and whisker plot.

4.9 SOIL AND IRRIGATION TYPE ANALYSIS

The Order requires that the evaluation of AR ratios by crop type include an evaluation of irrigation method, soil conditions, and farming operation size. Farming operation size is not currently requested from members on the approved INMP Summary Report or FE Templates, so this factor could not be analyzed. Members can have operations that span multiple subwatersheds, farm fields for multiple property owners, or have fields that were exempt from reporting such as pasture and rice, which makes defining the operation size difficult. Soil conditions were assessed using drainage class that was assigned during the spatial join, and irrigation method was assessed using the response to the irrigation method question on the INMP Summary Reports.

4.9.1 SOIL TYPE EVALUATION

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 drainage class was obtained from the dominant condition in the SSURGO dataset for the map unit with largest overlap assigned to each parcel. The drainage classes were then aggregated into four 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 Kruskal-Wallis one-way analysis of variance (ANOVA). This is a non-parametric test that evaluates (for each crop type) the hypothesis that all drainage classes have the same mean A/R values. For annuals crops, the test was conducted on single year A/R values for the 2022 CY, while for perennials, the test was conducted on fields with 3-yr A/R ratios. A result was considered statistically significant for p -values < 0.05 . If a significant result was obtained for a given crop, a follow-up test was completed using Dunn's test, a non-parametric multiple comparisons test, to identify which of the drainage classes were significantly different from each other. The Dunn's test p -values were adjusted for error using the Bonferroni adjustment. The soil type evaluation was not performed for crops without R values or with a small number of observations. Results of the soil type evaluation are provided in Section 4.10.2.

4.9.2 IRRIGATION TYPE EVALUATION

Irrigation type was reported by growers with the 2022 CY INMP data. The influence of primary irrigation type on A/R values for each crop was assessed using a Kruskal-Wallis ANOVA. For annuals crops, the test was conducted on single year A/R values for the 2022 CY, while for perennials, the test was conducted on fields with 3-yr A/R ratios. Dunn’s test with a Bonferroni adjustment was performed for any crops with a significant effect (p -values < 0.05) to identify which irrigation methods were significantly different from each other. The irrigation type evaluation was not performed for crops without R values or with a small number of observations. Results of the irrigation type evaluation are provided in Section 4.10.3.

4.10 RESULTS

4.10.1 IRRIGATION AND NITROGEN MANAGEMENT PLAN

The crop acreages from the INMP Summary Reports included in the statistical analysis are shown in Table 10 and are sorted by acres. The top five crops by acreage were walnuts, almonds, wine grapes, processing tomatoes, and alfalfa, respectively. Also shown in Table 10 are the acres and number of fields by crop for records that were (1) analyzed, (2) non-bearing or zero yield, or (3) exempt or questionable data. The A/R and A-R summary statistics, histograms, boxplots, and number of outliers for each crop type analyzed are provided in Appendix A.

For annual crops, there were 18 fields that were considered outliers, meaning they were outliers for the 2022 CY and at least one of the previous two years for A/R. For perennial crops, there were 107 fields that were outliers, which were based on the 3-yr A/R ratios. There were more perennial crop outliers than the previous year due to fields in low vulnerability areas having 3-yr ratios for the first time.

Table 10. Summary of crops reported on INMP summary reports.

| Crop | Analyzed | | Non-Bearing or Zero Yield | | Exempt or Questionable Data ^a | |
|----------------------|----------|---------|---------------------------|--------|--|--------|
| | Fields | Acres | Fields | Acres | Fields | Acres |
| Walnut | 4,796 | 187,646 | 706 | 27,071 | 263 | 7,416 |
| Almond | 3,549 | 176,273 | 1,226 | 62,616 | 554 | 27,948 |
| Grape - Wine | 1,459 | 69,857 | 221 | 4,164 | 50 | 1,778 |
| Tomato - Processing | 1,251 | 68,740 | 6 | 323 | 23 | 1,231 |
| Alfalfa - Hay | 1,116 | 58,069 | 107 | 4,084 | 22 | 788 |
| Wheat - Grain | 661 | 31,095 | 31 | 1,106 | 27 | 257 |
| Prune | 714 | 25,856 | 77 | 3,409 | 101 | 3,594 |
| Sunflower | 449 | 25,445 | 22 | 942 | 51 | 292 |
| Corn - Grain | 233 | 14,705 | 10 | 317 | 15 | 262 |
| Hay/Forage | 277 | 13,454 | 47 | 1,970 | 53 | 243 |
| Olive | 334 | 11,392 | 199 | 5,319 | 75 | 1,170 |
| Corn - Fodder/Silage | 159 | 11,235 | 3 | 110 | 2 | 174 |

| Crop | Analyzed | | Non-Bearing or Zero Yield | | Exempt or Questionable Data ^a | |
|---------------------|----------|--------|---------------------------|--------|--|--------|
| | Fields | Acres | Fields | Acres | Fields | Acres |
| Safflower | 211 | 11,023 | 3 | 48 | 23 | 16 |
| Pasture | 124 | 10,789 | 760 | 49,128 | 951 | 57,252 |
| Peach/Nectarine | 396 | 8,741 | 27 | 248 | 18 | 118 |
| Sudan Grass - Hay | 108 | 8,732 | 4 | 186 | 1 | 0 |
| Pistachio | 126 | 8,703 | 95 | 5,502 | 16 | 633 |
| Grass Hay | 164 | 7,914 | 34 | 2,149 | 14 | 1,573 |
| Pear | 185 | 6,110 | 20 | 162 | 5 | 120 |
| Vine Seed | 142 | 5,673 | 7 | 230 | 6 | 259 |
| Wheat - Hay | 65 | 5,277 | 3 | 176 | 8 | 0 |
| Bean Dry | 103 | 4,748 | 9 | 346 | 5 | 104 |
| Olive - Oil | 48 | 3,889 | 37 | 1,828 | 0 | 0 |
| Triticale - Grain | 68 | 3,884 | 13 | 181 | 3 | 0 |
| Oat - Hay | 98 | 3,422 | 4 | 214 | 27 | 35 |
| Cucumber | 43 | 2,546 | 1 | 65 | 1 | 0 |
| Misc. Fruit Tree | 118 | 2,299 | 51 | 408 | 7 | 102 |
| Ryegrass - Hay | 61 | 2,273 | 10 | 448 | 46 | 50 |
| Misc. Row Crop | 21 | 1,900 | 12 | 662 | 2 | 0 |
| Barley - Grain | 28 | 1,828 | 0 | 0 | 1 | 0 |
| Plum/Pluot | 49 | 1,780 | 10 | 49 | 2 | 0 |
| Grain Hay | 39 | 1,679 | 6 | 445 | 10 | 165 |
| Orchard Grass - Hay | 26 | 1,669 | 0 | 0 | 5 | 261 |
| Triticale - Hay | 38 | 1,557 | 3 | 238 | 6 | 30 |
| Rice - Wild | 24 | 1,556 | 3 | 3 | 10 | 718 |
| Pecan | 61 | 1,437 | 29 | 915 | 7 | 295 |
| Cherry | 37 | 1,398 | 18 | 57 | 6 | 31 |
| Misc. Vegetable | 92 | 1,377 | 25 | 143 | 3 | 18 |
| Kiwi | 58 | 1,369 | 11 | 364 | 2 | 0 |
| Pepper | 41 | 1,314 | 0 | 0 | 0 | 0 |
| Seed Crop | 55 | 1,300 | 10 | 149 | 13 | 510 |
| Watermelon | 23 | 981 | 3 | 133 | 1 | 0 |
| Bean - Green | 13 | 834 | 0 | 0 | 0 | 0 |
| Cotton | 10 | 811 | 0 | 0 | 1 | 92 |
| Garlic | 12 | 803 | 1 | 0 | 0 | 0 |
| Sorghum - Grain | 15 | 764 | 5 | 188 | 1 | 0 |
| Wheat - Silage | 11 | 760 | 0 | 0 | 10 | 471 |
| Turf | 7 | 563 | 2 | 130 | 1 | 50 |
| Flower/Ornamental | 11 | 560 | 16 | 164 | 0 | 0 |
| Watermelon - Seed | 12 | 548 | 0 | 0 | 0 | 0 |
| Barley - Hay | 11 | 508 | 0 | 0 | 1 | 0 |

| Crop | Analyzed | | Non-Bearing or Zero Yield | | Exempt or Questionable Data ^a | |
|----------------------------|----------|-------|---------------------------|-------|--|-------|
| | Fields | Acres | Fields | Acres | Fields | Acres |
| Winter Grain | 5 | 491 | 0 | 0 | 3 | 190 |
| Melon | 8 | 485 | 4 | 38 | 0 | 0 |
| Tomato | 14 | 475 | 12 | 444 | 3 | 328 |
| Barley - Silage | 2 | 470 | 0 | 0 | 0 | 0 |
| Corn - Sweet | 12 | 385 | 1 | 5 | 0 | 0 |
| Apple | 26 | 371 | 23 | 434 | 3 | 5 |
| Millet - Grain | 9 | 343 | 0 | 0 | 0 | 0 |
| Persimmon | 27 | 339 | 9 | 69 | 1 | 9 |
| Dichondra | 7 | 296 | 2 | 72 | 0 | 0 |
| Wheat - Greenchop | 4 | 295 | 0 | 0 | 4 | 0 |
| Citrus | 38 | 262 | 11 | 29 | 5 | 23 |
| Alfalfa - Silage/Haylage | 7 | 260 | 4 | 251 | 0 | 0 |
| Corn - Popcorn | 8 | 252 | 0 | 0 | 0 | 0 |
| Pumpkin | 21 | 251 | 5 | 53 | 3 | 29 |
| Other | 12 | 227 | 25 | 1,739 | 8 | 142 |
| Onion - Seed | 8 | 227 | 0 | 0 | 0 | 0 |
| Asparagus | 7 | 216 | 2 | 1 | 2 | 31 |
| Fig | 7 | 214 | 1 | 4 | 3 | 6 |
| Orange | 14 | 202 | 5 | 21 | 4 | 3 |
| Squash | 10 | 176 | 3 | 39 | 0 | 0 |
| Vetch | 6 | 171 | 0 | 0 | 1 | 0 |
| Oat - Silage | 3 | 135 | 0 | 0 | 1 | 0 |
| Strawberry | 12 | 131 | 4 | 12 | 2 | 0 |
| Oat - Greenchop | 1 | 120 | 0 | 0 | 0 | 0 |
| Grape Rootstock | 6 | 119 | 12 | 127 | 0 | 0 |
| Misc. Nut Tree | 6 | 108 | 2 | 15 | 0 | 0 |
| Triticale - Silage/Haylage | 1 | 107 | 0 | 0 | 0 | 0 |
| Misc. Field Crops | 1 | 106 | 0 | 0 | 0 | 0 |
| Grape - Other | 9 | 103 | 3 | 10 | 0 | 0 |
| Oat - Grain | 3 | 87 | 0 | 0 | 3 | 0 |
| Blueberry | 15 | 84 | 4 | 2 | 0 | 0 |
| Cover Crop | 5 | 76 | 18 | 223 | 14 | 0 |
| Cilantro | 1 | 75 | 0 | 0 | 4 | 0 |
| Fescue | 1 | 75 | 0 | 0 | 0 | 0 |
| Chestnut | 8 | 67 | 3 | 9 | 0 | 0 |
| Mandarin | 19 | 66 | 3 | 8 | 0 | 0 |
| Sorghum - Hay | 2 | 61 | 0 | 0 | 0 | 0 |
| Sudan Grass - Silage | 2 | 60 | 0 | 0 | 0 | 0 |
| Christmas Tree | 4 | 59 | 21 | 168 | 1 | 3 |

| Crop | Analyzed | | Non-Bearing or Zero Yield | | Exempt or Questionable Data ^a | |
|---------------------------|----------|-------|---------------------------|-------|--|--------|
| | Fields | Acres | Fields | Acres | Fields | Acres |
| Ryegrass - Silage/Haylage | 2 | 56 | 0 | 0 | 23 | 0 |
| Melon - Cantaloupe | 1 | 55 | 0 | 0 | 0 | 0 |
| Sorghum - Silage | 1 | 50 | 0 | 0 | 3 | 55 |
| Research | 14 | 43 | 31 | 271 | 2 | 29 |
| Tomato - Fresh Market | 3 | 38 | 0 | 0 | 0 | 0 |
| Broccoli | 2 | 37 | 0 | 0 | 0 | 0 |
| Sudan Grass - Greenchop | 1 | 30 | 0 | 0 | 0 | 0 |
| Timothygrass - Hay | 1 | 28 | 0 | 0 | 0 | 0 |
| Squash - Seed | 2 | 27 | 0 | 0 | 0 | 0 |
| Apricot/Aprium | 13 | 27 | 4 | 5 | 0 | 0 |
| Sorghum - Greenchop | 3 | 18 | 0 | 0 | 0 | 0 |
| Berry | 4 | 12 | 3 | 9 | 0 | 0 |
| Pomegranate | 3 | 10 | 7 | 8 | 1 | 20 |
| Pumpkin - Seed | 1 | 10 | 0 | 0 | 0 | 0 |
| Hops | 3 | 8 | 4 | 14 | 1 | 0 |
| Nursery | 3 | 7 | 38 | 527 | 1 | 0 |
| Truffle | 1 | 7 | 0 | 0 | 0 | 0 |
| Eggplant | 2 | 5 | 0 | 0 | 0 | 0 |
| Grape - Table | 1 | 4 | 0 | 0 | 0 | 0 |
| Cucumber - Seed | 1 | 3 | 0 | 0 | 0 | 0 |
| Lavender | 2 | 3 | 1 | 0 | 0 | 0 |
| Cabbage | 1 | 3 | 1 | 0 | 0 | 0 |
| Mulberry | 1 | 1 | 0 | 0 | 0 | 0 |
| Agave | 0 | 0 | 1 | 1 | 0 | 0 |
| Aquaculture | 0 | 0 | 11 | 844 | 13 | 885 |
| Bean - Garbanzo | 0 | 0 | 2 | 90 | 0 | 0 |
| Beet | 0 | 0 | 1 | 1 | 0 | 0 |
| Blackberry | 0 | 0 | 1 | 1 | 0 | 0 |
| Fallow | 0 | 0 | 3 | 0 | 970 | 870 |
| Filbert/Hazelnut | 0 | 0 | 1 | 1 | 0 | 0 |
| Hemp | 0 | 0 | 3 | 11 | 0 | 0 |
| Herb/Spice | 0 | 0 | 4 | 26 | 0 | 0 |
| Leek | 0 | 0 | 1 | 0 | 0 | 0 |
| Lettuce | 0 | 0 | 1 | 0 | 0 | 0 |
| Non-Irrigated Crop | 0 | 0 | 4 | 103 | 30 | 160 |
| Olive - Table | 0 | 0 | 3 | 4 | 0 | 0 |
| Onion | 0 | 0 | 5 | 109 | 4 | 587 |
| Pasture - No Nitrogen | 0 | 0 | 4 | 44 | 1,274 | 49,973 |
| Plum | 0 | 0 | 3 | 3 | 0 | 0 |

| Crop | Analyzed | | Non-Bearing or Zero Yield | | Exempt or Questionable Data ^a | |
|--------------------|----------|---------|---------------------------|---------|--|---------|
| | Fields | Acres | Fields | Acres | Fields | Acres |
| Pluot | 0 | 0 | 2 | 2 | 0 | 0 |
| Rangeland | 0 | 0 | 1 | 11 | 10 | 0 |
| Rice | 0 | 0 | 12 | 652 | 51 | 1,531 |
| Sudan Grass - Seed | 0 | 0 | 0 | 0 | 5 | 488 |
| Total | 18,169 | 825,611 | 4,216 | 182,897 | 4,902 | 163,423 |

Notes:

- a. Excludes incomplete records or fields that were not required to report (e.g. non-irrigated)
- b. NR - specific crop type not reported. A/R and A-R could not be calculated for this category.
- c. Fields can be counted in multiple categories if multi-cropped.

4.10.2 SOIL TYPE EVALUATION RESULTS

Nine annual crops and ten perennial crops had large enough sample sizes to include in the soil type evaluation. The results are summarized in Table 11. For the annuals, five crops had a significant effect of drainage class vs A/R (p -value <0.05): dry beans, grain corn, safflower, processing tomatoes, and wheat. The drainage classes that differed significantly from each other varied by crop. For example, in grain corn the poorly drained class had the lowest A/R and was significantly lower than well drained, but for safflower, the well-drained class had the lowest A/R and was significantly lower than poorly drained soils.

For perennials, six crops had a significant effect of drainage class vs 3-yr A/R: alfalfa hay, wine grapes, hay/forage, pistachios, prunes, and walnuts. The drainage classes that were significantly different from each other varied by crop, and there was no drainage class that was consistently higher than others.

Table 11. Evaluation of soil drainage class effect on A/R.

| Crop | Drainage Class | Fields | Mean A/R | Significant Effect ^a |
|--------------------------------|-----------------|--------|----------|---------------------------------|
| Annual Crops (1-yr A/R) | | | | |
| Bean Dry | Well | 43 | 1.51 | a |
| | Moderately well | 29 | 1.23 | a |
| | Somewhat poorly | 25 | 1.14 | a |
| | Poorly | 6 | 1.36 | a |
| Corn – Silage | Well | 22 | 1.23 | NS |
| | Moderately well | 50 | 1.04 | NS |
| | Somewhat poorly | 29 | 3.62 | NS |
| | Poorly | 53 | 1.46 | NS |
| Corn – Grain | Well | 66 | 1.78 | a |
| | Moderately well | 30 | 2.06 | ab |
| | Somewhat poorly | 52 | 1.53 | ab |
| | Poorly | 81 | 1.41 | b |

| Crop | Drainage Class | Fields | Mean A/R | Significant Effect ^a |
|-----------------------------------|-----------------|--------|----------|---------------------------------|
| Oat - Hay | Well | 49 | 0.83 | NS |
| | Moderately well | 23 | 0.85 | NS |
| | Somewhat poorly | 6 | 0.69 | NS |
| | Poorly | 15 | 0.81 | NS |
| Safflower | Well | 22 | 1.41 | a |
| | Moderately well | 6 | 1.30 | ab |
| | Somewhat poorly | 36 | 2.08 | b |
| | Poorly | 138 | 1.86 | b |
| Sunflower | Well | 173 | 3.42 | NS |
| | Moderately well | 102 | 3.40 | NS |
| | Somewhat poorly | 72 | 2.44 | NS |
| | Poorly | 81 | 2.61 | NS |
| Tomato - Processing | Well | 552 | 1.50 | a |
| | Moderately well | 139 | 1.74 | b |
| | Somewhat poorly | 255 | 1.66 | c |
| | Poorly | 261 | 1.84 | bc |
| Triticale – Grain | Well | 1 | 0.70 | NS |
| | Moderately well | 7 | 0.68 | NS |
| | Somewhat poorly | 6 | 0.97 | NS |
| | Poorly | 45 | 0.73 | NS |
| Wheat - Grain | Well | 249 | 0.86 | a |
| | Moderately well | 115 | 0.92 | a |
| | Somewhat poorly | 126 | 0.90 | a |
| | Poorly | 144 | 0.98 | a |
| Perennial Crops (3-yr A/R) | | | | |
| Alfalfa – Hay | Well | 164 | 0.09 | a |
| | Moderately well | 167 | 0.13 | b |
| | Somewhat poorly | 93 | 0.09 | a |
| | Poorly | 134 | 0.05 | c |
| Almond | Well | 1730 | 1.14 | NS |
| | Moderately well | 395 | 1.13 | NS |
| | Somewhat poorly | 202 | 1.14 | NS |
| | Poorly | 63 | 1.07 | NS |
| Grape – Wine | Well | 361 | 1.90 | a |
| | Moderately well | 75 | 1.18 | ab |
| | Somewhat poorly | 138 | 1.14 | b |
| | Poorly | 167 | 1.33 | ab |
| Hay/Forage | Well | 30 | 0.34 | a |
| | Moderately well | 72 | 0.62 | b |
| | Somewhat poorly | 18 | 0.55 | ab |
| | Poorly | 6 | 0.84 | ab |

| Crop | Drainage Class | Fields | Mean A/R | Significant Effect ^a |
|-----------------|-----------------|--------|----------|---------------------------------|
| Olive | Well | 223 | 3.36 | NS |
| | Moderately well | 8 | 5.33 | NS |
| | Somewhat poorly | 5 | 2.39 | NS |
| | Poorly | 7 | 3.78 | NS |
| Peach/Nectarine | Well | 66 | 9.96 | NS |
| | Moderately well | 218 | 7.61 | NS |
| | Somewhat poorly | 8 | 7.12 | NS |
| | Poorly | 2 | 1.31 | NS |
| Pear | Well | 7 | 3.72 | NS |
| | Moderately well | 2 | 3.19 | NS |
| | Somewhat poorly | 61 | 5.13 | NS |
| | Poorly | 63 | 5.57 | NS |
| Pistachio | Well | 42 | 2.61 | ab |
| | Moderately well | 15 | 2.63 | a |
| | Somewhat poorly | 17 | 2.00 | b |
| | Poorly | 0 | -- | -- |
| Prune | Well | 211 | 4.17 | a |
| | Moderately well | 240 | 5.33 | b |
| | Somewhat poorly | 38 | 4.19 | a |
| | Poorly | 31 | 4.46 | ab |
| Walnut | Well | 1888 | 1.64 | a |
| | Moderately well | 912 | 1.88 | b |
| | Somewhat poorly | 564 | 1.81 | b |
| | Poorly | 82 | 1.78 | ab |

Notes:

- a. Different letters indicate significant difference (p -value <0.05); NS = not significant

4.10.3 IRRIGATION TYPE EVALUATION RESULTS

Eight annual crops and nine perennial crops had large enough sample sizes to include in the irrigation type evaluation. Most of the crops tested do not have an even distribution of observations because certain irrigation methods are less common for some crops (i.e. flood is not very common for orchards or vineyards). Some irrigation methods had less than five observations, which is generally considered too small for the Kruskal-Wallis test to be reliable. The results are summarized in Table 12. For the annuals, seven crops had a significant effect (p -value <0.05). Drip had the largest number of observations and the second lowest mean A/R after sub-irrigation, while sprinkler irrigation had the highest mean A/R; however, only one crop had significantly lower mean A/R for drip compared to sprinkler.

For perennials, seven crops had a significant effect, though some irrigation methods had less than five observations. Sprinkler irrigation had the highest mean A/R while furrow irrigation had the lowest mean A/R, but this was not consistent for individual crops.

Table 12. Evaluation of irrigation type effect on A/R.

| Annuals | Irrigation Type | Fields | Mean A/R | Significant Effect ^a |
|--------------------------------|-----------------|--------|----------|---------------------------------|
| Annual Crops (1-yr A/R) | | | | |
| Bean Dry | Drip | 27 | 1.40 | a |
| | Flood | 5 | 1.28 | ab |
| | Furrow | 55 | 1.52 | b |
| | Sprinkler | 15 | 0.63 | b |
| | Sub-Irrigation | 1 | 0.00 | ab |
| Corn - Silage | Border Strip | 8 | 1.13 | ab |
| | Drip | 10 | 1.11 | ab |
| | Flood | 35 | 0.90 | b |
| | Furrow | 75 | 2.10 | b |
| | Sprinkler | 16 | 2.85 | a |
| Corn - Grain | Sub-Irrigation | 10 | 0.65 | b |
| | Border Strip | 1 | 2.38 | ab |
| | Drip | 50 | 1.67 | b |
| | Flood | 16 | 1.93 | ab |
| | Furrow | 108 | 1.57 | b |
| | Non-Irrigated | 2 | 2.08 | ab |
| | Sprinkler | 20 | 2.37 | ab |
| Oat - Hay | Sub-Irrigation | 32 | 1.09 | a |
| | Drip | 4 | 0.58 | NS |
| | Flood | 42 | 0.84 | NS |
| | Furrow | 10 | 0.85 | NS |
| | Non-Irrigated | 24 | 0.73 | NS |
| | Sprinkler | 6 | 0.26 | NS |
| Safflower | Sub-Irrigation | 7 | 1.58 | NS |
| | Drip | 16 | 1.46 | bc |
| | Flood | 10 | 2.28 | ab |
| | Furrow | 79 | 1.44 | b |
| | Non-Irrigated | 11 | 1.39 | ab |
| | Sprinkler | 53 | 2.36 | ac |
| Sunflower | Sub-Irrigation | 33 | 2.13 | a |
| | Drip | 188 | 2.58 | a |
| | Flood | 21 | 3.49 | b |
| | Furrow | 208 | 3.57 | b |
| | Non-Irrigated | 4 | 1.64 | ab |
| | Sprinkler | 6 | 2.63 | ab |
| | Sub-Irrigation | 1 | 1.23 | ab |

| Annuals | Irrigation Type | Fields | Mean A/R | Significant Effect ^a |
|--|-----------------|--------|----------|---------------------------------|
| Tomato - Processing | Border Strip | 3 | 1.52 | NS |
| | Drip | 1004 | 1.53 | NS |
| | Flood | 5 | 1.35 | NS |
| | Furrow | 143 | 1.88 | NS |
| | Micro Sprinkler | 1 | 1.59 | NS |
| | Non-Irrigated | 2 | 1.49 | NS |
| | Sprinkler | 46 | 3.16 | NS |
| | Sub-Irrigation | 3 | 1.99 | NS |
| Wheat - Grain | Border Strip | 23 | 0.87 | abc |
| | Drip | 165 | 0.68 | a |
| | Flood | 140 | 1.23 | c |
| | Furrow | 190 | 0.88 | b |
| | Non-Irrigated | 40 | 0.69 | a |
| | Sprinkler | 41 | 0.96 | bc |
| | Sub-Irrigation | 35 | 1.08 | b |
| <i>Perennial Crops (3-yr A/R)</i> | | | | |
| Alfalfa – Hay | Border Strip | 40 | 0.04 | bc |
| | Drip | 5 | 0.00 | b |
| | Flood | 340 | 0.11 | a |
| | Furrow | 68 | 0.10 | ac |
| | Non-Irrigated | 1 | 0.00 | ab |
| | Sprinkler | 104 | 0.04 | b |
| Almond | Border Strip | 2 | 1.25 | ab |
| | Drip | 1001 | 1.18 | a |
| | Flood | 12 | 1.44 | a |
| | Micro Sprinkler | 709 | 1.10 | b |
| | Sprinkler | 666 | 1.11 | b |
| Grape - Wine | Drip | 706 | 1.58 | a |
| | Flood | 2 | 2.47 | a |
| | Furrow | 17 | 1.28 | a |
| | Micro Sprinkler | 8 | 1.62 | a |
| | Sprinkler | 8 | 0.16 | b |
| Hay/Forage | Border Strip | 9 | 0.55 | NS |
| | Drip | 4 | 0.52 | NS |
| | Flood | 86 | 0.59 | NS |
| | Furrow | 5 | 0.30 | NS |
| | Non-Irrigated | 3 | 0.51 | NS |
| | Sprinkler | 19 | 0.47 | NS |

| Annuals | Irrigation Type | Fields | Mean A/R | Significant Effect ^a |
|-----------------|-----------------|--------|----------|---------------------------------|
| Olive | Border Strip | 1 | 4.43 | NS |
| | Drip | 183 | 3.19 | NS |
| | Flood | 23 | 3.44 | NS |
| | Furrow | 1 | 0.00 | NS |
| | Micro Sprinkler | 30 | 4.22 | NS |
| | Sprinkler | 5 | 7.19 | NS |
| Peach/Nectarine | Border Strip | 2 | 1.32 | a |
| | Drip | 12 | 4.58 | a |
| | Flood | 12 | 2.69 | a |
| | Micro Sprinkler | 245 | 6.59 | a |
| | Sprinkler | 23 | 29.23 | b |
| Pear | Drip | 8 | 5.35 | bc |
| | Flood | 28 | 4.95 | ac |
| | Micro Sprinkler | 6 | 9.56 | b |
| | Sprinkler | 91 | 5.03 | ac |
| Prune | Border Strip | 8 | 4.96 | a |
| | Drip | 112 | 4.18 | a |
| | Flood | 44 | 5.42 | a |
| | Micro Sprinkler | 306 | 4.94 | a |
| | Sprinkler | 50 | 3.97 | a |
| Walnut | Border Strip | 21 | 1.88 | ab |
| | Drip | 93 | 1.80 | ab |
| | Flood | 166 | 2.19 | a |
| | Furrow | 15 | 2.49 | a |
| | Micro Sprinkler | 1510 | 1.74 | b |
| | Sprinkler | 1639 | 1.67 | b |
| | Sub-Irrigation | 2 | 2.89 | ab |

Notes:

- a. Different letters indicate significant difference (p -value <0.05); NS = not significant

4.11 CONCLUSIONS

The Coalition received INMP data for 22,943 fields representing 5,378 members and 1,098,373 acres. The member return rate for the 2022 CY was 95%. For the fields with data submitted, 17,454 were included in the analysis while the remainder were excluded for being non-bearing, young orchards, exempt or having questionable data. The top five crops reported by acreage were walnuts, almonds, wine grapes, processing tomatoes, and alfalfa, respectively.

The method used for multi-year outlier determination varied for perennial vs. annual crops. For perennial crops, 3-yr A/R ratios were used which required the field to have the same crop and be at full production age for all 3 years. This was the first year that low vulnerability areas had enough data to calculate 3-yr A/R. There were 107 perennial crop fields considered outliers. For annuals, single year A/R

was assessed for each year of the 3-yr period, and a field had to be an outlier in 2022 and at least one of the two previous years, for any crop, to be considered a multi-year outlier. There were 18 annual crop fields that were considered outliers.

Soil drainage class did not appear to have a consistent effect on A/R as the drainage class with the highest A/R varied by crop, with all drainage classes having the highest mean A/R for at least one crop.

For annuals, drip irrigation had the lowest mean A/R and sprinkler had the highest A/R, but for many crops drip and sprinkler were not significantly different. For perennials, sprinkler irrigation had the highest mean A/R while furrow irrigation had the lowest mean A/R, but this was not consistent for individual crops.

4.12 MEMBER FEEDBACK AND OUTREACH

Member outreach is expected to occur over the 2023-24 winter. 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 individual values for each member's fields, 3-yr AR ratios for perennials crops, and Coalition averages for N applied, A/R, and A-R. An example of an individual member feedback report is provided in Appendix C.

The member feedback report is designed to show N 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.

5 ANNUAL IRRIGATION AND NITROGEN MANAGEMENT PLAN SUMMARY REPORT DATA

The annual INMP Summary Report data is provided in Attachment 2 (Excel workbook format) and is organized into the following three tables:

- Individual field-level AR data by anonymous member ID
- Individual field-level AR data by anonymous APN ID
- Township-level aggregated AR data table

In the township data table, fields that could not be mapped spatially have the township listed as "unknown". For crops without N removal coefficients, A/R and A-R are blank since R could not be calculated. Outliers for perennial crops were determined using 3-yr A/R while annual crops were considered outliers if the 1-yr A/R was above the outlier threshold for the 2022 CY and either the 2021 or 2020 CY.

6 SUMMARY OF ANNUAL MANAGEMENT PRACTICE INFORMATION

This section summarizes the management practice information collected through the INMP Summary Reports for the 2022 CY. The annual management practice implementation data collected through the INMP Summary Reports (irrigation method, irrigation efficiency practices, and N efficiency practices) are summarized below and provided in Attachment 1 (Excel workbook format).

6.1 IRRIGATION METHOD

For primary irrigation method, drip was the most common, comprising 34% of the acres (Table 13). The next most common methods were micro-sprinkler (23% of acres), sprinkler (18% of acres) and flood (16% of acres). The least used methods were furrow, border strip, and sub-irrigation. Secondary irrigation was reported for 13% of acres with the most common methods being sprinkler and drip.

Table 13. Irrigation method summary.

| Irrigation Type | Primary Method | | Secondary Method | |
|-----------------|----------------|--------|------------------|--------|
| | Acres | Fields | Acres | Fields |
| Drip | 351,640 (34%) | 7,253 | 44,127 | 1,042 |
| Micro Sprinkler | 237,854 (23%) | 5,706 | 24,010 | 663 |
| Furrow | 71,496 (7%) | 1,531 | 5,612 | 155 |
| Sprinkler | 189,368 (18%) | 4,957 | 39,473 | 1,007 |
| Border Strip | 11,952 (1%) | 296 | 4,855 | 117 |
| Flood | 167,660 (16%) | 3,073 | 18,762 | 495 |
| Sub-irrigation | 12,903 (1%) | 209 | 996 | 35 |

6.2 IRRIGATION AND NITROGEN EFFICIENCY PRACTICES

The N efficiency practices reported by members are shown in Table 14. The most common practices were soil nutrient testing (25% of acres), petiole tissue testing (23% of acres), fertigation (19% of acres), and irrigation water N testing (15% of acres). For the least common practices, cover crops are not practical on every field, and variable rate fertilization requires specialized equipment, data, and interpretation to execute.

Irrigation management efficiency practices are shown in Table 15. This data reflects the increasing availability and data accessibility of technologies to improve irrigation efficiency such as drip irrigation, laser leveling, ET-based irrigation scheduling, and the use of moisture probes.

Table 14. N management efficiency practices reported by members for 2022 CY.

| N Efficiency Practice | Irrigated Crop Acreage | Number of Fields |
|--------------------------------------|-------------------------------|-------------------------|
| Cover crops | 202,196 (7%) | 4,931 |
| Fertigation | 539,079 (19%) | 10,340 |
| Foliar N applications | 272,351 (10%) | 5,504 |
| Irrigation water N testing | 435,715 (15%) | 8,107 |
| Soil nutrient testing | 720,673 (25%) | 14,292 |
| Petiole tissue | 645,152 (23%) | 13,592 |
| Variable rate fertilizer application | 18,936 (1%) | 235 |

Table 15. Irrigation management efficiency practices reported by members for 2022 CY.

| Irrigation Efficiency Practice | Irrigated Crop Acreage | Number of Fields |
|---------------------------------------|-------------------------------|-------------------------|
| Laser leveling | 561,040 (19%) | 11,501 |
| Use of ET in irrigation scheduling | 563,925 (20%) | 10,787 |
| Water application scheduled to need | 964,339 (33%) | 21,026 |
| Use of moisture probe | 434,357 (15%) | 8,693 |
| Soil moisture neutron probe | 84,699 (3%) | 1,803 |
| Pressure bomb | 275,042 (10%) | 5,215 |

6.3 MANAGEMENT PRACTICE IMPLEMENTATION REPORT

The MPIR is required to be completed by members in a surface water quality management plan (SQMP) or groundwater quality management plan (GQMP) area to identify management practices implemented by members to comply with the SQMP and GQMP requirements. MPIR implementation data in Excel workbook format from the most recently submitted MPIR is due to the RWQCB by November 30 annually.

For the 2022 CY there were no groundwater (GW) MPIR data collected per the RWQCB letter sent on August 26, 2021, which stated the GW MPIR should be completed every third year beginning in 2021; thus, the next GW MPIR data will be submitted in 2024 for the 2023 CY.

The surface water (SW) MPIR data is provided in Attachment 1. This data is for Ulatis Creek, Lower Honcut Creek, Lower Snake River, and Pine Creek drainages.

7 REFERENCES

- CH2M Hill. 2014. Sacramento Valley Water Quality Coalition groundwater quality assessment report. Northern California Water Association. June 2014.
- CH2M Hill. 2016. Groundwater quality assessment report. Northern California Water Association. January 2016.
- Geisseler, D. 2016. Nitrogen concentrations in harvested plants parts – a literature overview. December 2016. http://geisseler.ucdavis.edu/Geisseler_Report_2016_12_02.pdf
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- Lloyd M., Geisseler, D., Lazicki, P., Muramoto, J., Smith R. 2022. Estimating nitrogen availability in organic annual production: for nitrogen budgeting and other purposes. UC ANR Publication 8712. December 2022. <https://anrcatalog.ucanr.edu/Details.aspx?itemNo=8712>
- 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
- SVWQC. 2021. Annual management practice implementation and nitrogen management report – 2020 crop year. Sacramento Valley Water Quality Coalition. November 2021.
- SVWQC. 2022. Annual management practice implementation and nitrogen management report – 2021 crop year. Sacramento Valley Water Quality Coalition. November 2022.
- Tukey. J.W. 1977. Exploratory data analysis. Addison-Wesley, Reading MA.

APPENDICES

Appendix A: INMP Summary Statistics by Crop

Appendix B: Example INMP Member Feedback Report

Appendix C: INMP Statistical Groupings and Exclusion Thresholds by Crop

APPENDIX A

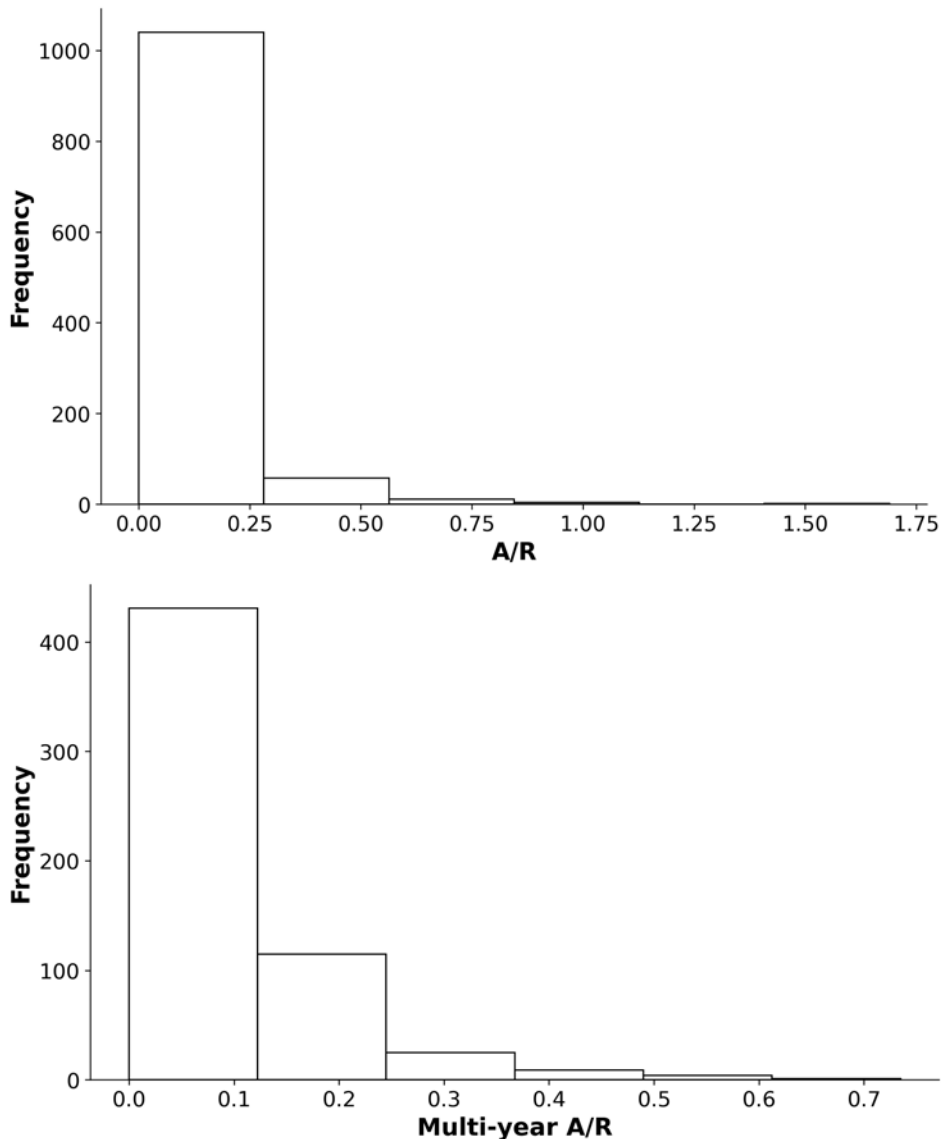
INMP SUMMARY STATISTICS BY CROP

1. ALFALFA - HAY

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

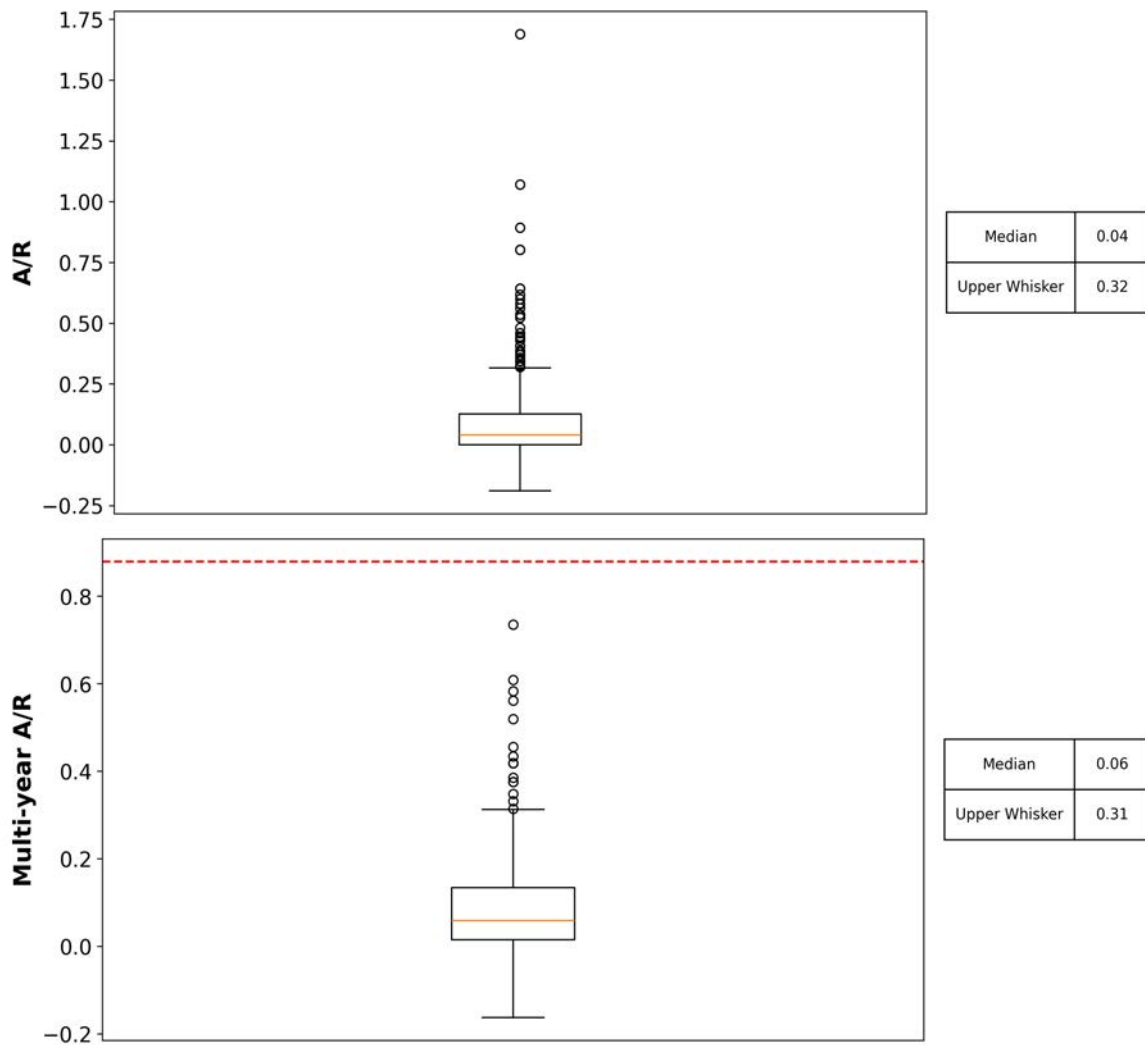
| Parameter | # Fields | Acreage | Mean | St. Dev. | Min | Max | Outlier Threshold | No. Outliers |
|----------------|----------|----------|----------|----------|---------|-------|-------------------|--------------|
| A/R | 1116 | 58068.57 | 0.1 | 0.2 | 0.0 | 3.21 | -- | -- |
| A-R | 1116 | 58068.57 | -334.03 | 119.59 | -705.0 | 137.7 | -- | -- |
| Multi-year A/R | 586 | 28045.85 | 0.09 | 0.16 | 0.0 | 3.21 | 0.88 | 1 |
| Multi-year A-R | 586 | 28045.85 | -1035.21 | 334.2 | -1869.0 | 413.1 | -- | -- |

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



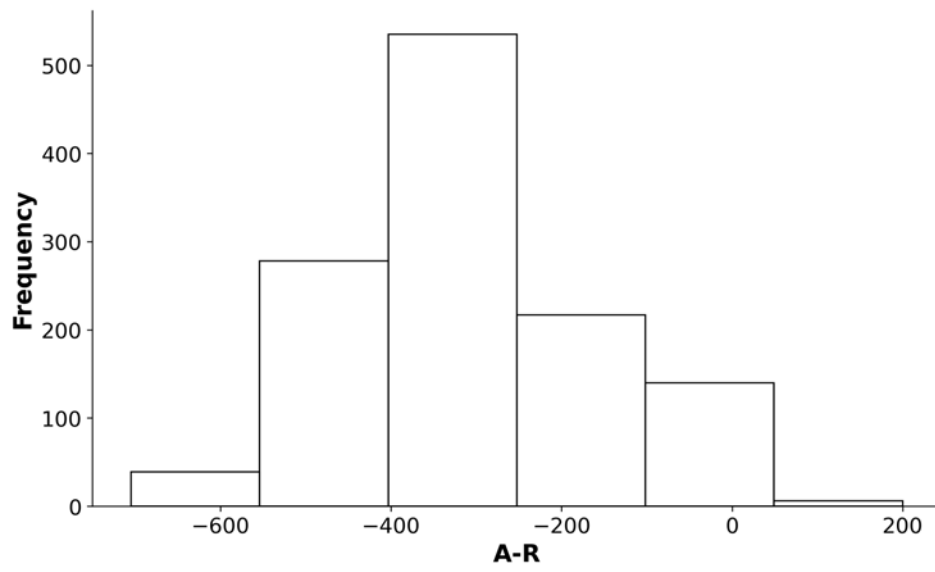
Values greater than 3 times the difference between the upper and lower whisker not shown to avoid skewing of plot.

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



The boxplot uses the standard method of Tukey (1977), and values greater than 3 times the difference between the upper and lower whisker are not shown to avoid skewing the plot. The red dashed line shows the outlier threshold which was calculated via the adjusted boxplot method of Hubert and Vandervieren (2008) using pooled 2020 – 2021 single year ratios. Any dots that exceed the red dashed line were outliers.

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



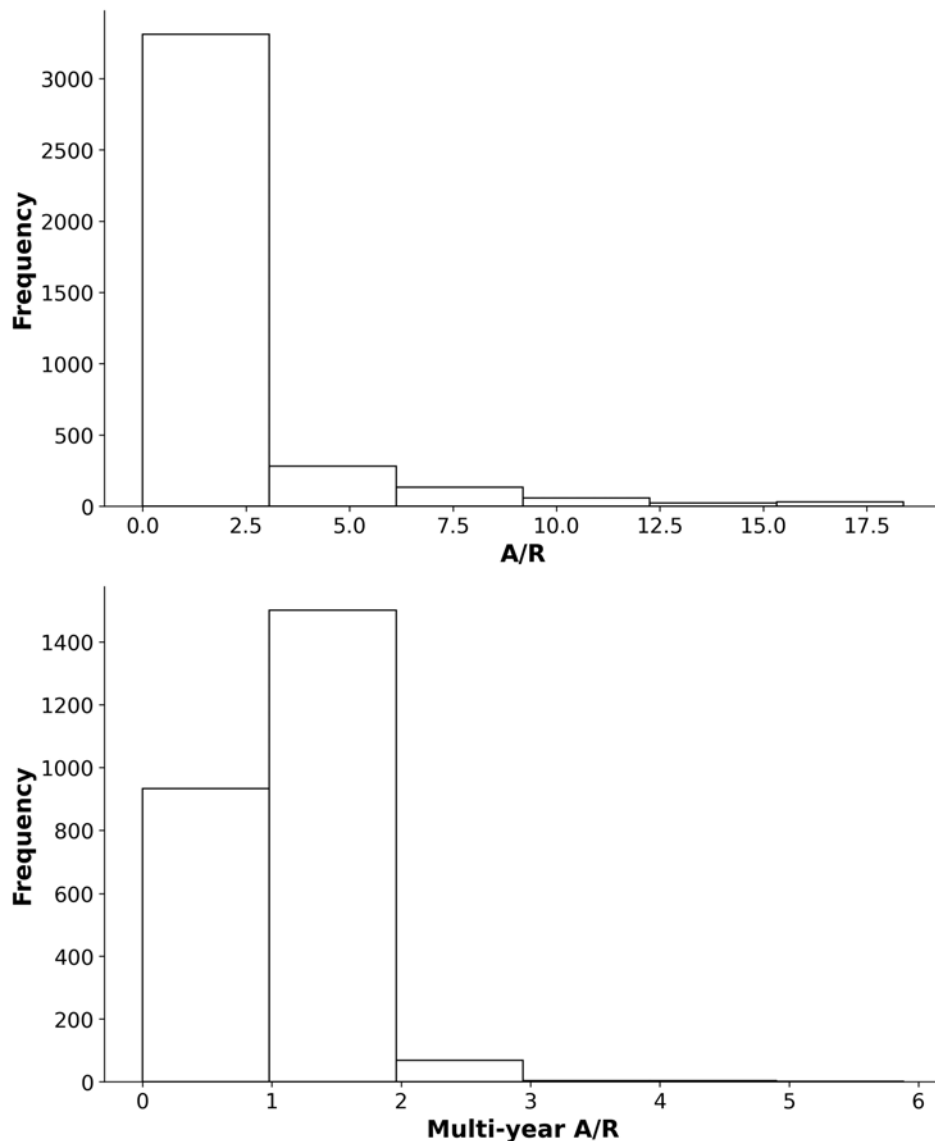
Values greater than 3 times the difference between the upper and lower whisker not shown to avoid skewing of plot.

