# Farm Evaluation Summary Report

**(2015 Crop Year)**


**Submittal Date**

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ECOSYSTEMS • CONSULTING

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| | |
|---|---|
| GAR | Groundwater Quality Assessment Report |
| FE | Farm Evaluation survey |
| MWE | Managed Wetland Evaluation survey |
| SVWQC | Sacramento Valley Water Quality Coalition |
| CVRWQCB | Central Valley Regional Water Quality Control Board |

# FARM EVALUATION REPORT

As outlined in the Waste Discharge Requirements General Order for Growers within the Sacramento River Watershed (WDR or General Order; Order No. R5-2014-0030-R1), the Sacramento Valley Water Quality Coalition (SVWQC or Coalition) is submitting a summary of management practice information obtained from 2015 Farm Evaluations (FEs). Members with parcels in high vulnerability areas, or without previous surveys completed for low vulnerability area parcels, were required to complete and return 2015 surveys for enrolled parcels to the Coalition by March 1, 2016. A version of the Farm Evaluation survey, called the Managed Wetland Evaluation (MWE), was completed by members with private or publically managed land irrigated for wetland conservation, preservation, or restoration.

This report summarizes management practices implemented by members during the 2015 calendar year for standard Farm Evaluations and between March 2014 and February 2015 for Managed Wetland Evaluations (MWEs). Data from the FEs and MWEs can be used to evaluate changes in surface water quality relative to changes in management practices. The standard FEs are designed to collect information in four survey "Parts":

- Part A: whole farm evaluation,
- Part B: specific field evaluation,
- Part C: irrigation well information, and
- Part D: sediment and erosion control practices.

The survey parts gather information specific to both surface and groundwater management practices from growers:

1. Identification of crops grown and the irrigated acreage of each crop,
2. Geographical location of the member's farm,
3. Identification of on-farm management practices implemented to achieve the WDR farm management performance standards,
4. Identification of whether or not there is movement of soil during storm events and/or during irrigation (sediment and erosion risk),
5. Location of active irrigation wells and abandoned wells, and
6. Applied wellhead protection and backflow prevention practices and devices.

Managed Wetland Evaluations are designed to include only practices that may be used in managing wetland habitat. These MWEs are completed with information from March 2014 through February 2015, including the following:

1. Identification of enrolled parcels included as managed wetland,
2. Identification of habitat type and acreage,
3. Geographical location of the property,
4. Identification of irrigation practices implemented for each habitat type and the months in which they occur,
5. Identification of management practices for irrigation, herbicide application, and sediment control used to ensure water quality standards,
6. Location of active irrigation wells and abandoned wells, and applied wellhead protection and backflow prevention practices and devices, and
7. Identification of whether or not water leaves the property and is conveyed downstream and a description of where this occurs.

Members with parcels in high vulnerability areas were required to complete the Farm Evaluations for 2015 (Table 1). High vulnerability areas are the geographic regions within the Coalition area where a management plan is required as a result of surface or groundwater quality impairments or where groundwater in an area has been determined to be highly vulnerable in the Groundwater Quality Assessment Report (GAR). Seven of the 13 Subwatershed Groups have members with high vulnerability parcels including Butte Yuba Sutter, Colusa Glenn, Dixon Solano, Northeastern California, Sacramento Amador, Shasta Tehama, and Yolo groups.

**Table 1. Farm Evaluation deadlines for high and low vulnerability areas in the SVWQC.**

| VULNERABILITY | DOCUMENT REQUIRED | DUE DATE | UPDATES REQUIRED | REPORT TO RB |
|---|---|---|---|---|
| High | Farm Evaluation | March 1, 2016 | March 1 Annually | May 1, 2016 |
| Low | Farm Evaluation[1] | March 1, 2015 | March 1 Every 5 years | May 1, 2020 |

[1] Managed wetlands are considered low vulnerability.