2. ALMOND

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

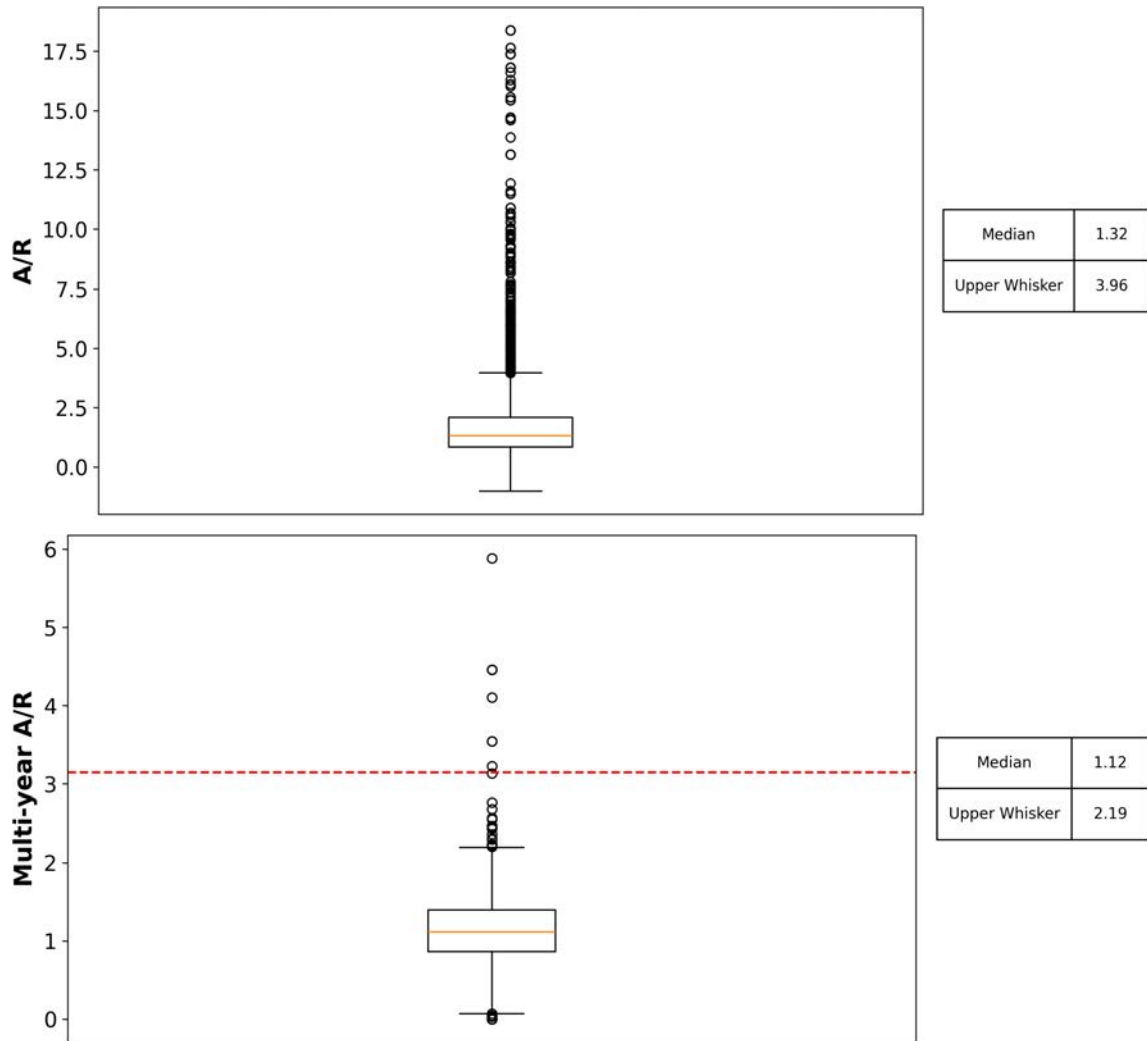
| Parameter | # Fields | Acreage | Mean | St. Dev. | Min | Max | Outlier Threshold | No. Outliers |
|----------------|----------|-----------|-------|----------|--------|-------|-------------------|--------------|
| A/R | 3289 | 164642.43 | 1.67 | 1.88 | 0.0 | 27.77 | -- | -- |
| A-R | 3289 | 164642.43 | 26.37 | 70.73 | -567.0 | 332.0 | -- | -- |
| Multi-year A/R | 2511 | 124547.81 | 1.15 | 0.44 | 0.0 | 5.88 | 3.14 | 8 |
| Multi-year A-R | 2511 | 124547.81 | 45.45 | 149.95 | -816.0 | 996.0 | -- | -- |

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



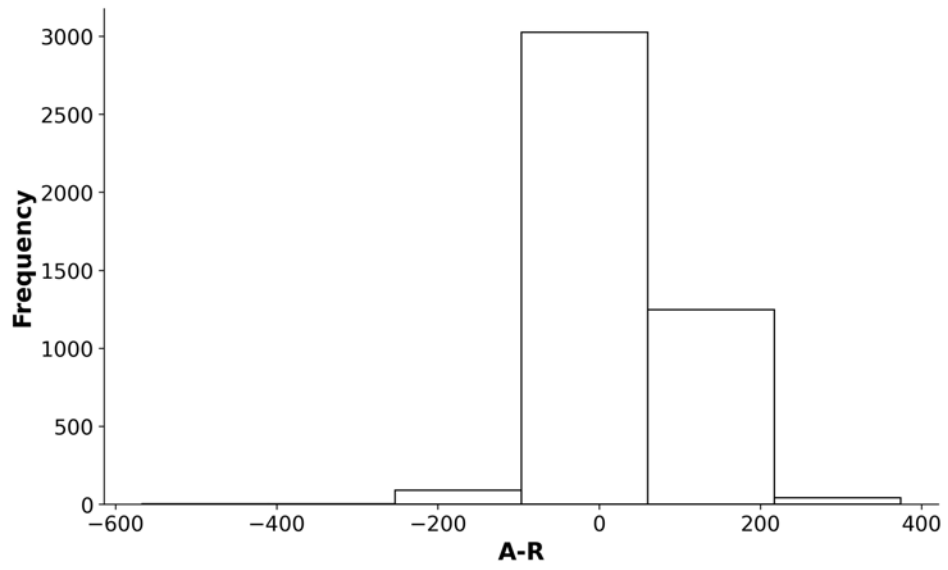
Values greater than 3 times the difference between the upper and lower whisker not shown to avoid skewing of plot.

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



The boxplot uses the standard method of Tukey (1977), and values greater than 3 times the difference between the upper and lower whisker are not shown to avoid skewing the plot. The red dashed line shows the outlier threshold which was calculated via the adjusted boxplot method of Hubert and Vandervieren (2008) using pooled 2020 – 2021 single year ratios. Any dots that exceed the red dashed line were outliers.

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



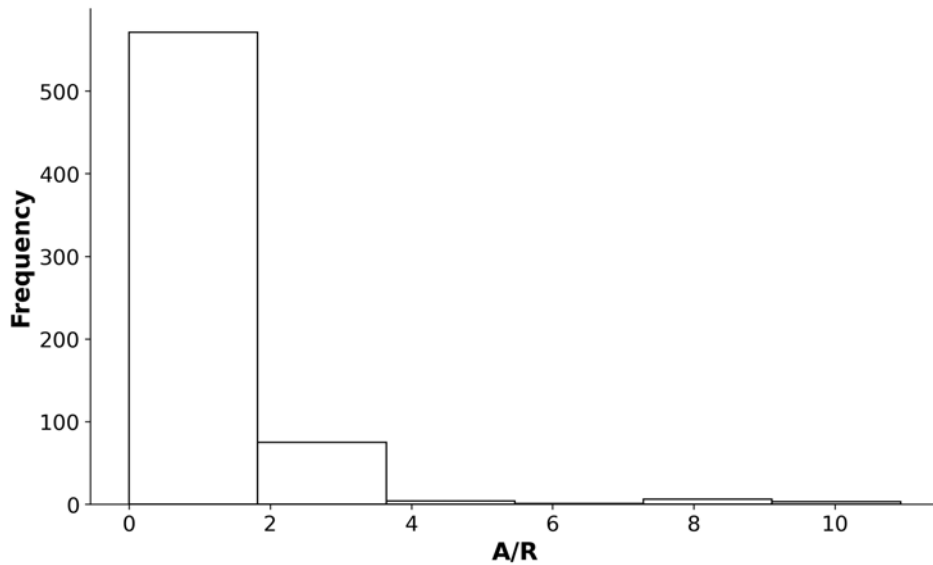
Values greater than 3 times the difference between the upper and lower whisker not shown to avoid skewing of plot.

3. ALMOND-YOUNG

Table 3-1. Summary statistics for ALMOND-YOUNG fields in Coalition.

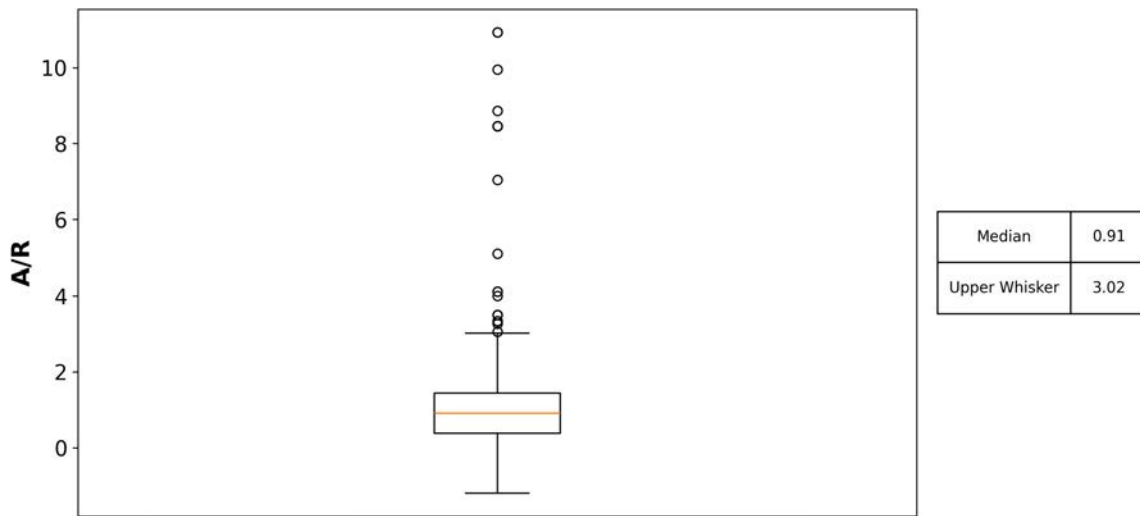
| Parameter | # Fields | Acreage | Mean | St. Dev. | Min | Max | Outlier Threshold | No. Outliers |
|----------------|----------|----------|--------|----------|--------|--------|-------------------|--------------|
| A/R | 260 | 11630.56 | 1.45 | 1.6 | 0.0 | 10.93 | -- | -- |
| A-R | 260 | 11630.56 | 9.42 | 56.64 | -152.8 | 187.0 | -- | -- |
| Multi-year A/R | 1 | 60.0 | 1.6 | -- | 1.6 | 1.6 | -- | -- |
| Multi-year A-R | 1 | 60.0 | 235.72 | -- | 235.72 | 235.72 | -- | -- |

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



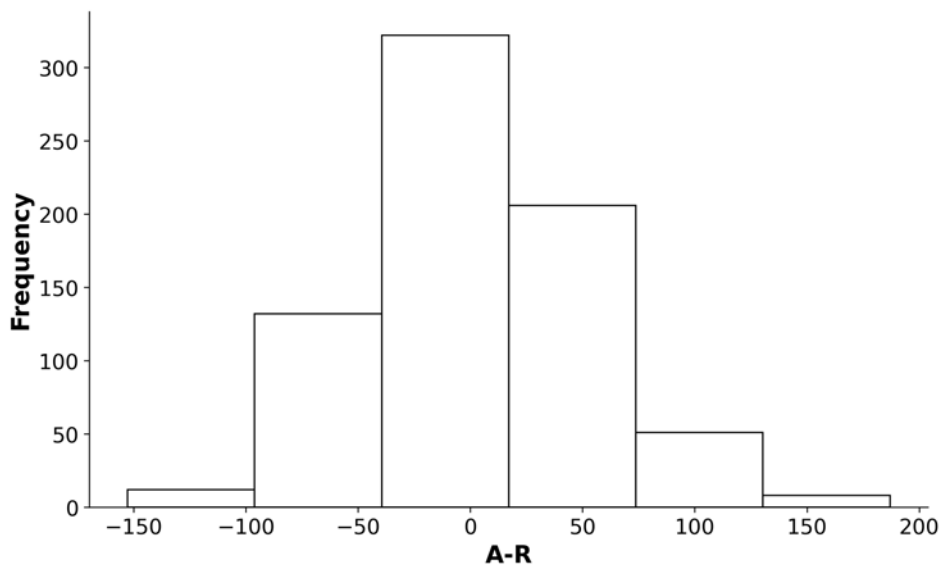
Values greater than 3 times the difference between the upper and lower whisker not shown to avoid skewing of plot.

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



The boxplot uses the standard method of Tukey (1977), and values greater than 3 times the difference between the upper and lower whisker are not shown to avoid skewing the plot. The red dashed line shows the outlier threshold which was calculated via the adjusted boxplot method of Hubert and Vandervieren (2008) using pooled 2020 – 2021 single year ratios. Any dots that exceed the red dashed line were outliers.

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



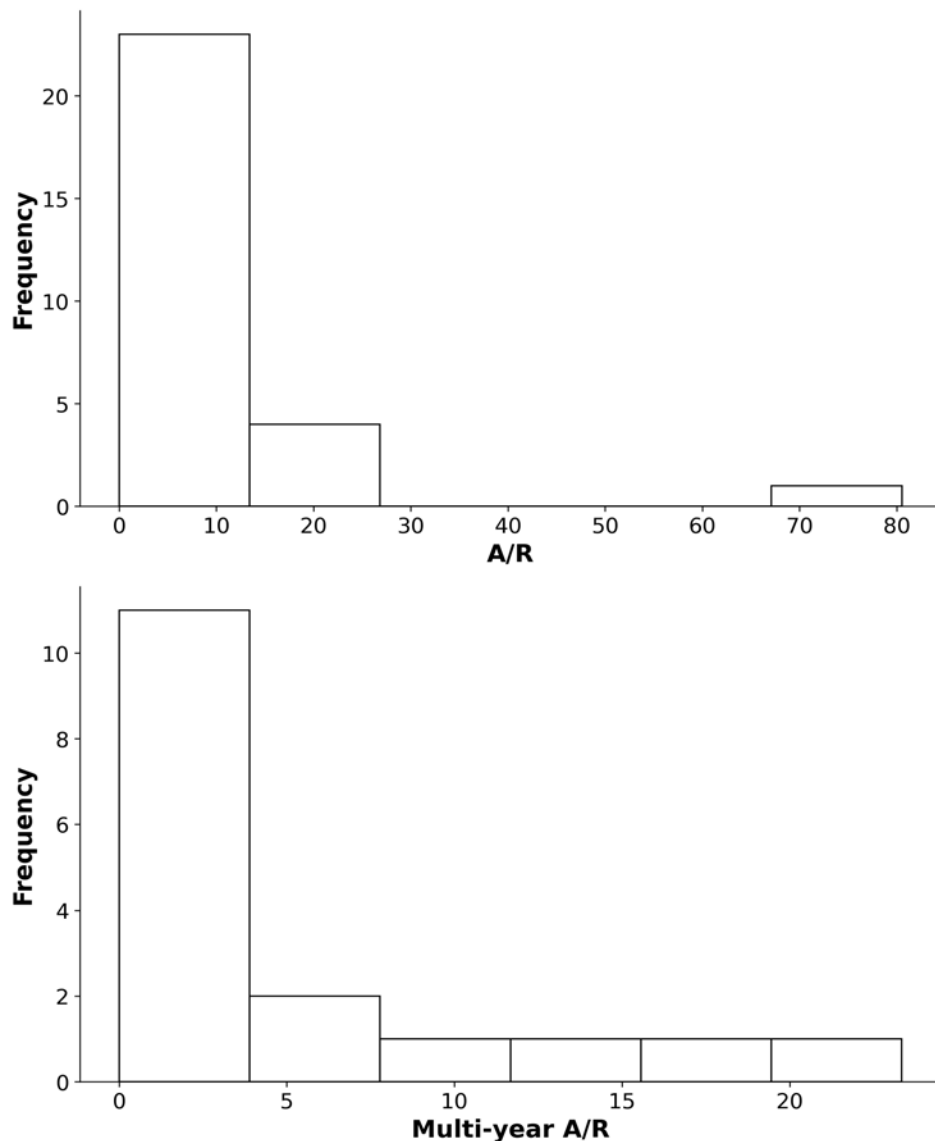
Values greater than 3 times the difference between the upper and lower whisker not shown to avoid skewing of plot.

4. APPLE

Table 4-1. Summary statistics for APPLE fields in Coalition.

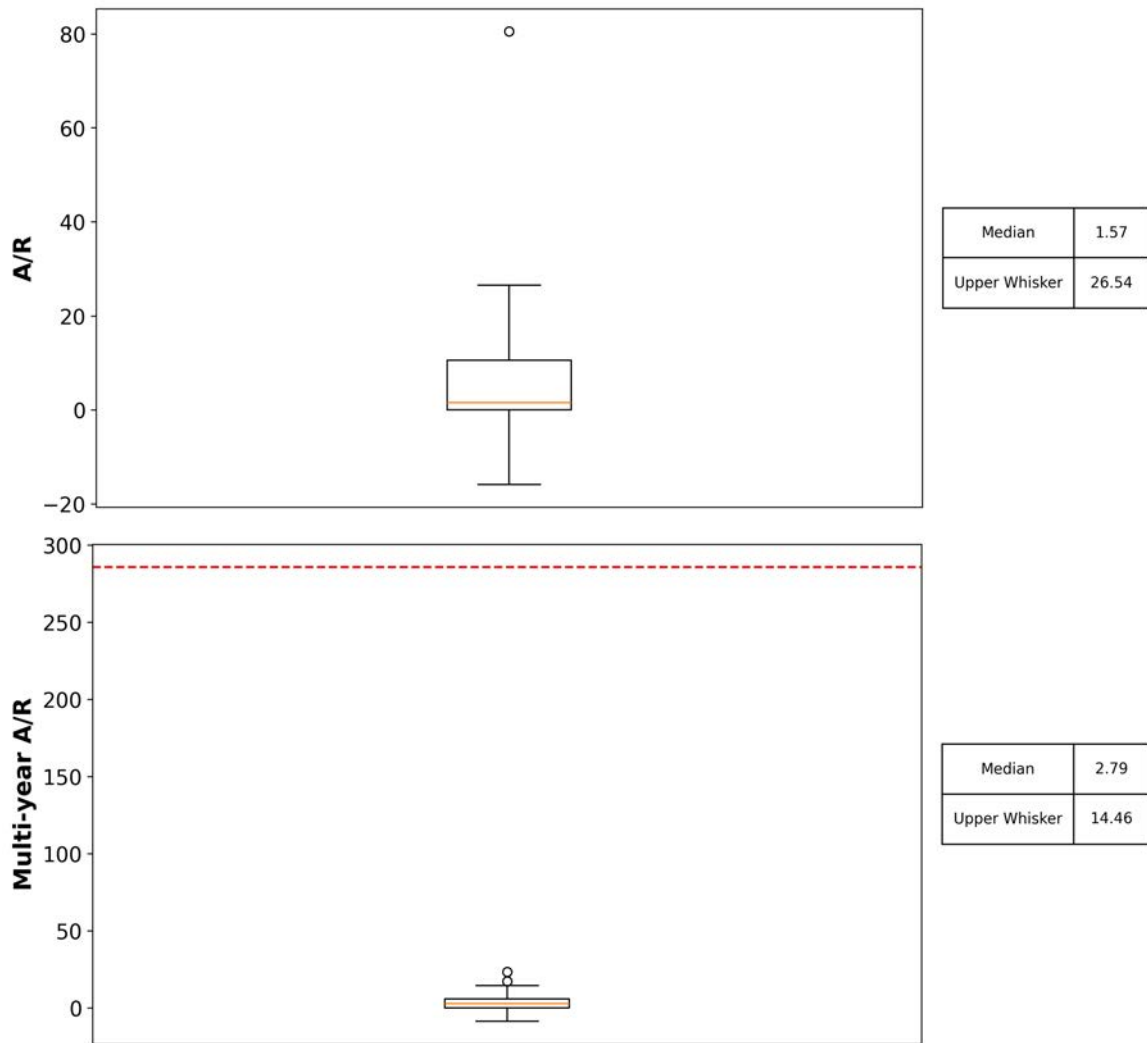
| Parameter | # Fields | Acreage | Mean | St. Dev. | Min | Max | Outlier Threshold | No. Outliers |
|----------------|----------|---------|-------|----------|--------|--------|-------------------|--------------|
| A/R | 26 | 370.7 | 8.18 | 15.95 | 0.0 | 80.52 | -- | -- |
| A-R | 26 | 370.7 | 26.45 | 37.69 | -31.32 | 92.44 | -- | -- |
| Multi-year A/R | 17 | 305.2 | 5.09 | 7.02 | 0.0 | 23.35 | 285.79 | 0 |
| Multi-year A-R | 17 | 305.2 | 76.29 | 118.76 | -48.05 | 339.79 | -- | -- |

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



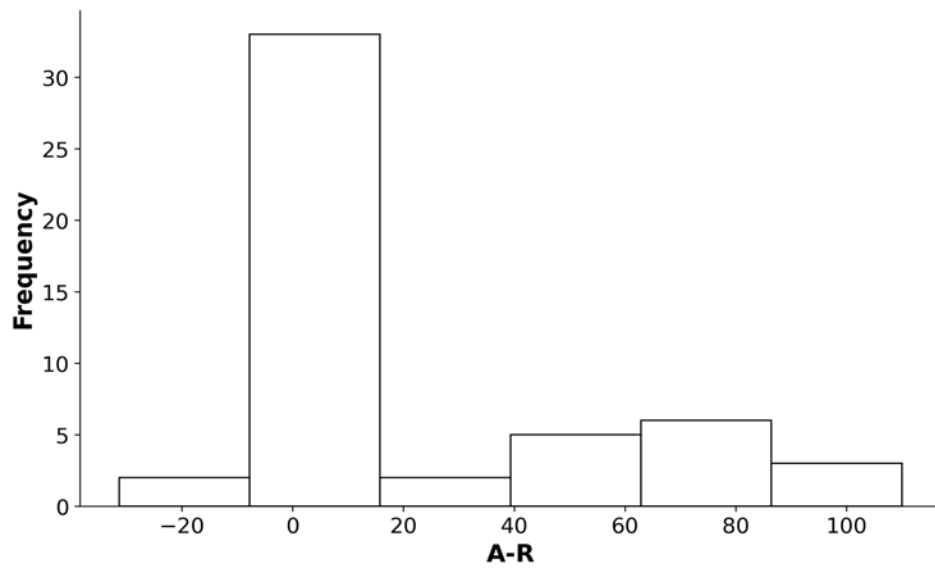
Values greater than 3 times the difference between the upper and lower whisker not shown to avoid skewing of plot.

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



The boxplot uses the standard method of Tukey (1977), and values greater than 3 times the difference between the upper and lower whisker are not shown to avoid skewing the plot. The red dashed line shows the outlier threshold which was calculated via the adjusted boxplot method of Hubert and Vandervieren (2008) using pooled 2020 – 2021 single year ratios. Any dots that exceed the red dashed line were outliers.

Figure 4-3. Histogram of A-R for APPLE fields in the Coalition.



Values greater than 3 times the difference between the upper and lower whisker not shown to avoid skewing of plot.

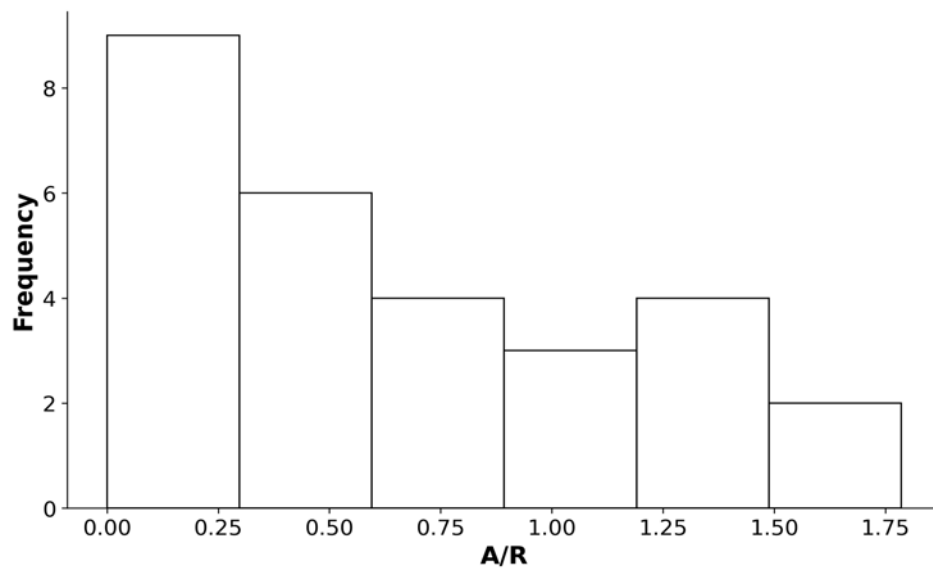
5. BARLEY - GRAIN

Table 5-1. Summary statistics for BARLEY - GRAIN fields in Coalition.

| Parameter | # Fields | Acreage | Mean | St. Dev. | Min | Max | Outlier Threshold | No. Outliers |
|-----------|----------|---------|--------|----------|-------|-------|-------------------|--------------|
| A/R | 28 | 1828.06 | 0.62 | 0.54 | 0.0 | 1.79 | 4.14 | 0 |
| A-R | 28 | 1828.06 | -26.72 | 32.3 | -62.2 | 34.64 | -- | -- |

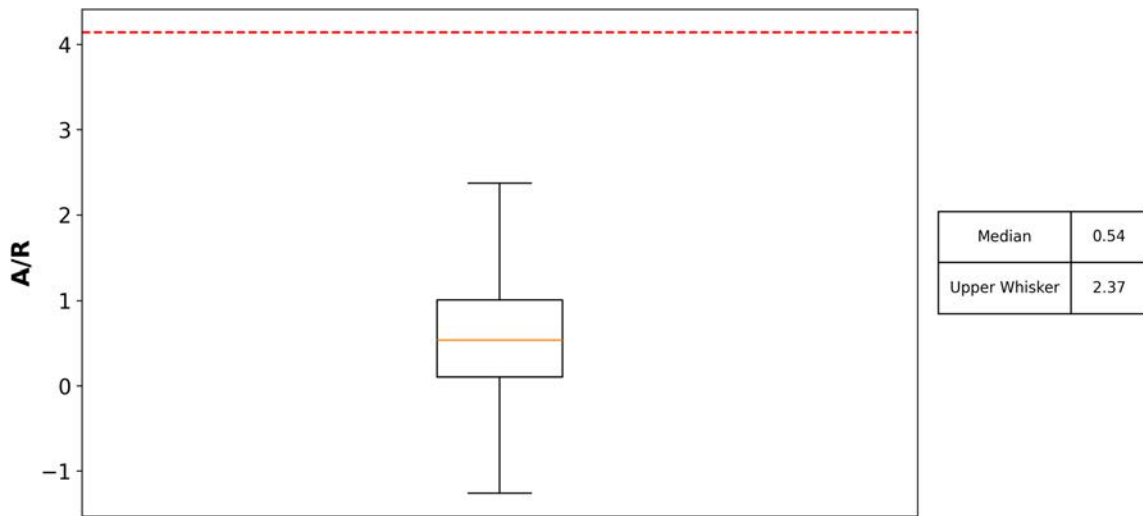
Outliers for annual crops are single year outliers in 2022 and either 2021 or 2020.

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



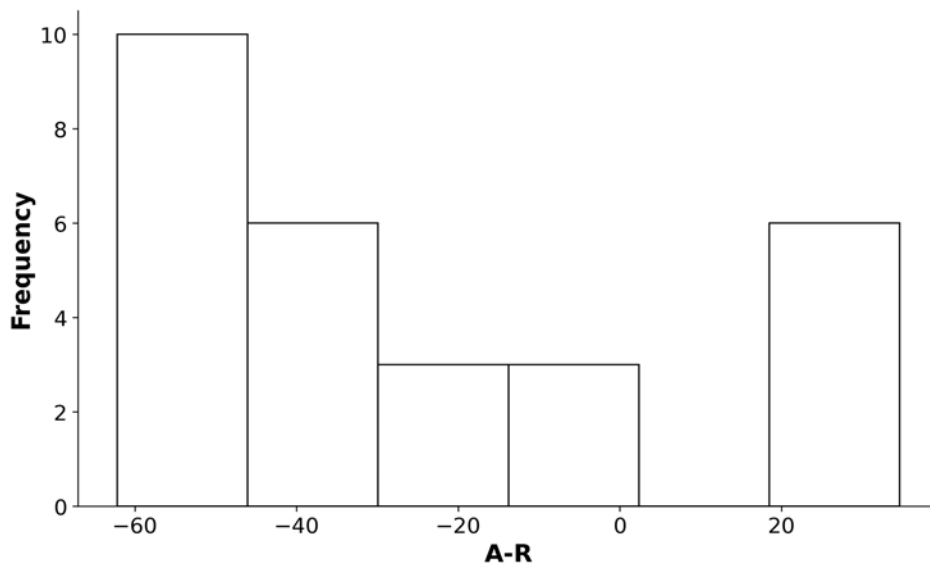
Values greater than 3 times the difference between the upper and lower whisker not shown to avoid skewing of plot.

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



The boxplot uses the standard method of Tukey (1977), and values greater than 3 times the difference between the upper and lower whisker are not shown to avoid skewing the plot. The red dashed line shows the outlier threshold which was calculated via the adjusted boxplot method of Hubert and Vandervieren (2008) using pooled 2020 – 2022 single year ratios. Outliers for 2022 CY annual crop fields are any dots above the red dashed line that were also outliers in either the 2021 or 2020 CY for any crop.

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



Values greater than 3 times the difference between the upper and lower whisker not shown to avoid skewing of plot.

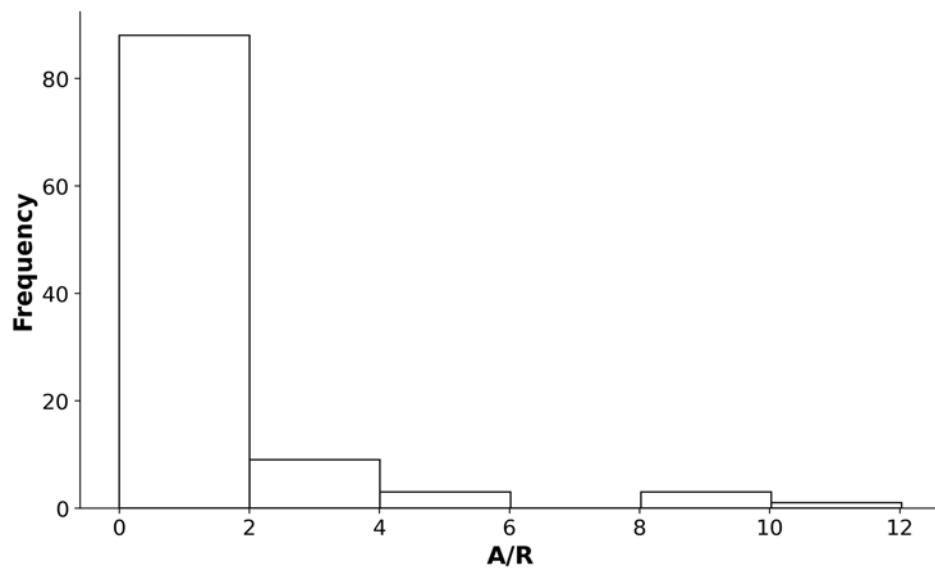
6. BEAN DRY

Table 6-1. Summary statistics for BEAN DRY fields in Coalition.

| Parameter | # Fields | Acreage | Mean | St. Dev. | Min | Max | Outlier Threshold | No. Outliers |
|-----------|----------|---------|------|----------|---------|--------|-------------------|--------------|
| A/R | 104 | 4851.82 | 1.37 | 1.86 | 0.0 | 12.03 | 3.52 | 0 |
| A-R | 115 | 5287.68 | 4.92 | 51.78 | -106.25 | 116.88 | -- | -- |

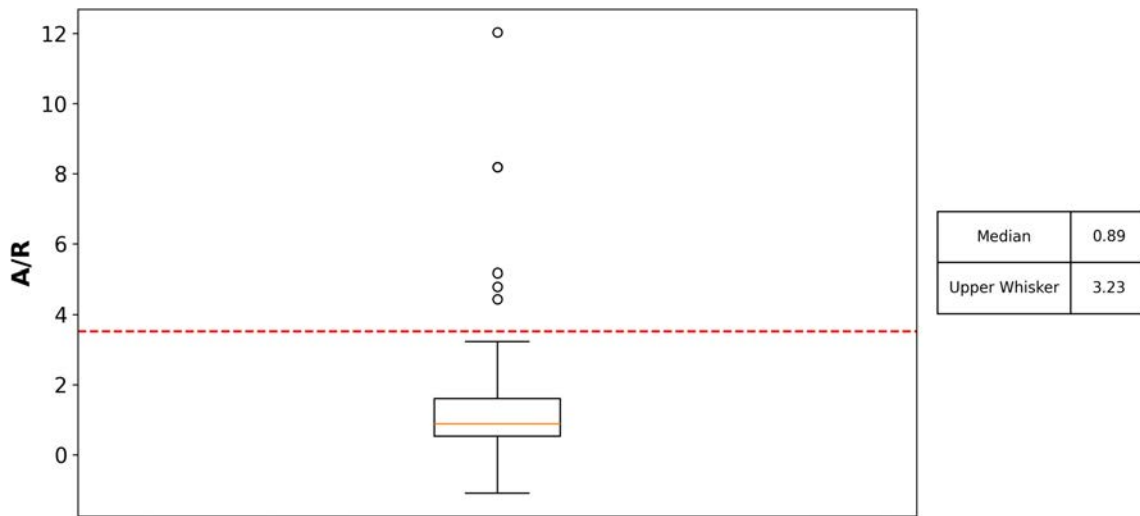
Outliers for annual crops are single year outliers in 2022 and either 2021 or 2020.

Figure 6-1. Histogram of A/R for BEAN DRY fields in the Coalition.



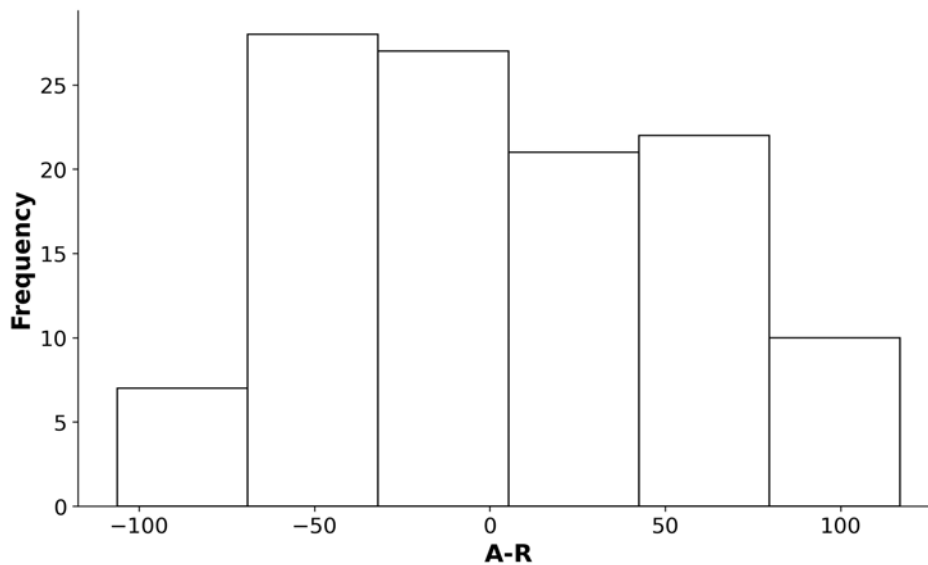
Values greater than 3 times the difference between the upper and lower whisker not shown to avoid skewing of plot.

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



The boxplot uses the standard method of Tukey (1977), and values greater than 3 times the difference between the upper and lower whisker are not shown to avoid skewing the plot. The red dashed line shows the outlier threshold which was calculated via the adjusted boxplot method of Hubert and Vandervieren (2008) using pooled 2020 – 2022 single year ratios. Outliers for 2022 CY annual crop fields are any dots above the red dashed line that were also outliers in either the 2021 or 2020 CY for any crop.

Figure 6-3. Histogram of A-R for BEAN DRY fields in the Coalition.



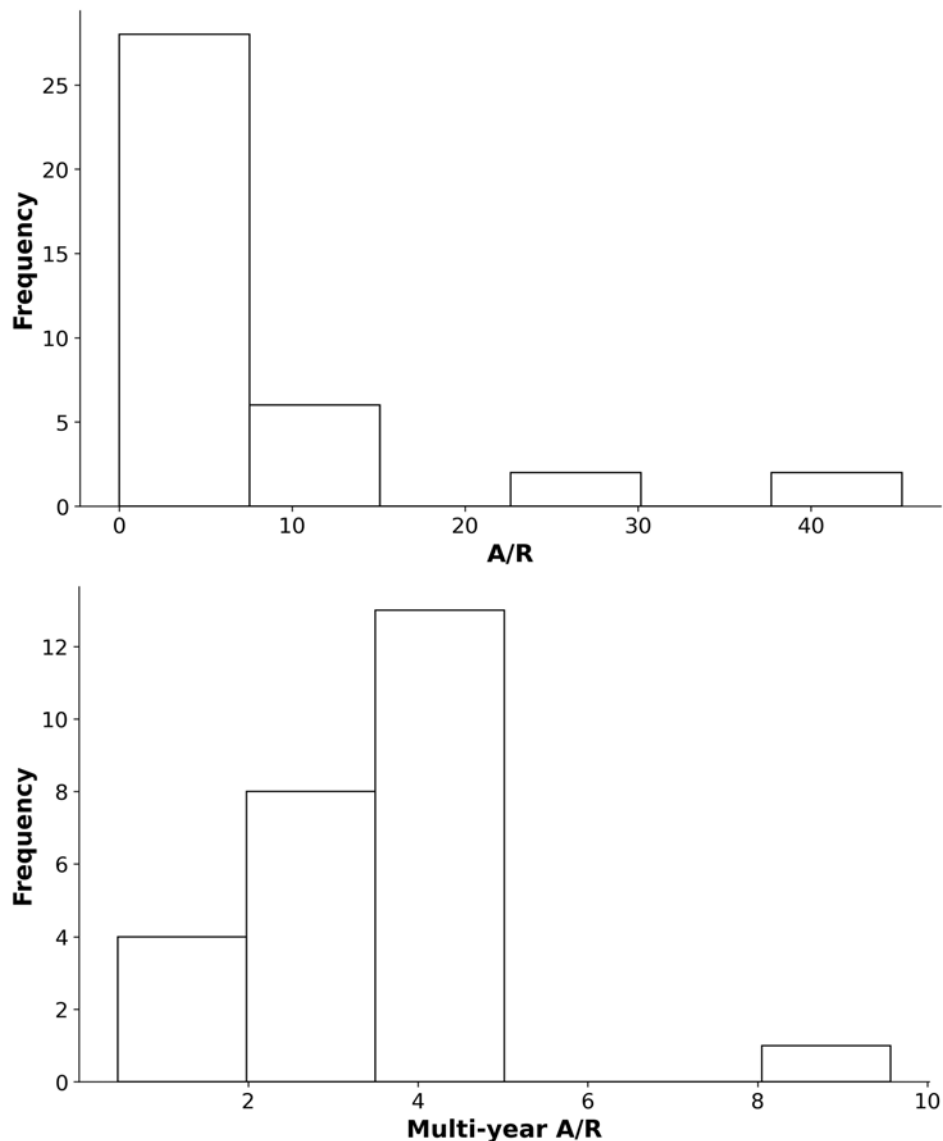
Values greater than 3 times the difference between the upper and lower whisker not shown to avoid skewing of plot.

7. CHERRY

Table 7-1. Summary statistics for CHERRY fields in Coalition.

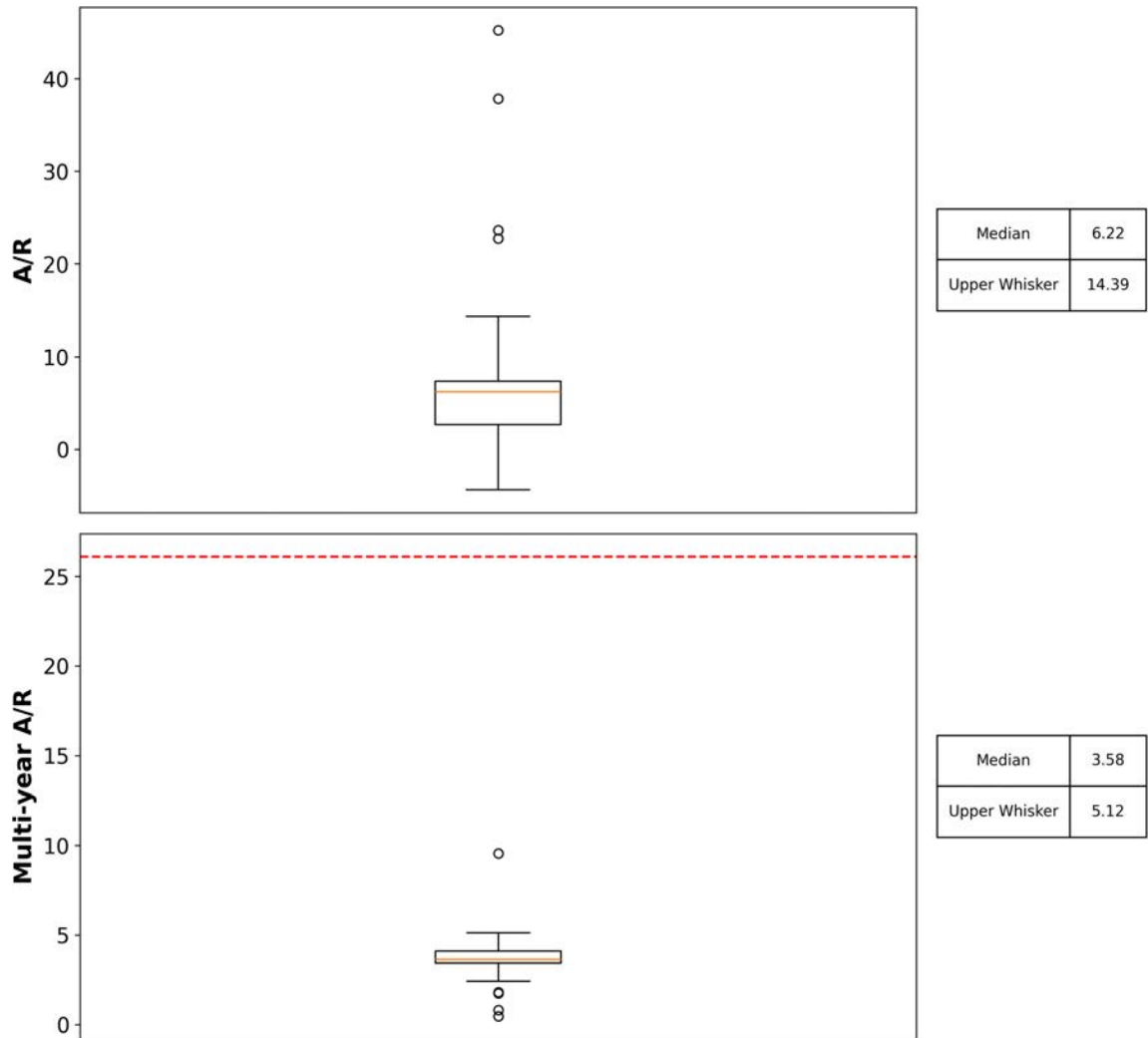
| Parameter | # Fields | Acreage | Mean | St. Dev. | Min | Max | Outlier Threshold | No. Outliers |
|----------------|----------|---------|--------|----------|--------|--------|-------------------|--------------|
| A/R | 37 | 1398.0 | 6.51 | 7.35 | 0.0 | 37.83 | -- | -- |
| A-R | 37 | 1398.0 | 31.41 | 29.26 | -19.2 | 113.01 | -- | -- |
| Multi-year A/R | 27 | 1128.4 | 4.21 | 3.55 | 0.46 | 20.17 | 26.1 | 0 |
| Multi-year A-R | 27 | 1128.4 | 102.26 | 65.34 | -31.34 | 268.64 | -- | -- |

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



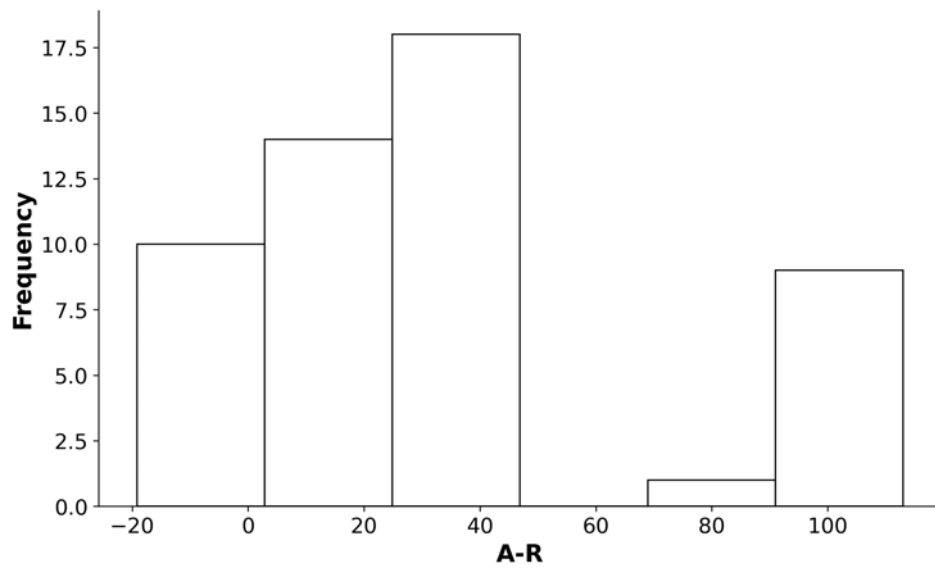
Values greater than 3 times the difference between the upper and lower whisker not shown to avoid skewing of plot.

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



The boxplot uses the standard method of Tukey (1977), and values greater than 3 times the difference between the upper and lower whisker are not shown to avoid skewing the plot. The red dashed line shows the outlier threshold which was calculated via the adjusted boxplot method of Hubert and Vandervieren (2008) using pooled 2020 – 2021 single year ratios. Any dots that exceed the red dashed line were outliers.

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



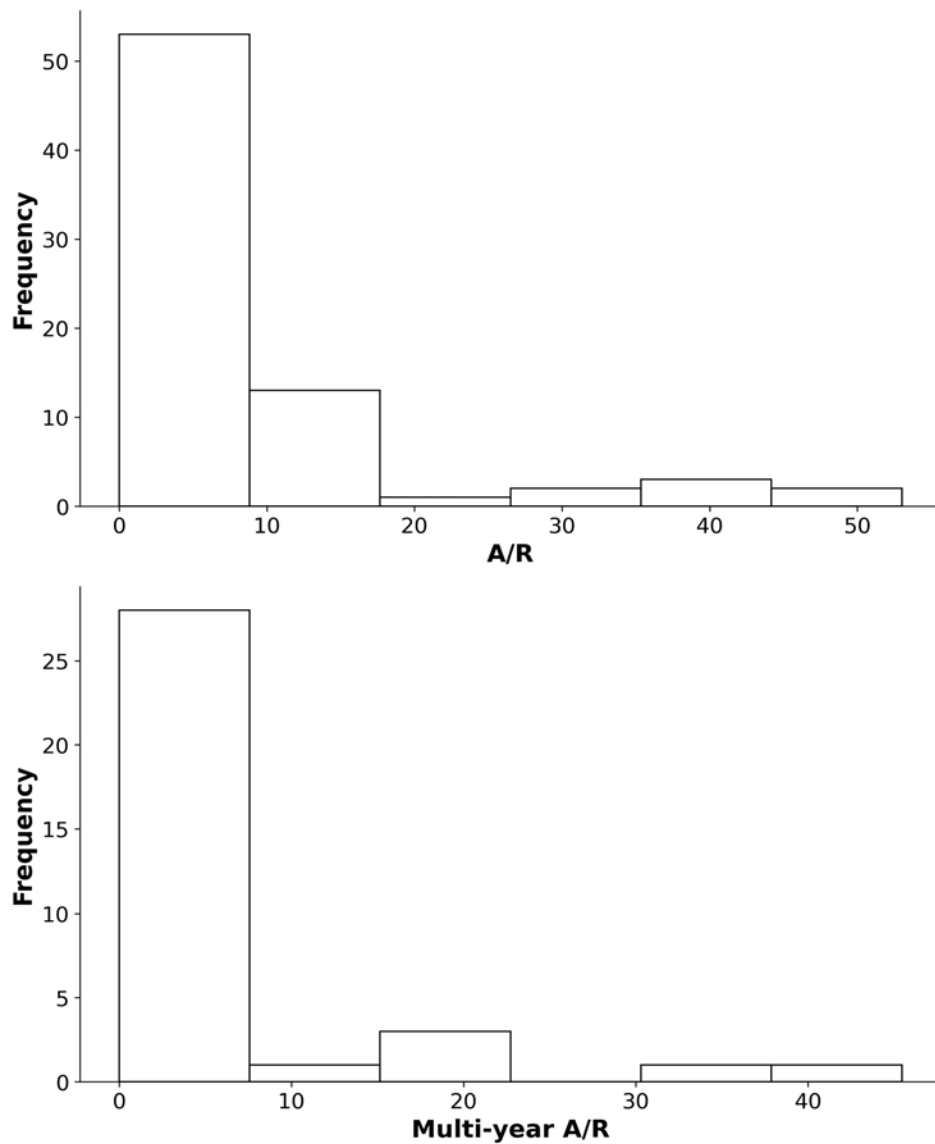
Values greater than 3 times the difference between the upper and lower whisker not shown to avoid skewing of plot.

8. CITRUS

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

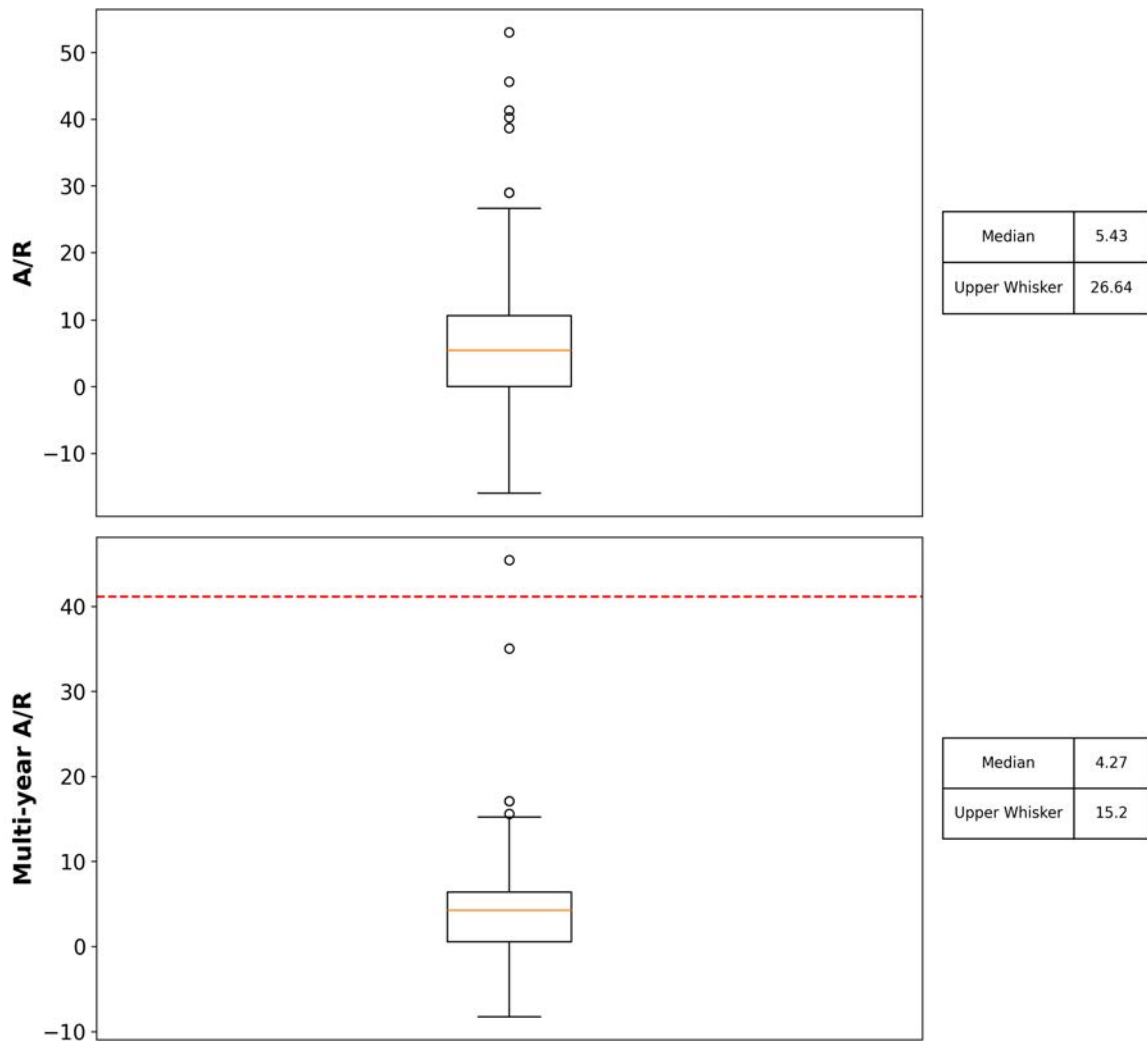
| Parameter | # Fields | Acreage | Mean | St. Dev. | Min | Max | Outlier Threshold | No. Outliers |
|----------------|----------|---------|--------|----------|--------|--------|-------------------|--------------|
| A/R | 70 | 526.68 | 7.37 | 10.05 | 0.0 | 45.65 | -- | -- |
| A-R | 70 | 526.68 | 52.83 | 75.35 | -41.4 | 365.78 | -- | -- |
| Multi-year A/R | 34 | 325.49 | 6.39 | 9.86 | 0.0 | 45.45 | 41.13 | 1 |
| Multi-year A-R | 34 | 325.49 | 163.69 | 219.29 | -91.36 | 784.45 | -- | -- |

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



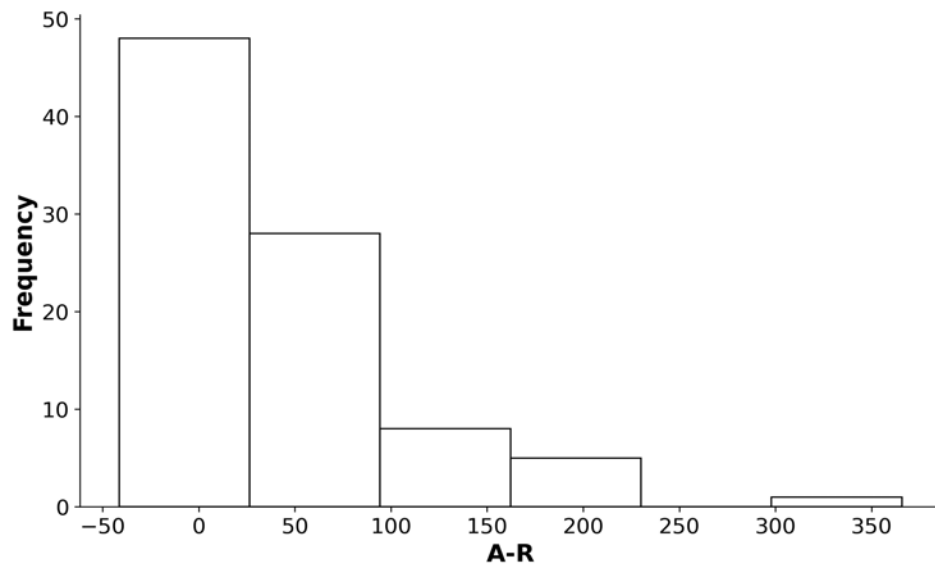
Values greater than 3 times the difference between the upper and lower whisker not shown to avoid skewing of plot.

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



The boxplot uses the standard method of Tukey (1977), and values greater than 3 times the difference between the upper and lower whisker are not shown to avoid skewing the plot. The red dashed line shows the outlier threshold which was calculated via the adjusted boxplot method of Hubert and Vandervieren (2008) using pooled 2020 – 2021 single year ratios. Any dots that exceed the red dashed line were outliers.

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



Values greater than 3 times the difference between the upper and lower whisker not shown to avoid skewing of plot.

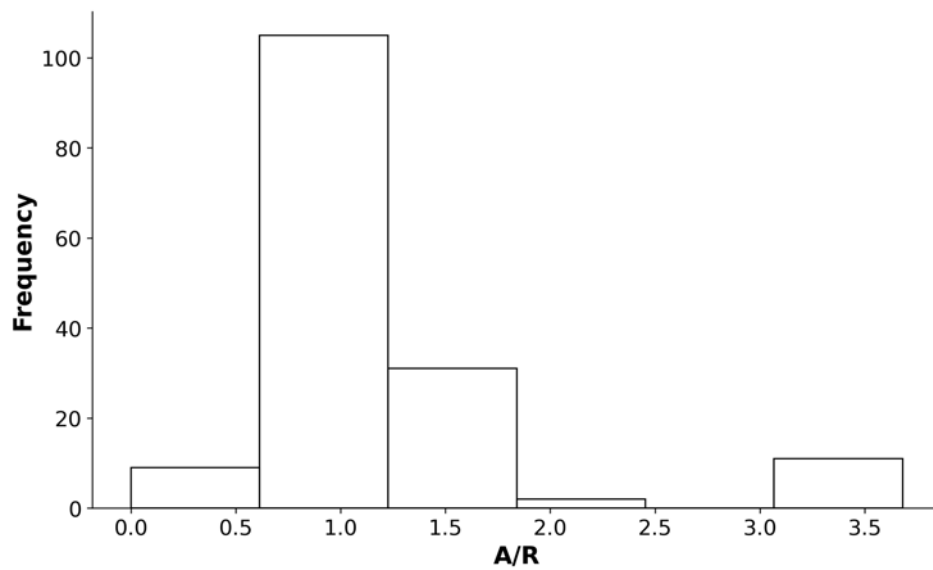
9. CORN - FODDER/SILAGE

Table 9-1. Summary statistics for CORN - FODDER/SILAGE fields in Coalition.

| Parameter | # Fields | Acreage | Mean | St. Dev. | Min | Max | Outlier Threshold | No. Outliers |
|-----------|----------|---------|-------|----------|---------|-------|-------------------|--------------|
| A/R | 159 | 11235.1 | 1.69 | 6.07 | 0.0 | 77.18 | 2.92 | 0 |
| A-R | 162 | 11345.1 | 15.28 | 69.73 | -158.13 | 243.8 | -- | -- |

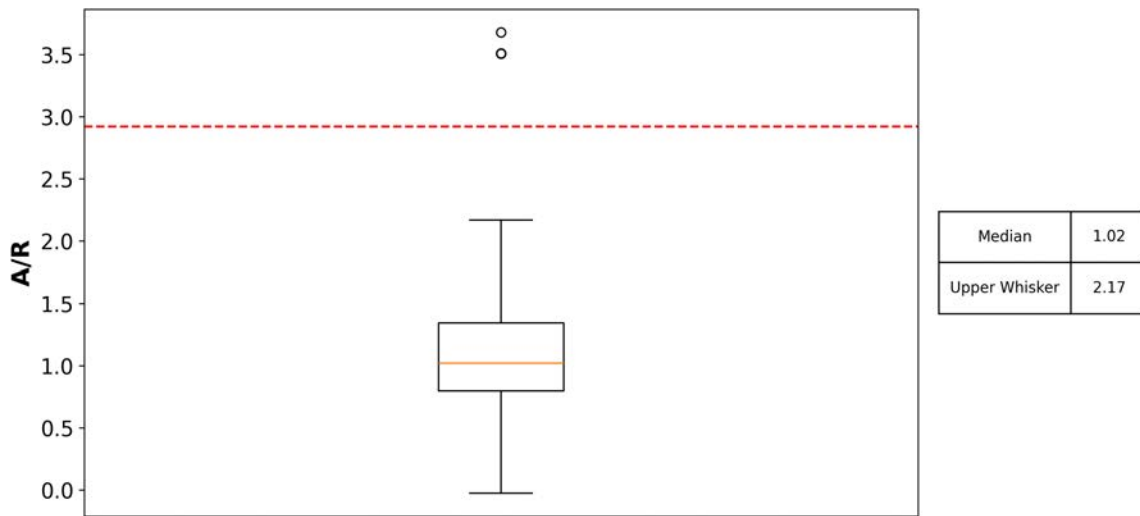
Outliers for annual crops are single year outliers in 2022 and either 2021 or 2020.

Figure 9-1. Histogram of A/R for CORN - FODDER/SILAGE fields in the Coalition.



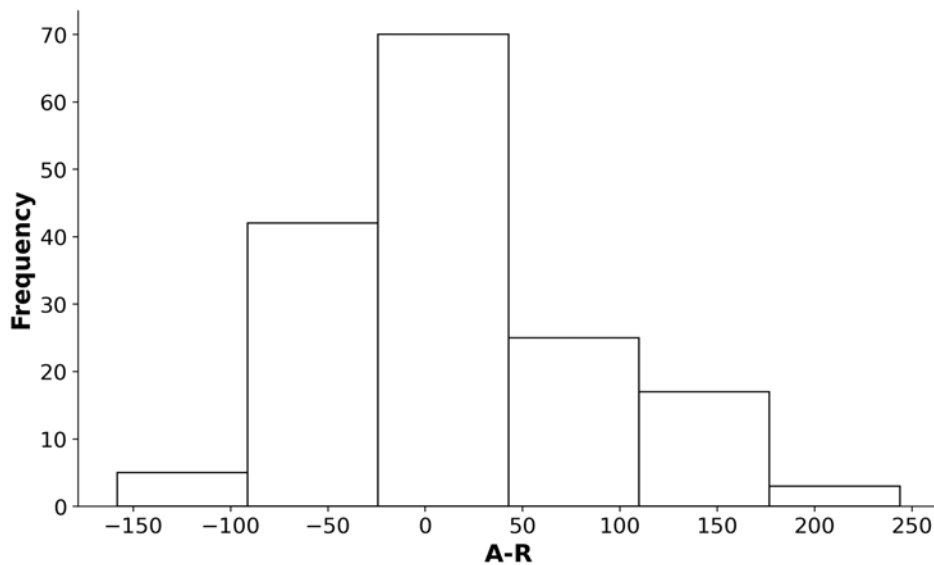
Values greater than 3 times the difference between the upper and lower whisker not shown to avoid skewing of plot.

Figure 9-2. Box and whisker plot of A/R for CORN - FODDER/SILAGE fields in the Coalition.



The boxplot uses the standard method of Tukey (1977), and values greater than 3 times the difference between the upper and lower whisker are not shown to avoid skewing the plot. The red dashed line shows the outlier threshold which was calculated via the adjusted boxplot method of Hubert and Vandervieren (2008) using pooled 2020 – 2022 single year ratios. Outliers for 2022 CY annual crop fields are any dots above the red dashed line that were also outliers in either the 2021 or 2020 CY for any crop.

Figure 9-3. Histogram of A-R for CORN - FODDER/SILAGE fields in the Coalition.



Values greater than 3 times the difference between the upper and lower whisker not shown to avoid skewing of plot.

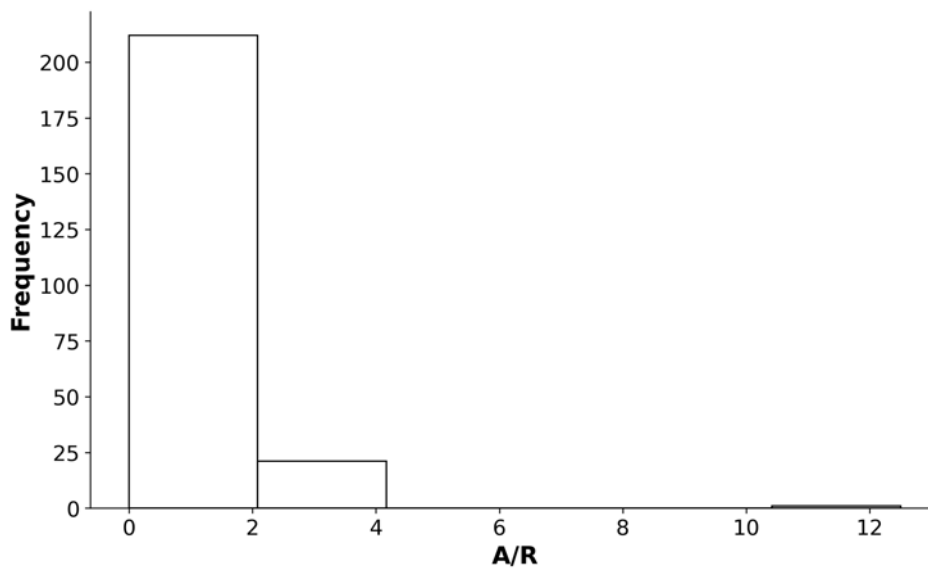
10. CORN - GRAIN

Table 10-1. Summary statistics for CORN - GRAIN fields in Coalition.

| Parameter | # Fields | Acreage | Mean | St. Dev. | Min | Max | Outlier Threshold | No. Outliers |
|-----------|----------|----------|-------|----------|--------|-------|-------------------|--------------|
| A/R | 235 | 14718.42 | 1.63 | 1.59 | 0.0 | 21.36 | 2.53 | 3 |
| A-R | 245 | 15035.77 | 69.21 | 84.27 | -215.2 | 268.8 | -- | -- |

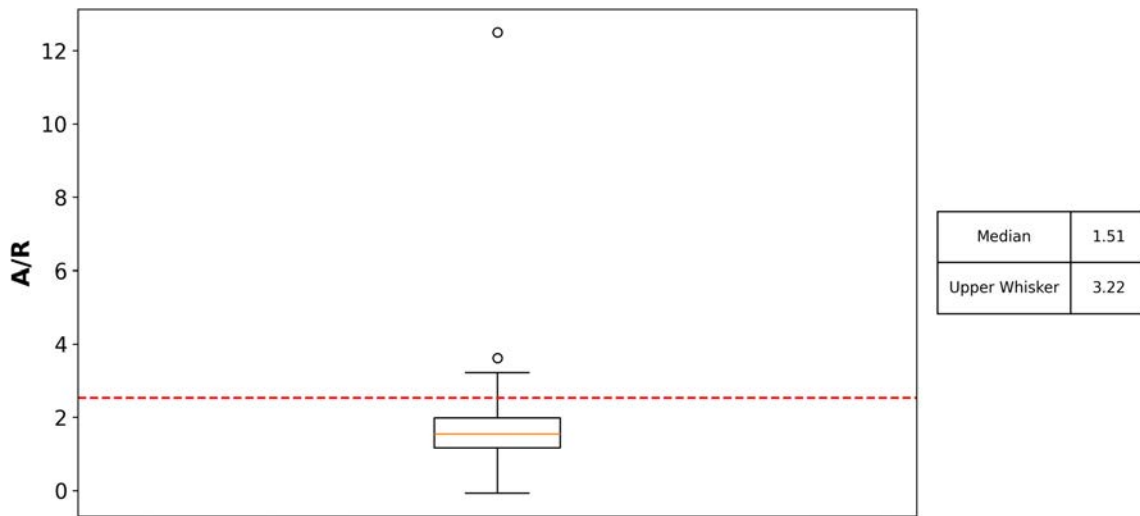
Outliers for annual crops are single year outliers in 2022 and either 2021 or 2020.

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



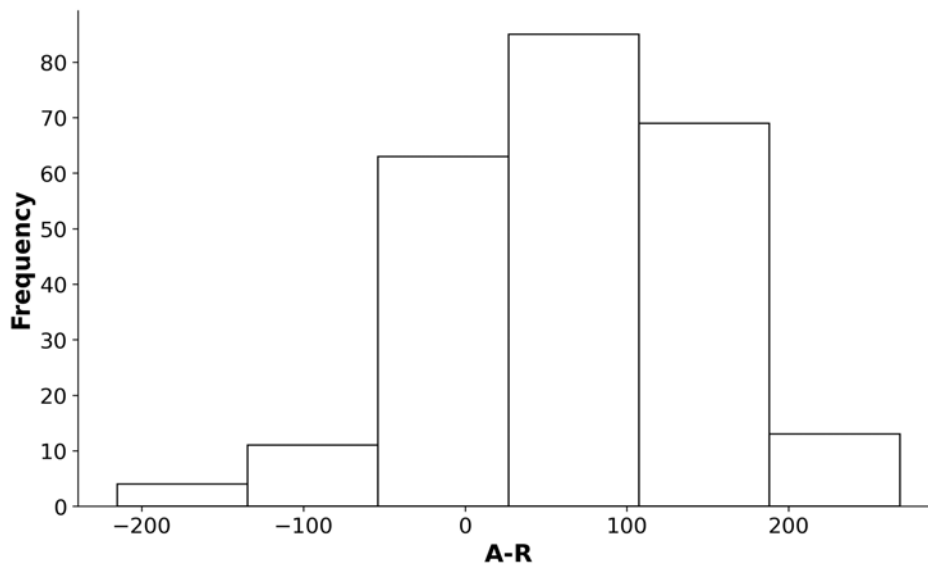
Values greater than 3 times the difference between the upper and lower whisker not shown to avoid skewing of plot.

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



The boxplot uses the standard method of Tukey (1977), and values greater than 3 times the difference between the upper and lower whisker are not shown to avoid skewing the plot. The red dashed line shows the outlier threshold which was calculated via the adjusted boxplot method of Hubert and Vandervieren (2008) using pooled 2020 – 2022 single year ratios. Outliers for 2022 CY annual crop fields are any dots above the red dashed line that were also outliers in either the 2021 or 2020 CY for any crop.

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



Values greater than 3 times the difference between the upper and lower whisker not shown to avoid skewing of plot.

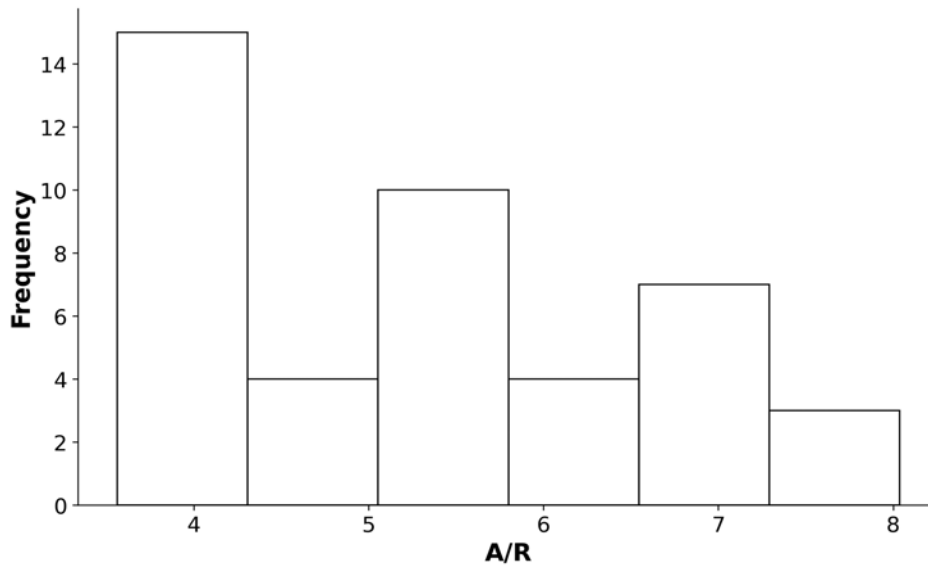
11. CUCUMBER

Table 11-1. Summary statistics for CUCUMBER fields in Coalition.

| Parameter | # Fields | Acreage | Mean | St. Dev. | Min | Max | Outlier Threshold | No. Outliers |
|-----------|----------|---------|-------|----------|------|--------|-------------------|--------------|
| A/R | 43 | 2546.12 | 5.32 | 1.4 | 3.56 | 8.04 | 6.68 | 3 |
| A-R | 44 | 2611.52 | 78.05 | 21.11 | 0.0 | 109.45 | -- | -- |

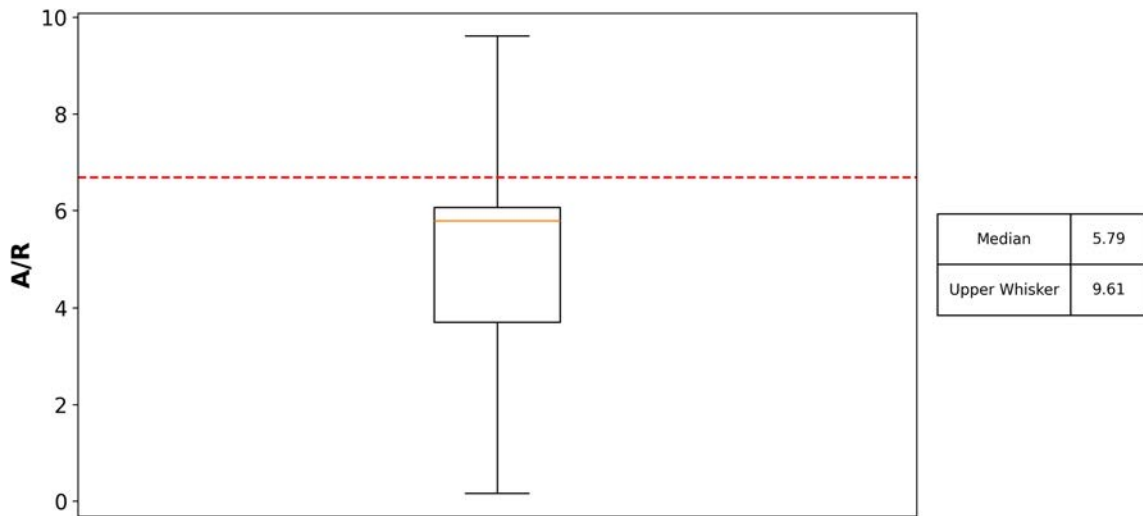
Outliers for annual crops are single year outliers in 2022 and either 2021 or 2020.

Figure 11-1. Histogram of A/R for CUCUMBER fields in the Coalition.



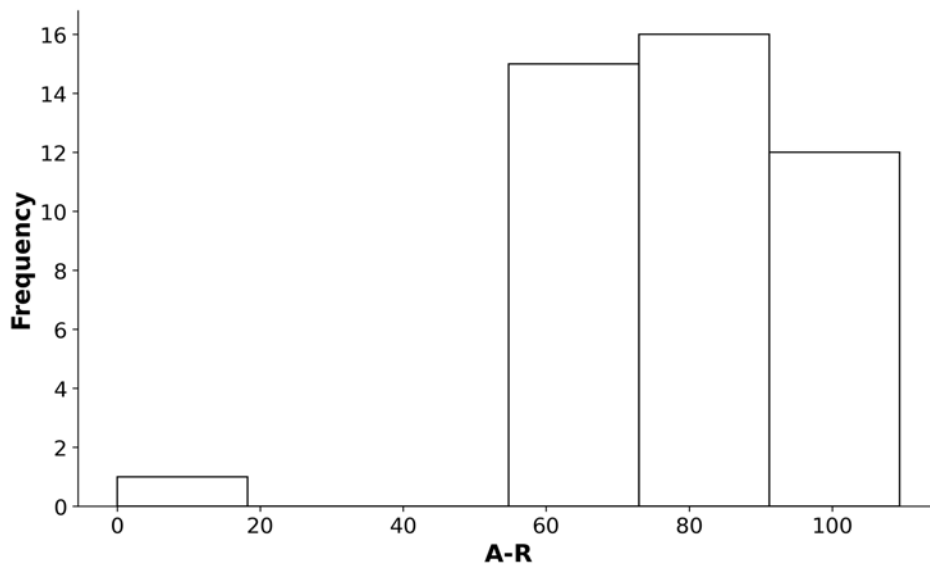
Values greater than 3 times the difference between the upper and lower whisker not shown to avoid skewing of plot.

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



The boxplot uses the standard method of Tukey (1977), and values greater than 3 times the difference between the upper and lower whisker are not shown to avoid skewing the plot. The red dashed line shows the outlier threshold which was calculated via the adjusted boxplot method of Hubert and Vandervieren (2008) using pooled 2020 – 2022 single year ratios. Outliers for 2022 CY annual crop fields are any dots above the red dashed line that were also outliers in either the 2021 or 2020 CY for any crop.

Figure 11-3. Histogram of A-R for CUCUMBER fields in the Coalition.



Values greater than 3 times the difference between the upper and lower whisker not shown to avoid skewing of plot.

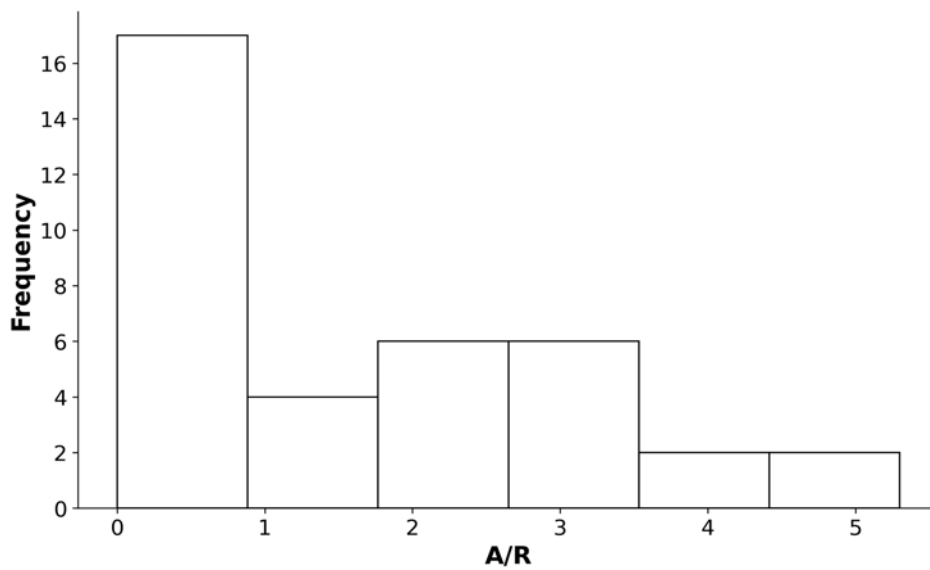
12. GRAIN HAY

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

| Parameter | # Fields | Acreage | Mean | St. Dev. | Min | Max | Outlier Threshold | No. Outliers |
|-----------|----------|---------|--------|----------|--------|---------|-------------------|--------------|
| A/R | 39 | 1679.21 | 118.77 | 510.61 | 0.0 | 2286.64 | 9.53 | 0 |
| A-R | 40 | 1750.21 | 22.88 | 84.83 | -108.5 | 156.6 | -- | -- |

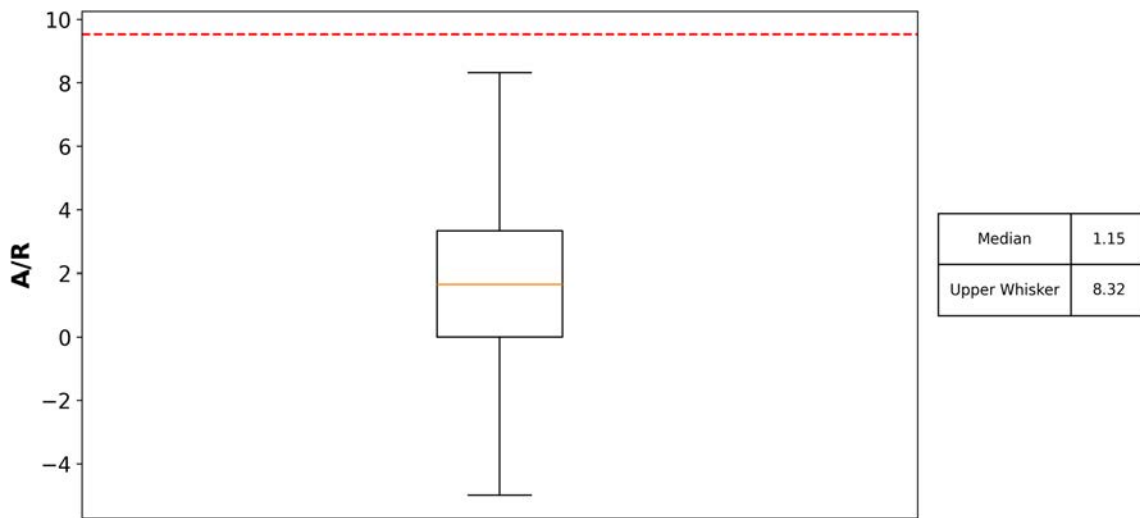
Outliers for annual crops are single year outliers in 2022 and either 2021 or 2020.

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



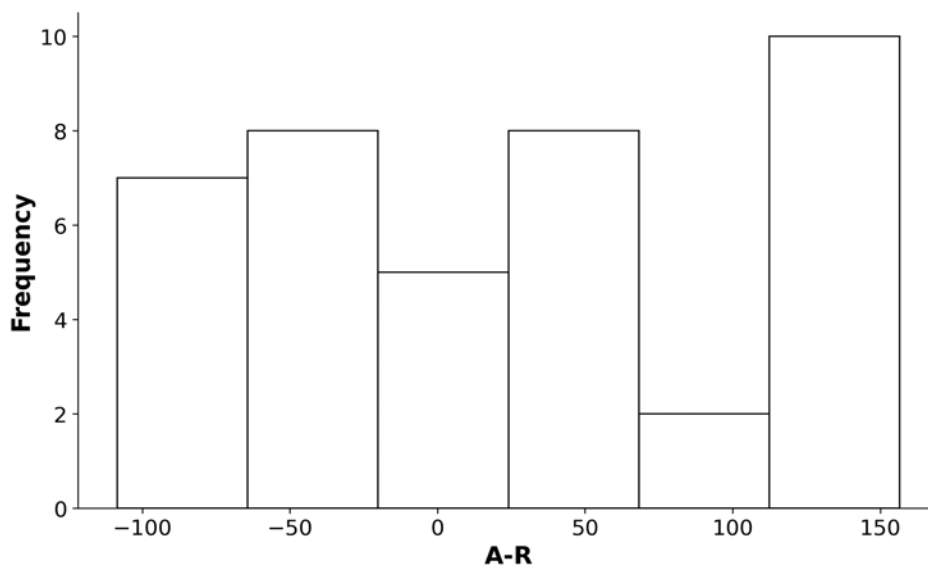
Values greater than 3 times the difference between the upper and lower whisker not shown to avoid skewing of plot.

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



The boxplot uses the standard method of Tukey (1977), and values greater than 3 times the difference between the upper and lower whisker are not shown to avoid skewing the plot. The red dashed line shows the outlier threshold which was calculated via the adjusted boxplot method of Hubert and Vandervieren (2008) using pooled 2020 – 2022 single year ratios. Outliers for 2022 CY annual crop fields are any dots above the red dashed line that were also outliers in either the 2021 or 2020 CY for any crop.

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



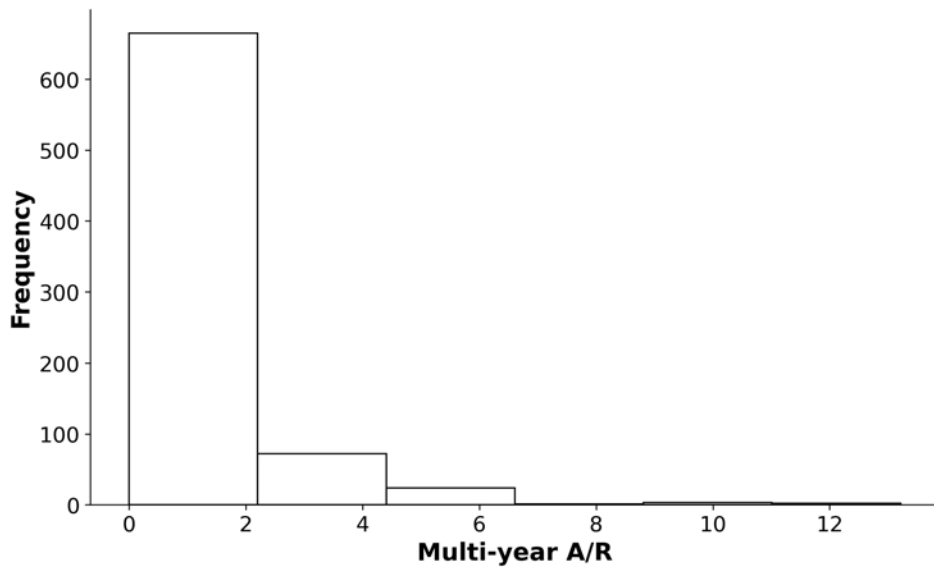
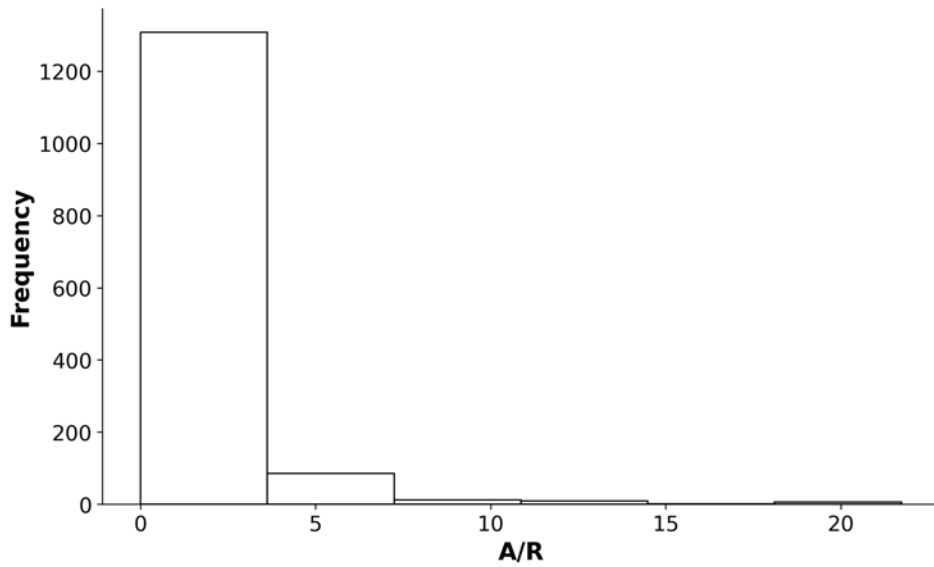
Values greater than 3 times the difference between the upper and lower whisker not shown to avoid skewing of plot.

13. GRAPE - WINE

Table 13-1. Summary statistics for GRAPE - WINE fields in Coalition.

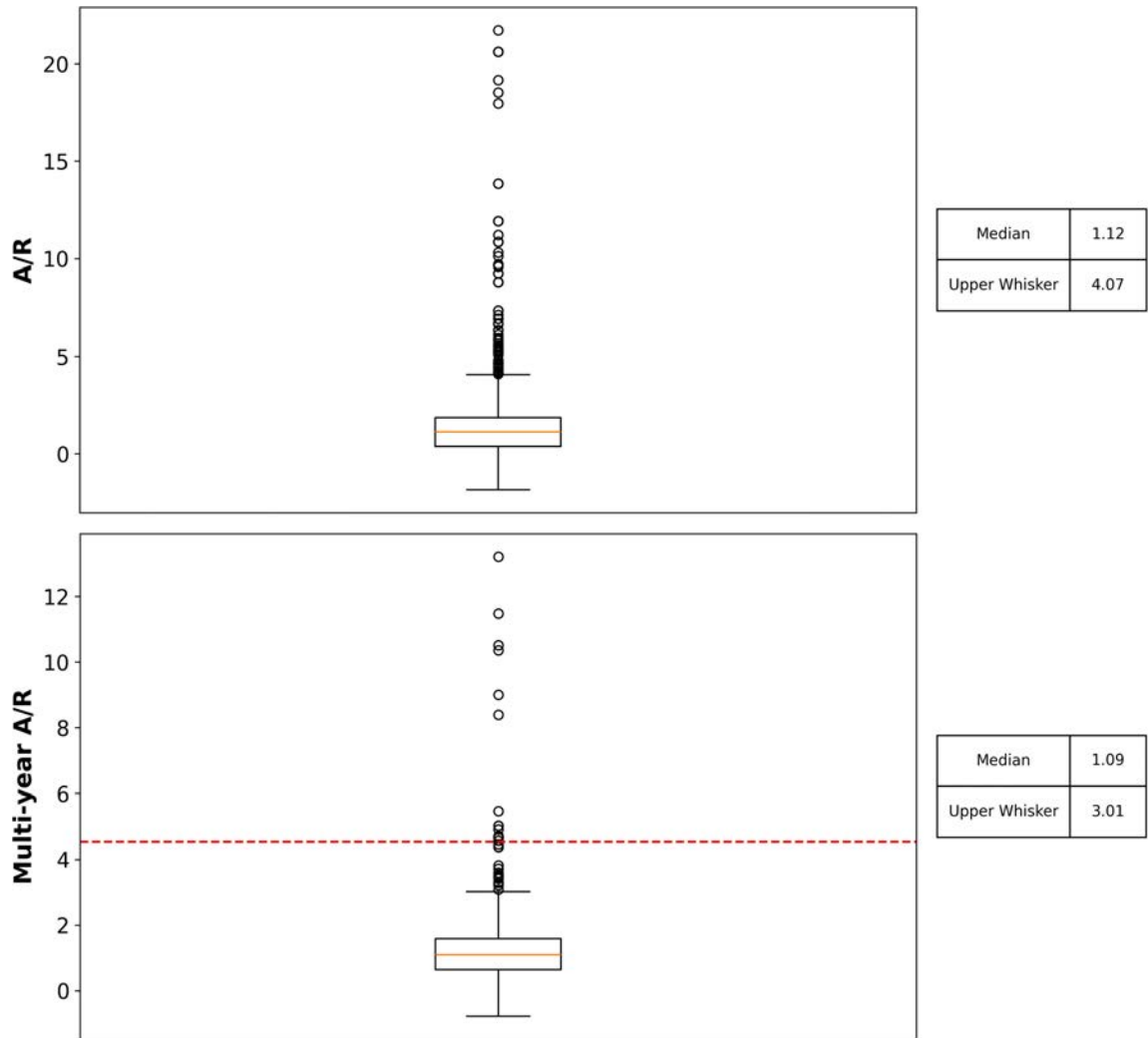
| Parameter | # Fields | Acreage | Mean | St. Dev. | Min | Max | Outlier Threshold | No. Outliers |
|----------------|----------|----------|-------|----------|--------|--------|-------------------|--------------|
| A/R | 1403 | 66241.58 | 1.74 | 3.6 | 0.0 | 57.24 | -- | -- |
| A-R | 1403 | 66241.58 | 6.83 | 24.35 | -72.0 | 231.36 | -- | -- |
| Multi-year A/R | 773 | 41246.03 | 1.52 | 2.9 | 0.0 | 40.44 | 4.54 | 35 |
| Multi-year A-R | 773 | 41246.03 | 17.05 | 62.36 | -154.8 | 384.68 | -- | -- |

Figure 13-1. Histogram of A/R for GRAPE - WINE fields in the Coalition.



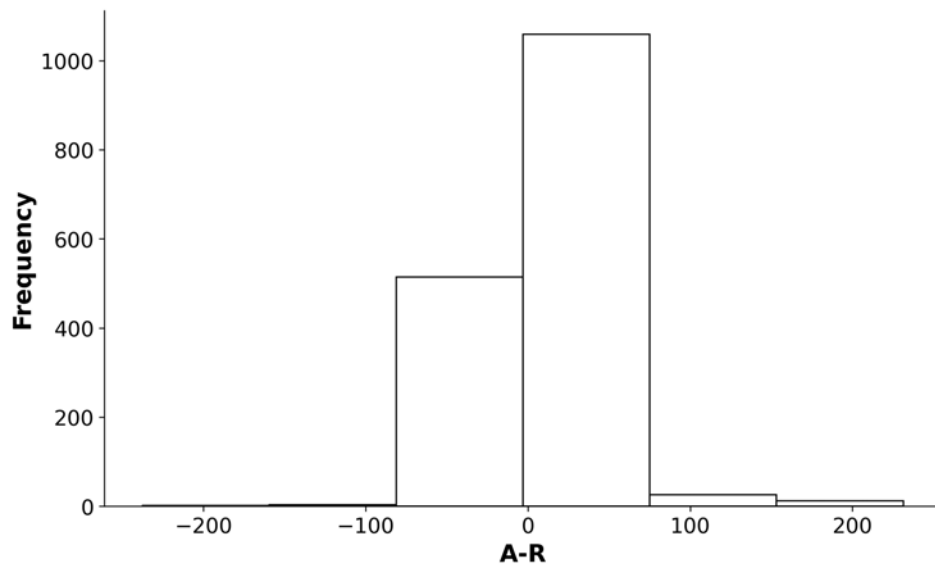
Values greater than 3 times the difference between the upper and lower whisker not shown to avoid skewing of plot.

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



The boxplot uses the standard method of Tukey (1977), and values greater than 3 times the difference between the upper and lower whisker are not shown to avoid skewing the plot. The red dashed line shows the outlier threshold which was calculated via the adjusted boxplot method of Hubert and Vandervieren (2008) using pooled 2020 – 2021 single year ratios. Any dots that exceed the red dashed line were outliers.

Figure 13-3. Histogram of A-R for GRAPE - WINE fields in the Coalition.



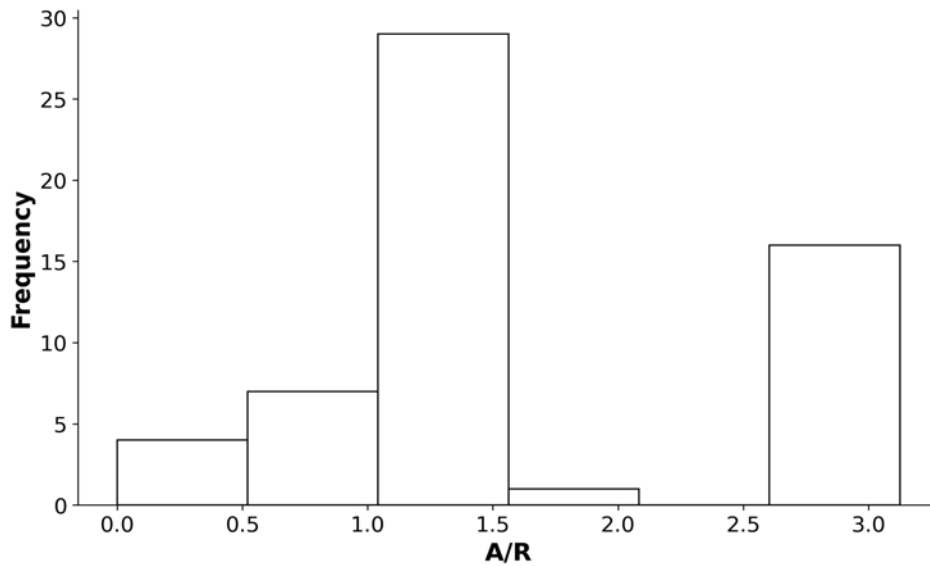
Values greater than 3 times the difference between the upper and lower whisker not shown to avoid skewing of plot.

14. GRAPE - WINE-YOUNG

Table 14-1. Summary statistics for GRAPE - WINE-YOUNG fields in Coalition.

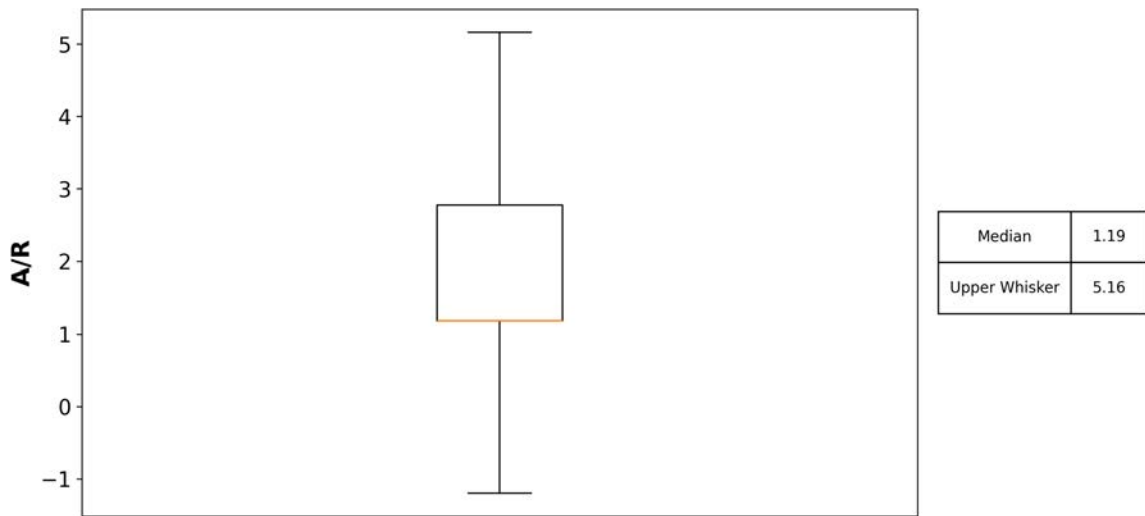
| Parameter | # Fields | Acreage | Mean | St. Dev. | Min | Max | Outlier Threshold | No. Outliers |
|-----------|----------|---------|-------|----------|-------|------|-------------------|--------------|
| A/R | 56 | 3615.15 | 1.54 | 0.87 | 0.0 | 3.12 | -- | -- |
| A-R | 56 | 3615.15 | 11.48 | 18.89 | -54.0 | 38.4 | -- | -- |

Figure 14-1. Histogram of A/R for GRAPE - WINE-YOUNG fields in the Coalition.



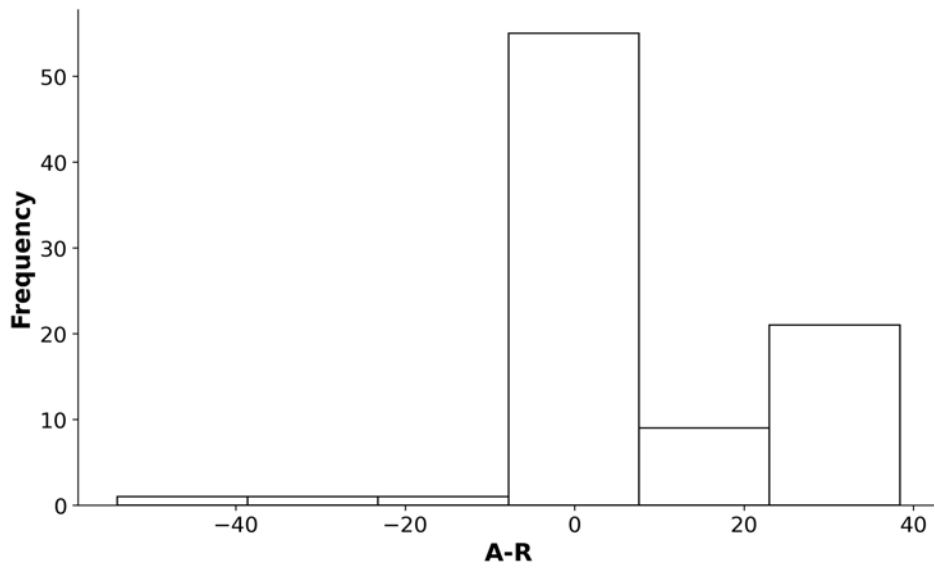
Values greater than 3 times the difference between the upper and lower whisker not shown to avoid skewing of plot.

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



The boxplot uses the standard method of Tukey (1977), and values greater than 3 times the difference between the upper and lower whisker are not shown to avoid skewing the plot. The red dashed line shows the outlier threshold which was calculated via the adjusted boxplot method of Hubert and Vandervieren (2008) using pooled 2020 – 2021 single year ratios. Any dots that exceed the red dashed line were outliers.

Figure 14-3. Histogram of A-R for GRAPE - WINE-YOUNG fields in the Coalition.



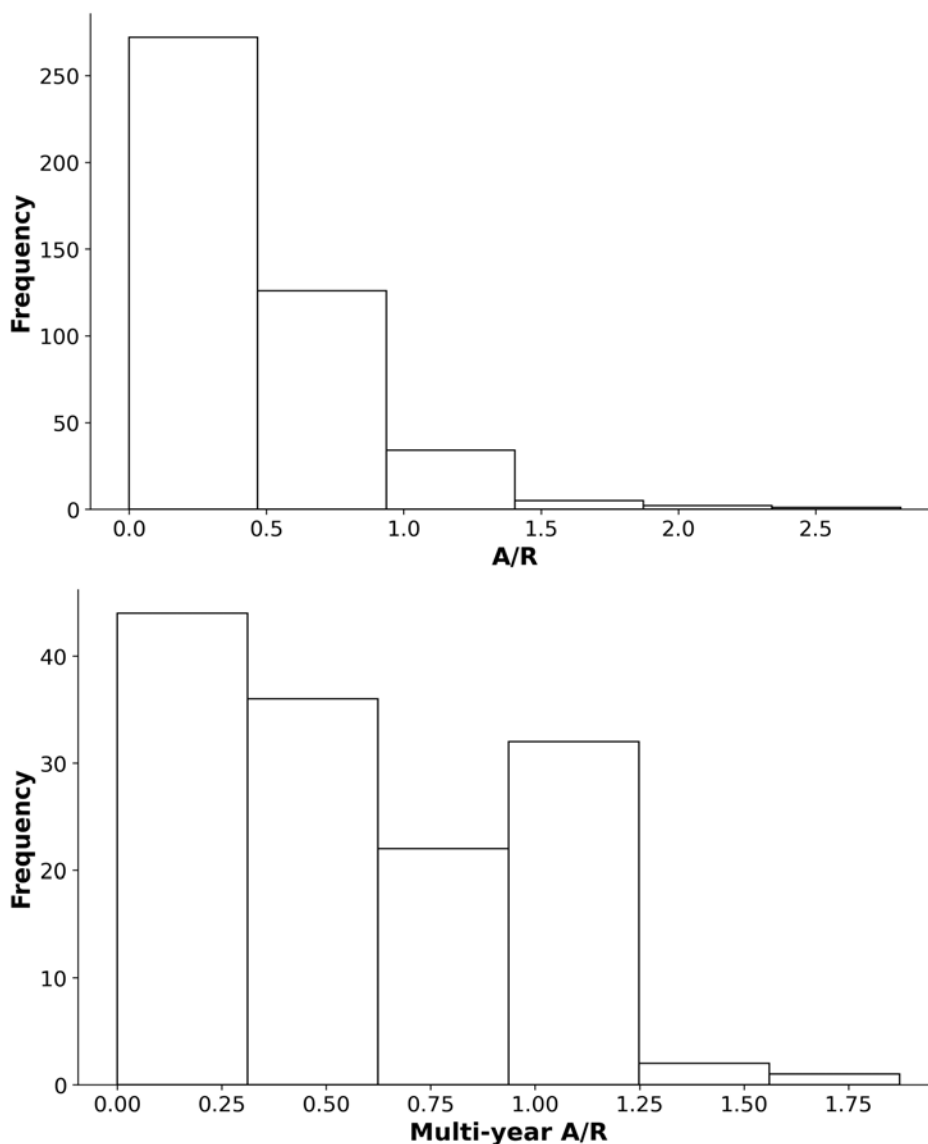
Values greater than 3 times the difference between the upper and lower whisker not shown to avoid skewing of plot.

15. HAY/FORAGE

Table 15-1. Summary statistics for HAY/FORAGE fields in Coalition.