Due to the size and diversity of the Coalition, FEs were distributed and processed through Subwatershed Groups. These smaller organizations more efficiently communicate with individual members. Lists of active members were used to evaluate the status of returned FEs. All members on these lists were sent notifications regarding FE completion deadlines and were provided with both resources and assistance with filling out the surveys and to answer any questions. Members known to have managed wetlands were mailed MWEs. A majority of FE and MWE surveys were prepopulated based on 2014 FE/MWE responses.

Member survey responses were recorded electronically by each Subwatershed Group into an Access database and then compiled into a master database for analysis. The use of on-line data entry by members was pioneered by one Subwatershed group this year with the results incorporated into the Coalition's Access database. Survey responses were linked to unique identifiers per parcel with an Assessor Parcel Number (APN) and the associated acreage. Results are being submitted in an Access database by Township with this report. Some parcels are associated with two townships. In those cases, we have displayed each Township on a single line as "Township 1" and "Township 2" to avoid duplicating the results per township.

Members were offered assistance with completing their surveys by each Subwatershed Group. The following actions were taken to ensure accurate data collection and reporting:

- Surveys were pre-populated by many Subwatershed Groups based on the previous year's answers. The member was given the opportunity to change their answer or indicate that no change has occurred. If questions were not answered the year before, the question was marked with an arrow and a note indicated that the question was left blank last year and needed to be answered this year.
- Workshops were held to provide members with in-person help from Coalition representatives. Providing assistance with answering questions was important to ensure that the member was able to fill in the survey accurately.
- Private appointments were offered to assist members unable to attend workshops.
- Members unable to travel to group offices were also assisted via phone and email.
- Members were contacted by phone for follow-up when unanswered questions or unclear responses were found during survey entry; this only occurred for priority questions that were essential to the survey (management practice questions) and not all members could be contacted prior to the submission of this report.
- Database improvements were made to standardize entry to improve efficiency and clarity.
- Data were reviewed in the database to reduce errors including comparing acreages provided by the members versus acreages enrolled with the Coalition and ensuring that there is a response for every question (if the question was not answered a default answer of No Selection was entered).

During the data entry process, reviewing responses indicated several areas of concern:

- Some parcels were not included on returned surveys and therefore could not be associated with the answers on the survey. In some cases, it was unclear which parcels were associated with which group of responses. For example, a member may have returned two sets of surveys and recorded corn on one and tomatoes on another. If the parcels were not clearly marked, data entry personnel could not enter the data into the database and would have to follow up with the member for clarification.
- Many members did not divide their APN acreage into each Site ID/Field ID. It is unclear whether this was because of a lack of understanding of how to subdivide their APNs or if they simply failed to complete the subdivision as requested. Failure to complete this task potentially affects the accuracy of the acreage associated with each management practice. If acreage was not filled in by the member and they could not be reached for clarification, the default became the enrolled acreage.
- Surveys were returned without all questions completed. When surveys were reviewed and missing responses were noted, the Subwatershed Groups called as many members as possible to complete the missing responses.

# RESOURCES REQUIRED TO DOCUMENT FARM EVALUATION MANAGEMENT PRACTICES

As the largest water quality coalition in the Central Valley, both in irrigated acreage (1.3 million irrigated acres) and number of participants (over 8,000) enrolled, assisting owners and operators of irrigated lands in the Sacramento Valley Water Quality Coalition (SVWQC) complete the Farm Evaluation requirements was an "all hands on deck" effort that required thousands of hours and upwards of $750,000 to complete in 2014. While the Coalition was able to streamline the data collection and entry process in 2015, it is estimated that significant resources were spent, as documented in Table 2, costing approximately $300,000.

An estimated 25 workshops were held for owners and operators of irrigated agriculture in the counties of the SVWQC requiring 2015 surveys. Thousands of letters were mailed, monthly newsletters were sent during the months which Farm Evaluation distribution and collection efforts were underway, follow-up emails or letters were sent to those who hadn't returned Farm Evaluations, and 670 appointments were made with individual members to help them complete the forms (Table 2).