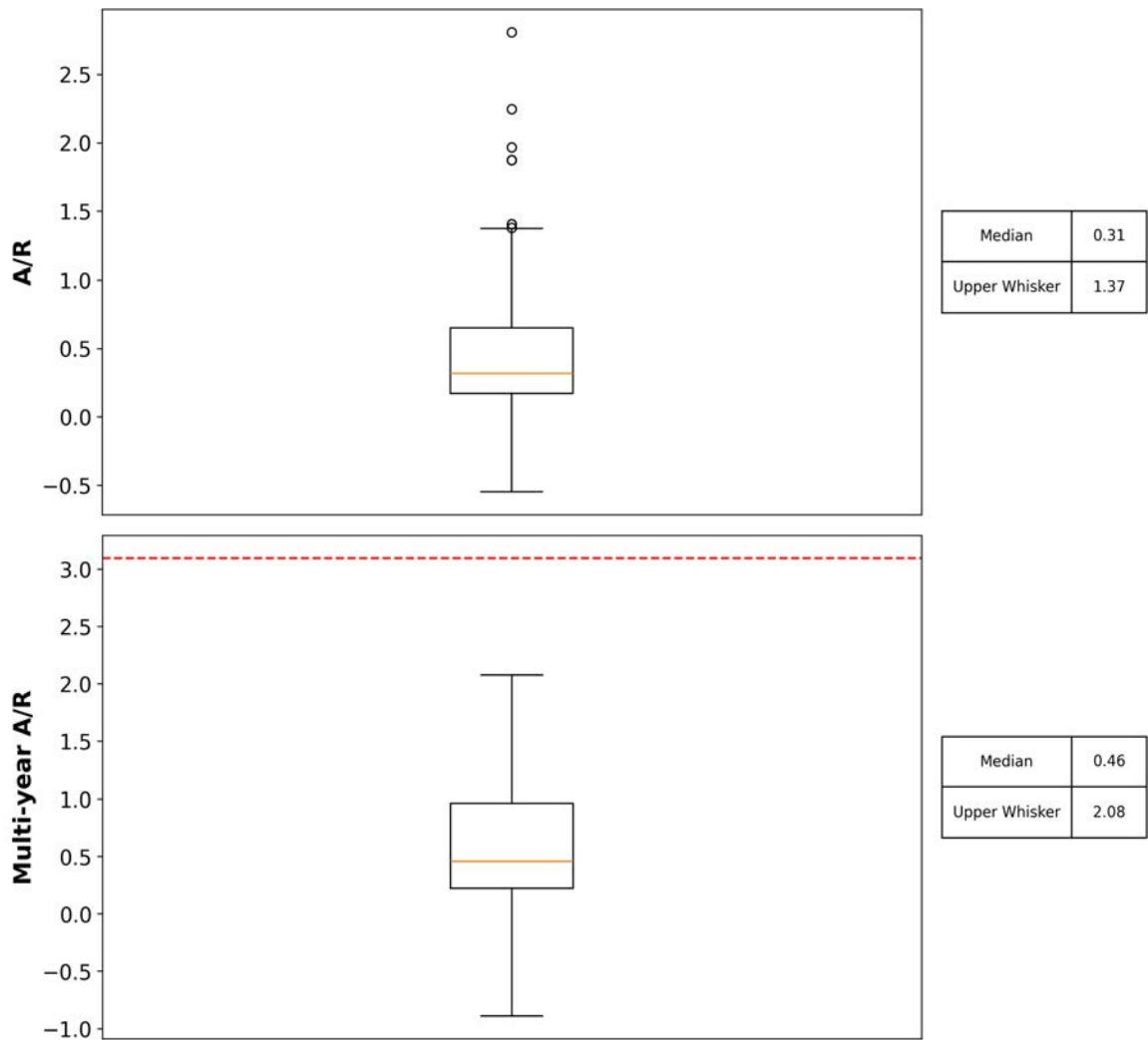
| Parameter | # Fields | Acreage | Mean | St. Dev. | Min | Max | Outlier Threshold | No. Outliers |
|----------------|----------|----------|---------|----------|---------|--------|-------------------|--------------|
| A/R | 439 | 21263.23 | 0.81 | 7.89 | 0.0 | 165.61 | -- | -- |
| A-R | 439 | 21263.23 | -131.63 | 136.19 | -1335.0 | 166.5 | -- | -- |
| Multi-year A/R | 134 | 7064.86 | 0.58 | 0.43 | 0.0 | 1.87 | 3.09 | 0 |
| Multi-year A-R | 134 | 7064.86 | -313.94 | 423.33 | -2299.6 | 372.8 | -- | -- |

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



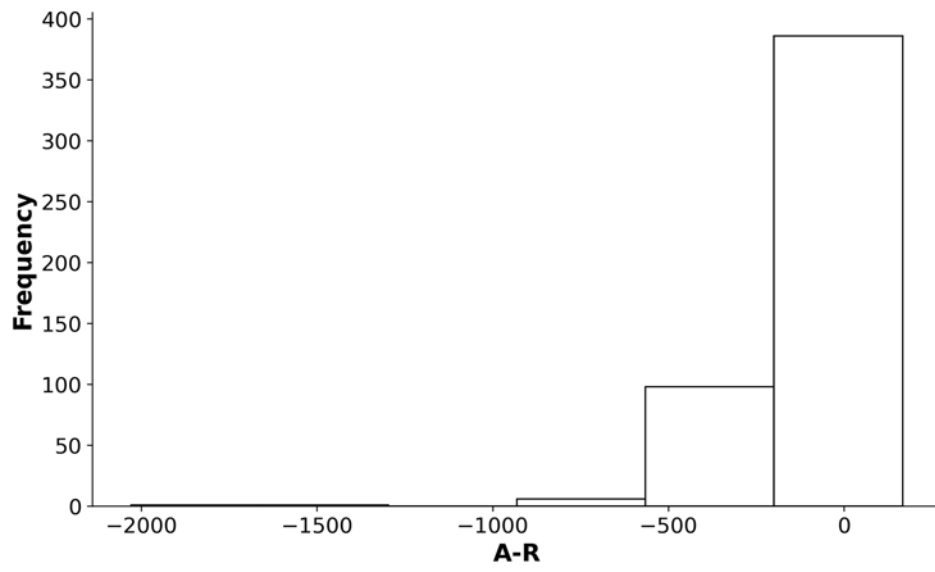
Values greater than 3 times the difference between the upper and lower whisker not shown to avoid skewing of plot.

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



The boxplot uses the standard method of Tukey (1977), and values greater than 3 times the difference between the upper and lower whisker are not shown to avoid skewing the plot. The red dashed line shows the outlier threshold which was calculated via the adjusted boxplot method of Hubert and Vandervieren (2008) using pooled 2020 – 2021 single year ratios. Any dots that exceed the red dashed line were outliers.

Figure 15-3. Histogram of A-R for HAY/FORAGE fields in the Coalition.



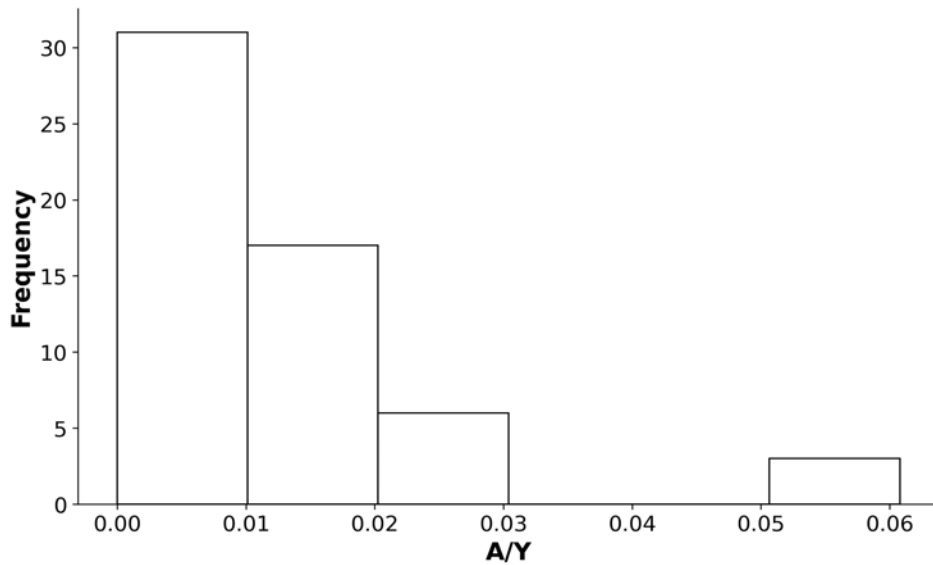
Values greater than 3 times the difference between the upper and lower whisker not shown to avoid skewing of plot.

16. KIWI

Table 16-1. Summary statistics for KIWI fields in Coalition.

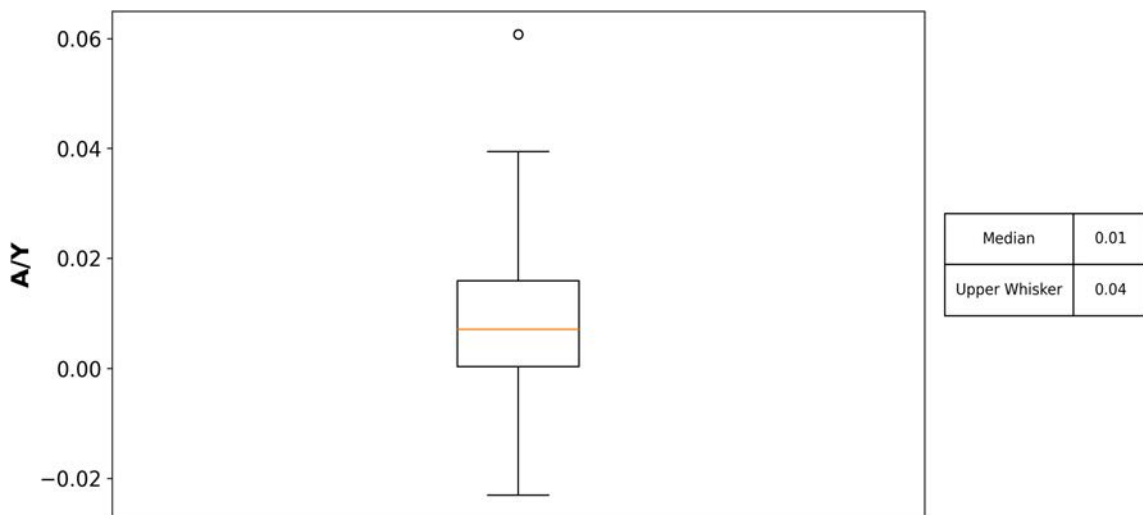
| Parameter | # Fields | Acreage | Mean | St. Dev. | Min | Max | Outlier Threshold | No. Outliers |
|-----------|----------|---------|------|----------|-----|------|-------------------|--------------|
| A/Y | 57 | 1343.39 | 0.01 | 0.01 | 0.0 | 0.06 | -- | -- |

Figure 16-1. Histogram of A/Y for KIWI fields in the Coalition.



Values greater than 3 times the difference between the upper and lower whisker not shown to avoid skewing of plot

Figure 16-2. Box and whisker plot of A/Y for KIWI fields in the Coalition.



Values greater than 3 times 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.

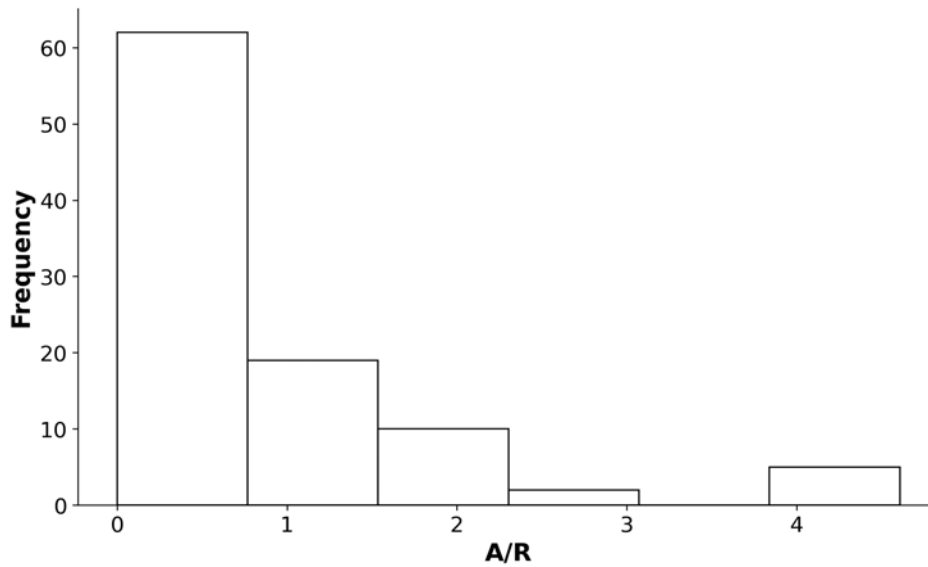
17. OAT - HAY

Table 17-1. Summary statistics for OAT - HAY fields in Coalition.

| Parameter | # Fields | Acreage | Mean | St. Dev. | Min | Max | Outlier Threshold | No. Outliers |
|-----------|----------|---------|--------|----------|--------|--------|-------------------|--------------|
| A/R | 98 | 3422.02 | 0.81 | 1.1 | 0.0 | 4.61 | 9.55 | 0 |
| A-R | 102 | 3635.62 | -25.33 | 77.21 | -282.1 | 258.95 | -- | -- |

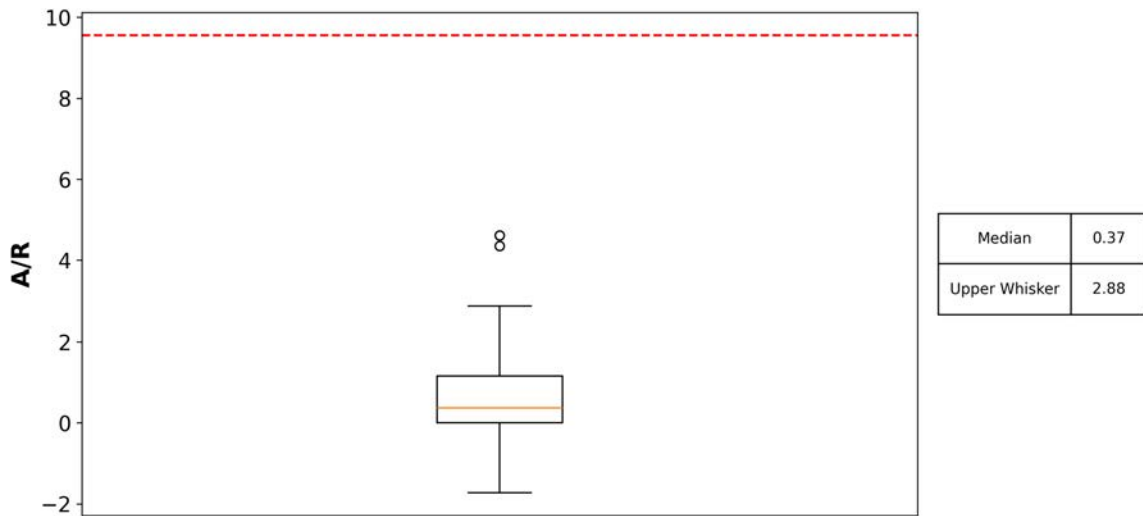
Outliers for annual crops are single year outliers in 2022 and either 2021 or 2020.

Figure 17-1. Histogram of A/R for OAT - HAY fields in the Coalition.



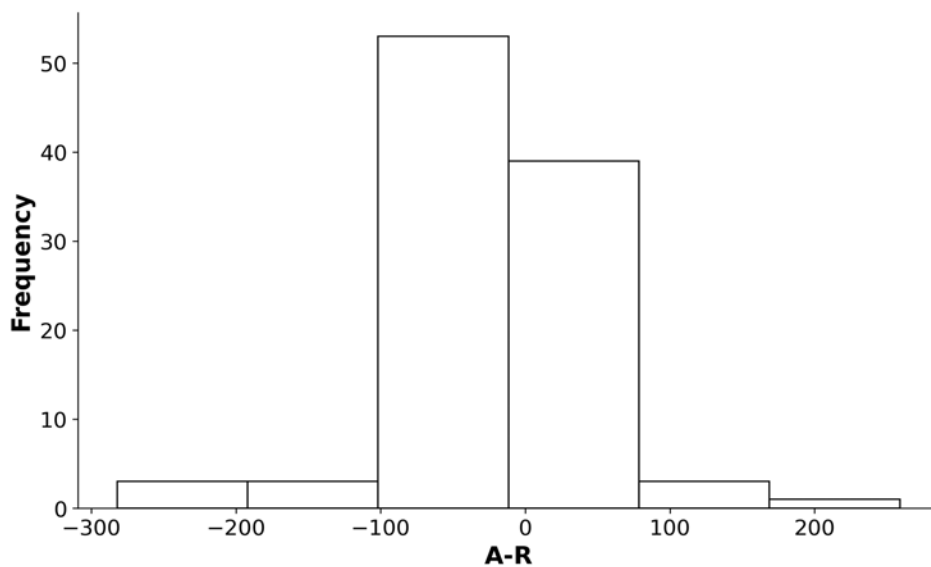
Values greater than 3 times the difference between the upper and lower whisker not shown to avoid skewing of plot.

Figure 17-2. Box and whisker plot of A/R for OAT - HAY fields in the Coalition.



The boxplot uses the standard method of Tukey (1977), and values greater than 3 times the difference between the upper and lower whisker are not shown to avoid skewing the plot. The red dashed line shows the outlier threshold which was calculated via the adjusted boxplot method of Hubert and Vandervieren (2008) using pooled 2020 – 2022 single year ratios. Outliers for 2022 CY annual crop fields are any dots above the red dashed line that were also outliers in either the 2021 or 2020 CY for any crop.

Figure 17-3. Histogram of A-R for OAT - HAY fields in the Coalition.



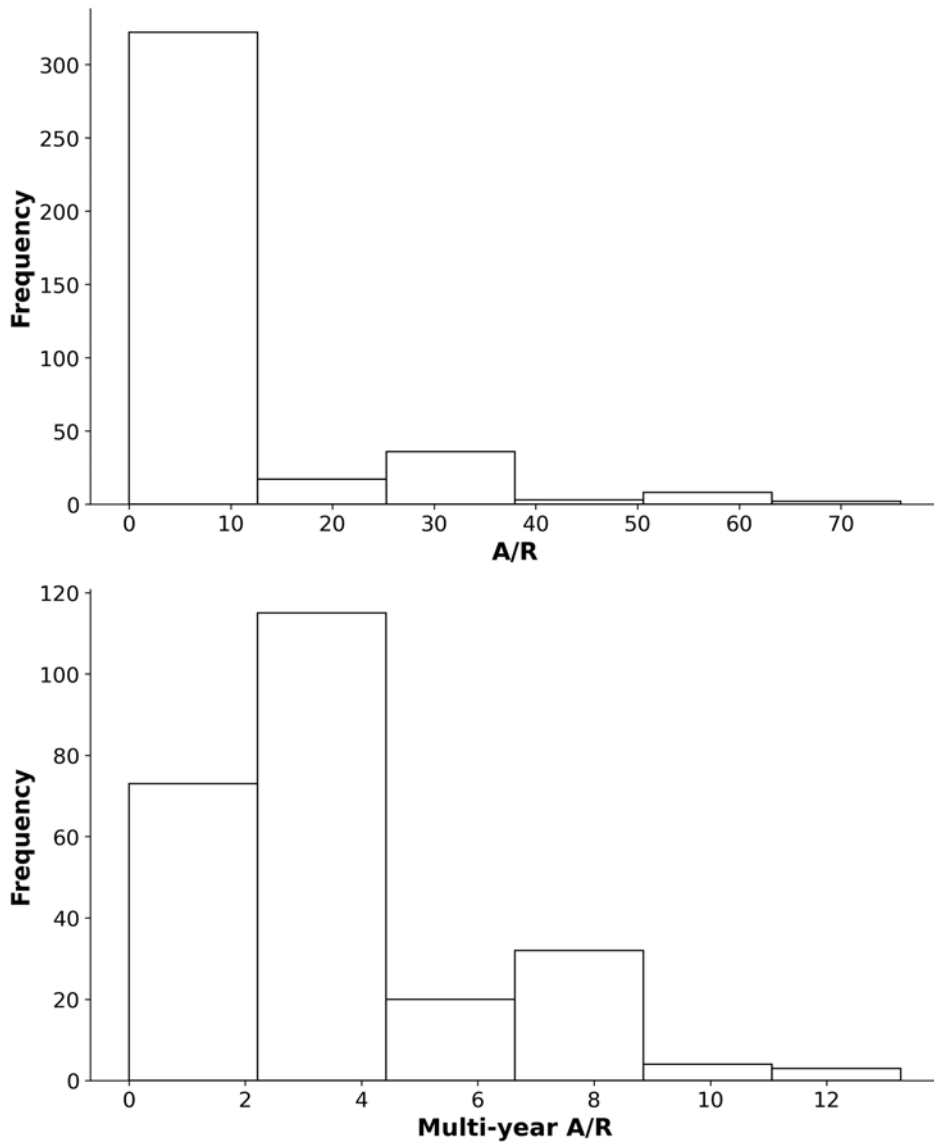
Values greater than 3 times the difference between the upper and lower whisker not shown to avoid skewing of plot.

18. OLIVE

Table 18-1. Summary statistics for OLIVE fields in Coalition.

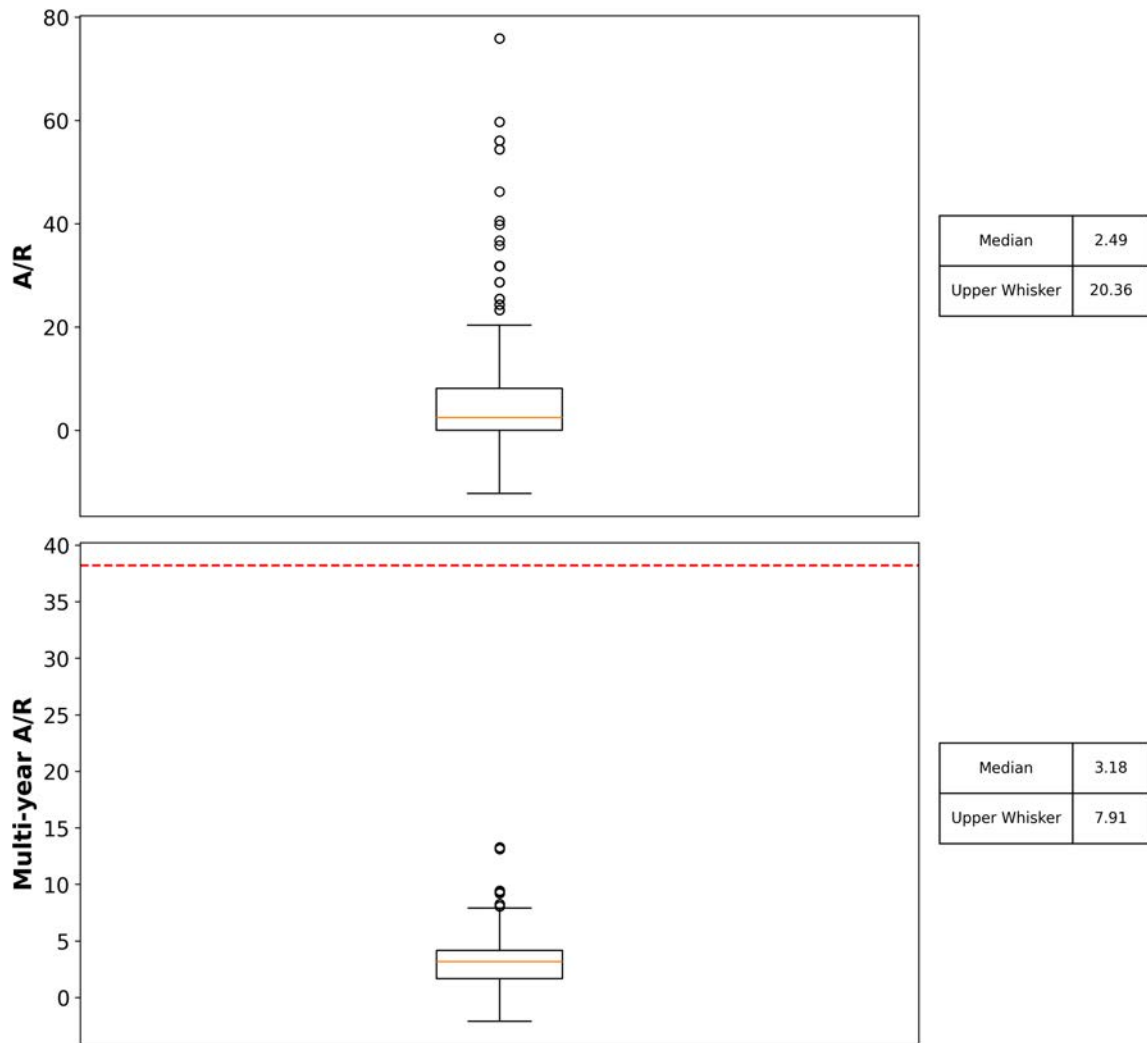
| Parameter | # Fields | Acreage | Mean | St. Dev. | Min | Max | Outlier Threshold | No. Outliers |
|----------------|----------|----------|--------|----------|--------|--------|-------------------|--------------|
| A/R | 372 | 14129.9 | 7.47 | 12.5 | 0.0 | 75.86 | -- | -- |
| A-R | 372 | 14129.9 | 35.46 | 65.32 | -157.0 | 579.19 | -- | -- |
| Multi-year A/R | 247 | 10425.68 | 3.43 | 2.59 | 0.0 | 13.27 | 38.2 | 0 |
| Multi-year A-R | 247 | 10425.68 | 140.65 | 145.75 | -219.8 | 670.35 | -- | -- |

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



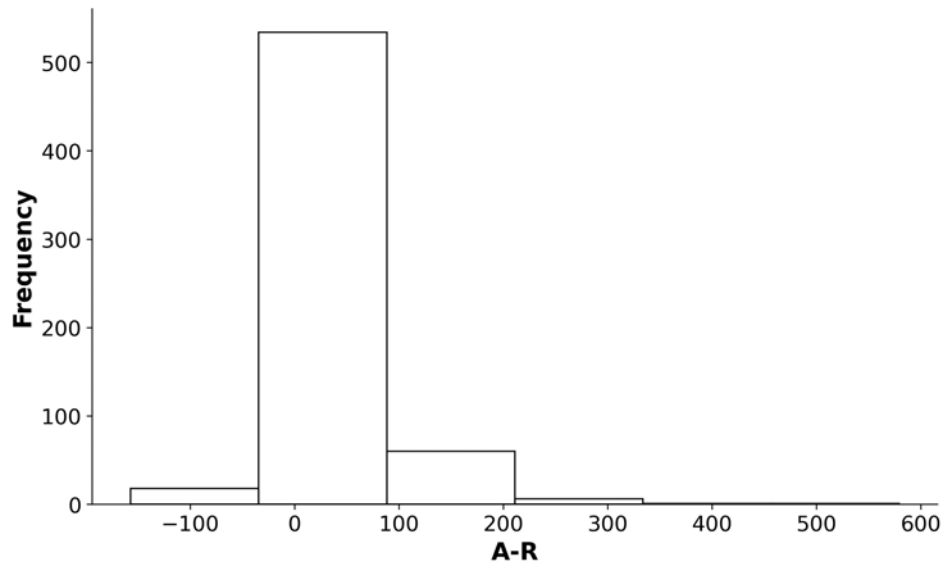
Values greater than 3 times the difference between the upper and lower whisker not shown to avoid skewing of plot.

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



The boxplot uses the standard method of Tukey (1977), and values greater than 3 times the difference between the upper and lower whisker are not shown to avoid skewing the plot. The red dashed line shows the outlier threshold which was calculated via the adjusted boxplot method of Hubert and Vandervieren (2008) using pooled 2020 – 2021 single year ratios. Any dots that exceed the red dashed line were outliers.

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



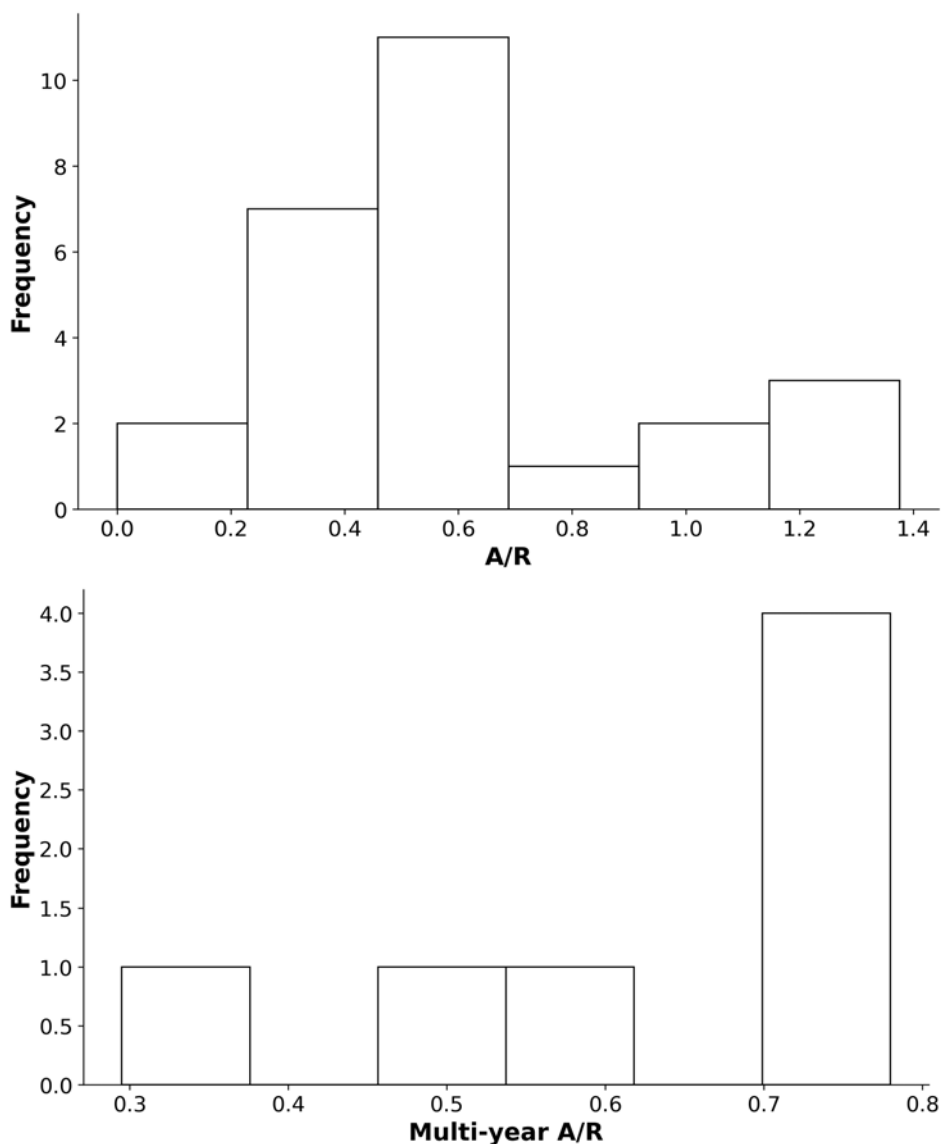
Values greater than 3 times the difference between the upper and lower whisker not shown to avoid skewing of plot.

19. ORCHARD GRASS - HAY

Table 19-1. Summary statistics for ORCHARD GRASS - HAY fields in Coalition.

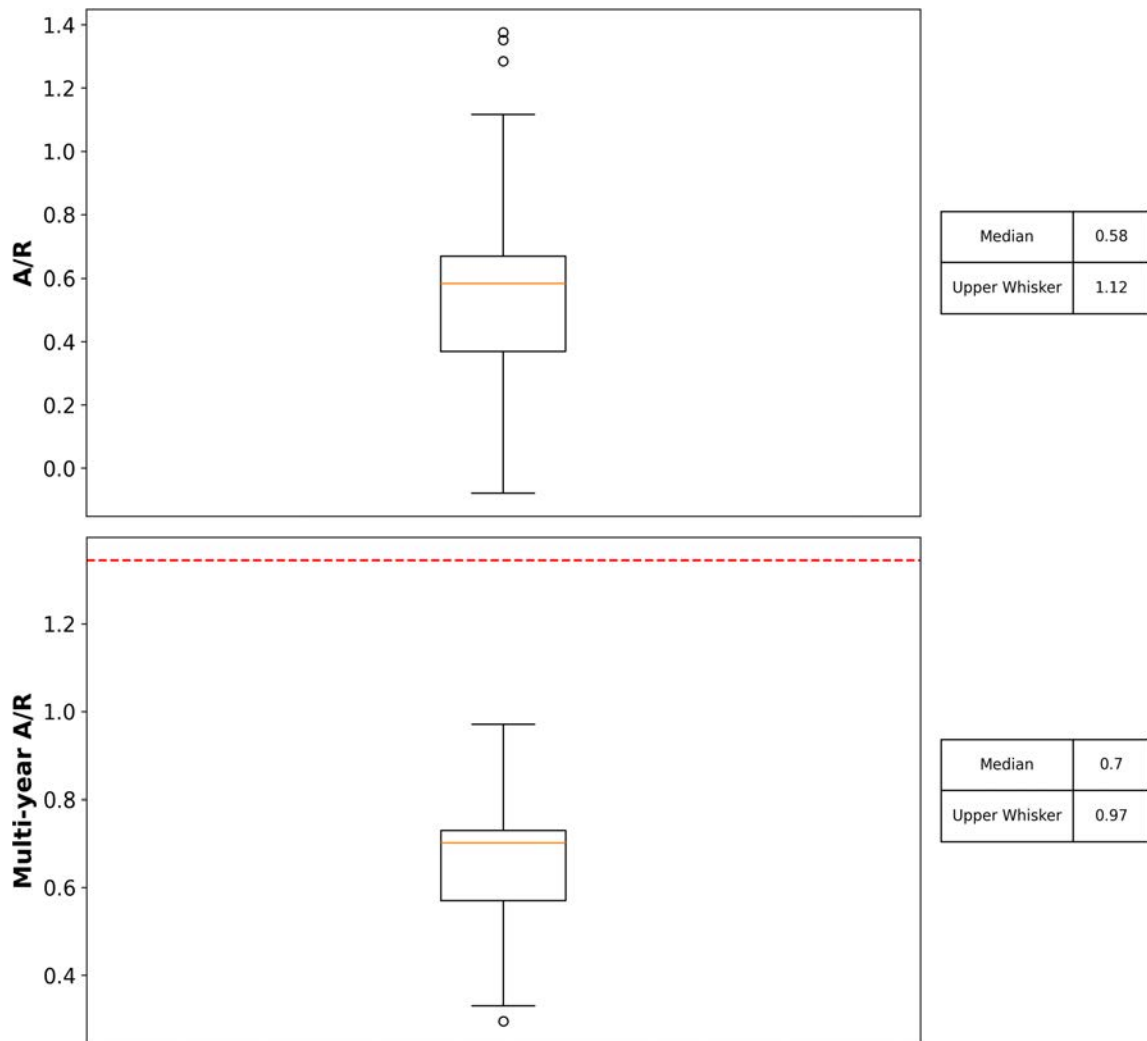
| Parameter | # Fields | Acreage | Mean | St. Dev. | Min | Max | Outlier Threshold | No. Outliers |
|----------------|----------|---------|---------|----------|--------|--------|-------------------|--------------|
| A/R | 26 | 1669.26 | 0.61 | 0.36 | 0.0 | 1.38 | -- | -- |
| A-R | 26 | 1669.26 | -100.99 | 98.98 | -243.5 | 91.12 | -- | -- |
| Multi-year A/R | 7 | 508.0 | 0.63 | 0.17 | 0.3 | 0.78 | 1.34 | 0 |
| Multi-year A-R | 7 | 508.0 | -318.61 | 160.15 | -544.5 | -144.0 | -- | -- |

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



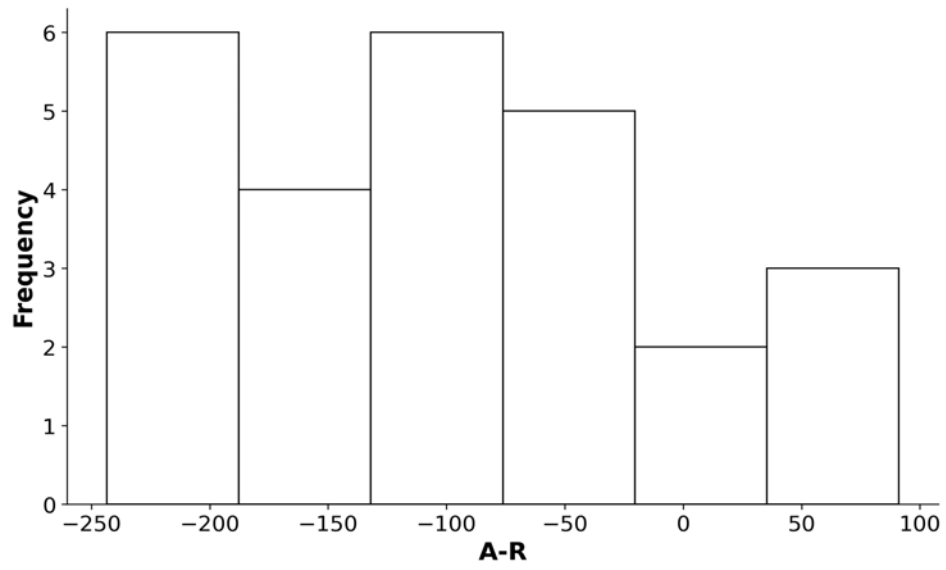
Values greater than 3 times the difference between the upper and lower whisker not shown to avoid skewing of plot.

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



The boxplot uses the standard method of Tukey (1977), and values greater than 3 times the difference between the upper and lower whisker are not shown to avoid skewing the plot. The red dashed line shows the outlier threshold which was calculated via the adjusted boxplot method of Hubert and Vandervieren (2008) using pooled 2020 – 2021 single year ratios. Any dots that exceed the red dashed line were outliers.

Figure 19-3. Histogram of A-R for ORCHARD GRASS - HAY fields in the Coalition.



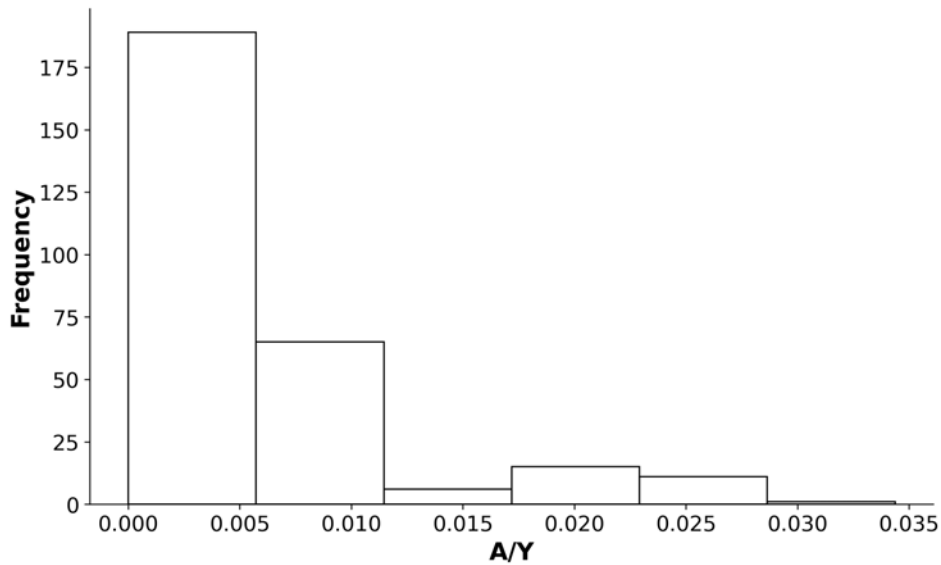
Values greater than 3 times the difference between the upper and lower whisker not shown to avoid skewing of plot.

20. PASTURE

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

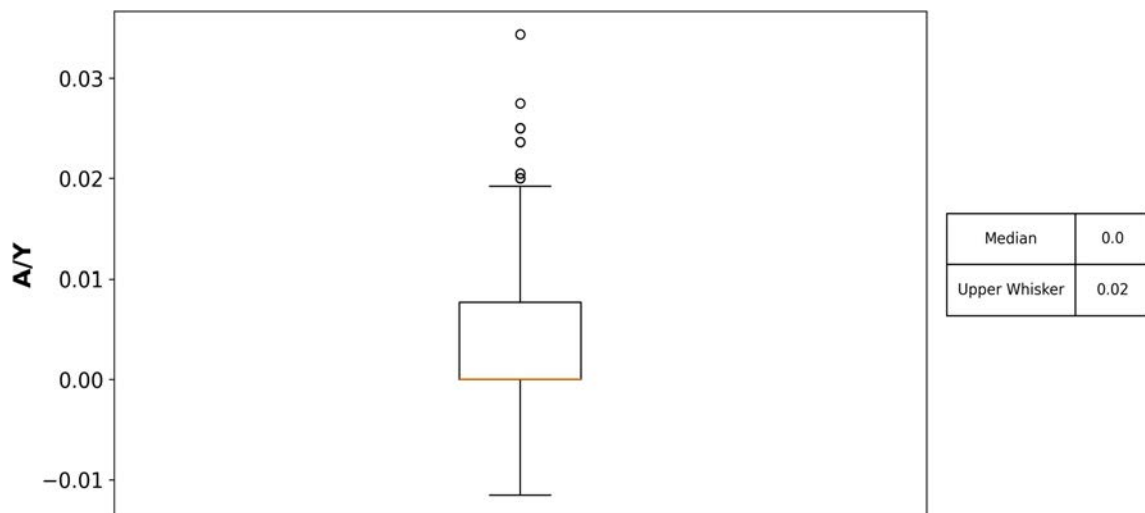
| Parameter | # Fields | Acreage | Mean | St. Dev. | Min | Max | Outlier Threshold | No. Outliers |
|-----------|----------|----------|------|----------|-----|------|-------------------|--------------|
| A/Y | 113 | 10559.38 | 0.01 | 0.01 | 0.0 | 0.03 | -- | -- |

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



Values greater than 3 times 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 PASTURE fields in the Coalition.



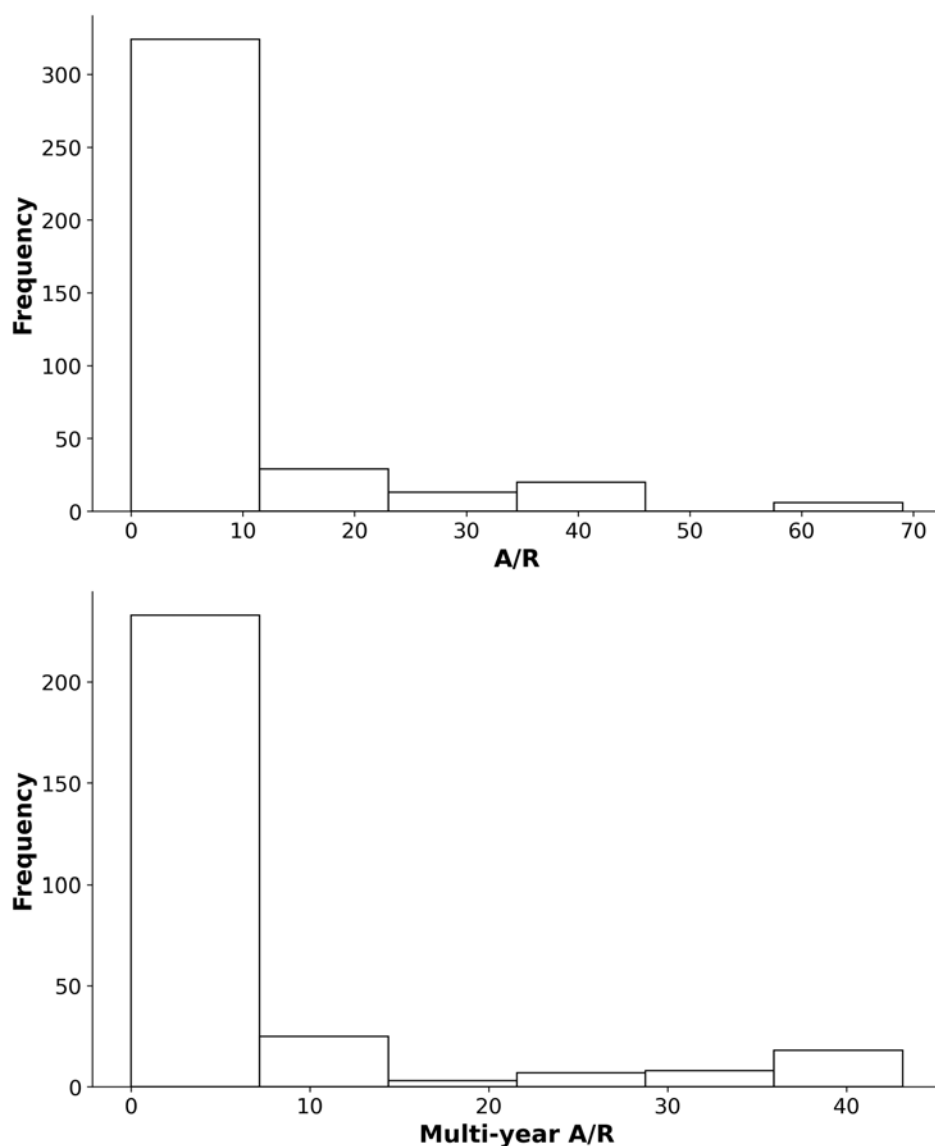
Values greater than 3 times the difference between the upper and lower whisker not shown to avoid skewing of plot. The whiskers are the medcouple values with the upper whisker being the outlier threshold. Dots are outliers.

21. PEACH/NECTARINE

Table 21-1. Summary statistics for PEACH/NECTARINE fields in Coalition.

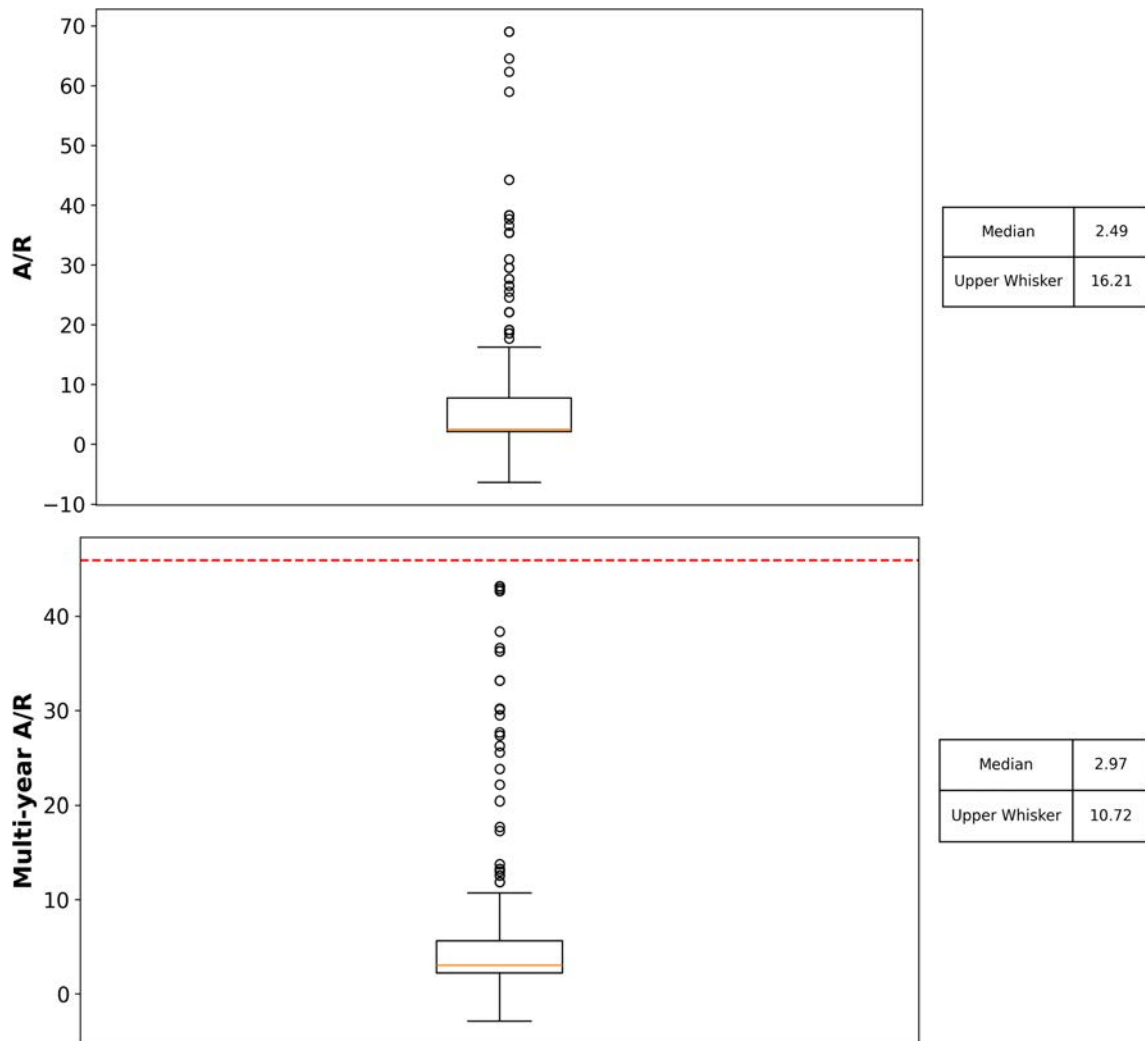
| Parameter | # Fields | Acreage | Mean | St. Dev. | Min | Max | Outlier Threshold | No. Outliers |
|----------------|----------|---------|--------|----------|---------|--------|-------------------|--------------|
| A/R | 385 | 8624.18 | 7.58 | 11.92 | 0.0 | 69.03 | -- | -- |
| A-R | 385 | 8624.18 | 75.82 | 67.1 | -39.46 | 445.78 | -- | -- |
| Multi-year A/R | 299 | 6714.48 | 8.23 | 12.93 | 0.0 | 66.37 | 45.91 | 5 |
| Multi-year A-R | 299 | 6714.48 | 240.64 | 157.02 | -189.84 | 884.64 | -- | -- |

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



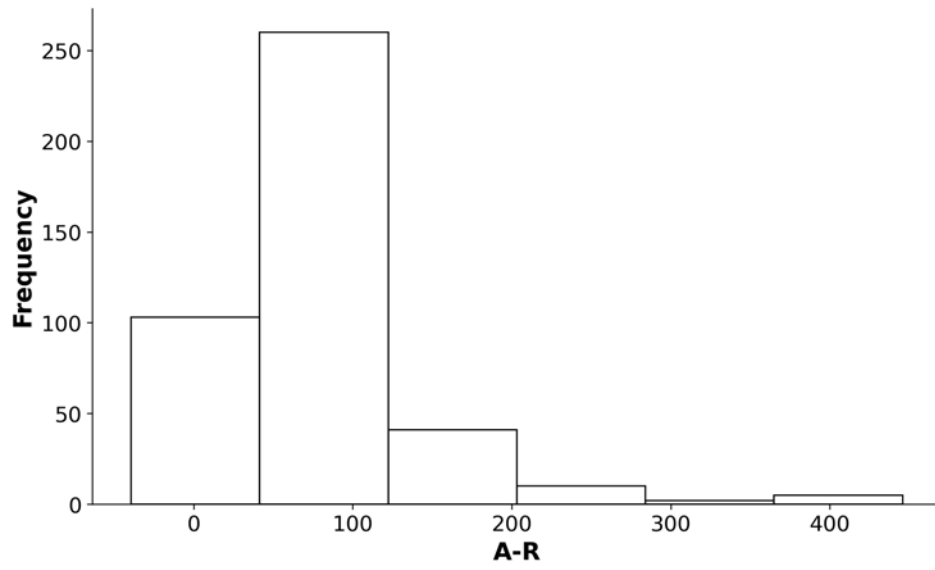
Values greater than 3 times the difference between the upper and lower whisker not shown to avoid skewing of plot.

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



The boxplot uses the standard method of Tukey (1977), and values greater than 3 times the difference between the upper and lower whisker are not shown to avoid skewing the plot. The red dashed line shows the outlier threshold which was calculated via the adjusted boxplot method of Hubert and Vandervieren (2008) using pooled 2020 – 2021 single year ratios. Any dots that exceed the red dashed line were outliers.

Figure 21-3. Histogram of A-R for PEACH/NECTARINE fields in the Coalition.



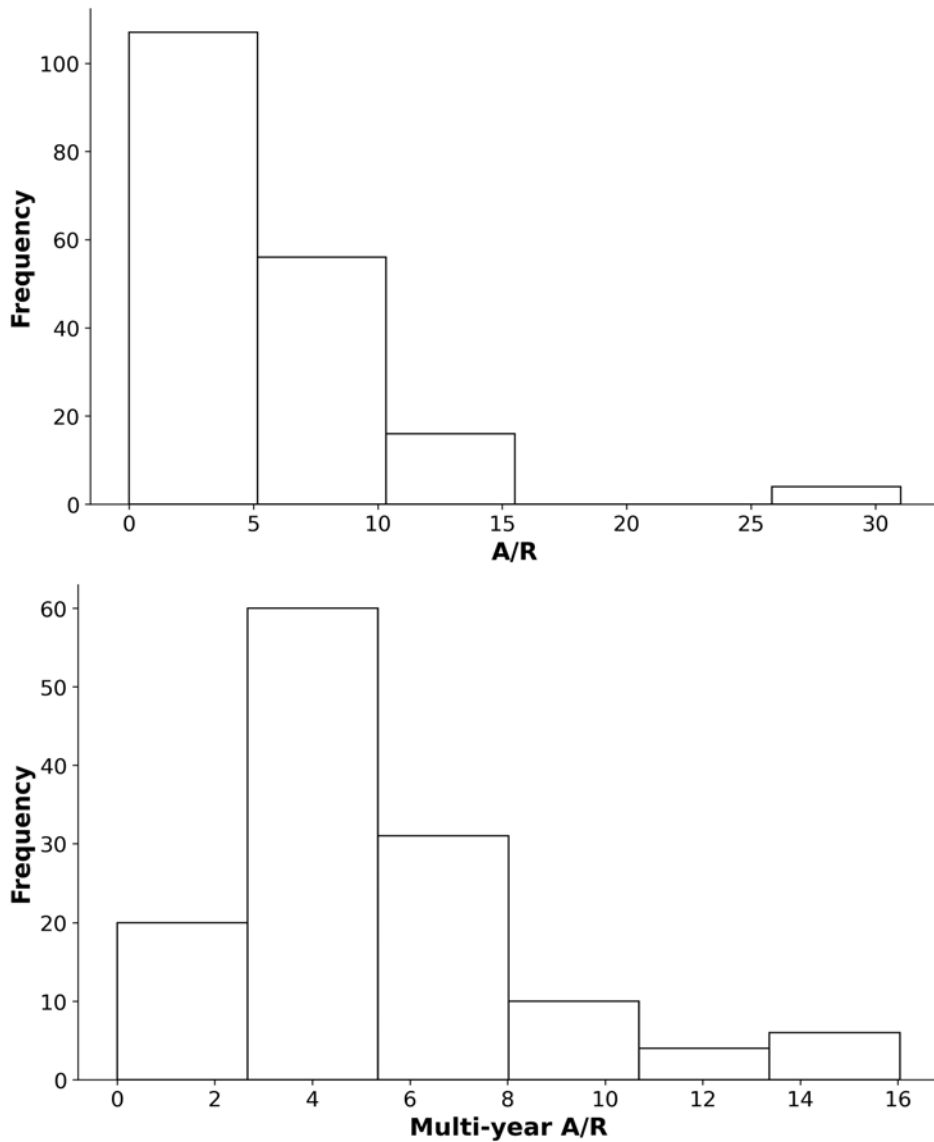
Values greater than 3 times the difference between the upper and lower whisker not shown to avoid skewing of plot.

22. PEAR

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

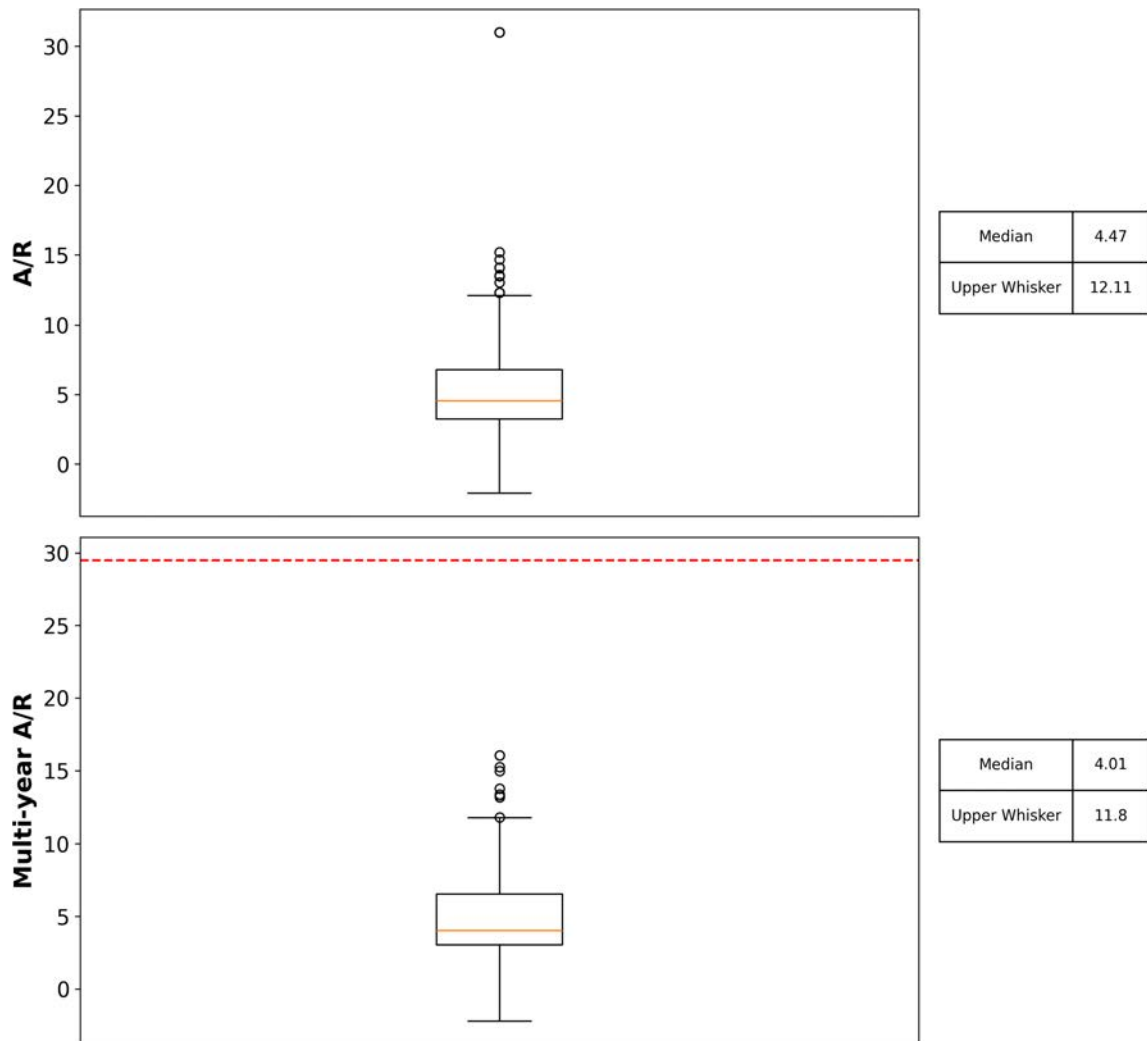
| Parameter | # Fields | Acreage | Mean | St. Dev. | Min | Max | Outlier Threshold | No. Outliers |
|----------------|----------|---------|--------|----------|--------|--------|-------------------|--------------|
| A/R | 181 | 5983.77 | 5.86 | 5.02 | 0.0 | 31.01 | -- | -- |
| A-R | 181 | 5983.77 | 84.98 | 57.57 | -33.14 | 226.32 | -- | -- |
| Multi-year A/R | 131 | 4513.5 | 5.25 | 3.31 | 0.0 | 16.04 | 29.49 | 0 |
| Multi-year A-R | 131 | 4513.5 | 213.72 | 105.85 | -40.62 | 425.47 | -- | -- |

Figure 22-1. Histogram of A/R for PEAR fields in the Coalition.



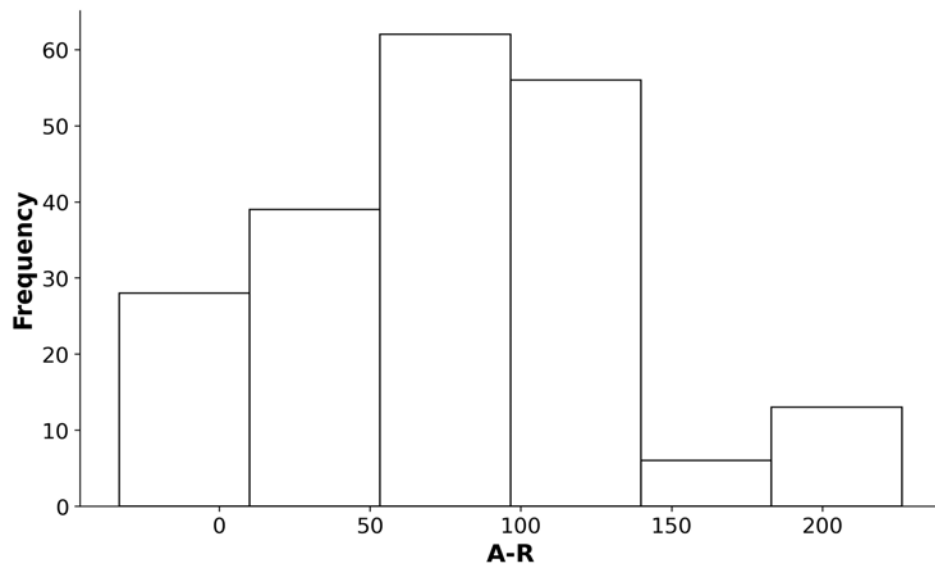
Values greater than 3 times the difference between the upper and lower whisker not shown to avoid skewing of plot.

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



The boxplot uses the standard method of Tukey (1977), and values greater than 3 times the difference between the upper and lower whisker are not shown to avoid skewing the plot. The red dashed line shows the outlier threshold which was calculated via the adjusted boxplot method of Hubert and Vandervieren (2008) using pooled 2020 – 2021 single year ratios. Any dots that exceed the red dashed line were outliers.

Figure 22-3. Histogram of A-R for PEAR fields in the Coalition.



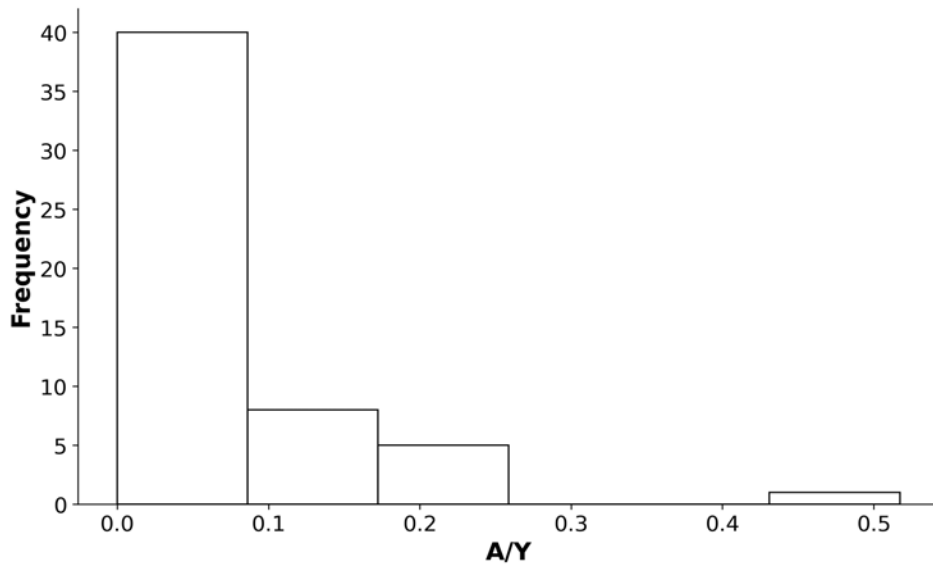
Values greater than 3 times the difference between the upper and lower whisker not shown to avoid skewing of plot.

23. PECAN

Table 23-1. Summary statistics for PECAN fields in Coalition.

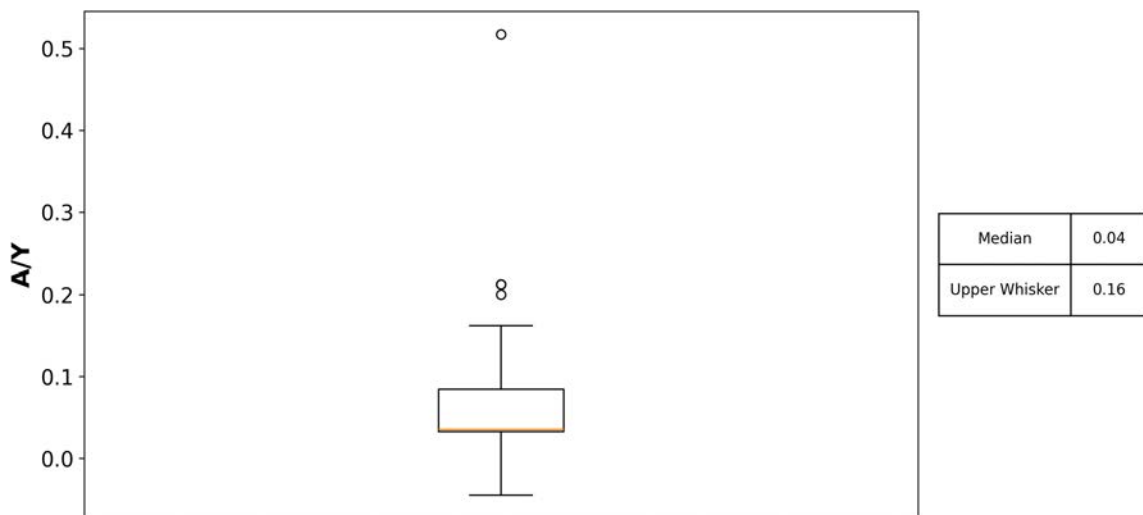
| Parameter | # Fields | Acreage | Mean | St. Dev. | Min | Max | Outlier Threshold | No. Outliers |
|-----------|----------|---------|------|----------|-----|------|-------------------|--------------|
| A/Y | 54 | 1252.53 | 0.07 | 0.09 | 0.0 | 0.52 | -- | -- |

Figure 23-1. Histogram of A/Y for PECAN fields in the Coalition.



Values greater than 3 times 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 PECAN fields in the Coalition.



Values greater than 3 times 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.

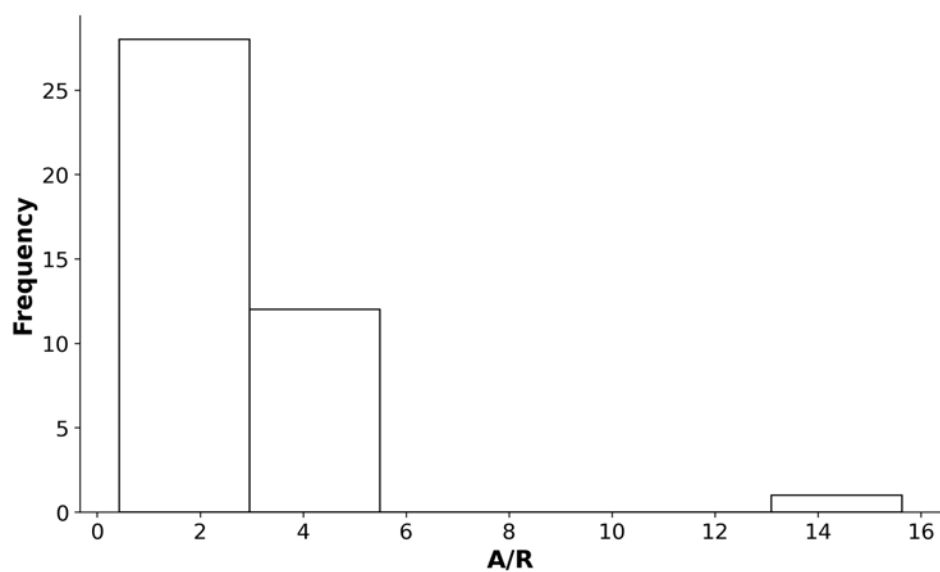
24. PEPPER

Table 24-1. Summary statistics for PEPPER fields in Coalition.

| Parameter | # Fields | Acreage | Mean | St. Dev. | Min | Max | Outlier Threshold | No. Outliers |
|-----------|----------|---------|-------|----------|-------|-------|-------------------|--------------|
| A/R | 41 | 1314.32 | 2.59 | 2.4 | 0.43 | 15.63 | 5.31 | 1 |
| A-R | 41 | 1314.32 | 88.53 | 61.38 | -5.68 | 280.8 | -- | -- |

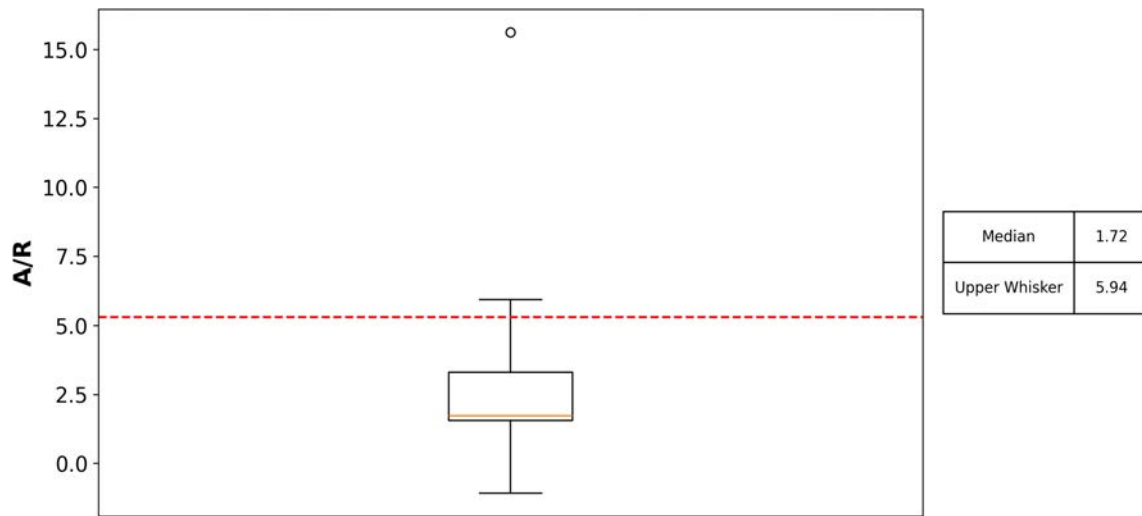
Outliers for annual crops are single year outliers in 2022 and either 2021 or 2020.

Figure 24-1. Histogram of A/R for PEPPER fields in the Coalition.



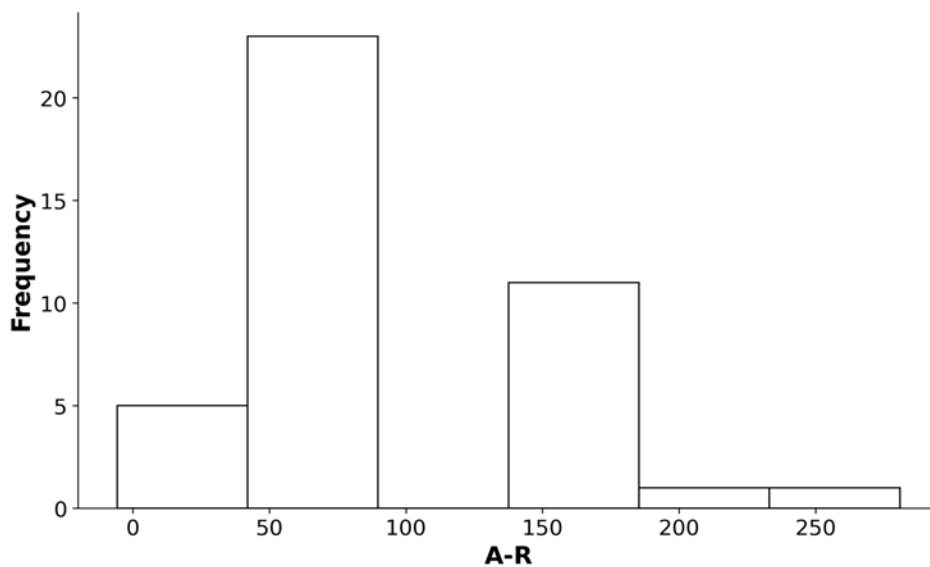
Values greater than 3 times the difference between the upper and lower whisker not shown to avoid skewing of plot.

Figure 24-2. Box and whisker plot of A/R for PEPPER fields in the Coalition.



The boxplot uses the standard method of Tukey (1977), and values greater than 3 times the difference between the upper and lower whisker are not shown to avoid skewing the plot. The red dashed line shows the outlier threshold which was calculated via the adjusted boxplot method of Hubert and Vandervieren (2008) using pooled 2020 – 2022 single year ratios. Outliers for 2022 CY annual crop fields are any dots above the red dashed line that were also outliers in either the 2021 or 2020 CY for any crop.

Figure 24-3. Histogram of A-R for PEPPER fields in the Coalition.



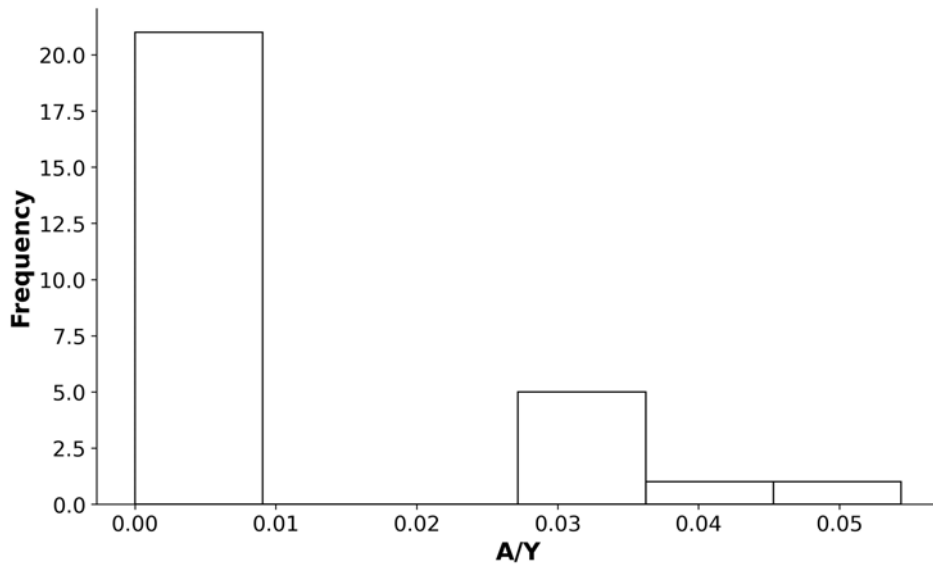
Values greater than 3 times the difference between the upper and lower whisker not shown to avoid skewing of plot.

25. PERSIMMON

Table 25-1. Summary statistics for PERSIMMON fields in Coalition.

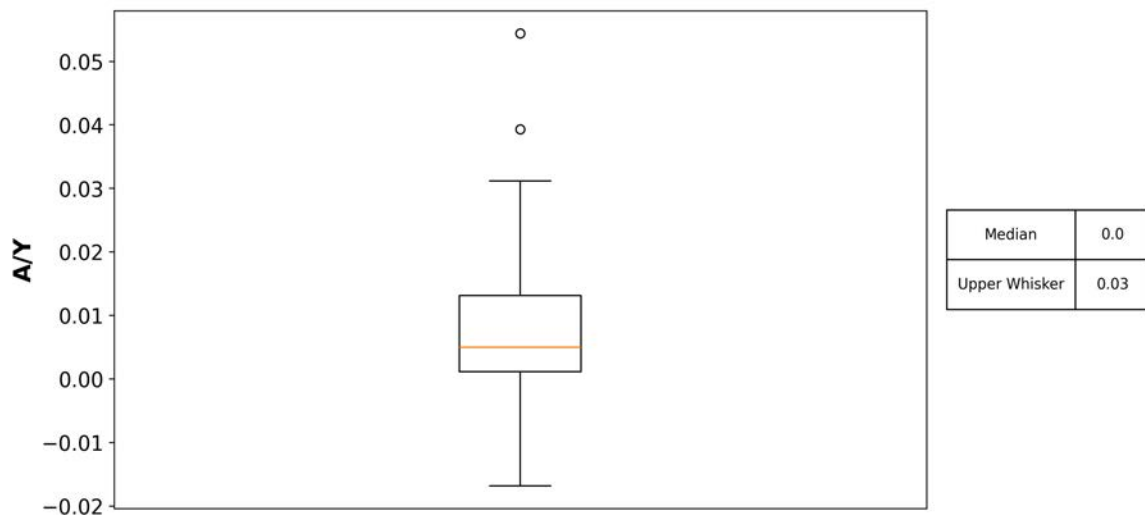
| Parameter | # Fields | Acreage | Mean | St. Dev. | Min | Max | Outlier Threshold | No. Outliers |
|-----------|----------|---------|------|----------|-----|------|-------------------|--------------|
| A/Y | 27 | 338.73 | 0.01 | 0.01 | 0.0 | 0.04 | -- | -- |

Figure 25-1. Histogram of A/Y for PERSIMMON fields in the Coalition.



Values greater than 3 times 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 PERSIMMON fields in the Coalition.



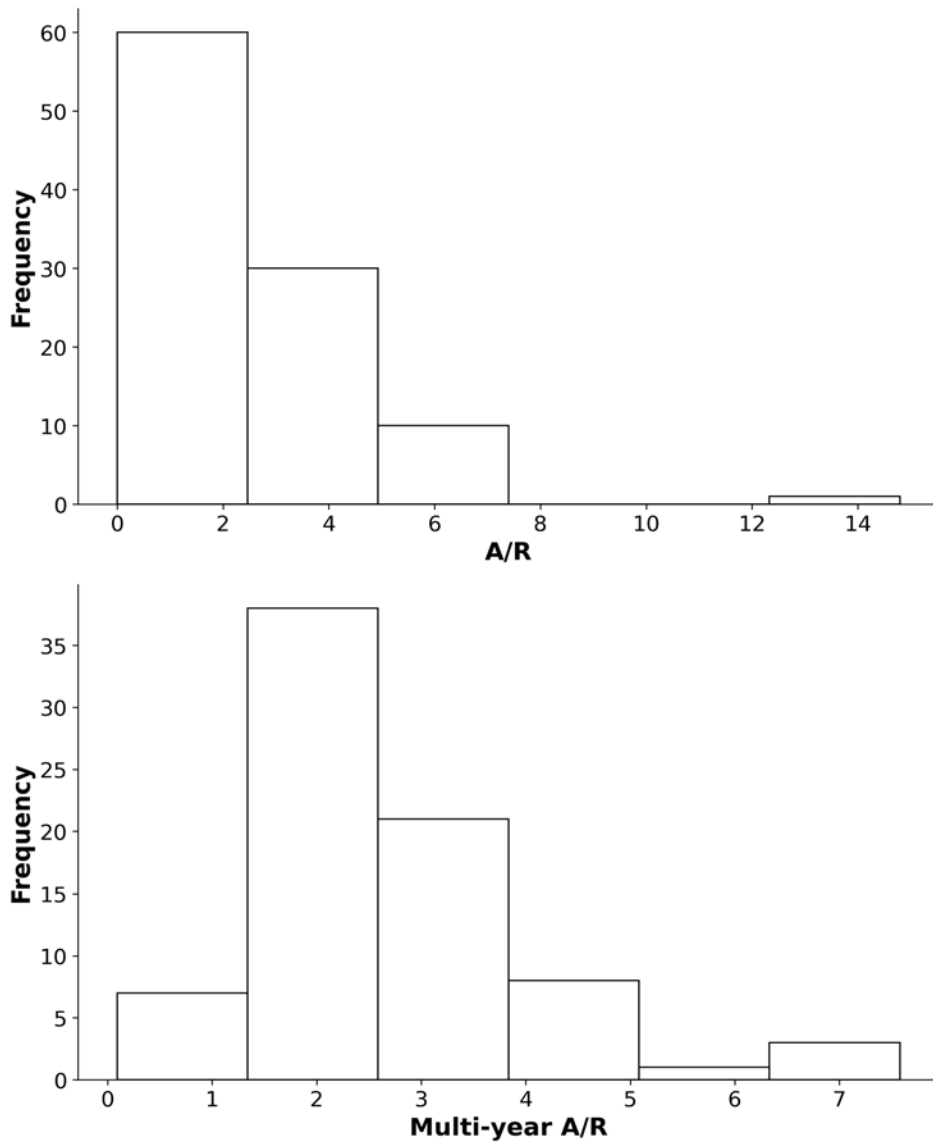
Values greater than 3 times the difference between the upper and lower whisker not shown to avoid skewing of plot. The whiskers are the medcouple values with the upper whisker being the outlier threshold. Dots are outliers.

26. PISTACHIO

Table 26-1. Summary statistics for PISTACHIO fields in Coalition.

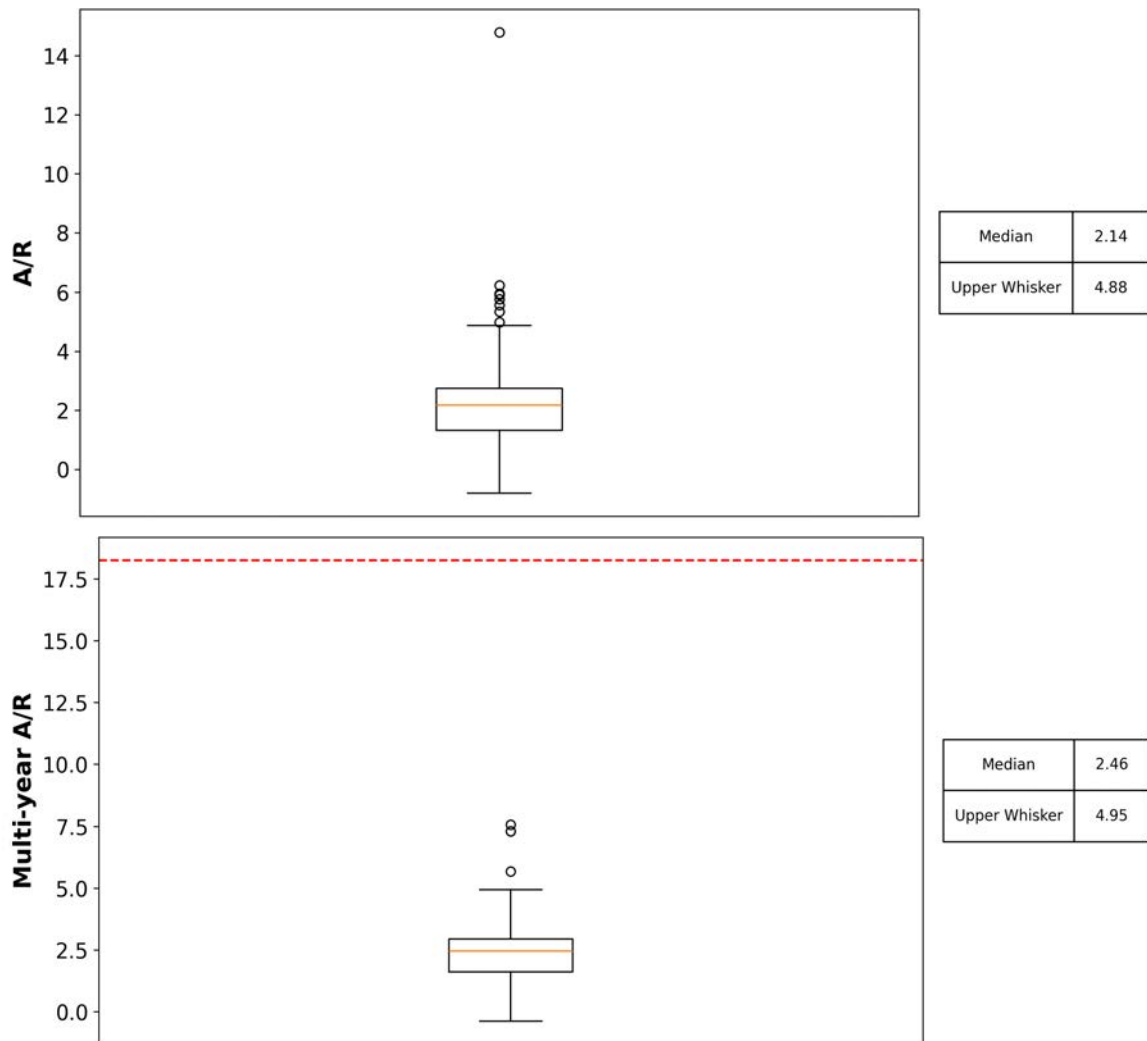
| Parameter | # Fields | Acreage | Mean | St. Dev. | Min | Max | Outlier Threshold | No. Outliers |
|----------------|----------|---------|--------|----------|---------|--------|-------------------|--------------|
| A/R | 100 | 6137.46 | 2.33 | 1.54 | 0.0 | 6.24 | -- | -- |
| A-R | 100 | 6137.46 | 60.91 | 73.7 | -105.72 | 346.26 | -- | -- |
| Multi-year A/R | 78 | 4750.26 | 2.58 | 1.47 | 0.09 | 7.58 | 18.26 | 0 |
| Multi-year A-R | 78 | 4750.26 | 226.68 | 180.49 | -199.58 | 871.89 | -- | -- |

Figure 26-1. Histogram of A/R for PISTACHIO fields in the Coalition.



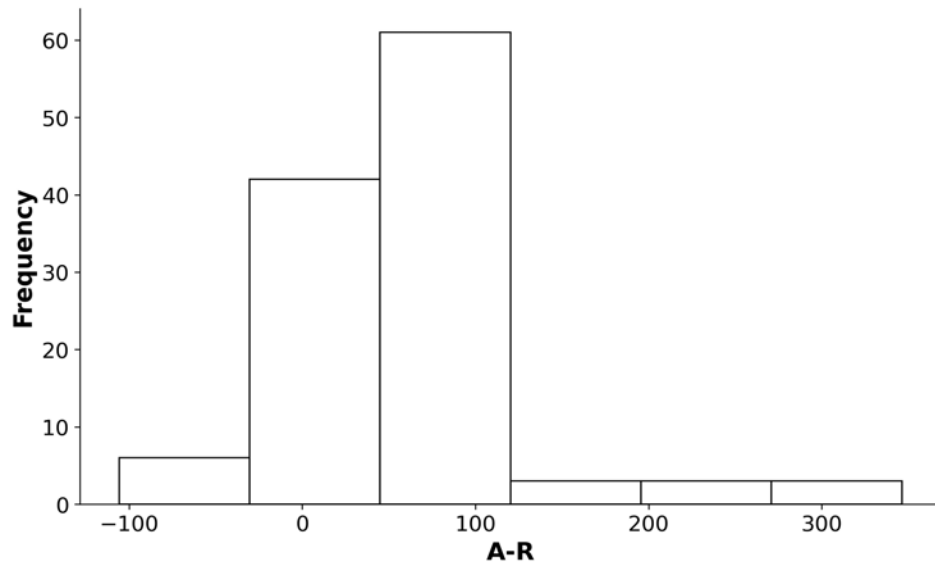
Values greater than 3 times the difference between the upper and lower whisker not shown to avoid skewing of plot.

Figure 26-2. Box and whisker plot of A/R for PISTACHIO fields in the Coalition.



The boxplot uses the standard method of Tukey (1977), and values greater than 3 times the difference between the upper and lower whisker are not shown to avoid skewing the plot. The red dashed line shows the outlier threshold which was calculated via the adjusted boxplot method of Hubert and Vandervieren (2008) using pooled 2020 – 2021 single year ratios. Any dots that exceed the red dashed line were outliers.

Figure 26-3. Histogram of A-R for PISTACHIO fields in the Coalition.



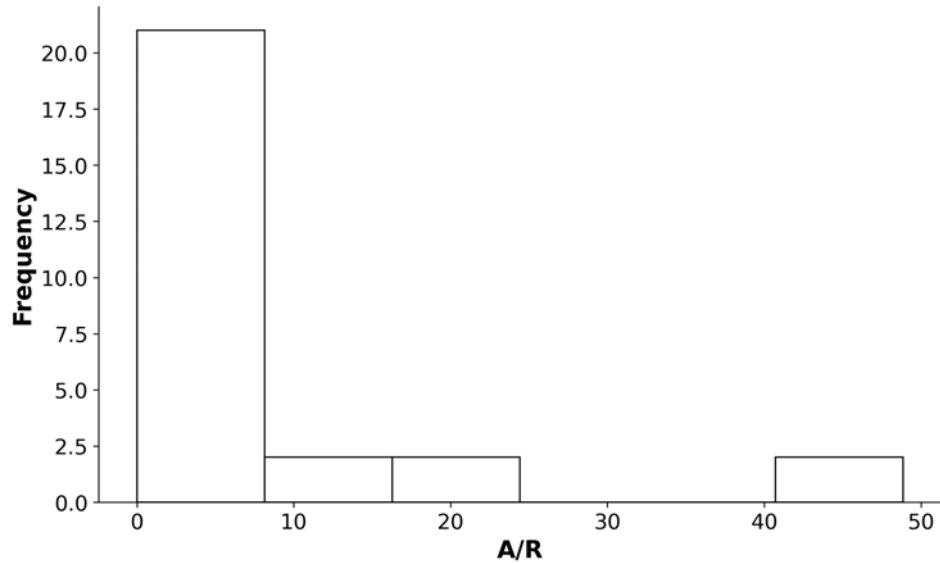
Values greater than 3 times the difference between the upper and lower whisker not shown to avoid skewing of plot.

27. PISTACHIO-YOUNG

Table 27-1. Summary statistics for PISTACHIO-YOUNG fields in Coalition.

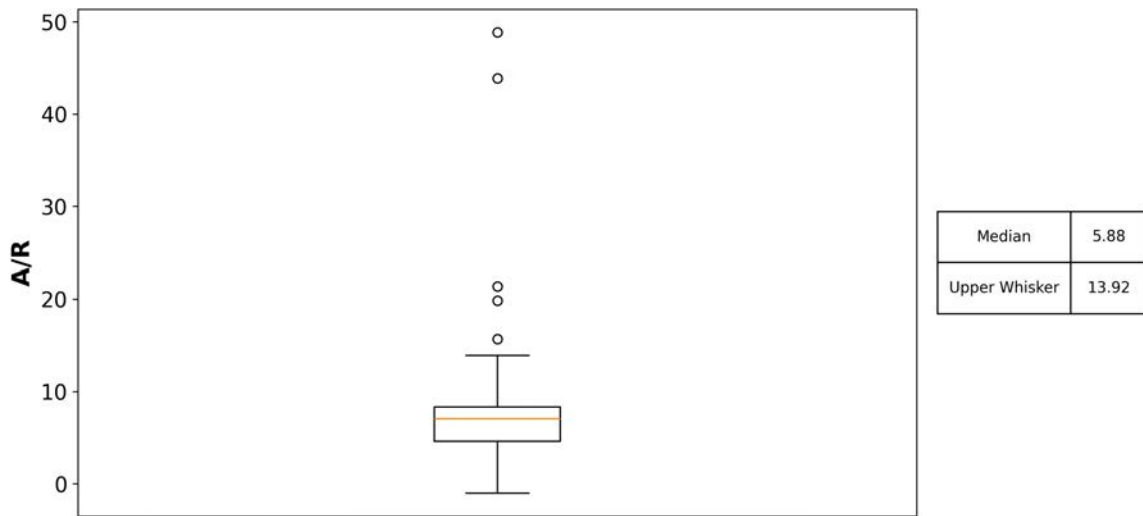
| Parameter | # Fields | Acreage | Mean | St. Dev. | Min | Max | Outlier Threshold | No. Outliers |
|-----------|----------|---------|------|----------|--------|--------|-------------------|--------------|
| A/R | 26 | 2565.6 | 8.0 | 8.97 | 0.0 | 43.85 | -- | -- |
| A-R | 26 | 2565.6 | 81.2 | 53.39 | -28.05 | 181.95 | -- | -- |

Figure 27-1. Histogram of A/R for PISTACHIO-YOUNG fields in the Coalition.



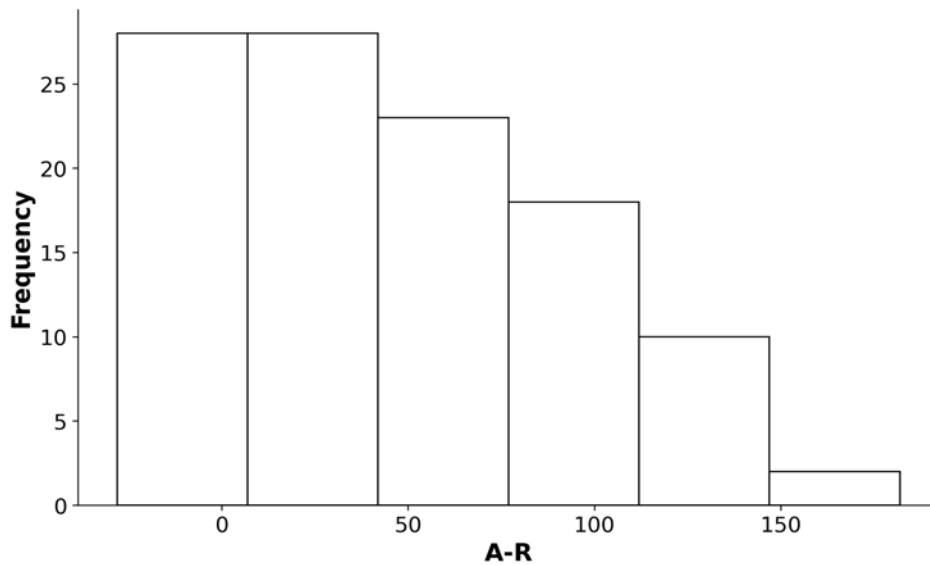
Values greater than 3 times the difference between the upper and lower whisker not shown to avoid skewing of plot.

Figure 27-2. Box and whisker plot of A/R for PISTACHIO-YOUNG fields in the Coalition.



The boxplot uses the standard method of Tukey (1977), and values greater than 3 times the difference between the upper and lower whisker are not shown to avoid skewing the plot. The red dashed line shows the outlier threshold which was calculated via the adjusted boxplot method of Hubert and Vandervieren (2008) using pooled 2020 – 2021 single year ratios. Any dots that exceed the red dashed line were outliers.

Figure 27-3. Histogram of A-R for PISTACHIO-YOUNG fields in the Coalition.



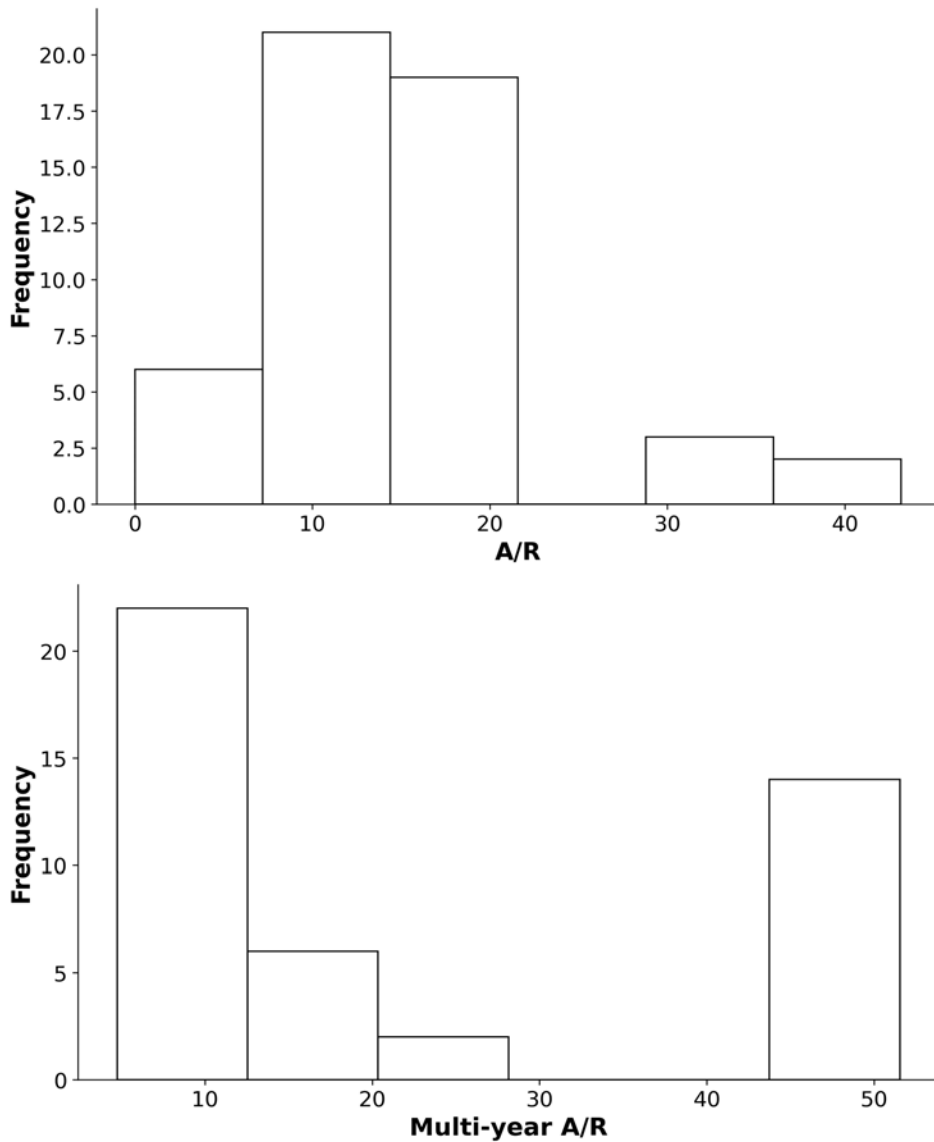
Values greater than 3 times the difference between the upper and lower whisker not shown to avoid skewing of plot.

28. PLUM/PLUOT

Table 28-1. Summary statistics for PLUM/PLUOT fields in Coalition.

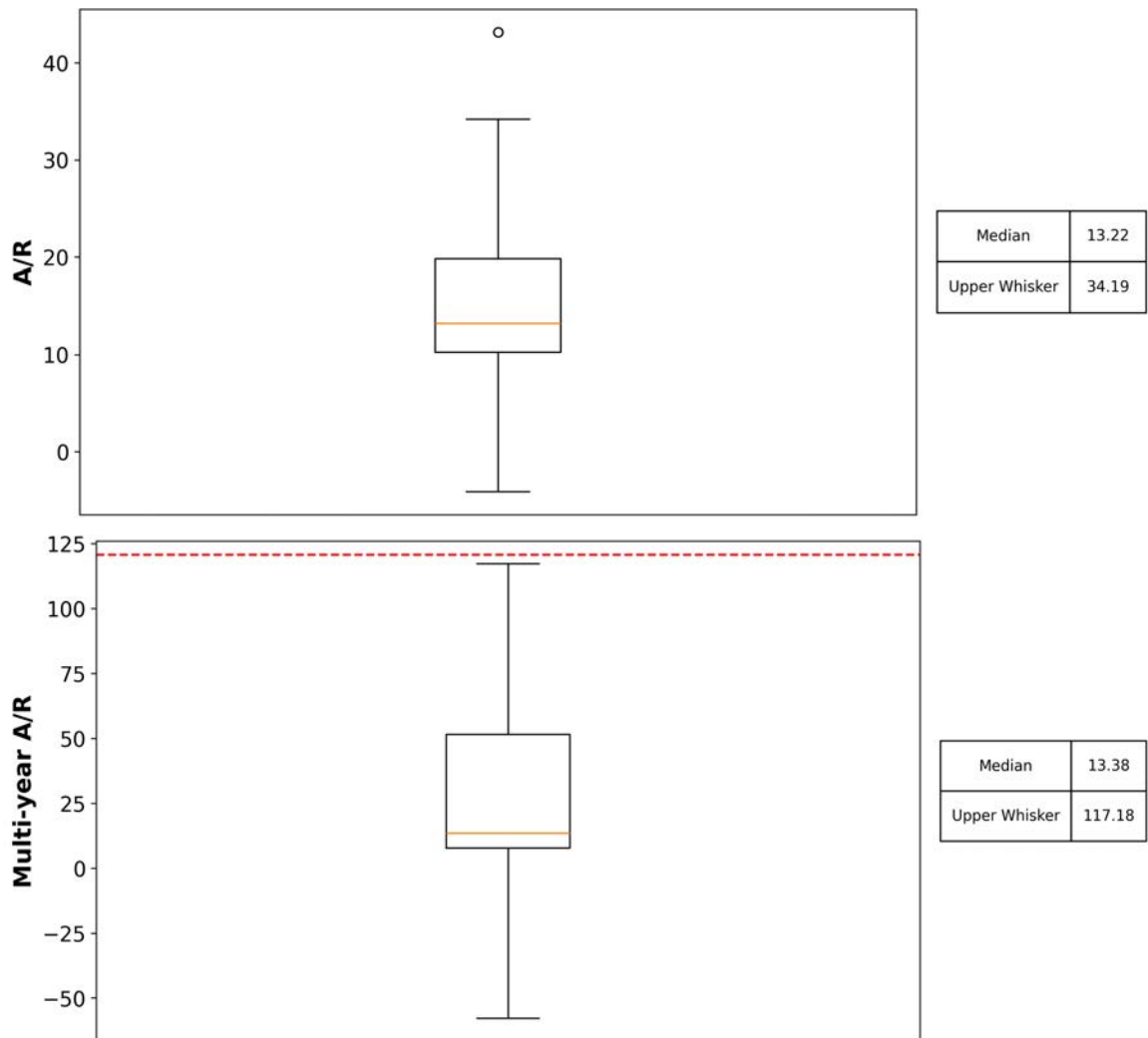
| Parameter | # Fields | Acreage | Mean | St. Dev. | Min | Max | Outlier Threshold | No. Outliers |
|----------------|----------|---------|--------|----------|--------|--------|-------------------|--------------|
| A/R | 49 | 1779.83 | 16.09 | 8.47 | 0.0 | 43.17 | -- | -- |
| A-R | 49 | 1779.83 | 85.3 | 60.21 | -13.62 | 347.11 | -- | -- |
| Multi-year A/R | 44 | 1629.83 | 23.58 | 19.29 | 4.75 | 51.54 | 120.61 | 0 |
| Multi-year A-R | 44 | 1629.83 | 316.69 | 179.38 | 43.42 | 573.65 | -- | -- |

Figure 28-1. Histogram of A/R for PLUM/PLUOT fields in the Coalition.



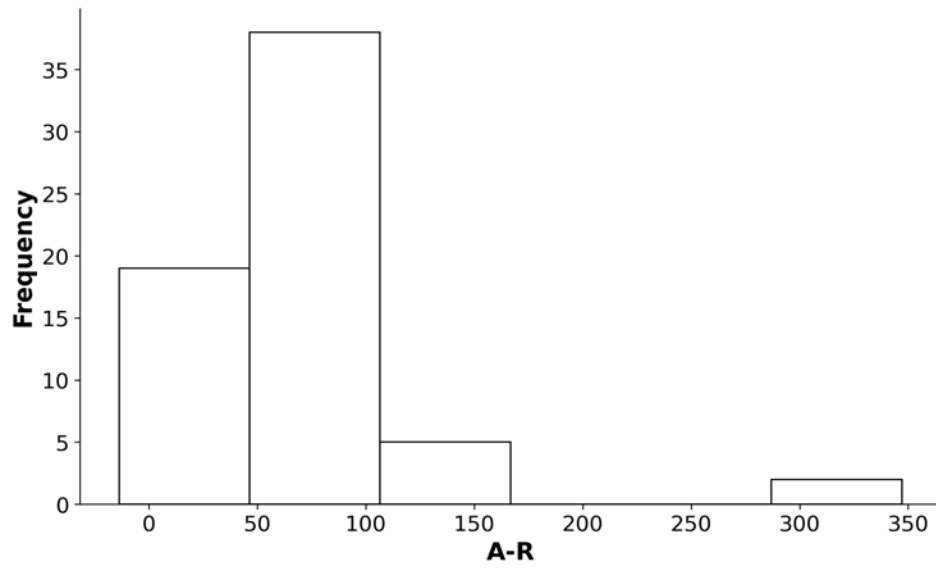
Values greater than 3 times the difference between the upper and lower whisker not shown to avoid skewing of plot.

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



The boxplot uses the standard method of Tukey (1977), and values greater than 3 times the difference between the upper and lower whisker are not shown to avoid skewing the plot. The red dashed line shows the outlier threshold which was calculated via the adjusted boxplot method of Hubert and Vandervieren (2008) using pooled 2020 – 2021 single year ratios. Any dots that exceed the red dashed line were outliers.