In addition to the outreach summarized above, there was a significant capital investment in developing a database system, purchasing upgraded hardware and software systems and training full time and temporary help to input the data in a consistent manner.

Costs ranged from an average $7,000 for a Subwatershed Group with less than 100 members to $75,000 for Subwatershed Groups with over 1,500 members and/or 225,000 irrigated acres. A breakdown of outreach efforts for the Farm Evaluation is provided below. Assisting members with the Nitrogen Management Plan templates is expected to take the same manpower and financial resources.

The Central Valley Regional Water Quality Board should not view these costs in insolation or merely the first year costs for the SVWQC Waste Discharge Requirements (WDR) Order. Agriculture faces increasing cost pressures, not only from regulation, but from other areas (e.g., water master fees, fire tax), all "coming from the same pocket" of the grower and challenging the sustainability of California agriculture. Additionally, future costs of implementing groundwater quality elements of the WDR require the Regional Board to balance priorities and streamline requirements.

**Table 2. Summary of outreach efforts by the Coalition to assist growers with Farm Evaluations.**

| Outreach Type | Count |
|---|---|
| Workshops | 25 |
| Phone Calls | Approximately 2,500 |
| Walk-in/Appointments | 670 |
| Newsletter Articles | 18 |
| Weekly E-mails | 385 |

# SUMMARY

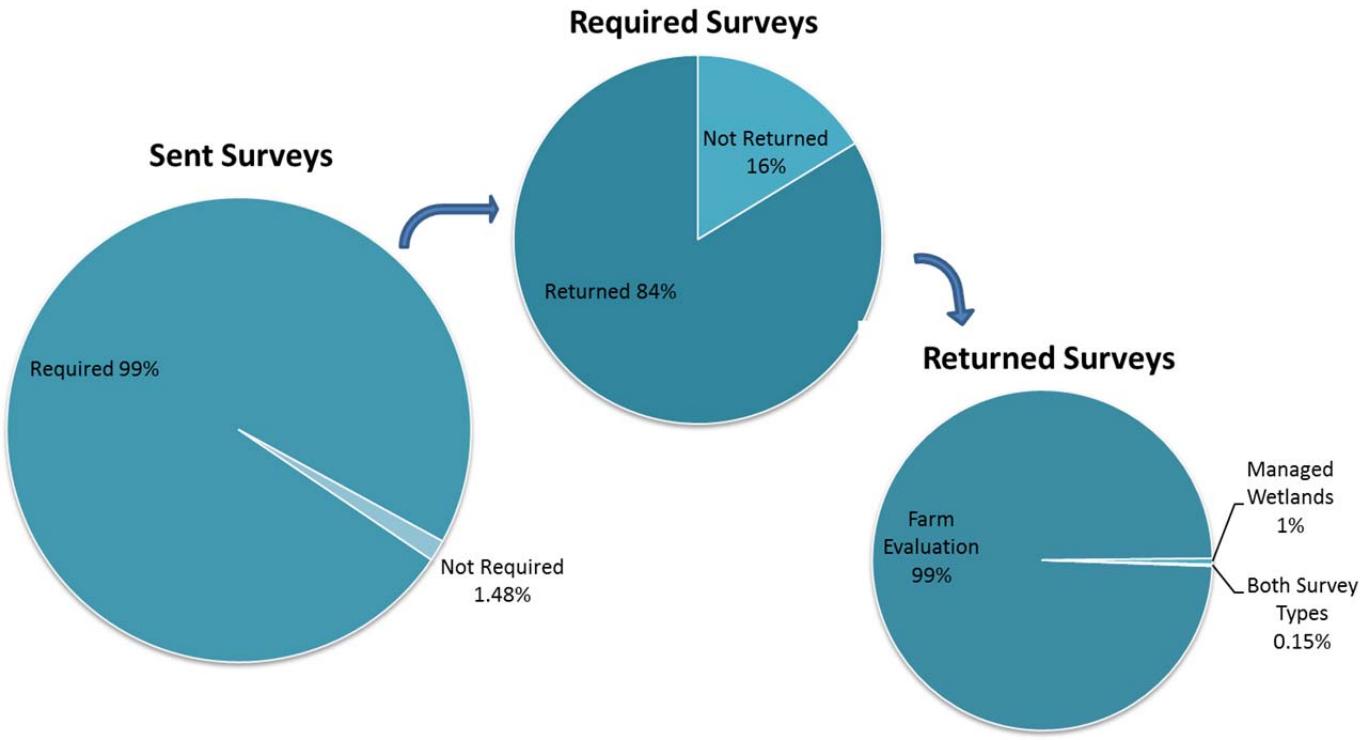
Members with high vulnerability parcels were required to complete and return a FE or MWE survey for the 2015 crop year. The SVWQC received surveys from 84% of the members representing 82% of the expected acreage by the March 1 (Table 3). When additional FE/MWE surveys received after the deadline are inputted the percentages of members and irrigated acreage reported is likely to be closer to 90%. Two percent of the returned surveys were MWEs. Less than one percent of memberships submitted both Farm and Managed Wetland Evaluations. Four percent of members sent surveys, making up 1.19 % of the Coalition acreage, were not required to return a survey for one of three possible reasons: 1) the member had no irrigated acreage in the Coalition during 2015 (a member may do this if the ground was temporarily fallowed), 2) they did not farm in 2015 (new members who recently acquired the land), or 3) they are no longer a Coalition member (Figure 1).