Figure 28-3. Histogram of A-R for PLUM/PLUOT fields in the Coalition.



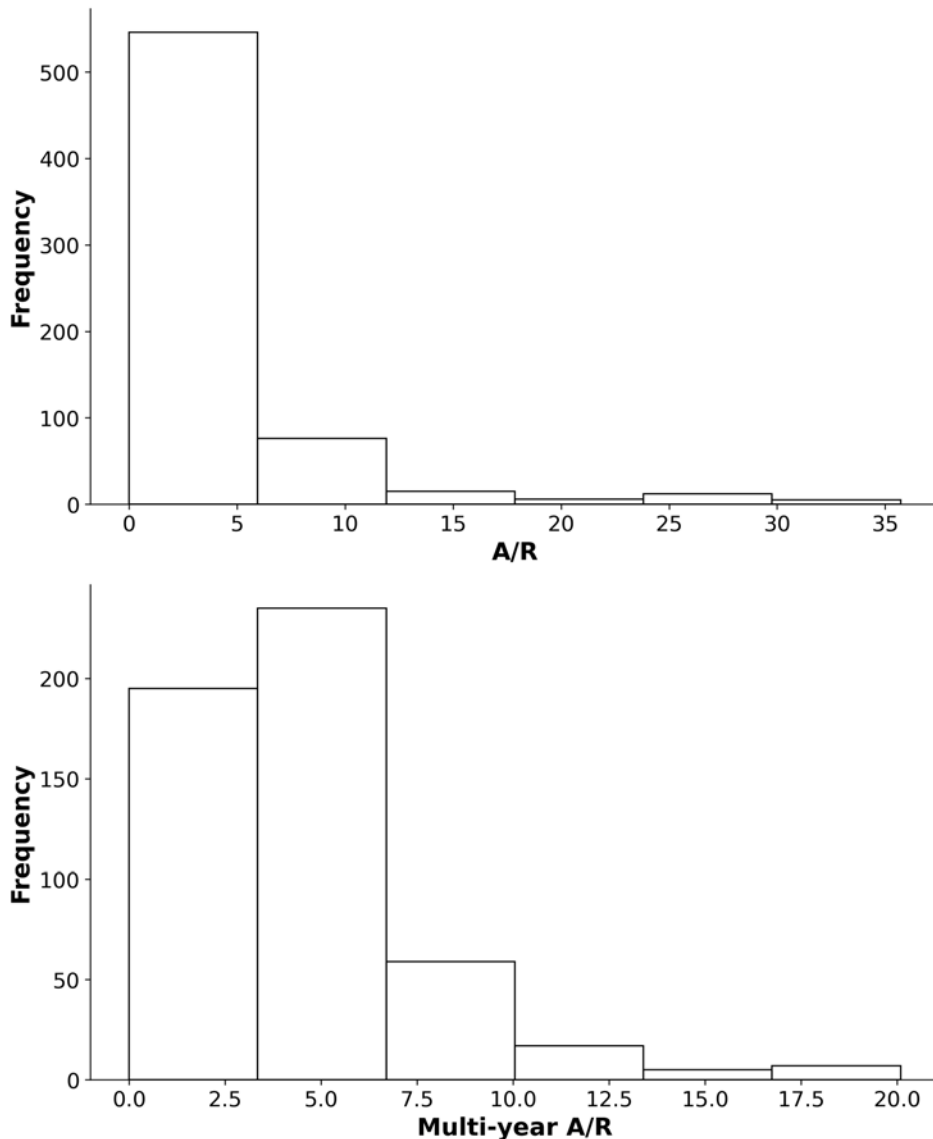
Values greater than 3 times the difference between the upper and lower whisker not shown to avoid skewing of plot.

29. PRUNE

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

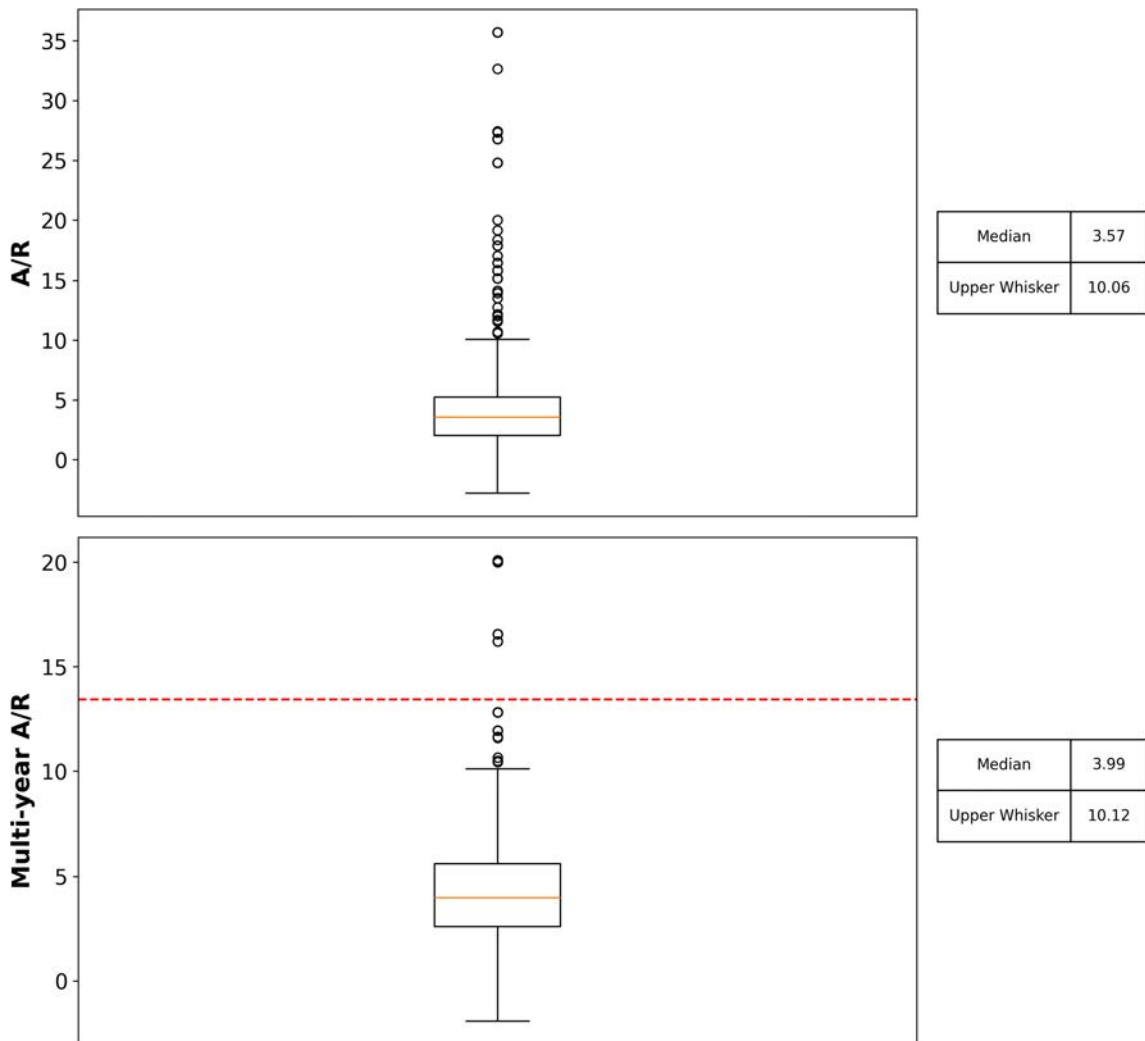
| Parameter | # Fields | Acreage | Mean | St. Dev. | Min | Max | Outlier Threshold | No. Outliers |
|----------------|----------|----------|-------|----------|--------|--------|-------------------|--------------|
| A/R | 662 | 23393.21 | 4.78 | 6.0 | 0.0 | 70.49 | -- | -- |
| A-R | 662 | 23393.21 | 59.34 | 49.48 | -112.0 | 427.6 | -- | -- |
| Multi-year A/R | 518 | 18288.35 | 4.61 | 3.32 | 0.0 | 20.09 | 13.44 | 12 |
| Multi-year A-R | 518 | 18288.35 | 200.4 | 127.34 | -84.0 | 691.49 | -- | -- |

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



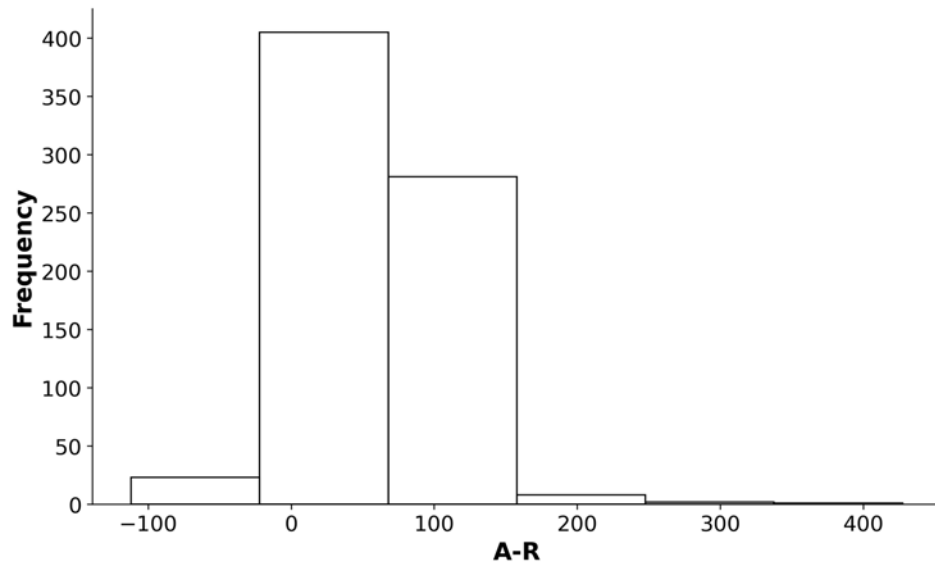
Values greater than 3 times the difference between the upper and lower whisker not shown to avoid skewing of plot.

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



The boxplot uses the standard method of Tukey (1977), and values greater than 3 times the difference between the upper and lower whisker are not shown to avoid skewing the plot. The red dashed line shows the outlier threshold which was calculated via the adjusted boxplot method of Hubert and Vandervieren (2008) using pooled 2020 – 2021 single year ratios. Any dots that exceed the red dashed line were outliers.

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



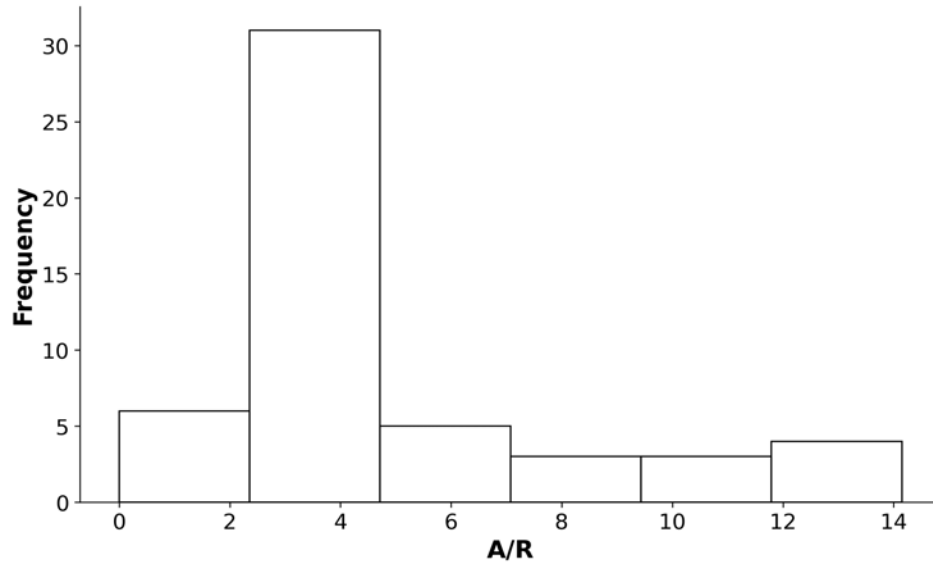
Values greater than 3 times the difference between the upper and lower whisker not shown to avoid skewing of plot.

30. PRUNE-YOUNG

Table 30-1. Summary statistics for PRUNE-YOUNG fields in Coalition.

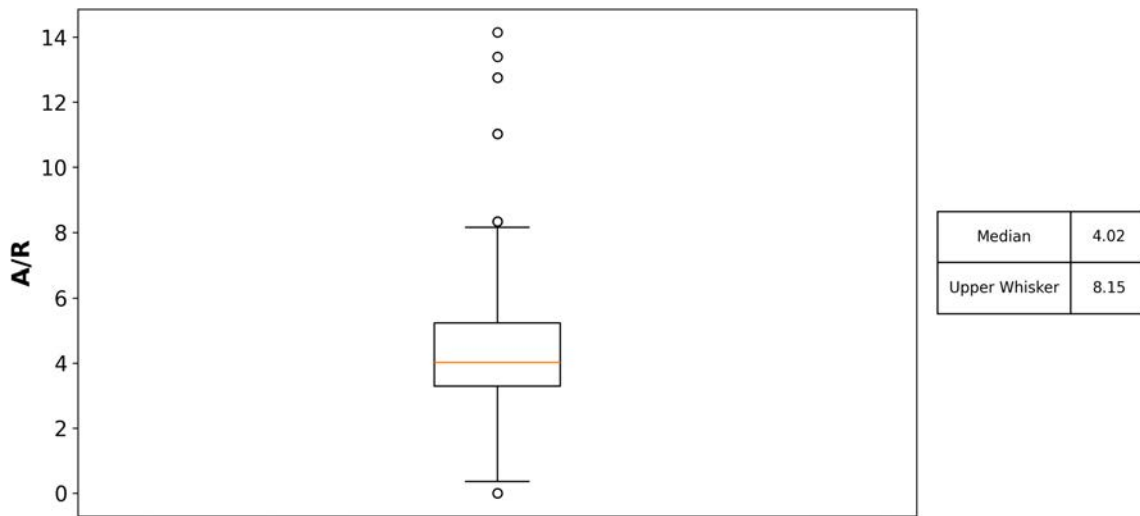
| Parameter | # Fields | Acreage | Mean | St. Dev. | Min | Max | Outlier Threshold | No. Outliers |
|-----------|----------|---------|-------|----------|--------|-------|-------------------|--------------|
| A/R | 52 | 2462.49 | 5.04 | 3.38 | 0.0 | 14.15 | -- | -- |
| A-R | 52 | 2462.49 | 63.45 | 35.31 | -31.36 | 132.6 | -- | -- |

Figure 30-1. Histogram of A/R for PRUNE-YOUNG fields in the Coalition.



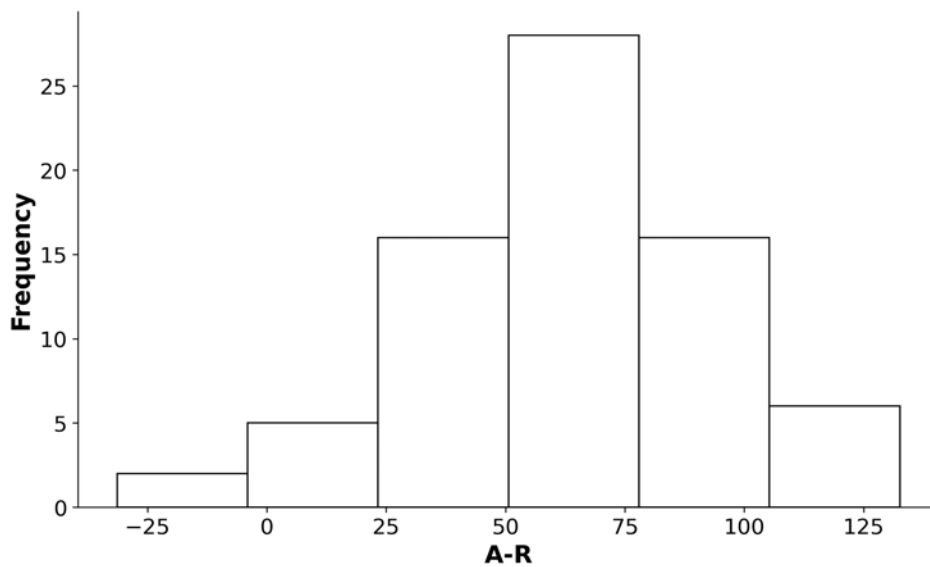
Values greater than 3 times the difference between the upper and lower whisker not shown to avoid skewing of plot.

Figure 30-2. Box and whisker plot of A/R for PRUNE-YOUNG fields in the Coalition.



The boxplot uses the standard method of Tukey (1977), and values greater than 3 times the difference between the upper and lower whisker are not shown to avoid skewing the plot. The red dashed line shows the outlier threshold which was calculated via the adjusted boxplot method of Hubert and Vandervieren (2008) using pooled 2020 – 2021 single year ratios. Any dots that exceed the red dashed line were outliers.

Figure 30-3. Histogram of A-R for PRUNE-YOUNG fields in the Coalition.



Values greater than 3 times the difference between the upper and lower whisker not shown to avoid skewing of plot.

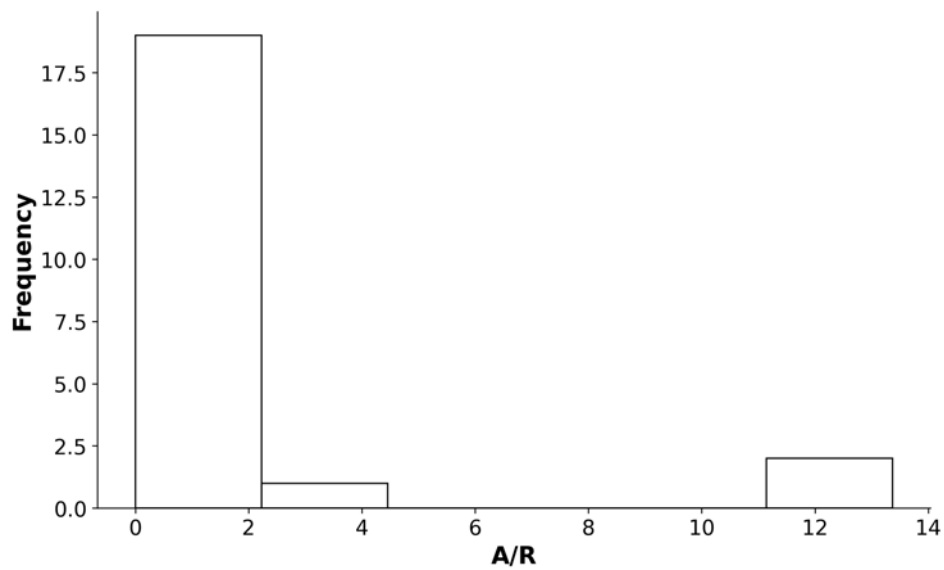
31. PUMPKIN

Table 31-1. Summary statistics for PUMPKIN fields in Coalition.

| Parameter | # Fields | Acreage | Mean | St. Dev. | Min | Max | Outlier Threshold | No. Outliers |
|-----------|----------|---------|-------|----------|-------|--------|-------------------|--------------|
| A/R | 22 | 251.88 | 2.3 | 3.67 | 0.0 | 13.37 | 9.47 | 0 |
| A-R | 27 | 304.58 | 27.92 | 50.24 | -68.6 | 136.56 | -- | -- |

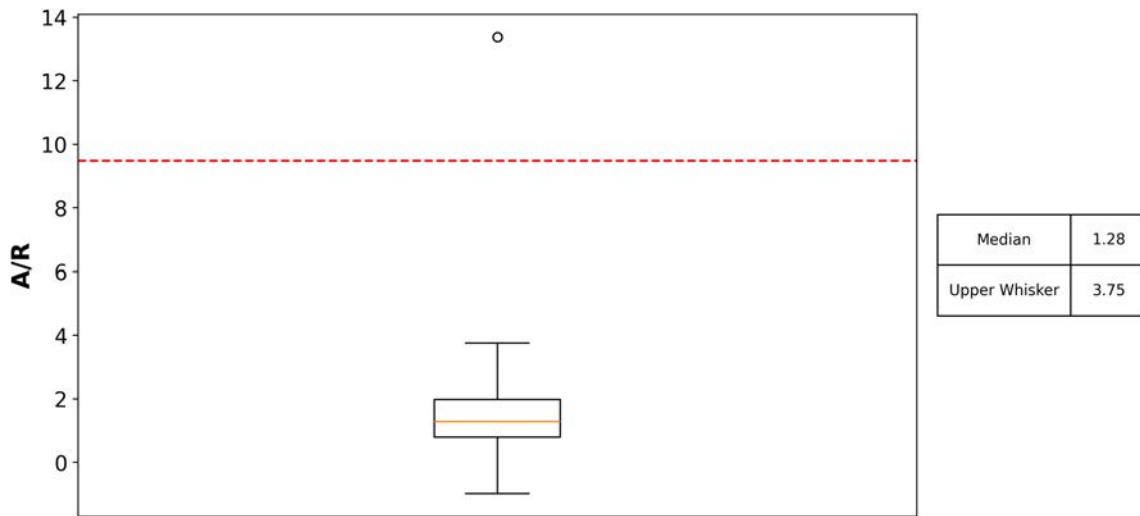
Outliers for annual crops are single year outliers in 2022 and either 2021 or 2020.

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



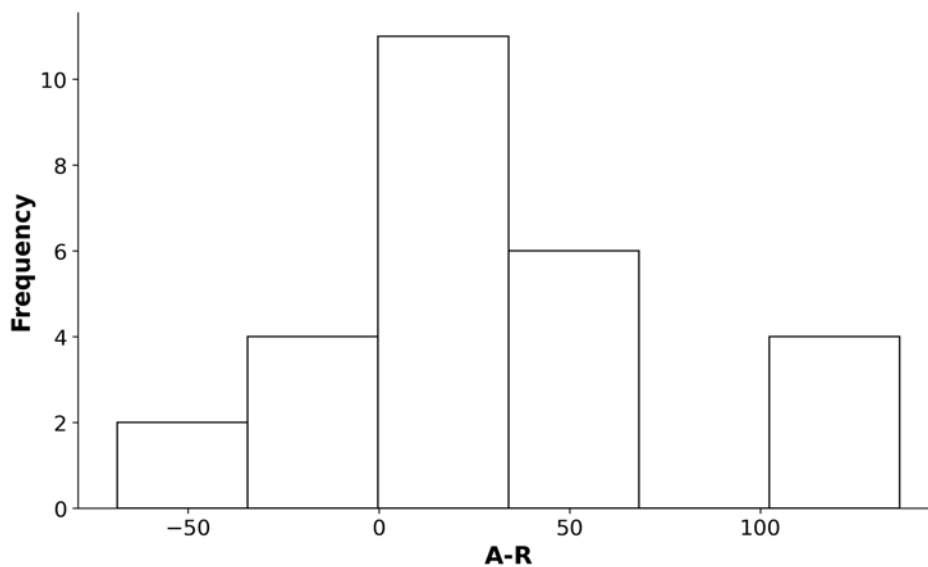
Values greater than 3 times the difference between the upper and lower whisker not shown to avoid skewing of plot.

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



The boxplot uses the standard method of Tukey (1977), and values greater than 3 times the difference between the upper and lower whisker are not shown to avoid skewing the plot. The red dashed line shows the outlier threshold which was calculated via the adjusted boxplot method of Hubert and Vandervieren (2008) using pooled 2020 – 2022 single year ratios. Outliers for 2022 CY annual crop fields are any dots above the red dashed line that were also outliers in either the 2021 or 2020 CY for any crop.

Figure 31-3. Histogram of A-R for PUMPKIN fields in the Coalition.



Values greater than 3 times the difference between the upper and lower whisker not shown to avoid skewing of plot.

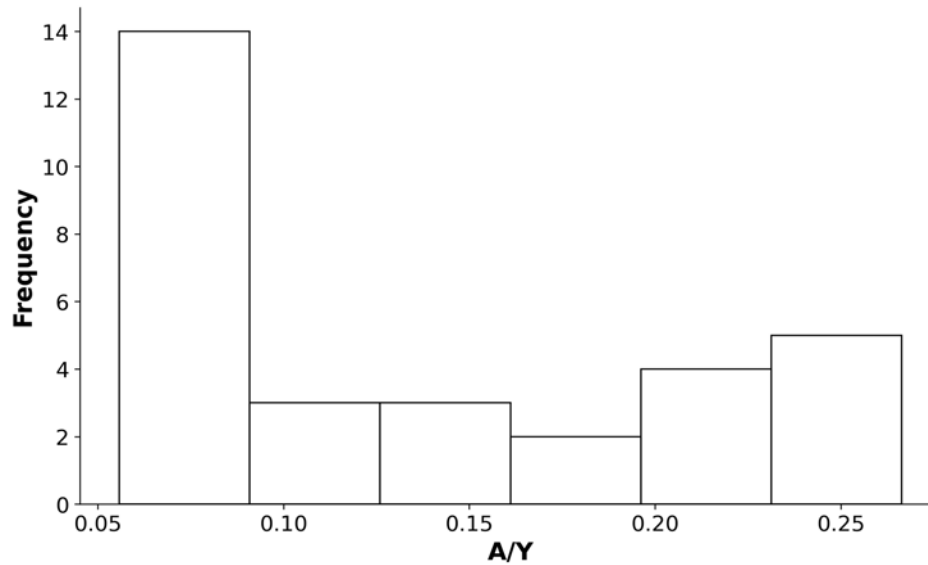
32. RICE - WILD

Table 32-1. Summary statistics for RICE - WILD fields in Coalition.

| Parameter | # Fields | Acreage | Mean | St. Dev. | Min | Max | Outlier Threshold | No. Outliers |
|-----------|----------|---------|------|----------|------|------|-------------------|--------------|
| A/Y | 31 | 2094.3 | 0.14 | 0.08 | 0.06 | 0.27 | -- | -- |

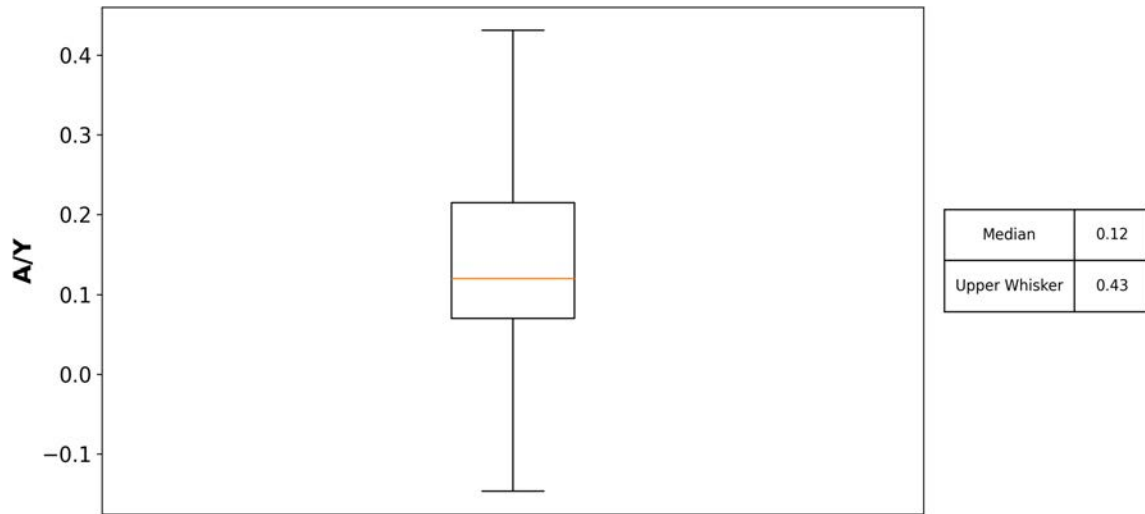
Outliers for annual crops are single year outliers in 2022 and either 2021 or 2020.

Figure 32-1. Histogram of A/Y for RICE - WILD fields in the Coalition.



Values greater than 3 times the difference between the upper and lower whisker not shown to avoid skewing of plot

Figure 32-2. Box and whisker plot of A/Y for RICE - WILD fields in the Coalition.



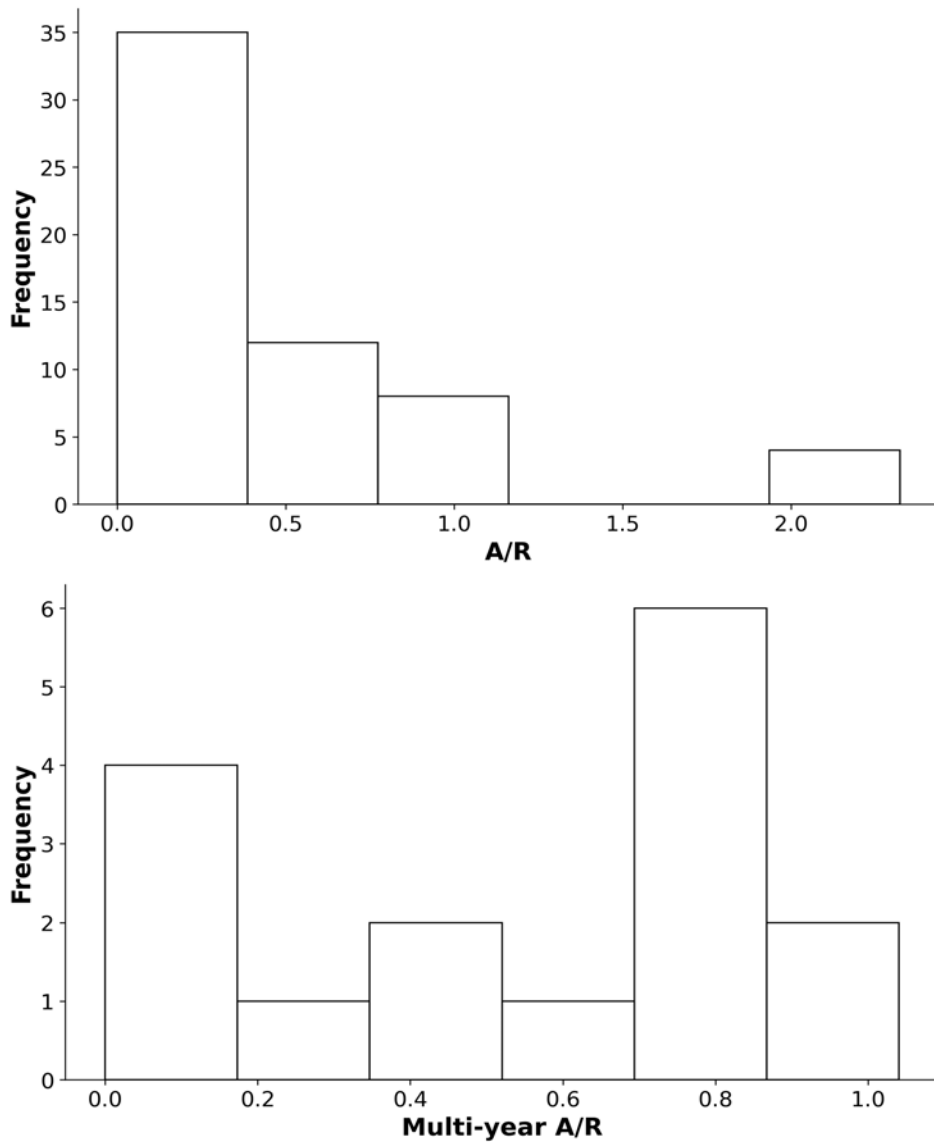
Values greater than 3 times the difference between the upper and lower whisker not shown to avoid skewing of plot. The whiskers are the medcouple values with the upper whisker being the outlier threshold. Dots are outliers.

33. RYEGRASS - HAY

Table 33-1. Summary statistics for RYEGRASS - HAY fields in Coalition.

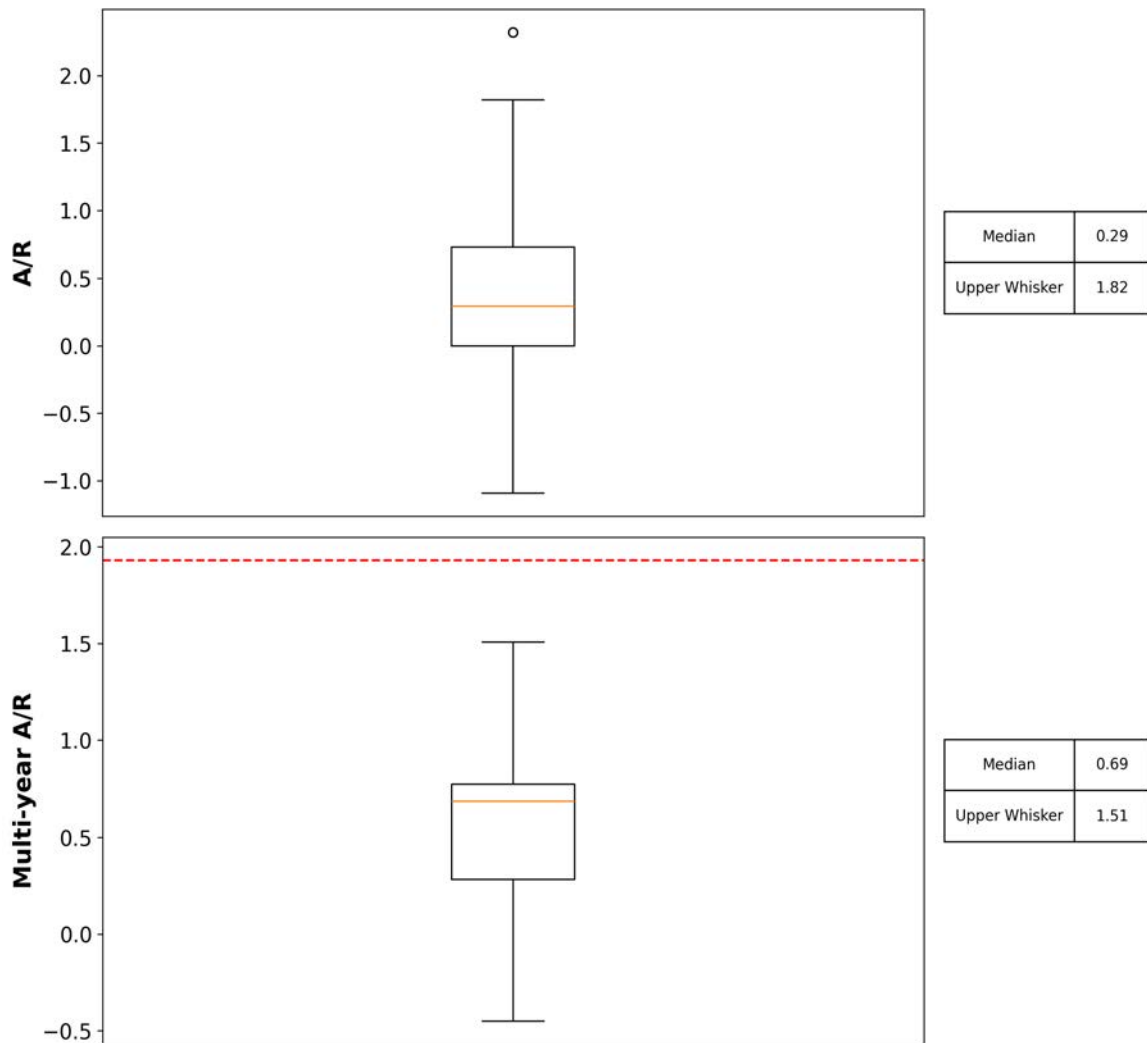
| Parameter | # Fields | Acreage | Mean | St. Dev. | Min | Max | Outlier Threshold | No. Outliers |
|----------------|----------|---------|---------|----------|---------|-------|-------------------|--------------|
| A/R | 59 | 2189.42 | 0.46 | 0.6 | 0.0 | 2.32 | -- | -- |
| A-R | 59 | 2189.42 | -106.16 | 123.38 | -549.0 | 145.2 | -- | -- |
| Multi-year A/R | 16 | 654.3 | 0.52 | 0.36 | 0.0 | 1.04 | 1.93 | 0 |
| Multi-year A-R | 16 | 654.3 | -230.41 | 170.42 | -491.15 | 15.29 | -- | -- |

Figure 33-1. Histogram of A/R for RYEGRASS - HAY fields in the Coalition.



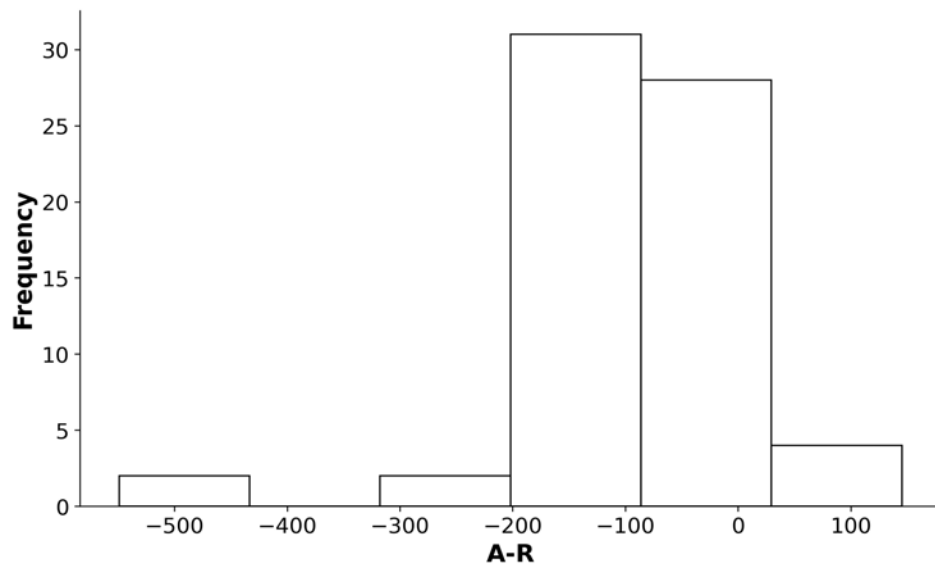
Values greater than 3 times the difference between the upper and lower whisker not shown to avoid skewing of plot.

Figure 33-2. Box and whisker plot of A/R for RYEGRASS - HAY fields in the Coalition.



The boxplot uses the standard method of Tukey (1977), and values greater than 3 times the difference between the upper and lower whisker are not shown to avoid skewing the plot. The red dashed line shows the outlier threshold which was calculated via the adjusted boxplot method of Hubert and Vandervieren (2008) using pooled 2020 – 2021 single year ratios. Any dots that exceed the red dashed line were outliers.

Figure 33-3. Histogram of A-R for RYEGRASS - HAY fields in the Coalition.



Values greater than 3 times the difference between the upper and lower whisker not shown to avoid skewing of plot.

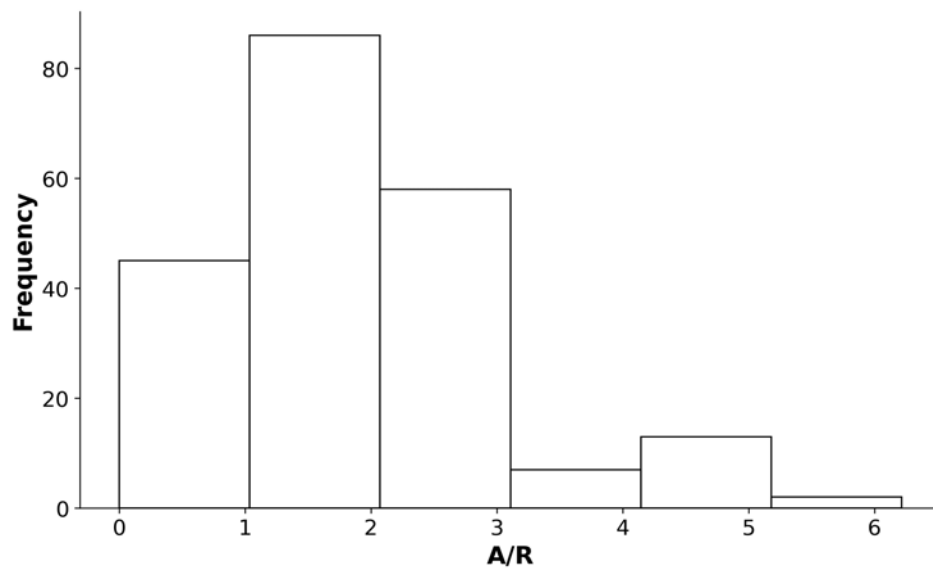
34. SAFFLOWER

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

| Parameter | # Fields | Acreage | Mean | St. Dev. | Min | Max | Outlier Threshold | No. Outliers |
|-----------|----------|----------|-------|----------|--------|--------|-------------------|--------------|
| A/R | 213 | 11039.33 | 6.36 | 46.58 | 0.0 | 483.56 | 4.68 | 3 |
| A-R | 216 | 11087.33 | 32.29 | 49.29 | -155.1 | 146.22 | -- | -- |

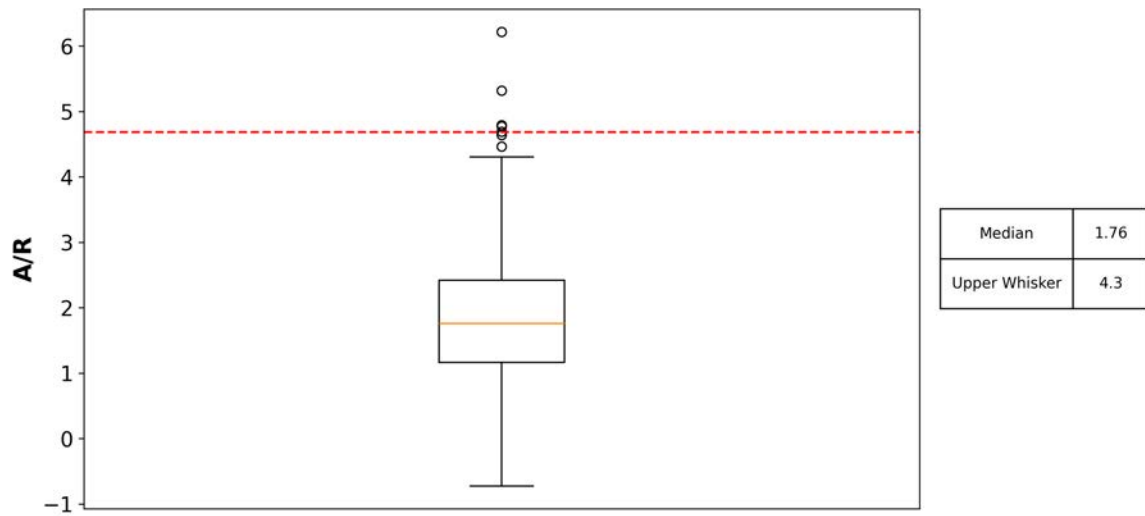
Outliers for annual crops are single year outliers in 2022 and either 2021 or 2020.

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



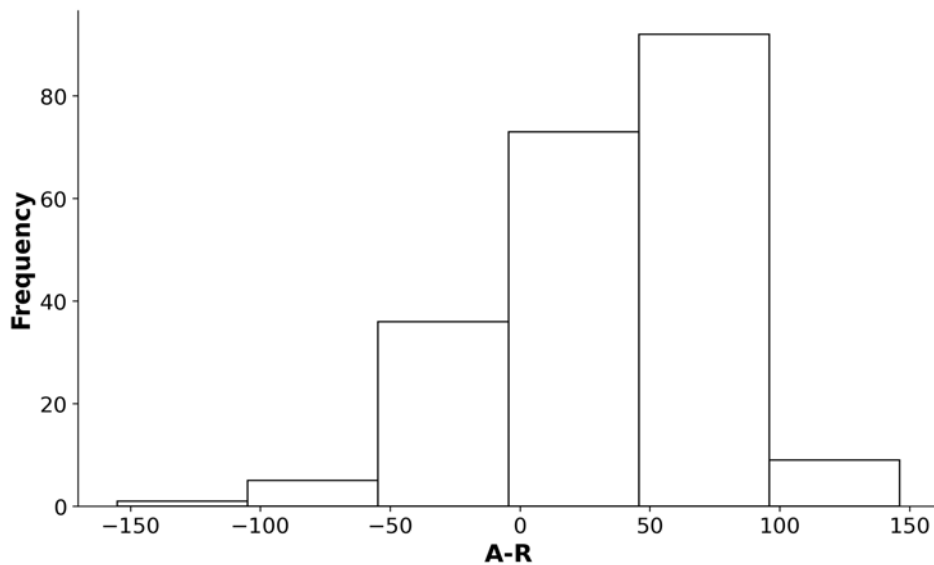
Values greater than 3 times the difference between the upper and lower whisker not shown to avoid skewing of plot.

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



The boxplot uses the standard method of Tukey (1977), and values greater than 3 times the difference between the upper and lower whisker are not shown to avoid skewing the plot. The red dashed line shows the outlier threshold which was calculated via the adjusted boxplot method of Hubert and Vandervieren (2008) using pooled 2020 – 2022 single year ratios. Outliers for 2022 CY annual crop fields are any dots above the red dashed line that were also outliers in either the 2021 or 2020 CY for any crop.

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



Values greater than 3 times the difference between the upper and lower whisker not shown to avoid skewing of plot.

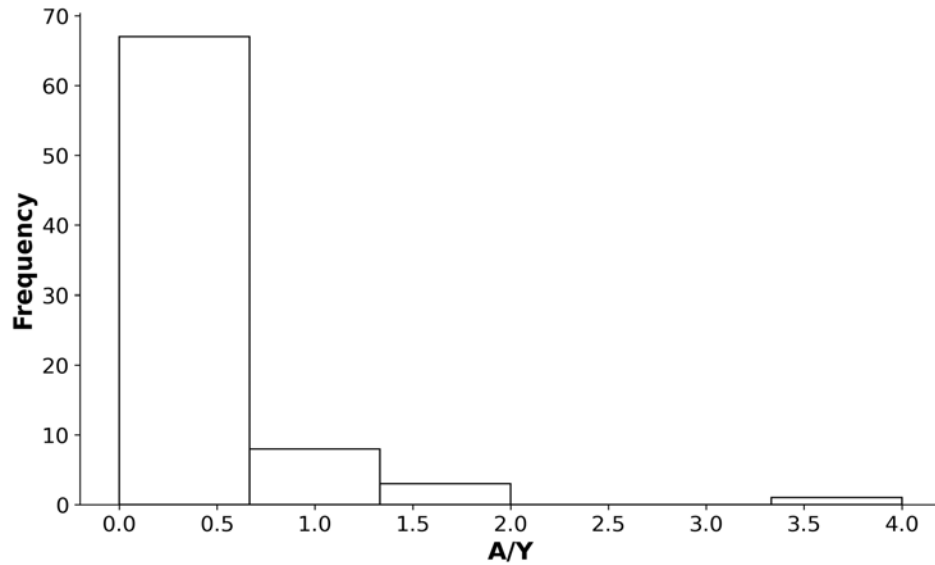
35. SEED CROP

Table 35-1. Summary statistics for SEED CROP fields in Coalition.

| Parameter | # Fields | Acreage | Mean | St. Dev. | Min | Max | Outlier Threshold | No. Outliers |
|-----------|----------|---------|------|----------|-----|-----|-------------------|--------------|
| A/Y | 79 | 2494.9 | 0.36 | 0.56 | 0.0 | 4.0 | -- | -- |

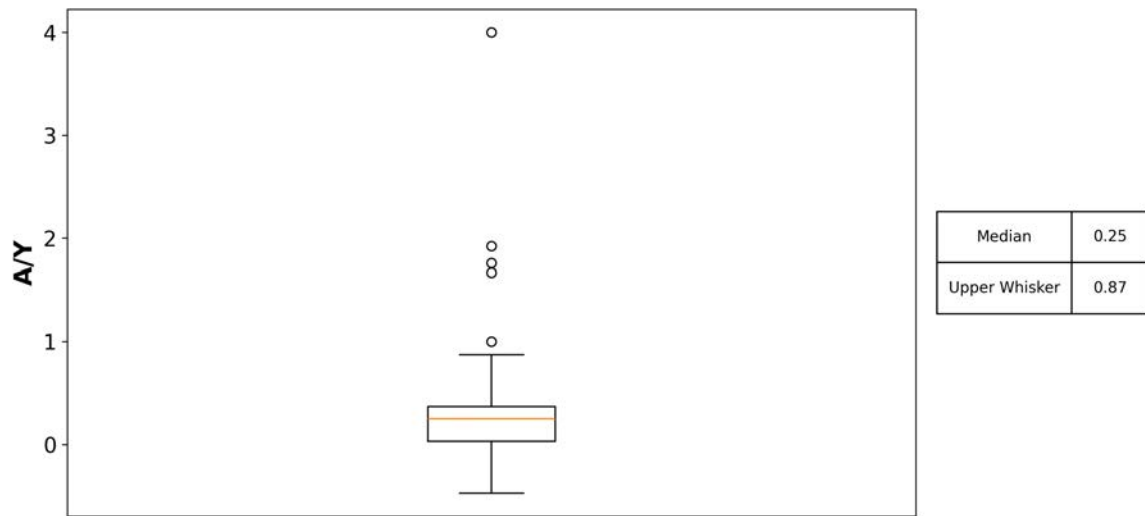
Outliers for annual crops are single year outliers in 2022 and either 2021 or 2020.

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



Values greater than 3 times 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 SEED CROP fields in the Coalition.



Values greater than 3 times 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.

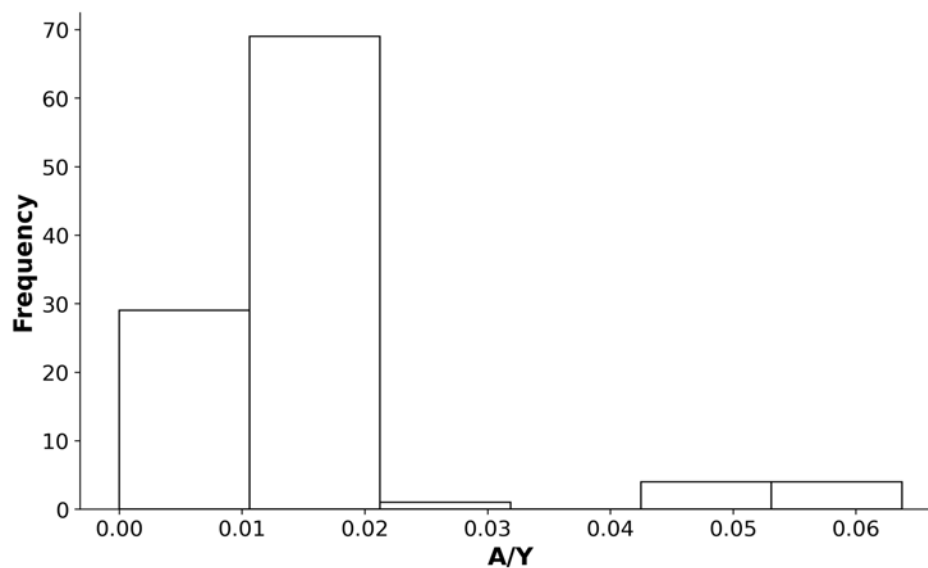
36. SUDAN GRASS - HAY

Table 36-1. Summary statistics for SUDAN GRASS - HAY fields in Coalition.

| Parameter | # Fields | Acreage | Mean | St. Dev. | Min | Max | Outlier Threshold | No. Outliers |
|-----------|----------|---------|------|----------|-----|------|-------------------|--------------|
| A/Y | 107 | 8722.83 | 0.02 | 0.01 | 0.0 | 0.06 | -- | -- |

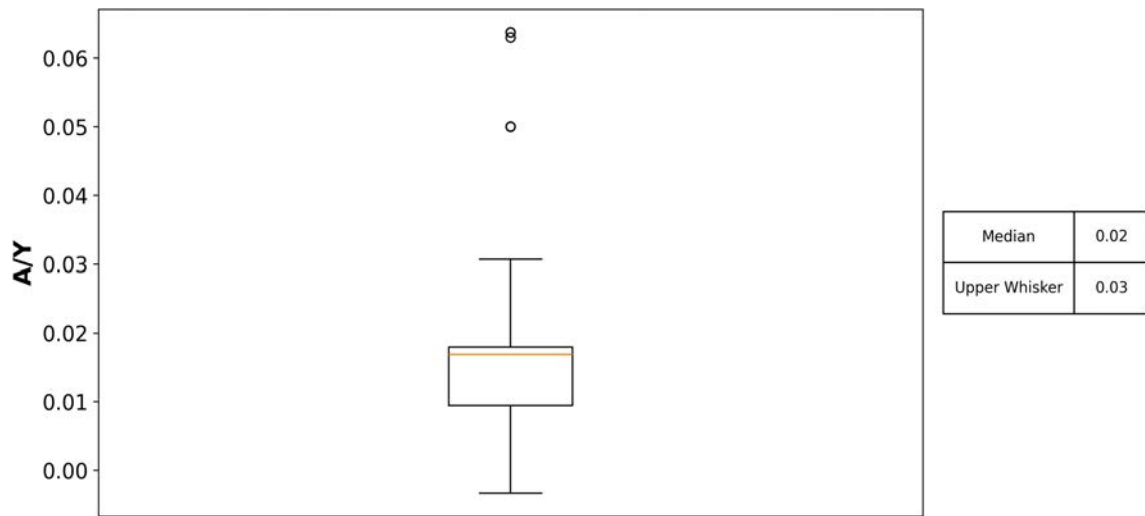
Outliers for annual crops are single year outliers in 2022 and either 2021 or 2020.