**Table 3. Acreage and membership totals of returned 2015 FE and MWEs.**

| Survey Status | Survey Type | Sum of Acreage | Count of Members |
|---|---|---|---|
| Returned | Farm Evaluation | 997,053 | 5,187 |
| | Managed Wetland Evaluation[1] | 15,010 | 30 |
| | Mixed | 20,449 | 8 |
| **Returned Total[2]** | | **1,034,407** | **5,225** |
| **Not Returned Total** | | **225,859** | **1,016** |
| **Expected Grand Total** | | **1,256,702** | **6,224** |
| **Percent Returned of Expected** | | **82%** | **84%** |

[1] Managed wetlands are considered low vulnerability areas; therefore, MWEs were only required if previous surveys were not returned.
[2] Total includes 17 members with 1,669 acres returned surveys that were not required for 2015.

**Figure 1. An illustration of the 1) percent of sent surveys that did not need to be returned based on changes in membership or crop status, 2) percent of required surveys that were returned, and 3) the type of survey returned (FE, MWE or both). Percentages were calculated using membership counts.**




NOTE: The "Not Returned Surveys" include surveys returned after the March 1, 2016 deadline that will be inputted.

## STANDARD FARM EVALUATION

Of the returned surveys, 97% of the acreage was reported with standard Farm Evaluation surveys, representing 99% of the memberships with returned surveys (Table 3). Many Coalition members reported parcel specific crop information on their FE for 2015. Similar to the 2014 analysis, in the case of multiple crops per parcel, the first crop listed was recorded as the primary crop, Crop 1, and the remaining crops as Crop 2, Crop 3, and so on.

Primary crops (Crop 1) were grouped into sub categories and general categories. For example, Orchard is a general category with a subcategory of Nut Trees and Almonds is a primary crop associated with both. General categories include Pasture/Hay/Grain, Orchard, Row Crop, Vineyard, and Habitat; Habitat is specific to the MWEs. In some cases, surveys were returned without a crop designation (3% of the acreage) and the crop information was recorded as Not Recorded. Less than 1% of the acreage was fallow and is grouped under the general category of Not Farmed (Figure 2). Table 4 lists the designations for each primary crop and illustrates the percentage of reported acreage for returned 2015 FE surveys, including MWE surveys.

Orchards represent the largest percent of acreage (41%) followed by pasture/hay/grain (27%) and row crops (20%; Figure 2). For the surveys returned, nut trees have more acreage than any other type of

orchard including fruit trees (81% of the acreage; Figure 3). Almonds and walnuts each cover approximately half of the total nut tree acreage (Figure 3, Table 4). Wetland habitat, representing three percent of the crop acreage, is discussed further in a separate MWE section of the report.