Figure 36-1. Histogram of A/Y for SUDAN GRASS - HAY fields in the Coalition.



Values greater than 3 times the difference between the upper and lower whisker not shown to avoid skewing of plot

Figure 36-2. Box and whisker plot of A/Y for SUDAN GRASS - HAY fields in the Coalition.



Values greater than 3 times 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.

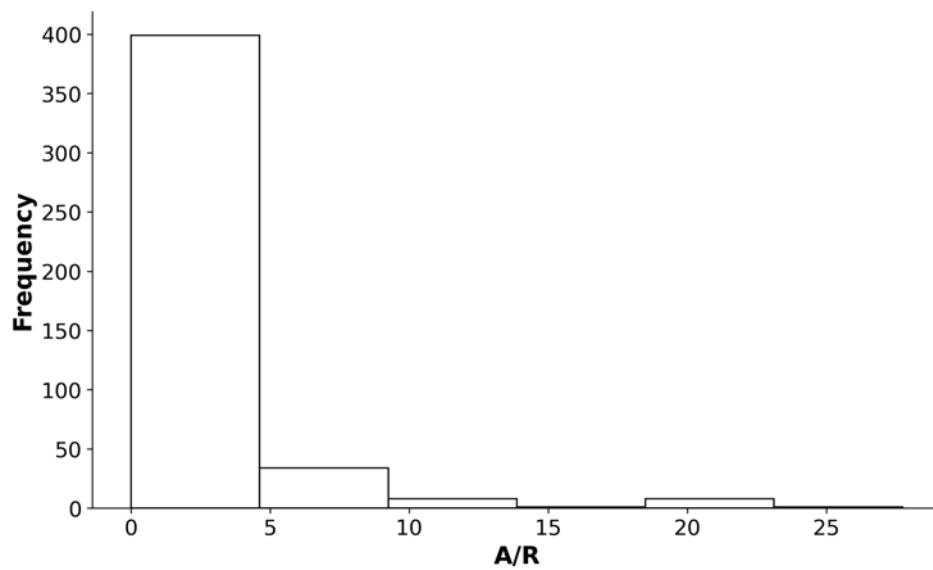
37. SUNFLOWER

Table 37-1. Summary statistics for SUNFLOWER fields in Coalition.

| Parameter | # Fields | Acreage | Mean | St. Dev. | Min | Max | Outlier Threshold | No. Outliers |
|-----------|----------|----------|-------|----------|---------|--------|-------------------|--------------|
| A/R | 452 | 25590.8 | 3.04 | 3.63 | 0.0 | 36.39 | 7.95 | 1 |
| A-R | 474 | 26532.63 | 29.21 | 235.87 | -3201.4 | 205.84 | -- | -- |

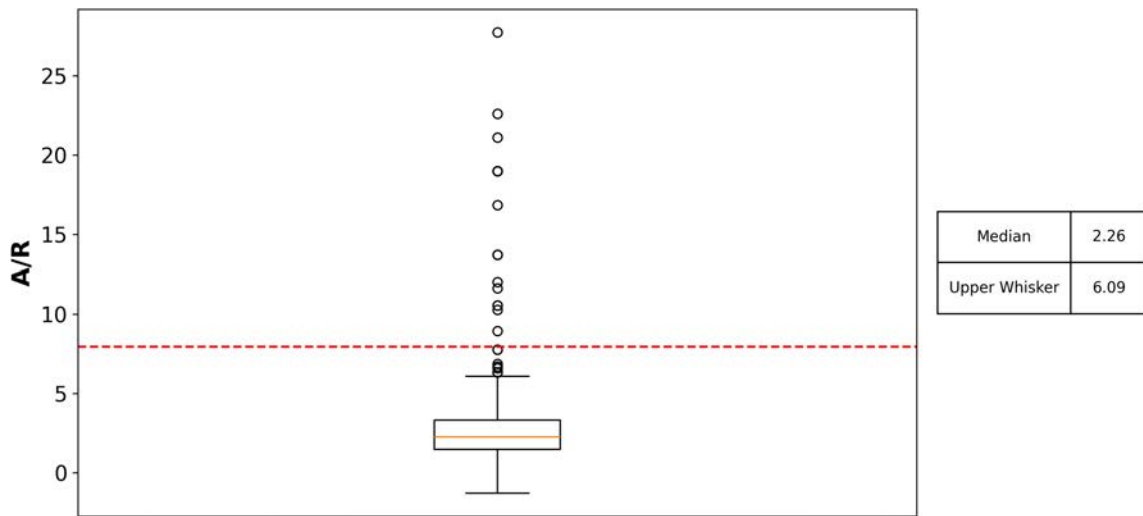
Outliers for annual crops are single year outliers in 2022 and either 2021 or 2020.

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



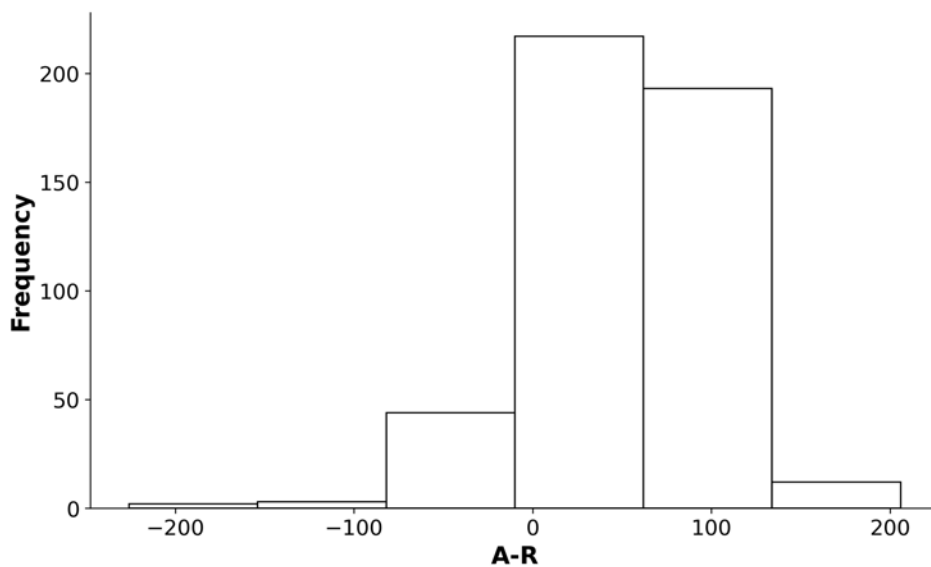
Values greater than 3 times the difference between the upper and lower whisker not shown to avoid skewing of plot.

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



The boxplot uses the standard method of Tukey (1977), and values greater than 3 times the difference between the upper and lower whisker are not shown to avoid skewing the plot. The red dashed line shows the outlier threshold which was calculated via the adjusted boxplot method of Hubert and Vandervieren (2008) using pooled 2020 – 2022 single year ratios. Outliers for 2022 CY annual crop fields are any dots above the red dashed line that were also outliers in either the 2021 or 2020 CY for any crop.

Figure 37-3. Histogram of A-R for SUNFLOWER fields in the Coalition.



Values greater than 3 times the difference between the upper and lower whisker not shown to avoid skewing of plot.

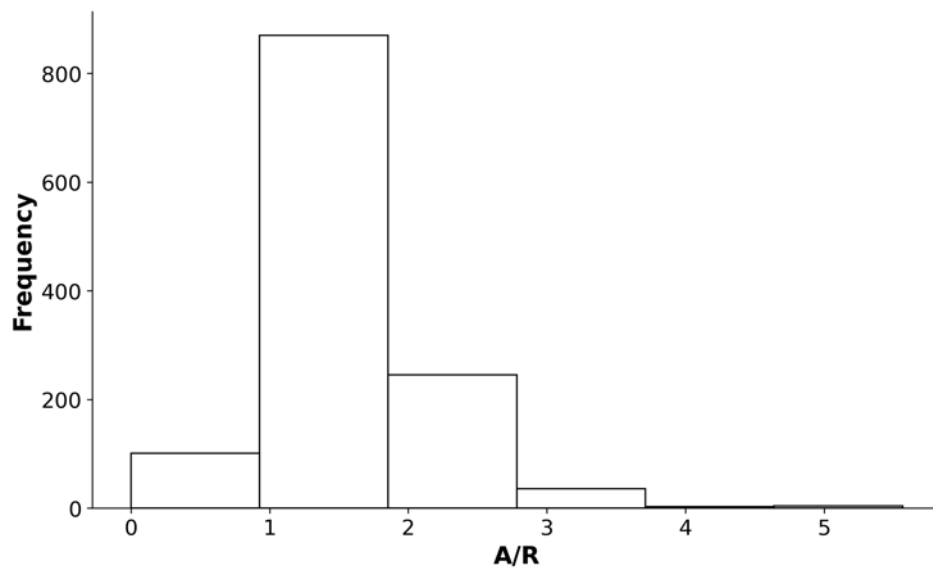
38. TOMATO - PROCESSING

Table 38-1. Summary statistics for TOMATO - PROCESSING fields in Coalition.

| Parameter | # Fields | Acreage | Mean | St. Dev. | Min | Max | Outlier Threshold | No. Outliers |
|-----------|----------|----------|-------|----------|--------|--------|-------------------|--------------|
| A/R | 1263 | 69225.63 | 1.65 | 1.47 | 0.0 | 39.6 | 2.93 | 6 |
| A-R | 1269 | 69548.43 | 73.75 | 66.64 | -164.1 | 319.92 | -- | -- |

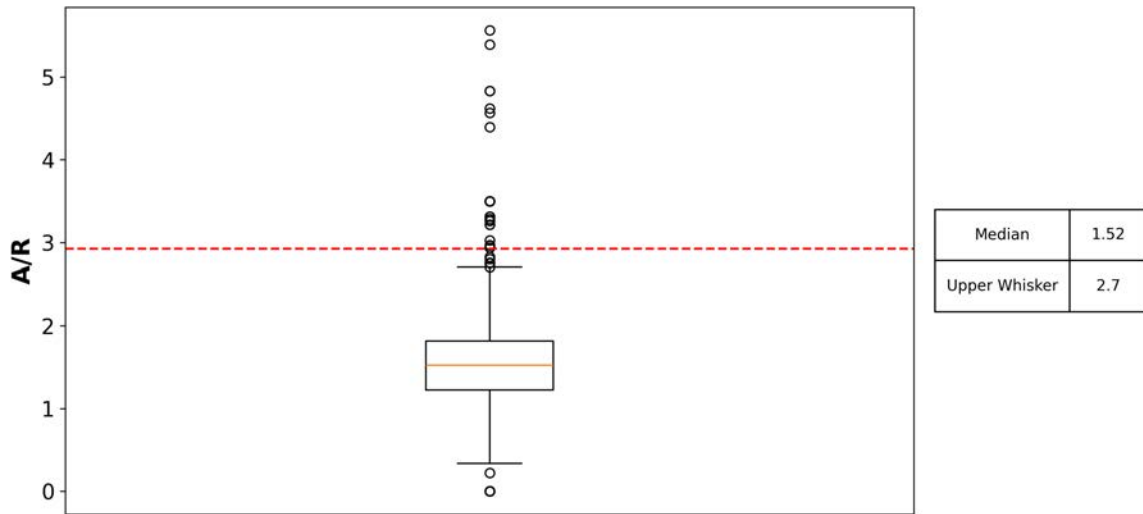
Outliers for annual crops are single year outliers in 2022 and either 2021 or 2020.

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



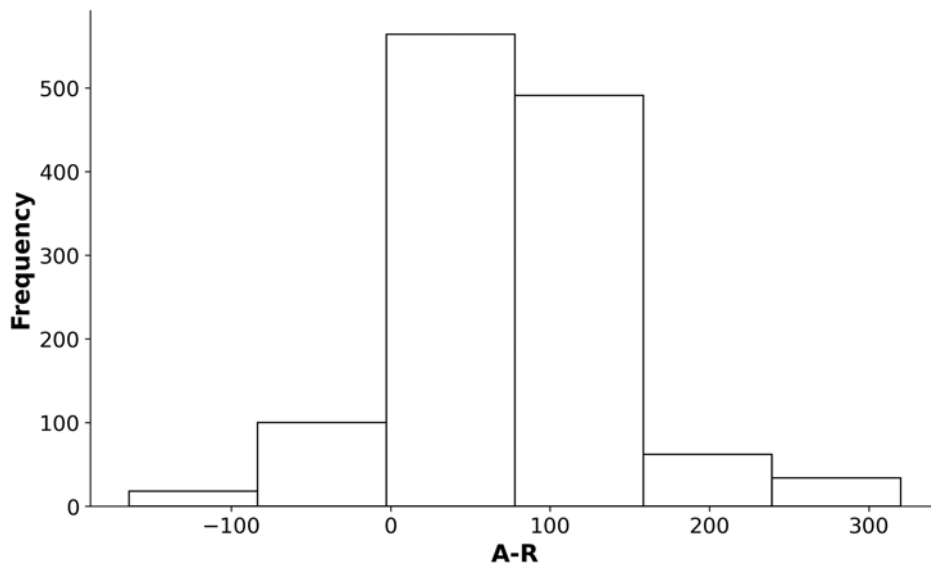
Values greater than 3 times the difference between the upper and lower whisker not shown to avoid skewing of plot.

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



The boxplot uses the standard method of Tukey (1977), and values greater than 3 times the difference between the upper and lower whisker are not shown to avoid skewing the plot. The red dashed line shows the outlier threshold which was calculated via the adjusted boxplot method of Hubert and Vandervieren (2008) using pooled 2020 – 2022 single year ratios. Outliers for 2022 CY annual crop fields are any dots above the red dashed line that were also outliers in either the 2021 or 2020 CY for any crop.

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



Values greater than 3 times the difference between the upper and lower whisker not shown to avoid skewing of plot.

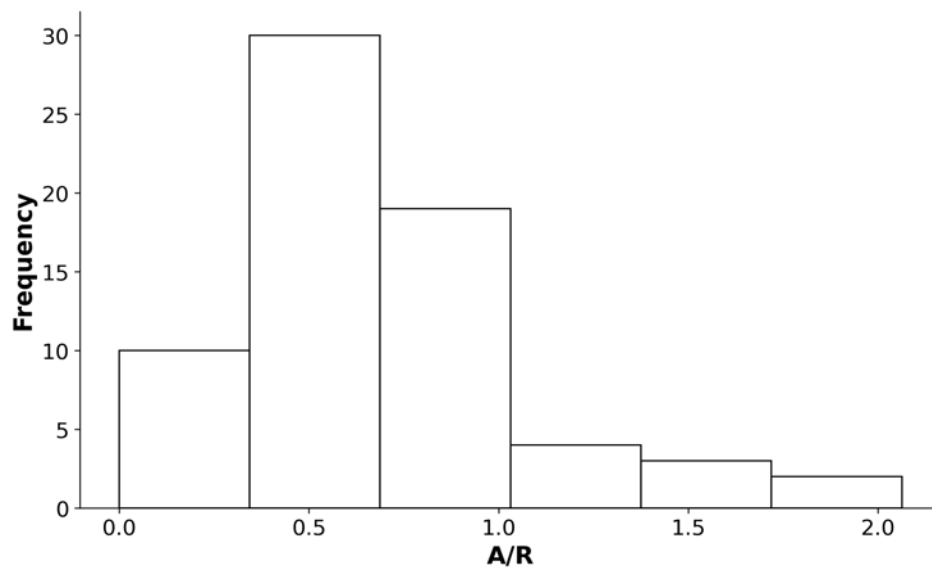
39. TRITICALE - GRAIN

Table 39-1. Summary statistics for TRITICALE - GRAIN fields in Coalition.

| Parameter | # Fields | Acreage | Mean | St. Dev. | Min | Max | Outlier Threshold | No. Outliers |
|-----------|----------|---------|--------|----------|--------|------|-------------------|--------------|
| A/R | 68 | 3883.83 | 0.71 | 0.44 | 0.0 | 2.06 | 2.0 | 0 |
| A-R | 77 | 4046.93 | -35.07 | 42.24 | -121.2 | 64.4 | -- | -- |

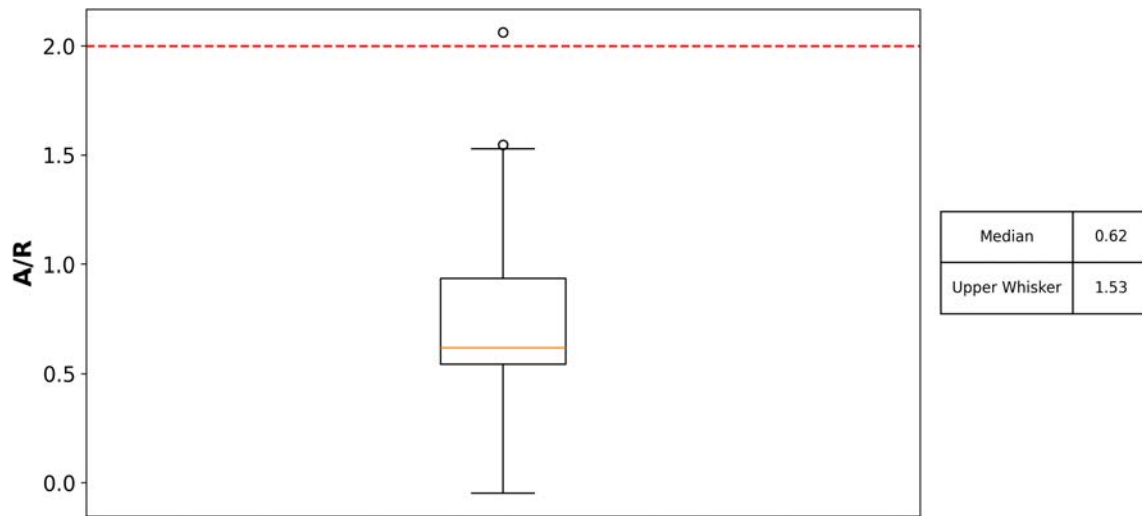
Outliers for annual crops are single year outliers in 2022 and either 2021 or 2020.

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



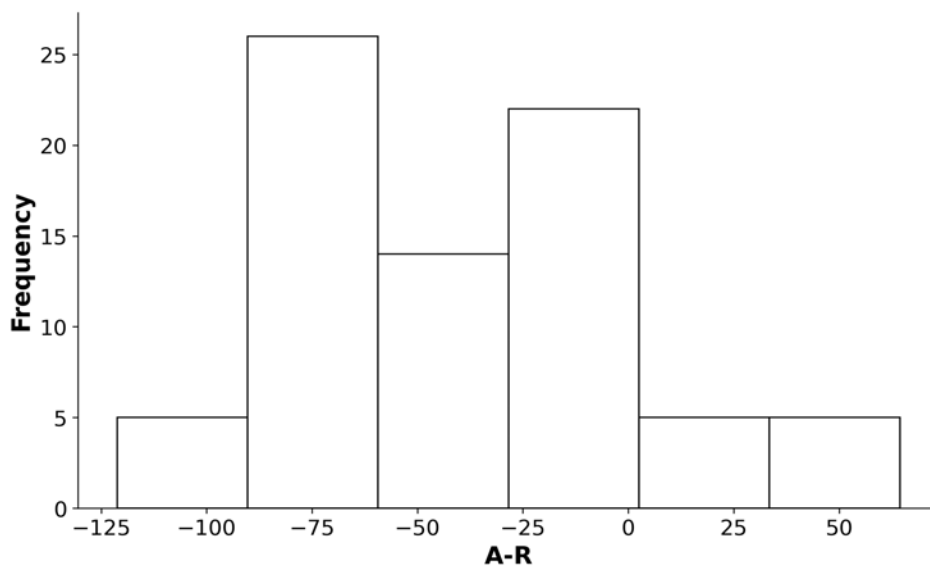
Values greater than 3 times the difference between the upper and lower whisker not shown to avoid skewing of plot.

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



The boxplot uses the standard method of Tukey (1977), and values greater than 3 times the difference between the upper and lower whisker are not shown to avoid skewing the plot. The red dashed line shows the outlier threshold which was calculated via the adjusted boxplot method of Hubert and Vandervieren (2008) using pooled 2020 – 2022 single year ratios. Outliers for 2022 CY annual crop fields are any dots above the red dashed line that were also outliers in either the 2021 or 2020 CY for any crop.

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



Values greater than 3 times the difference between the upper and lower whisker not shown to avoid skewing of plot.

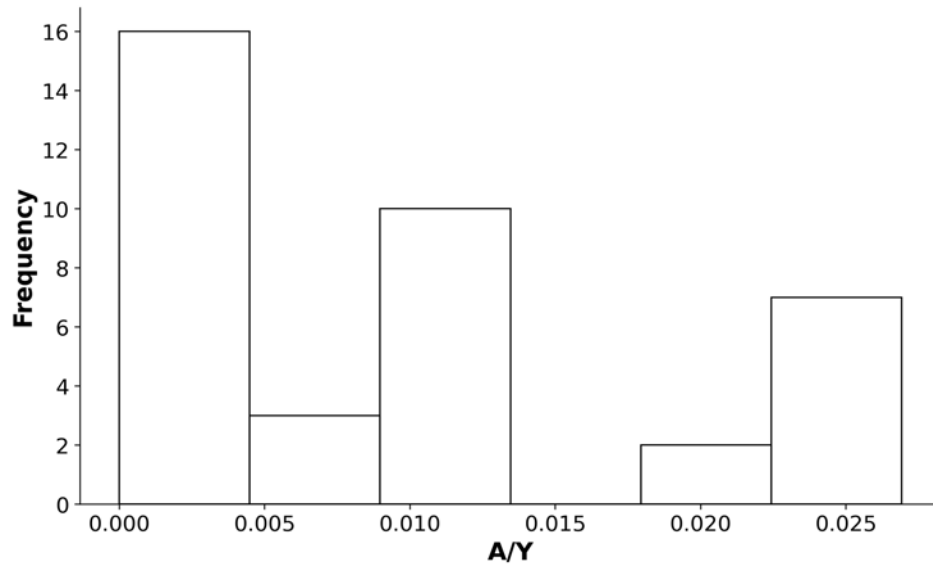
40. TRITICALE - HAY

Table 40-1. Summary statistics for TRITICALE - HAY fields in Coalition.

| Parameter | # Fields | Acreage | Mean | St. Dev. | Min | Max | Outlier Threshold | No. Outliers |
|-----------|----------|---------|------|----------|-----|------|-------------------|--------------|
| A/Y | 38 | 1556.74 | 0.01 | 0.01 | 0.0 | 0.03 | -- | -- |

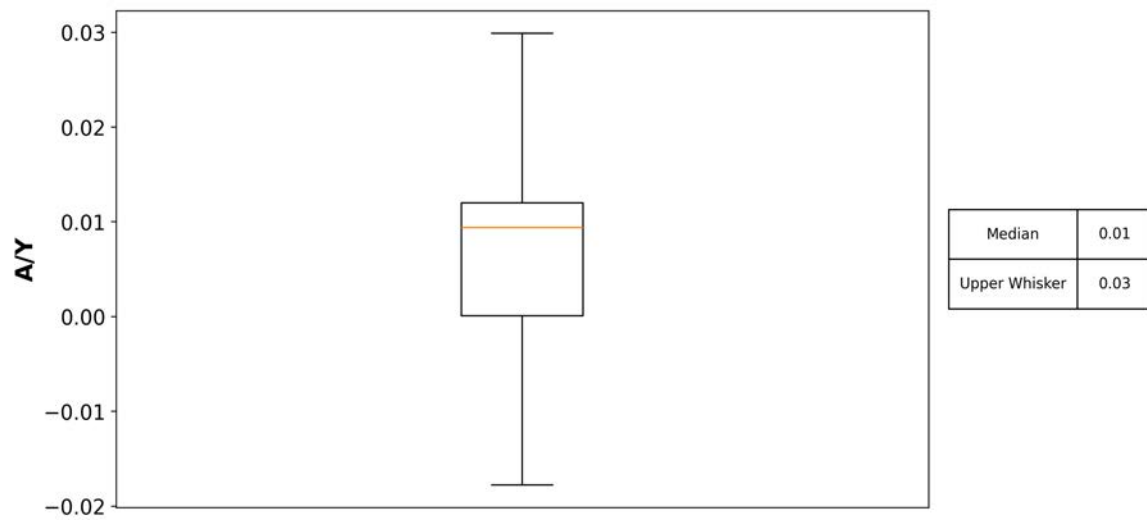
Outliers for annual crops are single year outliers in 2022 and either 2021 or 2020.

Figure 40-1. Histogram of A/Y for TRITICALE - HAY fields in the Coalition.



Values greater than 3 times the difference between the upper and lower whisker not shown to avoid skewing of plot

Figure 40-2. Box and whisker plot of A/Y for TRITICALE - HAY fields in the Coalition.



Values greater than 3 times 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.

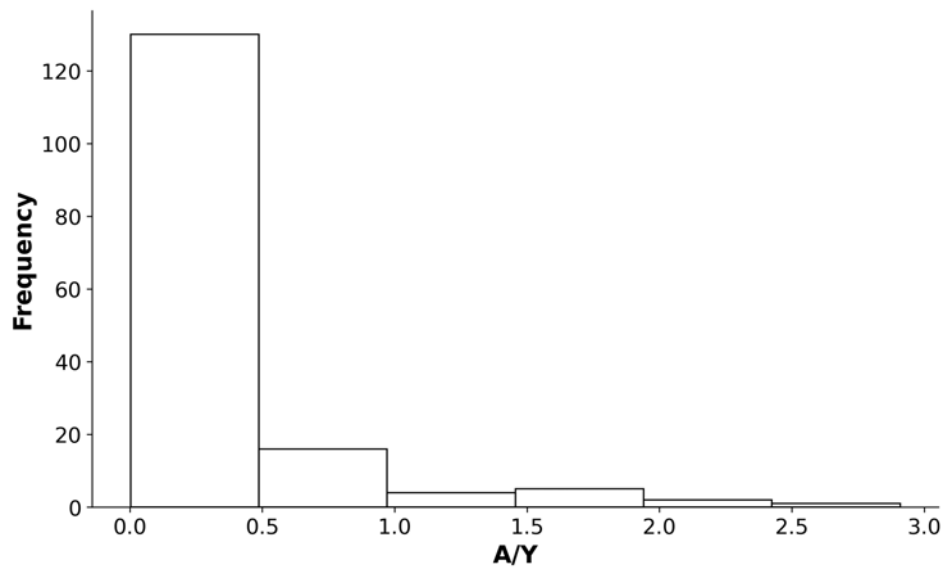
41. VINE SEED

Table 41-1. Summary statistics for VINE SEED fields in Coalition.

| Parameter | # Fields | Acreage | Mean | St. Dev. | Min | Max | Outlier Threshold | No. Outliers |
|-----------|----------|---------|------|----------|-----|---------|-------------------|--------------|
| A/Y | 159 | 6462.59 | 33.2 | 413.65 | 0.0 | 5216.32 | -- | -- |

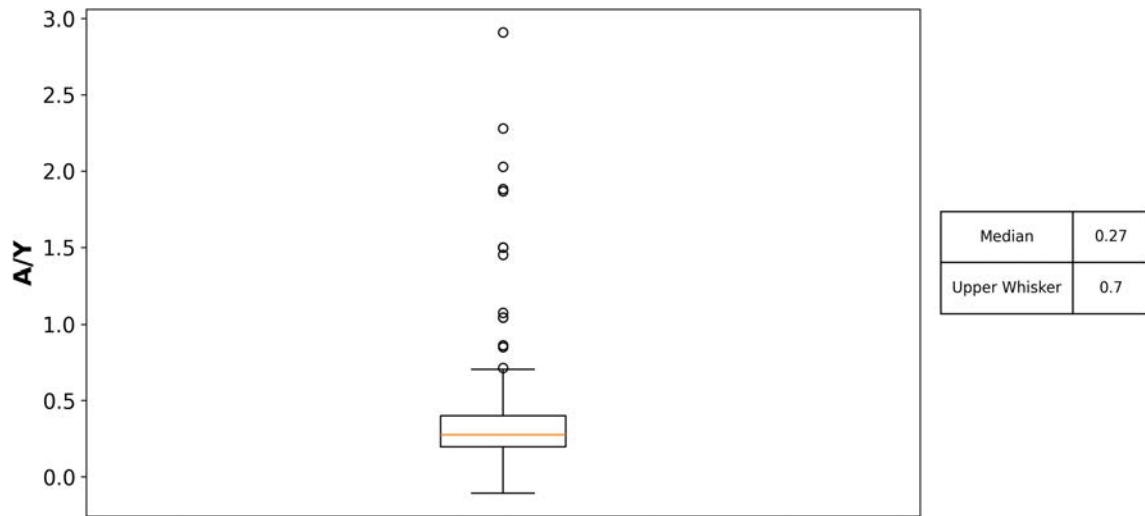
Outliers for annual crops are single year outliers in 2022 and either 2021 or 2020.

Figure 41-1. Histogram of A/Y for VINE SEED fields in the Coalition.



Values greater than 3 times the difference between the upper and lower whisker not shown to avoid skewing of plot

Figure 41-2. Box and whisker plot of A/Y for VINE SEED fields in the Coalition.



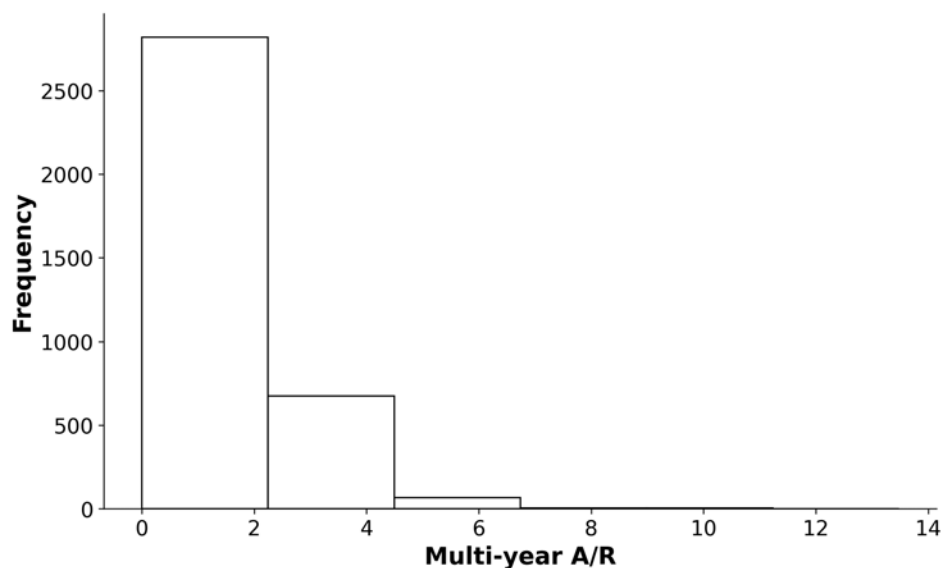
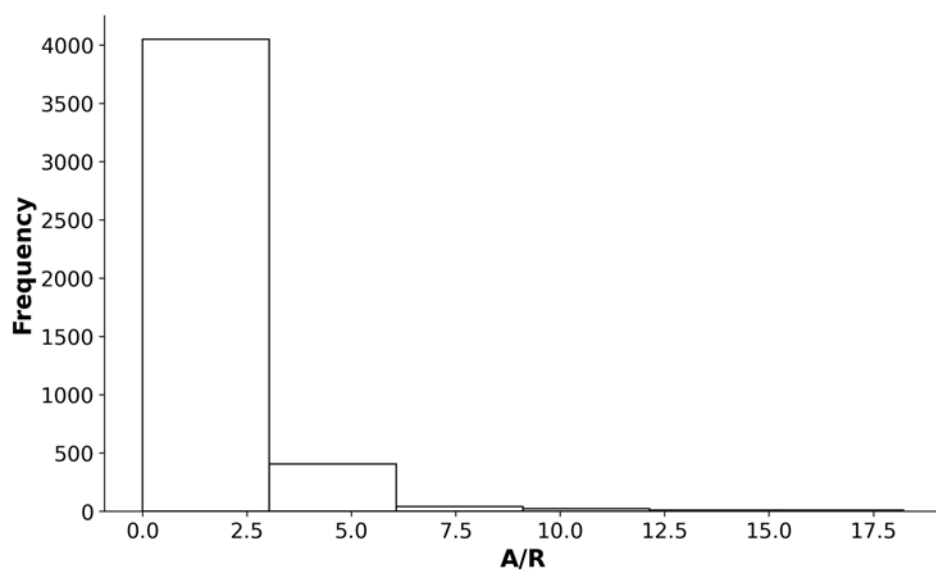
Values greater than 3 times the difference between the upper and lower whisker not shown to avoid skewing of plot. The whiskers are the medcouple values with the upper whisker being the outlier threshold. Dots are outliers.

42. WALNUT

Table 42-1. Summary statistics for WALNUT fields in Coalition.

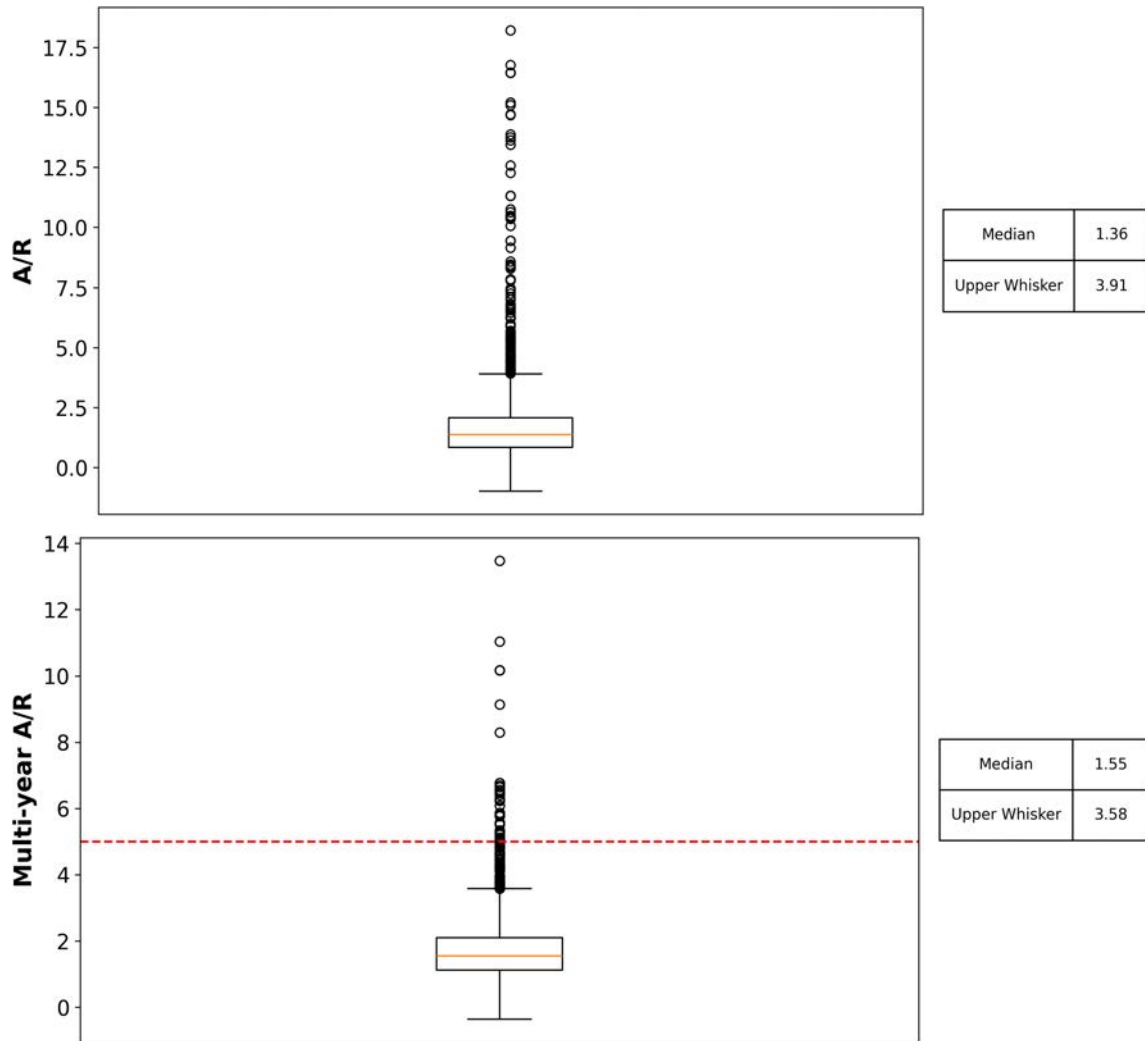
| Parameter | # Fields | Acreage | Mean | St. Dev. | Min | Max | Outlier Threshold | No. Outliers |
|----------------|----------|-----------|--------|----------|--------|--------|-------------------|--------------|
| A/R | 4506 | 174256.02 | 1.66 | 1.96 | 0.0 | 33.02 | -- | -- |
| A-R | 4506 | 174256.02 | 27.92 | 59.0 | -190.8 | 407.28 | -- | -- |
| Multi-year A/R | 3570 | 136655.69 | 1.74 | 1.08 | 0.0 | 16.74 | 4.99 | 45 |
| Multi-year A-R | 3570 | 136655.69 | 120.08 | 146.42 | -429.3 | 883.3 | -- | -- |

Figure 42-1. Histogram of A/R for WALNUT fields in the Coalition.



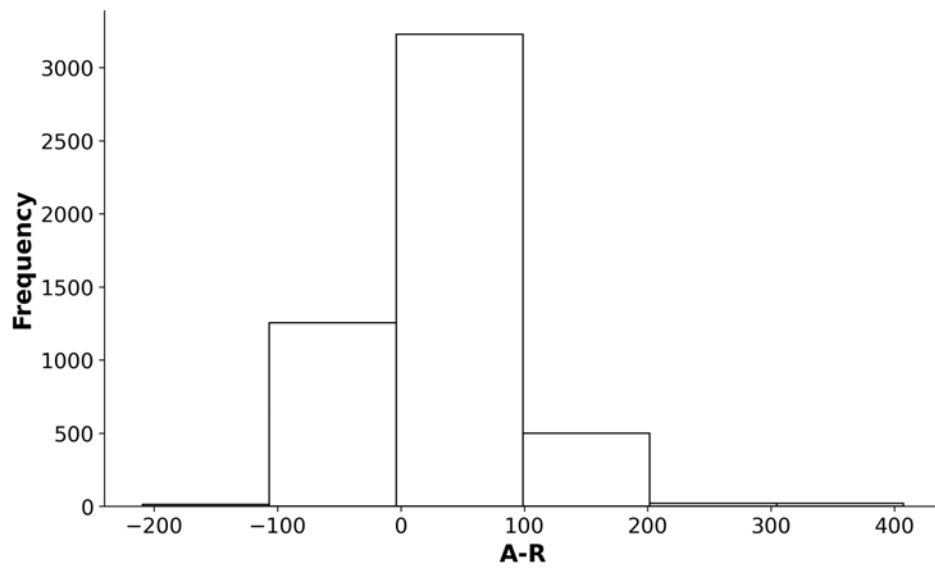
Values greater than 3 times the difference between the upper and lower whisker not shown to avoid skewing of plot.

Figure 42-2. Box and whisker plot of A/R for WALNUT fields in the Coalition.



The boxplot uses the standard method of Tukey (1977), and values greater than 3 times the difference between the upper and lower whisker are not shown to avoid skewing the plot. The red dashed line shows the outlier threshold which was calculated via the adjusted boxplot method of Hubert and Vandervieren (2008) using pooled 2020 – 2021 single year ratios. Any dots that exceed the red dashed line were outliers.

Figure 42-3. Histogram of A-R for WALNUT fields in the Coalition.



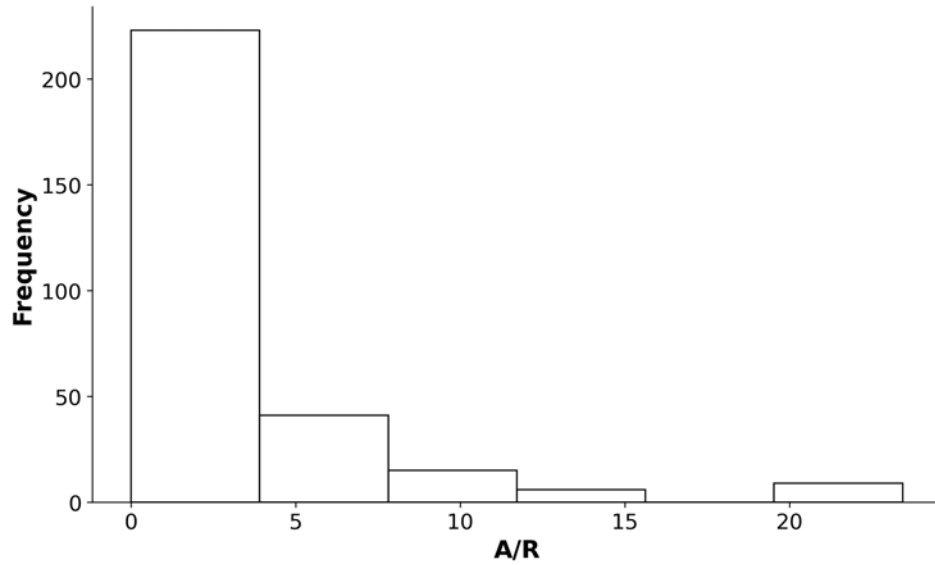
Values greater than 3 times the difference between the upper and lower whisker not shown to avoid skewing of plot.

43. WALNUT-YOUNG

Table 43-1. Summary statistics for WALNUT-YOUNG fields in Coalition.

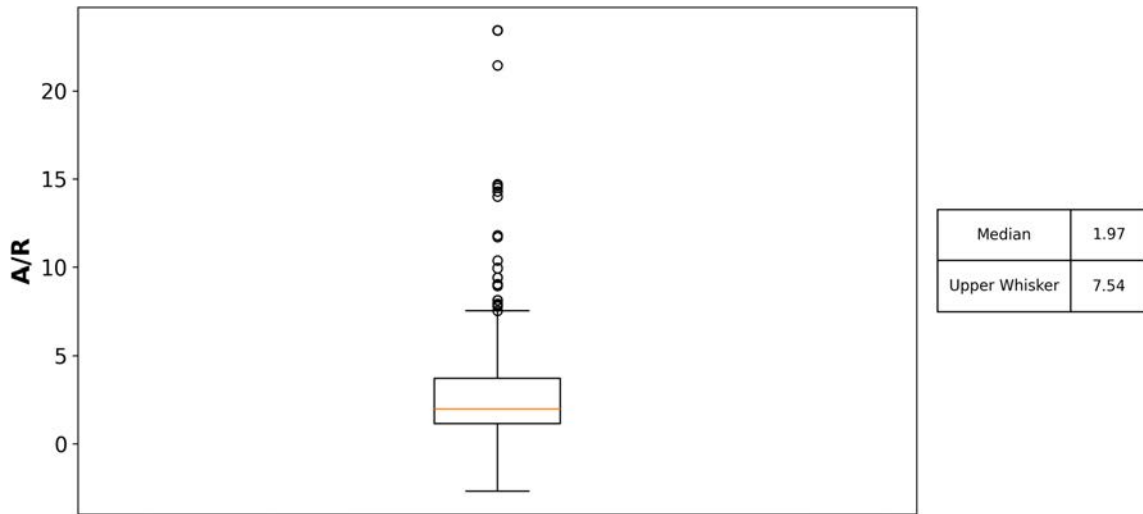
| Parameter | # Fields | Acreage | Mean | St. Dev. | Min | Max | Outlier Threshold | No. Outliers |
|-----------|----------|---------|------|----------|--------|-------|-------------------|--------------|
| A/R | 290 | 13390.4 | 3.43 | 4.51 | 0.0 | 23.43 | -- | -- |
| A-R | 290 | 13390.4 | 50.8 | 76.09 | -90.63 | 512.4 | -- | -- |

Figure 43-1. Histogram of A/R for WALNUT-YOUNG fields in the Coalition.



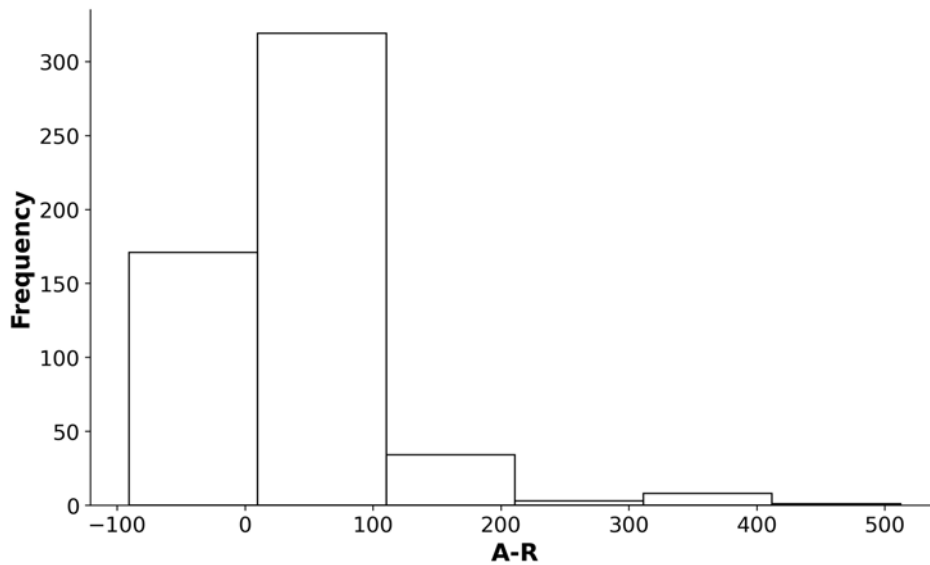
Values greater than 3 times the difference between the upper and lower whisker not shown to avoid skewing of plot.

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



The boxplot uses the standard method of Tukey (1977), and values greater than 3 times the difference between the upper and lower whisker are not shown to avoid skewing the plot. The red dashed line shows the outlier threshold which was calculated via the adjusted boxplot method of Hubert and Vandervieren (2008) using pooled 2020 – 2021 single year ratios. Any dots that exceed the red dashed line were outliers.

Figure 43-3. Histogram of A-R for WALNUT-YOUNG fields in the Coalition.



Values greater than 3 times the difference between the upper and lower whisker not shown to avoid skewing of plot.

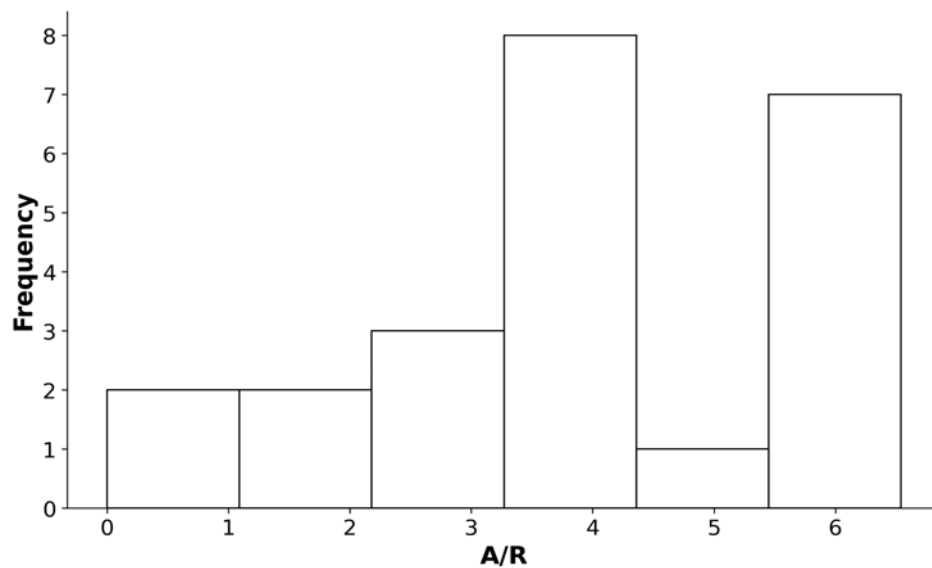
44. WATERMELON

Table 44-1. Summary statistics for WATERMELON fields in Coalition.

| Parameter | # Fields | Acreage | Mean | St. Dev. | Min | Max | Outlier Threshold | No. Outliers |
|-----------|----------|---------|-------|----------|-------|-------|-------------------|--------------|
| A/R | 23 | 981.36 | 3.96 | 1.75 | 0.0 | 6.54 | 10.9 | 0 |
| A-R | 26 | 1114.36 | 91.49 | 69.56 | -29.5 | 195.0 | -- | -- |

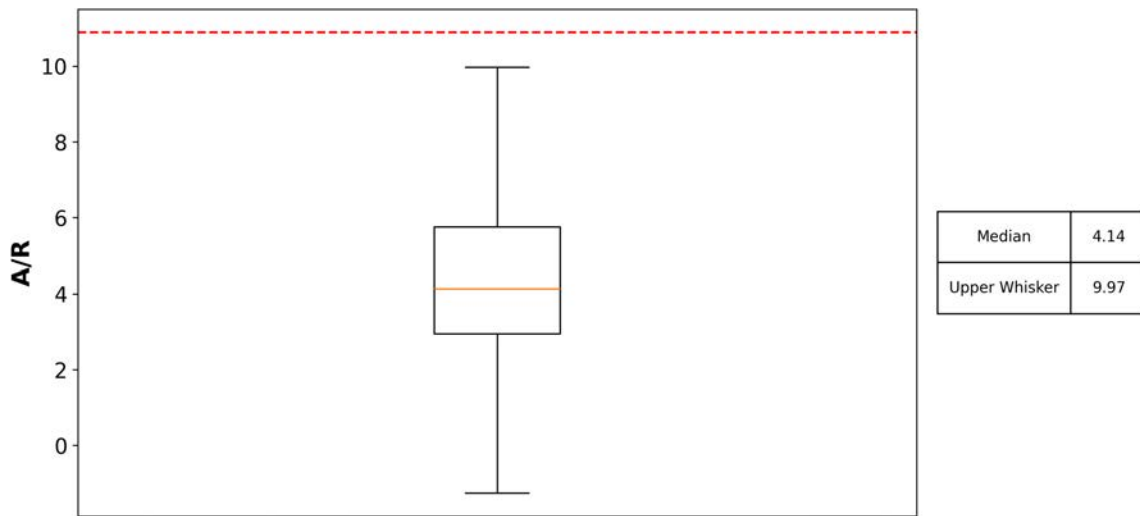
Outliers for annual crops are single year outliers in 2022 and either 2021 or 2020.

Figure 44-1. Histogram of A/R for WATERMELON fields in the Coalition.