**Figure 2. General categories of reported crops in 2015 Farm Evaluations, including Managed Wetland Evaluations, displayed as percent of total reported acreage.**

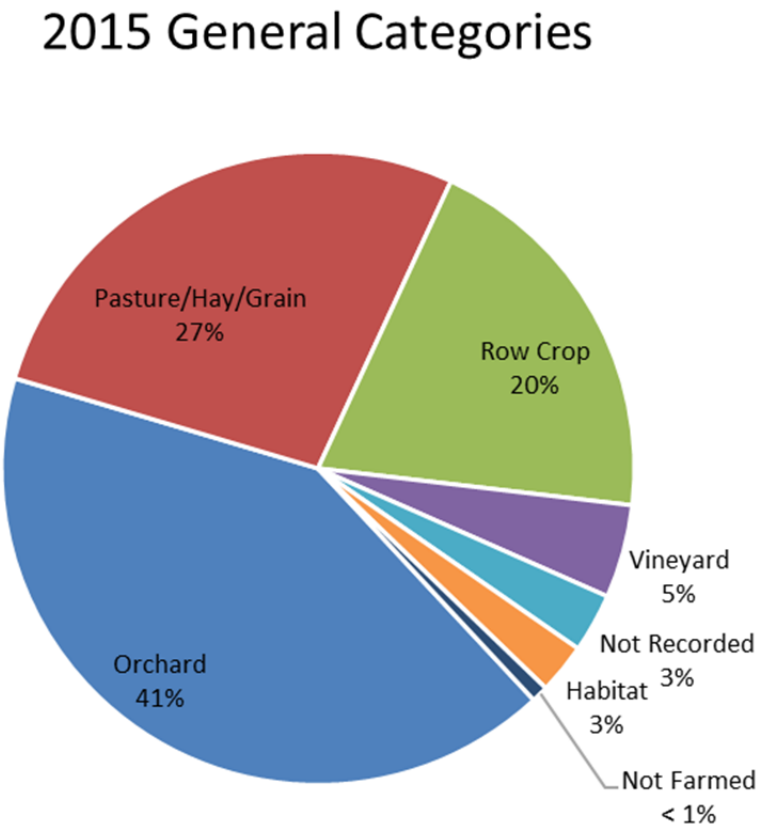


**Figure 3. A summary of the type of orchards associated with 2015 Farm Evaluations; displayed as percent of acres reported.**

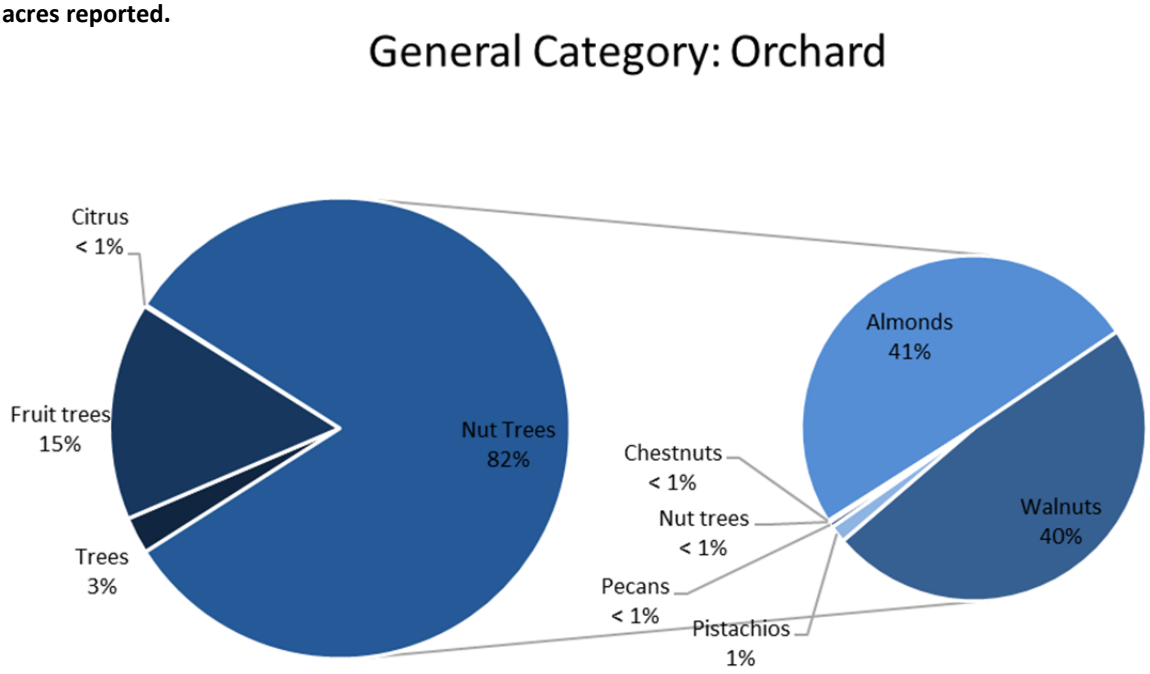



**Table 4. Crop classifications associated with primary crops reported by members for the 2015 crop year.**

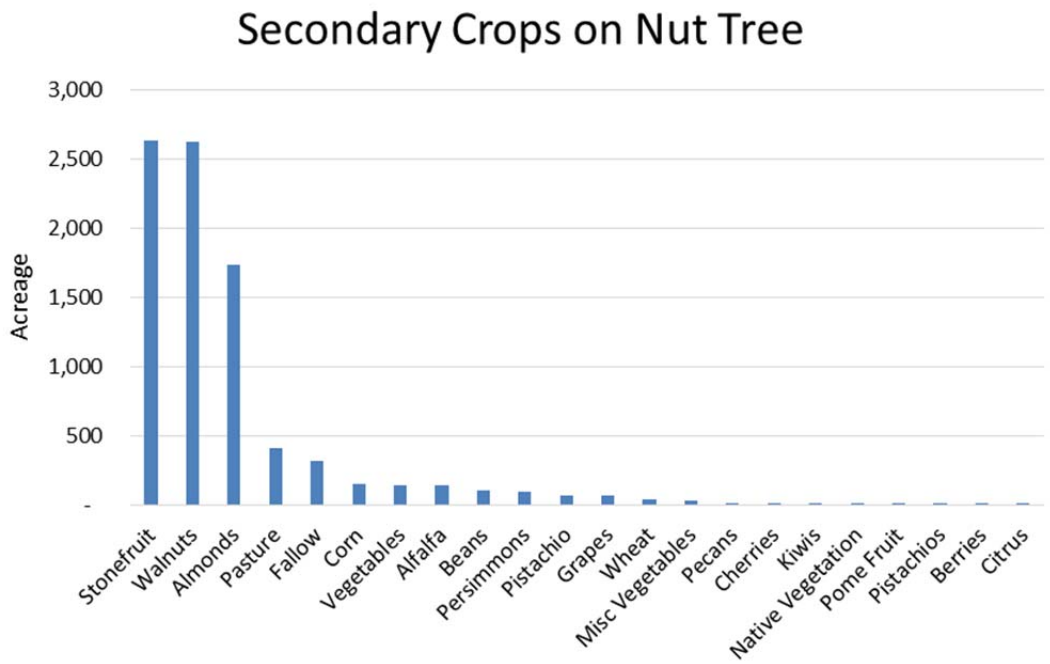
| General Category | Sub Category | Primary Crop | Percentage of Acreage |
|---|---|---|---|
| Pasture/Hay/Grain | Grain | Barley | 0.07% |
| Pasture/Hay/Grain | Grain | Grain | 0.11% |
| Pasture/Hay/Grain | Grain | Hay | < 0.01% |
| Pasture/Hay/Grain | Grain | Hops | < 0.01% |
| Pasture/Hay/Grain | Grain | Oats | 0.26% |
| Pasture/Hay/Grain | Grain | Rice | 1.84% |
| Pasture/Hay/Grain | Grain | Rye | 0.29% |
| Pasture/Hay/Grain | Grain | Sorghum Milo | 0.24% |
| Pasture/Hay/Grain | Grain | Sudan | 0.22% |
| Pasture/Hay/Grain | Grain | Teff | 0.03% |
| Pasture/Hay/Grain | Grain | Triticale | 0.43% |
| Pasture/Hay/Grain | Grain | Wheat | 4.02% |
| Pasture/Hay/Grain | Hay | Alfalfa | 8.82% |
| Pasture/Hay/Grain | Hay | Hay | 1.26% |
| Pasture/Hay/Grain | Pasture | Pasture | 9.73% |
| Row Crop | Berries | Berries | 0.07% |
| Row Crop | Corn | Corn | 3.33% |
| Row Crop | Herbs/Spices | Herbs/Spices | 0.07% |
| Row Crop | Miscellaneous | Bamboo | < 0.01% |
| Row Crop | Miscellaneous | Cotton | 0.16% |
| Row Crop | Miscellaneous | Cover Crop | 0.15% |
| Row Crop | Miscellaneous | Garlic | 0.03% |
| Row Crop | Miscellaneous | Miscellaneous | 2.18% |
| Row Crop | Miscellaneous | Shrubs | < 0.01% |
| Row Crop | Miscellaneous | Sod | 0.03% |