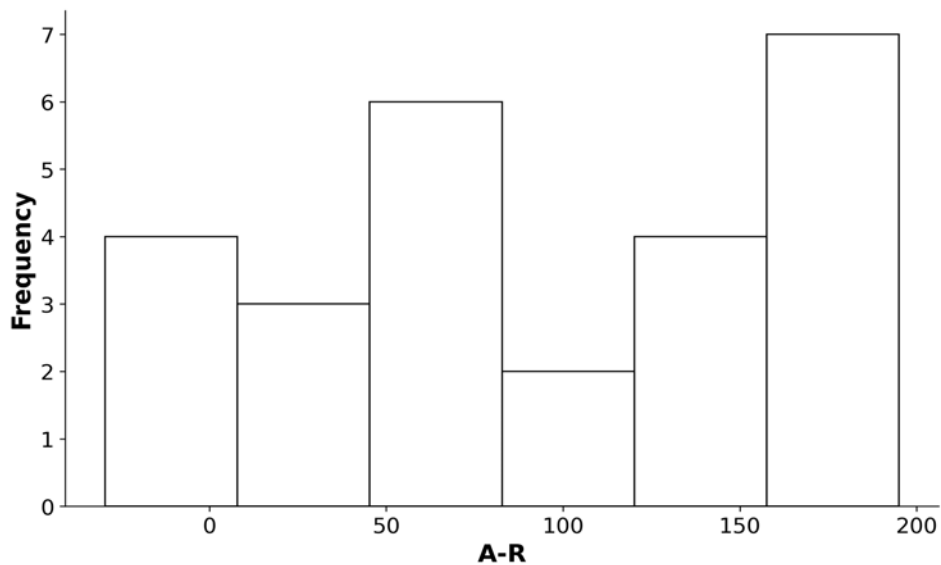
Values greater than 3 times the difference between the upper and lower whisker not shown to avoid skewing of plot.

Figure 44-2. Box and whisker plot of A/R for WATERMELON fields in the Coalition.



The boxplot uses the standard method of Tukey (1977), and values greater than 3 times the difference between the upper and lower whisker are not shown to avoid skewing the plot. The red dashed line shows the outlier threshold which was calculated via the adjusted boxplot method of Hubert and Vandervieren (2008) using pooled 2020 – 2022 single year ratios. Outliers for 2022 CY annual crop fields are any dots above the red dashed line that were also outliers in either the 2021 or 2020 CY for any crop.

Figure 44-3. Histogram of A-R for WATERMELON fields in the Coalition.



Values greater than 3 times the difference between the upper and lower whisker not shown to avoid skewing of plot.

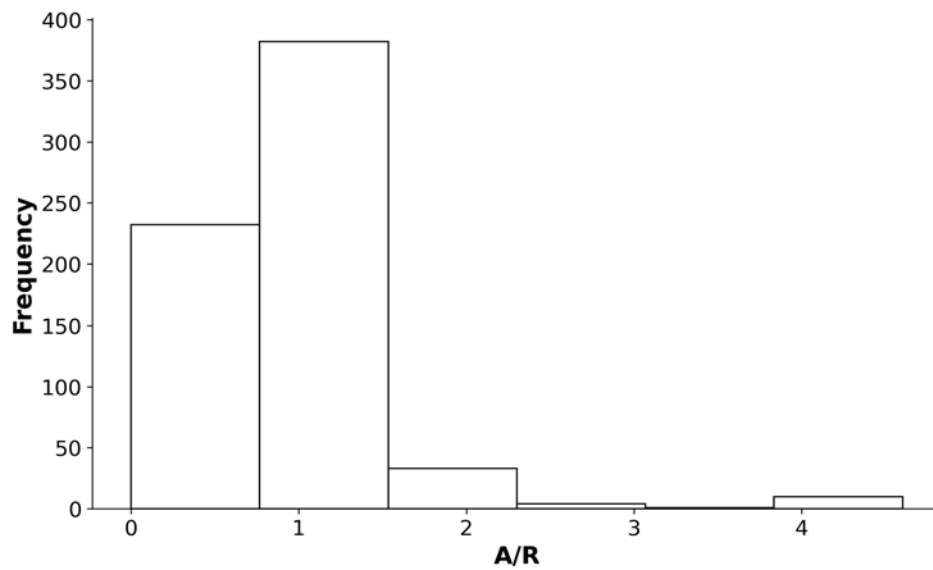
45. WHEAT - GRAIN

Table 45-1. Summary statistics for WHEAT - GRAIN fields in Coalition.

| Parameter | # Fields | Acreage | Mean | St. Dev. | Min | Max | Outlier Threshold | No. Outliers |
|-----------|----------|----------|--------|----------|--------|-------|-------------------|--------------|
| A/R | 665 | 31255.54 | 1.03 | 1.97 | 0.0 | 37.0 | 2.33 | 1 |
| A-R | 695 | 32361.76 | -18.15 | 61.94 | -430.0 | 166.0 | -- | -- |

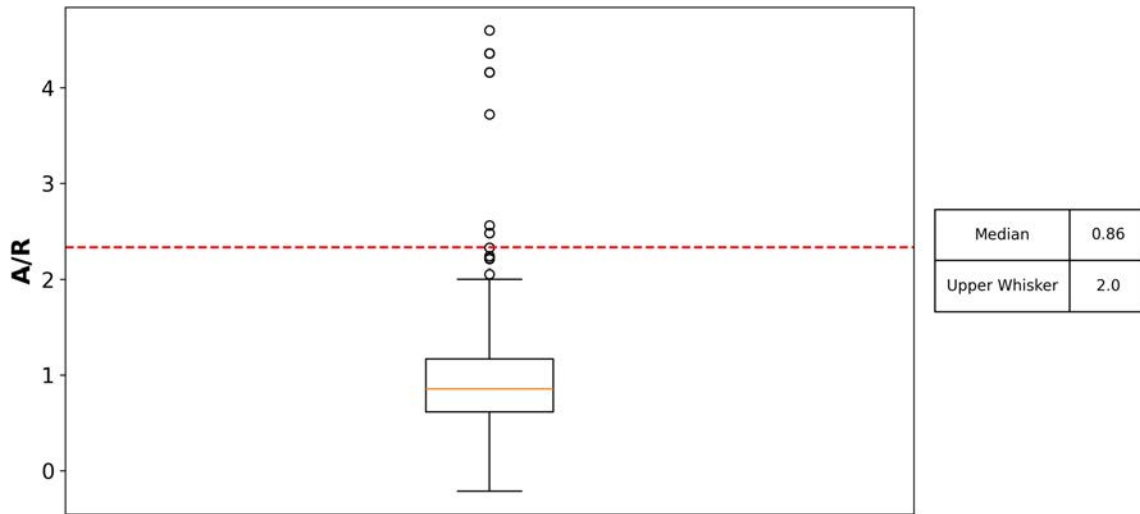
Outliers for annual crops are single year outliers in 2022 and either 2021 or 2020.

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



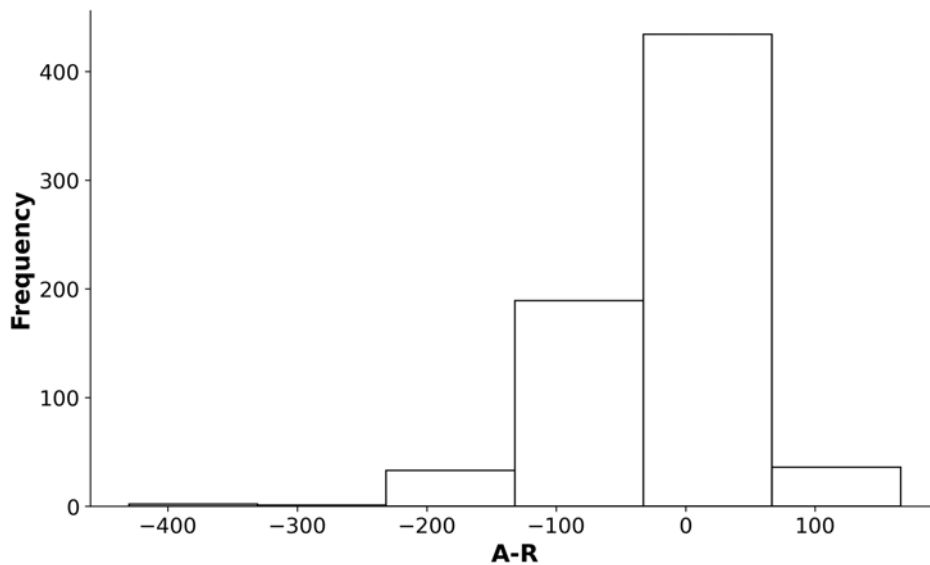
Values greater than 3 times the difference between the upper and lower whisker not shown to avoid skewing of plot.

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



The boxplot uses the standard method of Tukey (1977), and values greater than 3 times the difference between the upper and lower whisker are not shown to avoid skewing the plot. The red dashed line shows the outlier threshold which was calculated via the adjusted boxplot method of Hubert and Vandervieren (2008) using pooled 2020 – 2022 single year ratios. Outliers for 2022 CY annual crop fields are any dots above the red dashed line that were also outliers in either the 2021 or 2020 CY for any crop.

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



Values greater than 3 times the difference between the upper and lower whisker not shown to avoid skewing of plot.

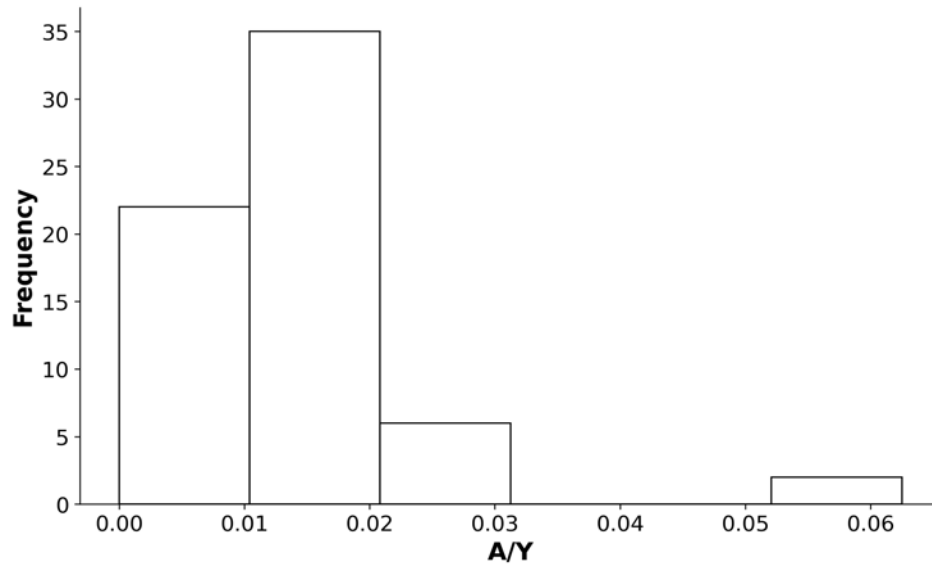
46. WHEAT - HAY

Table 46-1. Summary statistics for WHEAT - HAY fields in Coalition.

| Parameter | # Fields | Acreage | Mean | St. Dev. | Min | Max | Outlier Threshold | No. Outliers |
|-----------|----------|---------|------|----------|-----|------|-------------------|--------------|
| A/Y | 65 | 5277.22 | 0.01 | 0.01 | 0.0 | 0.06 | -- | -- |

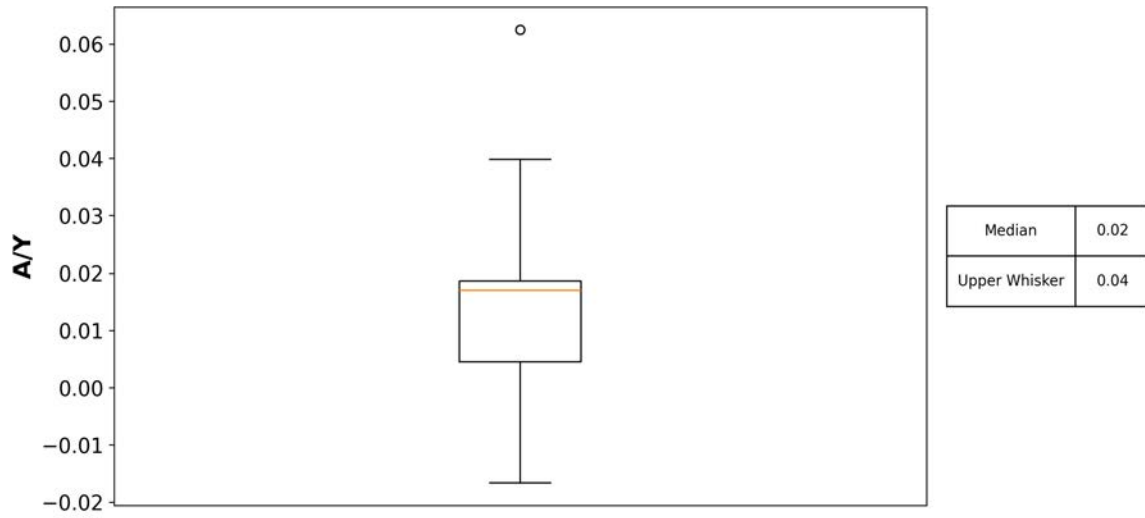
Outliers for annual crops are single year outliers in 2022 and either 2021 or 2020.

Figure 46-1. Histogram of A/Y for WHEAT - HAY fields in the Coalition.



Values greater than 3 times the difference between the upper and lower whisker not shown to avoid skewing of plot

Figure 46-2. Box and whisker plot of A/Y for WHEAT - HAY fields in the Coalition.



Values greater than 3 times 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. OTHER CROPS

Table 47-1. Summary statistics for crops with limited representation in the Coalition

Crops with limited data (less than 20 fields for 2022 CY) or non-specific crop categories (“other” or “misc”).

| Crop | Parameter | # Fields | Acreage | Mean | St. Dev. | Min | Max |
|--------------------------|-----------|----------|---------|---------|----------|--------|--------|
| ALFALFA - SILAGE/HAYLAGE | A/R | 7 | 259.7 | 0.06 | 0.08 | 0.0 | 0.16 |
| | A-R | 7 | 259.7 | -116.19 | 67.03 | -240.0 | -56.88 |
| | A/Y | 7 | 259.7 | 0.0 | 0.0 | 0.0 | 0.0 |
| APRICOT/APRIUM | A/R | 13 | 26.89 | 6.73 | 7.73 | 0.0 | 21.22 |
| | A-R | 13 | 26.89 | 32.22 | 42.22 | -6.67 | 112.44 |
| | A/Y | 13 | 26.89 | 0.02 | 0.02 | 0.0 | 0.06 |
| ASPARAGUS | A/R | 7 | 216.15 | 2.16 | 1.17 | 0.0 | 3.85 |
| | A-R | 7 | 216.15 | 19.47 | 18.36 | -10.81 | 48.12 |
| | A/Y | 7 | 216.15 | 0.01 | 0.0 | 0.0 | 0.01 |
| BARLEY - HAY | A/R | 0 | | | | | |
| | A-R | 0 | | | | | |
| | A/Y | 11 | 507.99 | 0.01 | 0.01 | 0.0 | 0.02 |
| BARLEY - SILAGE | A/R | 0 | | | | | |
| | A-R | 0 | | | | | |
| | A/Y | 2 | 470.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| BEAN - GREEN | A/R | 13 | 833.94 | 5.35 | 2.3 | 0.0 | 6.29 |
| | A-R | 13 | 833.94 | 69.45 | 57.44 | -98.5 | 91.72 |
| | A/Y | 13 | 833.94 | 0.02 | 0.01 | 0.0 | 0.02 |
| BERRY | A/R | 0 | | | | | |
| | A-R | 0 | | | | | |
| | A/Y | 19 | 95.39 | 0.07 | 0.16 | 0.0 | 0.67 |
| BROCCOLI | A/R | 2 | 36.5 | 0.5 | 0.41 | 0.21 | 0.79 |
| | A-R | 2 | 36.5 | -31.3 | 17.96 | -44.0 | -18.6 |
| | A/Y | 2 | 36.5 | 0.0 | 0.0 | 0.0 | 0.0 |
| CABBAGE | A/R | 1 | 2.9 | 0.15 | | 0.15 | 0.15 |
| | A-R | 2 | 3.24 | -56.3 | 79.62 | -112.6 | 0.0 |
| | A/Y | 1 | 2.9 | 0.0 | | 0.0 | 0.0 |
| CHESTNUT | A/R | 0 | | | | | |
| | A-R | 0 | | | | | |
| | A/Y | 8 | 66.98 | 0.09 | 0.04 | 0.02 | 0.13 |

| Crop | Parameter | # Fields | Acreage | Mean | St. Dev. | Min | Max |
|-------------------|-----------|----------|---------|--------|----------|--------|--------|
| CILANTRO | A/R | 1 | 75.0 | 3.31 | | 3.31 | 3.31 |
| | A-R | 1 | 75.0 | 20.92 | | 20.92 | 20.92 |
| | A/Y | 1 | 75.0 | 0.02 | | 0.02 | 0.02 |
| CITRUS-YOUNG | A/R | 1 | 3.0 | 0.0 | | 0.0 | 0.0 |
| | A-R | 1 | 3.0 | -27.6 | | -27.6 | -27.6 |
| | A/Y | 1 | 3.0 | 0.0 | | 0.0 | 0.0 |
| CORN - POPCORN | A/R | 0 | | | | | |
| | A-R | 0 | | | | | |
| | A/Y | 8 | 251.7 | 0.03 | 0.0 | 0.03 | 0.03 |
| CORN - SWEET | A/R | 12 | 384.5 | 5.84 | 1.86 | 2.58 | 8.33 |
| | A-R | 13 | 389.5 | 197.94 | 79.43 | 45.32 | 394.22 |
| | A/Y | 12 | 384.5 | 0.02 | 0.01 | 0.01 | 0.03 |
| COTTON | A/R | 11 | 903.0 | 1.68 | 0.76 | 0.87 | 3.59 |
| | A-R | 11 | 903.0 | 48.15 | 43.55 | -25.92 | 105.6 |
| | A/Y | 11 | 903.0 | 0.1 | 0.05 | 0.05 | 0.22 |
| COVER CROP | A/R | 0 | | | | | |
| | A-R | 0 | | | | | |
| | A/Y | 5 | 76.3 | 0.0 | 0.0 | 0.0 | 0.0 |
| DICHONDRA | A/R | 0 | | | | | |
| | A-R | 0 | | | | | |
| | A/Y | 7 | 295.69 | 0.31 | 0.16 | 0.05 | 0.49 |
| EGGPLANT | A/R | 0 | | | | | |
| | A-R | 0 | | | | | |
| | A/Y | 2 | 4.5 | 0.0 | 0.0 | 0.0 | 0.0 |
| FIG | A/R | 6 | 213.0 | 29.09 | 21.05 | 0.0 | 42.65 |
| | A-R | 6 | 213.0 | 212.82 | 162.04 | -3.0 | 317.38 |
| | A/Y | 6 | 213.0 | 0.04 | 0.03 | 0.0 | 0.05 |
| FLOWER/ORNAMENTAL | A/R | 0 | | | | | |
| | A-R | 0 | | | | | |
| | A/Y | 3 | 32.0 | 0.34 | 0.57 | 0.0 | 1.0 |
| GARLIC | A/R | 12 | 803.0 | 1.8 | 0.54 | 1.12 | 2.43 |
| | A-R | 13 | 803.3 | 74.0 | 42.1 | 15.61 | 129.4 |
| | A/Y | 12 | 803.0 | 0.01 | 0.0 | 0.01 | 0.02 |
| GRAPE - OTHER | A/R | 0 | | | | | |
| | A-R | 0 | | | | | |
| | A/Y | 9 | 103.0 | 0.01 | 0.01 | 0.0 | 0.02 |

| Crop | Parameter | # Fields | Acreage | Mean | St. Dev. | Min | Max |
|------------------|-----------|----------|---------|-------|----------|-------|--------|
| GRAPE - TABLE | A/R | 1 | 4.0 | 5.31 | | 5.31 | 5.31 |
| | A-R | 1 | 4.0 | 97.4 | | 97.4 | 97.4 |
| | A/Y | 1 | 4.0 | 0.01 | | 0.01 | 0.01 |
| GRAPE ROOTSTOCK | A/R | 0 | | | | | |
| | A-R | 0 | | | | | |
| | A/Y | 4 | 66.11 | 0.0 | 0.0 | 0.0 | 0.0 |
| HOPS | A/R | 0 | | | | | |
| | A-R | 0 | | | | | |
| | A/Y | 3 | 7.5 | 0.04 | 0.07 | 0.0 | 0.12 |
| KIWI-YOUNG | A/R | 0 | | | | | |
| | A-R | 0 | | | | | |
| | A/Y | 1 | 25.97 | 0.04 | | 0.04 | 0.04 |
| LAVENDER | A/R | 0 | | | | | |
| | A-R | 0 | | | | | |
| | A/Y | 2 | 3.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| MELON | A/R | 9 | 540.27 | 4.17 | 2.94 | 0.46 | 9.17 |
| | A-R | 13 | 578.57 | 63.05 | 57.97 | -4.96 | 150.58 |
| | A/Y | 9 | 540.27 | 0.01 | 0.01 | 0.0 | 0.01 |
| MILLET - GRAIN | A/R | 0 | | | | | |
| | A-R | 0 | | | | | |
| | A/Y | 9 | 343.2 | 0.02 | 0.0 | 0.02 | 0.02 |
| MISC FIELD CROPS | A/R | 0 | | | | | |
| | A-R | 0 | | | | | |
| | A/Y | 1 | 105.5 | 0.0 | | 0.0 | 0.0 |
| MISC FRUIT TREE | A/R | 0 | | | | | |
| | A-R | 0 | | | | | |
| | A/Y | 119 | 2300.31 | 0.06 | 0.18 | 0.0 | 1.0 |
| MISC NUT TREE | A/R | 0 | | | | | |
| | A-R | 0 | | | | | |
| | A/Y | 6 | 108.0 | 0.03 | 0.02 | 0.0 | 0.05 |
| MISC ROW CROP | A/R | 0 | | | | | |
| | A-R | 0 | | | | | |
| | A/Y | 21 | 1900.21 | 0.02 | 0.03 | 0.0 | 0.09 |
| MISC VEGETABLE | A/R | 0 | | | | | |
| | A-R | 0 | | | | | |
| | A/Y | 93 | 1377.79 | 0.13 | 0.78 | 0.0 | 7.47 |

| Crop | Parameter | # Fields | Acreage | Mean | St. Dev. | Min | Max |
|---------------------------|-----------|----------|---------|-------|----------|--------|--------|
| NURSERY | A/R | 0 | | | | | |
| | A-R | 0 | | | | | |
| | A/Y | 1 | 3.0 | 0.0 | | 0.0 | 0.0 |
| OAT - GRAIN | A/R | 3 | 86.7 | 0.96 | 0.92 | 0.0 | 1.82 |
| | A-R | 3 | 86.7 | 10.28 | 61.11 | -47.12 | 74.52 |
| | A/Y | 3 | 86.7 | 0.02 | 0.02 | 0.0 | 0.03 |
| OAT - GREENCHOP | A/R | 0 | | | | | |
| | A-R | 0 | | | | | |
| | A/Y | 1 | 120.0 | 0.0 | | 0.0 | 0.0 |
| OAT - SILAGE | A/R | 0 | | | | | |
| | A-R | 0 | | | | | |
| | A/Y | 3 | 135.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| OLIVE-YOUNG | A/R | 6 | 805.3 | 13.25 | 14.63 | 0.0 | 31.94 |
| | A-R | 6 | 805.3 | 34.76 | 25.05 | -11.93 | 62.95 |
| | A/Y | 6 | 805.3 | 0.04 | 0.05 | 0.0 | 0.1 |
| ONION | A/R | 0 | | | | | |
| | A-R | 5 | 108.53 | 23.2 | 51.88 | 0.0 | 116.0 |
| | A/Y | 0 | | | | | |
| PEACH/NECTARINE-YOUNG | A/R | 11 | 116.36 | 3.6 | 2.87 | 0.0 | 8.72 |
| | A-R | 11 | 116.36 | 70.04 | 89.93 | -11.3 | 265.6 |
| | A/Y | 11 | 116.36 | 0.0 | 0.0 | 0.0 | 0.01 |
| PEAR-YOUNG | A/R | 4 | 125.9 | 12.62 | 12.25 | 4.02 | 30.04 |
| | A-R | 4 | 125.9 | 99.12 | 22.15 | 74.92 | 128.65 |
| | A/Y | 4 | 125.9 | 0.01 | 0.01 | 0.0 | 0.02 |
| PECAN-YOUNG | A/R | 0 | | | | | |
| | A-R | 0 | | | | | |
| | A/Y | 7 | 184.59 | 0.68 | 1.1 | 0.0 | 2.86 |
| POMEGRANATE | A/R | 3 | 10.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | A-R | 3 | 10.0 | -3.35 | 4.61 | -8.67 | -0.59 |
| | A/Y | 3 | 10.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| RICE | A/R | 0 | | | | | |
| | A-R | 0 | | | | | |
| | A/Y | 13 | 878.3 | 0.02 | 0.01 | 0.0 | 0.03 |
| RYEGRASS - SILAGE/HAYLAGE | A/R | 0 | | | | | |
| | A-R | 0 | | | | | |
| | A/Y | 2 | 55.6 | 0.0 | 0.0 | 0.0 | 0.0 |

| Crop | Parameter | # Fields | Acreage | Mean | St. Dev. | Min | Max |
|----------------------------|-----------|----------|---------|---------|----------|---------|---------|
| SORGHUM/MILO - GRAIN | A/R | 15 | 763.88 | 1.27 | 0.53 | 0.52 | 2.27 |
| | A-R | 20 | 951.38 | 35.67 | 46.0 | -28.08 | 116.0 |
| | A/Y | 15 | 763.88 | 0.02 | 0.01 | 0.01 | 0.04 |
| SORGHUM/MILO - GREENCHOP | A/R | 0 | | | | | |
| | A-R | 0 | | | | | |
| | A/Y | 3 | 18.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| SORGHUM/MILO - HAY | A/R | 0 | | | | | |
| | A-R | 0 | | | | | |
| | A/Y | 2 | 61.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| SORGHUM/MILO - SILAGE | A/R | 1 | 50.0 | 0.45 | | 0.45 | 0.45 |
| | A-R | 1 | 50.0 | -144.75 | | -144.75 | -144.75 |
| | A/Y | 1 | 50.0 | 0.0 | | 0.0 | 0.0 |
| SQUASH | A/R | 10 | 175.85 | 2.93 | 3.67 | 0.0 | 12.26 |
| | A-R | 13 | 214.85 | 41.88 | 68.39 | -44.04 | 214.96 |
| | A/Y | 10 | 175.85 | 0.01 | 0.01 | 0.0 | 0.02 |
| STRAWBERRY | A/R | 12 | 130.57 | 27.63 | 46.35 | 0.0 | 172.93 |
| | A-R | 12 | 130.57 | 113.65 | 106.58 | -0.27 | 274.4 |
| | A/Y | 12 | 130.57 | 0.04 | 0.06 | 0.0 | 0.23 |
| SUDAN GRASS - GREENCHOP | A/R | 0 | | | | | |
| | A-R | 0 | | | | | |
| | A/Y | 1 | 30.0 | 0.0 | | 0.0 | 0.0 |
| SUDAN GRASS - SILAGE | A/R | 0 | | | | | |
| | A-R | 0 | | | | | |
| | A/Y | 2 | 60.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| TIMOTHYGRASS - HAY | A/R | 0 | | | | | |
| | A-R | 0 | | | | | |
| | A/Y | 1 | 28.0 | 0.01 | | 0.01 | 0.01 |
| TOMATO - FRESH MARKET | A/R | 3 | 38.0 | 6.51 | 4.65 | 1.15 | 9.2 |
| | A-R | 3 | 38.0 | 38.25 | 26.37 | 7.8 | 53.48 |
| | A/Y | 3 | 38.0 | 0.01 | 0.01 | 0.0 | 0.01 |
| TOMATO - NR | A/R | 0 | | | | | |
| | A-R | 0 | | | | | |
| | A/Y | 17 | 802.89 | 1.72 | 3.81 | 0.0 | 9.75 |
| TRITICALE - SILAGE/HAYLAGE | A/R | 1 | 107.0 | 1.79 | | 1.79 | 1.79 |
| | A-R | 1 | 107.0 | 48.6 | | 48.6 | 48.6 |
| | A/Y | 1 | 107.0 | 0.01 | | 0.01 | 0.01 |

| Crop | Parameter | # Fields | Acreage | Mean | St. Dev. | Min | Max |
|-------------------|-----------|----------|---------|---------|----------|--------|-------|
| TRUFFLE | A/R | 0 | | | | | |
| | A-R | 0 | | | | | |
| | A/Y | 1 | 6.5 | 0.0 | | 0.0 | 0.0 |
| TURF | A/R | 0 | | | | | |
| | A-R | 0 | | | | | |
| | A/Y | 7 | 563.13 | 4.77 | 8.08 | 0.04 | 16.61 |
| VETCH | A/R | 0 | | | | | |
| | A-R | 0 | | | | | |
| | A/Y | 6 | 170.7 | 0.07 | 0.16 | 0.0 | 0.4 |
| WHEAT - GREENCHOP | A/R | 0 | | | | | |
| | A-R | 0 | | | | | |
| | A/Y | 4 | 295.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| WHEAT - SILAGE | A/R | 18 | 1230.07 | 0.48 | 0.37 | 0.0 | 1.51 |
| | A-R | 18 | 1230.07 | -168.19 | 170.98 | -397.0 | 64.0 |
| | A/Y | 18 | 1230.07 | 0.0 | 0.0 | 0.0 | 0.01 |
| WINTER GRAIN | A/R | 0 | | | | | |
| | A-R | 0 | | | | | |
| | A/Y | 5 | 490.57 | 0.0 | 0.0 | 0.0 | 0.0 |

APPENDIX B

EXAMPLE INMP MEMBER FEEDBACK REPORT

Sacramento Water Quality Coalition
2021 CY Irrigation and Nitrogen Management Plan Summary Report Results

Owner ID: ABC1000

Owner Name: John Doe

Reporter ID: ABC1000

Reporter Name: John Doe

Crop: TOMATO – PROCESSING

These results represent information you provided on your 2021 crop year (CY) Irrigation and Nitrogen (N) Management Plan (INMP) Summary Report comparing your N *Applied* (A) to your N *Removed* (R) to other fields of the same crop in the Sacramento Valley Water Quality Coalition.

Table 1 below shows your results for the 2021 CY for pounds of N Applied (A) per acre, pounds of N Removed (R) per acre, A divided by R (A/R¹), and A minus R (A-R). Orange highlighting indicates your fields that are single-year outliers for A/R compared to other fields in the Coalition of the same crop for the 2021 CY. **For annual crops, multi-year outliers are any fields that were single-year outliers in 2021 and either 2020 or 2019.** Very few of the annual crop fields in the Coalition have the same crop three years in a row, preventing the use of 3-year average ratios for outlier determination.

Table 2 shows the Coalition-wide 2021 CY A/R outlier threshold and the Coalition averages for A, A/R, and A-R.

Single-Year A/R Status Color Key for Your Results

Outlier for 2021 CY²
 High (>75% of fields)
 Average or Low (<75% of fields)
 Not Enough Data
 N/A (not applicable)

Table 1. Your Individual Field Results for 2021 CY and 3-year (2019 – 2021 CY) periods.

| 2021 CY - Your Fields | | | | | | | | 2019 – 2021 CY - Your Fields | |
|-----------------------|--------------------|-----------------|-----------|---------------|-------------------|------|-----|------------------------------|--------------------|
| APN | Field Name | Irrigated Acres | Age (yrs) | Yield (lb/ac) | N Applied (lb/ac) | A/R | A-R | Outlier Years for A/R | Multi-Year Outlier |
| 000-000-000-001 | Limit to 15 digits | 77 | 10 | 9,000 | 290 | 2.69 | 182 | 19, 20, 21 | yes |
| 000-000-000-000 | | 80 | 7 | 8,000 | 250 | 2.50 | 150 | 21 | no |
| 000-000-000-002 | | 60 | 15 | 10,000 | 148 | 1.23 | 28 | none | no |
| 000-000-000-003 | | 40 | 2 | 12,000 | 130 | N/A | N/A | none | no |

Table 2. Coalition Results for 2021 CY for fields of the same crop.

| Coalition Results | 2021 CY - Coalition |
|--------------------------|---------------------|
| Median N Applied (lb/ac) | 222 |
| Median A/R | 1.53 |
| A/R Outlier Threshold | 2.23 |
| Median A-R | 77.6 |
| No. Fields | 454 |
| No. Outlier Fields | 50 |

The single-year A/R status color shows how your annual crop fields compare to others of the same crop across the whole Coalition for the 2021 CY. If your single-year A/R value is greater than the outlier threshold for the Coalition, it is an outlier for the 2021 CY. 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 the value was not calculated either because there was no N removal coefficient for the crop or the crop was a young orchard. For annual crops, multi-year outliers are any fields that were single-year outliers in 2021 and either 2020 or 2019. Very few of the annual crop fields in the Coalition have the same crop three years in a row, preventing the use of 3-year average ratios for outlier determination.

Members with multi-year A/R outliers for annual crops (“yes” in Table 1) must have their INMP certified by an irrigation and N management plan specialist unless the Member receives additional self-certification training provided by the Coalition.

Notes:

1. A/R Value: The purpose of this value is to estimate the amount of residual N 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; Geisseler, 2021). 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 a few if any values could be found, while for others extensive datasets were available.
2. 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).

**Sacramento Water Quality Coalition
2021 CY Irrigation and Nitrogen Management Plan Summary Report Results**

Owner ID: ABC1000

Owner Name: John Doe

Reporter ID: ABC1000

Reporter Name: John Doe

Crop: ALMOND

These results represent information you provided on your 2021 crop year (CY) Irrigation and Nitrogen (N) Management Plan (INMP) Summary Report comparing your N *Applied* (A) to your N *Removed* (R) to other fields of the same crop in the Sacramento Valley Water Quality Coalition.

Table 1 below shows your results for the 2021 CY and the running total for the last 3 years (2019 – 2021 CY) for pounds of N Applied (A) per acre, pounds of N Removed (R) per acre, A divided by R (A/R¹), and A minus R (A-R). Orange highlighting indicates your fields that are outliers for A/R compared to other fields in the Coalition of the same crop. **For perennial crops, outlier status is based on 3-year A/R (2019 – 2021 CY).**

Table 2 shows the Coalition-wide averages for the 2021 CY and 3-yr period with the 3-yr A/R outlier threshold being used to identify outliers.

3-Year A/R Status Color Key for Your Results

Outlier²
 High (>75% of fields)
 Average or Low (<75% of fields)
 Not Enough Data
 N/A (not applicable)

Table 1. Your Individual Field Results for 2021 CY and 3-year (2019 – 2021 CY) periods.

| 2021 CY - Your Fields | | | | | | | | 3-yr (2019 – 2021 CY) - Your Fields | | | |
|-----------------------|--------------------|-----------------|-----------|---------------|-------------------|------|-----|-------------------------------------|----------|----------|----------------------|
| APN | Field Name | Irrigated Acres | Age (yrs) | Yield (lb/ac) | N Applied (lb/ac) | A/R | A-R | 3-yr Total N Applied (lb/ac) | 3-yr A/R | 3-yr A-R | 3-yr Outlier for A/R |
| 000-000-000-001 | Limit to 15 digits | 77 | 10 | 9,000 | 290 | 2.69 | 182 | 600 | 2.5 | 50 | yes |
| 000-000-000-000 | | 80 | 7 | 8,000 | 250 | 2.50 | 150 | 550 | 2.3 | 70 | no |
| 000-000-000-002 | | 60 | 15 | 10,000 | 148 | 1.23 | 28 | 900 | 2.0 | 60 | no |
| 000-000-000-003 | | 40 | 2 | 12,000 | 130 | N/A | N/A | N/A | N/A | N/A | no |

Table 2. Coalition Results for 2021 CY and 3-year (2019 – 2021 CY) periods for fields of the same crop.

| Coalition Results | 2021 CY - Coalition | 3-yr (2019 – 2021 CY) - Coalition |
|--------------------------------|---------------------|-----------------------------------|
| Median Total N Applied (lb/ac) | 222 | 700 |
| Median A/R | 1.53 | 1.40 |
| A/R Outlier Threshold | N/A | 2.23 |
| Median A-R | 77.6 | 60.5 |
| No. Fields | 454 | 300 |
| No. Outlier Fields | N/A | 20 |

The 3-yr A/R status color shows how your fields compare to others of the same crop across the Coalition. For perennial crops, if your 3-yr A/R value is greater than the outlier threshold for the Coalition, it is a 3-yr “outlier”. For perennial crops, outlier determination is based on the 3-year A/R (2019 – 2021 CY) outlier threshold. 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 the value was not calculated either because there was no N removal coefficient for the crop, the crop was a young orchard, or the field was not eligible for multi-year ratios. To be eligible for the 3-yr A/R, the field must have a perennial crop of the same type for the 2019, 2020, and 2021 CY, and the member, parcel, and field name must also be the same during this period.

Members with 3-yr A/R outliers for perennial crops (“yes” in Table 1) must have their INMP certified by an irrigation and N management plan specialist unless the Member receives additional self-certification training provided by the Coalition.

Notes:

1. A/R Value: The purpose of this value is to estimate the amount of residual N 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; Geisseler, 2021). 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 a few if any values could be found, while for others extensive datasets were available.
2. 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

INMP STATISTICAL GROUPINGS AND EXCLUSION THRESHOLDS BY CROP

| Specific Crop | Statistical Crop Grouping | Maximum Yield (lbs/ac) | Minimum Yield (lbs/ac) | R Conversion Factor (lbs N/lbs yield) | Crop Exempt from INMP Reporting |
|--------------------------|---------------------------|------------------------|------------------------|---------------------------------------|---------------------------------|
| ALFALFA - HAY | ALFALFA - HAY | 35,000 | 1,000 | 0.03115 | |
| ALFALFA - SILAGE/HAYLAGE | ALFALFA - SILAGE/HAYLAGE | 50,000 | | 0.012 | |
| ALFALFA - GREENCHOP | ALFALFA - GREENCHOP | 50,000 | | | |
| ALMOND | ALMOND | 10,000 | 150 | 0.068 | |
| APPLE | APPLE | 70,000 | 500 | 0.00054 | |
| APRICOT/APRIUM | APRICOT/APRIUM | 70,000 | 500 | 0.00278 | |
| AQUACULTURE | AQUACULTURE | | | | Y |
| ASPARAGUS | ASPARAGUS | 10,000 | 200 | 0.002925 | |
| BARLEY - FODDER/SILAGE | BARLEY - FODDER/SILAGE | 50,000 | 500 | | |
| BARLEY - GRAIN | BARLEY - GRAIN | 20,000 | 500 | 0.0168 | |
| BARLEY - GREENCHOP | BARLEY - GREENCHOP | 50,000 | 500 | | |
| BARLEY - SILAGE | BARLEY - SILAGE | 50,000 | 500 | | |
| BARLEY - HAY | BARLEY - HAY | 50,000 | 500 | | |
| BEAN - GREEN | BEAN - GREEN | 50,000 | | 0.00289 | |
| BEAN - LIMA | BEAN DRY | 10,000 | 100 | 0.03615 | |
| BEAN - GARBANZO | BEAN DRY | 10,000 | 100 | 0.0336 | |
| BEAN - BLACKEYE | BEAN DRY | 10,000 | 100 | 0.0365 | |
| BEAN DRY | BEAN DRY | 10,000 | 100 | 0.035416667 | |
| BEET | BEET | 75,000 | | | |
| BERRY | BERRY | 50,000 | | | |
| BLACKBERRY | BERRY | 50,000 | | | |
| BLUEBERRY | BERRY | 50,000 | | | |
| BROCCOLI | BROCCOLI | 50,000 | | 0.0056 | |
| BROCCOLI - SEED | SEED CROP | 3,000 | | | |
| CABBAGE - SEED | SEED CROP | 3,000 | | | |
| CABBAGE | CABBAGE | 75,000 | | 0.00221 | |
| CANOLA | CANOLA | 10,000 | | | |
| CARROT | CARROT | 100,000 | | 0.0014 | |
| CHERRY | CHERRY | 30,000 | 300 | 0.00221 | |
| CHESTNUT | CHESTNUT | 30,000 | | | |
| CHRISTMAS TREE | CHRISTMAS TREE | | | | |
| CILANTRO | CILANTRO | 50,000 | | 0.00605 | |
| CITRUS | CITRUS | 70,000 | 300 | 0.00138 | |
| CORN - FODDER/SILAGE | CORN - FODDER/SILAGE | 100,000 | 500 | 0.003765 | |
| CORN - GRAIN | CORN - GRAIN | 20,000 | 500 | 0.012 | |
| CORN - POPCORN | CORN - POPCORN | 20,000 | | | |
| CORN - SWEET | CORN - SWEET | 50,000 | 300 | 0.003585 | |
| COTTON | COTTON | 10,000 | 500 | 0.062 | |
| COVER CROP | COVER CROP | | | | |
| CUCUMBER | CUCUMBER | 120,000 | | 0.00108 | |
| CUCUMBER - SEED | VINE SEED | 3,000 | | | |

Note:

Yield thresholds estimated from a variety of sources including CDFA production statistics, UCCE cost studies and literature, and previous years INMP data

| Specific Crop | Statistical Crop Grouping | Maximum Yield (lbs/ac) | Minimum Yield (lbs/ac) | R Conversion Factor (lbs N/lbs yield) | Crop Exempt from INMP Reporting |
|--------------------|---------------------------|------------------------|------------------------|---------------------------------------|---------------------------------|
| DICHONDRA | DICHONDRA | | | | |
| EGGPLANT | EGGPLANT | 50,000 | | | |
| FESCUE | HAY/FORAGE | 50,000 | 100 | 0.0254 | |
| FIG | FIG | 50,000 | 100 | 0.00127 | |
| FILBERT/HAZELNUT | FILBERT/HAZELNUT | 10,000 | | | |
| FLOWER/ORNAMENTAL | FLOWER/ORNAMENTAL | | | | |
| FORAGE/HAY | HAY/FORAGE | 50,000 | | 0.0267 | |
| GARLIC | GARLIC | 50,000 | | 0.00755 | |
| GRAIN HAY | GRAIN HAY | 50,000 | | 0.01085 | |
| GRAPE - OTHER | GRAPE - OTHER | | | | |
| GRAPE - TABLE | GRAPE - TABLE | 70,000 | 100 | 0.00113 | |
| GRAPE - WINE | GRAPE - WINE | 40,000 | 100 | 0.0018 | |
| GRASS HAY | HAY/FORAGE | 50,000 | 100 | 0.0267 | |
| GREENHOUSE | GREENHOUSE | | | | |
| HAY/FORAGE | HAY/FORAGE | 50,000 | 100 | 0.0267 | |
| HEMP | HEMP | | | | |
| HERB/SPICE | HERB/SPICE | | | | |
| HOPS | HOPS | | | | |
| KALE | KALE | 50,000 | | 0.00504 | |
| KALE - SEED | SEED CROP | 3,000 | | | |
| KIWI | KIWI | 50,000 | | | |
| KOHLRABI | KOHLRABI | 50,000 | | | |
| LAVENDER | LAVENDER | | | | |
| LEEK | LEEK | 75,000 | | | |
| LETTUCE | LETTUCE | 50,000 | | | |
| MANDARIN | CITRUS | 70,000 | 300 | 0.00138 | |
| MELON | MELON | 100,000 | | 0.001535 | |
| MELON - SEED | VINE SEED | 3,000 | | | |
| MELON - HONEYDEW | MELON | 100,000 | | 0.001475 | |
| MELON - CANTALOUPE | MELON | 100,000 | | 0.002435 | |
| MILLET - GREENCHOP | MILLET - GREENCHOP | 50,000 | | | |
| MILLET - SILAGE | MILLET - SILAGE | 50,000 | | | |
| MILLET - HAY | MILLET - HAY | 50,000 | | | |
| MILLET - GRAIN | MILLET - GRAIN | 50,000 | | | |
| MINT | MINT | | | | |
| MISC FIELD CROPS | MISC FIELD CROPS | 100,000 | | | |
| MISC FRUIT TREE | MISC FRUIT TREE | 75,000 | | | |
| MISC NUT TREE | MISC NUT TREE | 50,000 | | | |
| MISC ROW CROP | MISC ROW CROP | 100,000 | | | |
| MISC VEGETABLE | MISC VEGETABLE | 100,000 | | | |
| MULBERRY | MISC FRUIT TREE | 100,000 | | | |

Note:

Yield thresholds estimated from a variety of sources including CDFA production statistics, UCCE cost studies and literature, and previous years INMP data

| Specific Crop | Statistical Crop Grouping | Maximum Yield (lbs/ac) | Minimum Yield (lbs/ac) | R Conversion Factor (lbs N/lbs yield) | Crop Exempt from INMP Reporting |
|---------------------------|---------------------------|------------------------|------------------------|---------------------------------------|---------------------------------|
| NECTARINE | PEACH/NECTARINE | 75,000 | 1,000 | 0.00113 | |
| NON-IRRIGATED CROP | NON-IRRIGATED CROP | | | | Y |
| NURSERY | NURSERY | | | | |
| OAT - GRAIN | OAT - GRAIN | 20,000 | 500 | 0.01885 | |
| OAT - FODDER/SILAGE | OAT - FODDER/SILAGE | 50,000 | 500 | 0.01085 | |
| OAT - GREENCHOP | OAT - GREENCHOP | 50,000 | 500 | | |
| OAT - SILAGE | OAT - SILAGE | 50,000 | 500 | | |
| OAT - HAY | OAT - HAY | 50,000 | 500 | 0.01085 | |
| OKRA | OKRA | 50,000 | | | |
| OLIVE | OLIVE | 50,000 | 300 | 0.00314 | |
| OLIVE - OIL | OLIVE | 50,000 | 300 | 0.00314 | |
| OLIVE - TABLE | OLIVE | 50,000 | 300 | 0.00314 | |
| ONION | ONION | 75,000 | | 0.00197 | |
| ONION - SEED | SEED CROP | 3,000 | | | |
| ORANGE | CITRUS | 70,000 | 300 | 0.00148 | |
| ORCHARD GRASS - HAY | ORCHARD GRASS - HAY | 50,000 | | 0.02725 | |
| PASTURE | PASTURE | 75,000 | | | Y, if total_n_applied=0 |
| PEA | PEA | 50,000 | | | |
| PEA - FRESH | PEA | 50,000 | | | |
| PEA - FIELD | BEAN DRY | 10,000 | 100 | 0.035416667 | |
| PEACH/NECTARINE | PEACH/NECTARINE | 75,000 | 1,000 | 0.00113 | |
| PEAR | PEAR | 75,000 | 1,000 | 0.000645 | |
| PECAN | PECAN | 10,000 | | | |
| PEPPER | PEPPER | 75,000 | | 0.001655 | |
| PERSIMMON | PERSIMMON | 50,000 | | | |
| PISTACHIO | PISTACHIO | 10,000 | 100 | 0.02805 | |
| PLUM | PLUM/PLUOT | 75,000 | 300 | 0.001135 | |
| PLUM/PLUOT | PLUM/PLUOT | 75,000 | 300 | 0.001135 | |
| POMEGRANATE | POMEGRANATE | 75,000 | 300 | 0.00198 | |
| POTATO | POTATO | 75,000 | 1,000 | 0.00312 | |
| PRUNE | PRUNE | 20,000 | 300 | 0.0056 | |
| PUMPKIN - SEED | VINE SEED | 3,000 | | | |
| PUMPKIN | PUMPKIN | 75,000 | | 0.00368 | |
| RADISH - SEED | SEED CROP | 3,000 | | | |
| RADISH | RADISH | 50,000 | | | |
| RANGELAND | RANGELAND | | | | |
| RASPBERRY | BERRY | 50,000 | | | |
| RICE | RICE | 10,000 | | | Y |
| RICE - WILD | RICE - WILD | 10,000 | | | |
| RYEGRASS - GREENCHOP | RYEGRASS - GREENCHOP | 50,000 | 500 | | |
| RYEGRASS - SILAGE/HAYLAGE | RYEGRASS - SILAGE/HAYLAGE | 50,000 | 500 | | |

Note:

Yield thresholds estimated from a variety of sources including CDFA production statistics, UCCE cost studies and literature, and previous years INMP data

| Specific Crop | Statistical Crop Grouping | Maximum Yield (lbs/ac) | Minimum Yield (lbs/ac) | R Conversion Factor (lbs N/lbs yield) | Crop Exempt from INMP Reporting |
|----------------------------|----------------------------|------------------------|------------------------|---------------------------------------|---------------------------------|
| RYEGRASS - HAY | RYEGRASS - HAY | 50,000 | 500 | 0.02745 | |
| SAFFLOWER | SAFFLOWER | 10,000 | 300 | 0.02585 | |
| SEED CROP | SEED CROP | 5,000 | | | |
| SORGHUM/MILO - GREENCHOP | SORGHUM/MILO - GREENCHOP | 75,000 | 500 | | |
| SORGHUM/MILO - SILAGE | SORGHUM/MILO - SILAGE | 75,000 | 500 | 0.00367 | |
| SORGHUM/MILO - HAY | SORGHUM/MILO - HAY | 75,000 | 500 | | |
| SORGHUM/MILO - GRAIN | SORGHUM/MILO - GRAIN | 20,000 | 500 | 0.0165 | |
| SQUASH | SQUASH | 75,000 | | 0.001835 | |
| SQUASH - SEED | VINE SEED | 3,000 | | | |
| STRAWBERRY | STRAWBERRY | 90,000 | | 0.00133 | |
| SUDAN GRASS - SEED | SEED CROP | 3,000 | | | |
| SUDAN GRASS - GREENCHOP | SUDAN GRASS - GREENCHOP | 50,000 | | | |
| SUDAN GRASS - SILAGE | SUDAN GRASS - SILAGE | 50,000 | | | |
| SUDAN GRASS - HAY | SUDAN GRASS - HAY | 50,000 | | | |
| SUNFLOWER | SUNFLOWER | 10,000 | 100 | 0.0316 | |
| TIMOTHYGRASS - HAY | TIMOTHYGRASS - HAY | 50,000 | | | |
| TOMATILLO | TOMATILLO | 50,000 | 1,000 | | |
| TOMATO - FRESH MARKET | TOMATO - FRESH MARKET | 200,000 | 3,000 | 0.001305 | |
| TOMATO - PROCESSING | TOMATO - PROCESSING | 200,000 | 3,000 | 0.00146 | |
| TRITICALE - GRAIN | TRITICALE - GRAIN | 50,000 | 500 | 0.0202 | |
| TRITICALE - GREENCHOP | TRITICALE - GREENCHOP | 50,000 | 500 | | |
| TRITICALE - SILAGE/HAYLAGE | TRITICALE - SILAGE/HAYLAGE | 50,000 | 500 | 0.004515 | |
| TRITICALE - HAY | TRITICALE - HAY | 50,000 | 500 | | |
| TURNIP | TURNIP | 70,000 | | | |
| TURNIP - SEED | SEED CROP | 3,000 | | | |
| VEGETABLE SEED | SEED CROP | 3,000 | | | |
| VETCH | VETCH | 20,000 | | | |
| VINE SEED | VINE SEED | 3,000 | | | |
| WALNUT | WALNUT | 15,000 | 300 | 0.0159 | |

Note:

Yield thresholds estimated from a variety of sources including CDFA production statistics, UCCE cost studies and literature, and previous years INMP data

ATTACHMENTS

Attachment 1: Annual Management Practice Implementation Data

Attachment 2: Annual Irrigation and Nitrogen Management Plan Summary Report Data

ATTACHMENT 1

ANNUAL MANAGEMENT PRACTICE IMPLEMENTATION DATA

Excel workbook provided electronically

ATTACHMENT 2

ANNUAL IRRIGATION AND NITROGEN MANAGEMENT PLAN SUMMARY REPORT DATA

Excel workbook provided electronically