| General Category | Sub Category | Primary Crop | Percentage of Acreage |
|---|---|---|---|
| Row Crop | Nursery/Ornamental | Flowers | < 0.01% |
| Row Crop | Nursery/Ornamental | Nursery | 0.06% |
| Row Crop | Nursery/Ornamental | Ornamental plants | 0.05% |
| Row Crop | Oil Crop | Canola | 0.03% |
| Row Crop | Oil Crop | Safflower | 0.65% |
| Row Crop | Oil Crop | Sunflower | 0.05% |
| Row Crop | Oil Crop | Sunflowers | 3.10% |
| Row Crop | Row Crop | Beans | 1.00% |
| Row Crop | Row Crop | Bell Peppers | 0.05% |
| Row Crop | Row Crop | Carrots | < 0.01% |
| Row Crop | Row Crop | Cucumbers | 0.14% |
| Row Crop | Row Crop | Melons | 0.20% |
| Row Crop | Row Crop | Misc Produce | 0.12% |
| Row Crop | Row Crop | Onions | 0.01% |
| Row Crop | Row Crop | Peas | 0.03% |
| Row Crop | Row Crop | Peppers | 0.02% |
| Row Crop | Row Crop | Potatoes | 0.06% |
| Row Crop | Row Crop | Pumpkins | 0.01% |
| Row Crop | Row Crop | Salad Greens | < 0.01% |
| Row Crop | Row Crop | Squash | 0.05% |
| Row Crop | Row Crop | Tomatoes | 6.91% |
| Row Crop | Row Crop | Vegetables | 0.69% |
| Row Crop | Seed | Asparagus | < 0.01%% |
| Row Crop | Seed | Beans | < 0.01%% |
| Row Crop | Seed | Carrots | 0.01% |
| Row Crop | Seed | Christmas Trees | < 0.01% |
| Row Crop | Seed | Cucumbers | 0.01% |
| Row Crop | Seed | Melons | < 0.01% |
| Row Crop | Seed | Misc | 0.01% |
| Row Crop | Seed | Onions | 0.04% |
| Row Crop | Seed | Radish | < 0.01% |
| Row Crop | Seed | Salad greens | 0.01% |
| Row Crop | Seed | Seed | 0.02% |
| Row Crop | Seed | Sudan | 0.03% |
| Row Crop | Seed | Sunflowers | 0.26% |
| Row Crop | Seed | Tomatoes | 0.02% |
| Row Crop | Seed | Vegetables | 0.27% |
| Habitat | Native vegetation | Native vegetation | 0.29% |
| Habitat | Wetland | Brood Pond | 0.11% |
| Habitat | Wetland | Managed Wetland | 0.17% |
| Habitat | Wetland | Permanent Wetland | 0.03% |
| Habitat | Wetland | Seasonal Wetland | 1.06% |
| Habitat | Wetland | Semi - Permanent Wetland | 0.02% |
| Habitat | Wetland | Semi-Permanent Wetland | 0.70% |
| Habitat | Wetland | Wetlands | 0.19% |
| Not Farmed | Dry | Dry | 0.05% |
| Not Farmed | None | Fallow | 0.71% |
| Not Farmed | None | None | 0.09% |
| Not Recorded | Not Recorded | Not Recorded | 3.02% |
| Orchard | Citrus | Citrus | 0.05% |
| Orchard | Fruit Trees | Cherries | 0.13% |

| General Category | Sub Category | Primary Crop | Percentage of Acreage |
|---|---|---|---|
| Orchard | Fruit Trees | Figs | 0.02% |
| Orchard | Fruit Trees | Fruit Trees | 0.05% |
| Orchard | Fruit Trees | Olives | 1.83% |
| Orchard | Fruit Trees | Persimmons | 0.04% |
| Orchard | Fruit Trees | Pome fruit | 0.41% |
| Orchard | Fruit Trees | Pomegranates | 0.01% |
| Orchard | Fruit Trees | Stonefruit | 3.88% |
| Orchard | Nut Trees | Almonds | 16.88% |
| Orchard | Nut Trees | Chestnuts | < 0.01% |
| Orchard | Nut Trees | Nut trees | 0.06% |
| Orchard | Nut Trees | Pecans | 0.17% |
| Orchard | Nut Trees | Pistachios | 0.55% |
| Orchard | Nut Trees | Walnuts | 16.39% |
| Orchard | Trees | Christmas Trees | < 0.01% |
| Orchard | Trees | Orchard | 1.08% |
| Vineyard | Grapes | Grapes | 4.67% |
| Vineyard | Kiwis | Kiwis | 0.09% |

Many members reported multiple crops per parcel and/or management unit resulting in up to five crops being associated with a survey (Crop 1, Crop 2, Crop 3, Crop 4, and Crop 5). **Error! Not a valid bookmark self-reference.** includes a graph of the secondary crops associated with nut trees which includes mostly almonds and walnuts as the primary crop; combinations of nut crops were commonly reported on the same field. For example, both walnuts and almonds were farmed on the same parcel (**Error! Not a valid bookmark self-reference.**).

**Figure 4. Secondary crops reported on Nut Tree crops, shown by reported parcel acreage.**



## Irrigation Management Practices

Members use several different techniques to efficiently irrigate their fields. Nearly a third of the responses indicated that parcels were irrigated according to need (Table 5, Figure 5). Just over a fifth of the responses specified that fields were leveled in order to maximize irrigation water distribution and manage flows (Table 5, Figure 5). Drip irrigation and flood irrigation were the two most utilized primary irrigation methods in 2015; each method included close to 25% of the reported acreage (Figure 6). Border strip irrigation was not a common primary irrigation method. Most members utilize only primary irrigation methods, although sprinklers were reported as the most common secondary system (Table 5, Figure 6). Coalition members are following many Best Management Practices by managing their water usage and leveling their fields. Usage of these practices was consistent across 2014 and 2015 surveys, with equal rankings of practices in both datasets.

**Table 5. Irrigation efficiency and methods reported by Coalition members, displayed in acreage and response count.**

| Survey Section | Question | Response | Acreage | Response Count |
|---|---|---|---|---|
| B | Irrigation Efficiency Practices | | | |
| | | Scheduled to need | 862,148 | 4,398 |
| | | Laser Leveling | 597,580 | 2,067 |
| | | Use moisture probe | 530,330 | 1,941 |
| | | Use ET for scheduling | 403,331 | 1,300 |
| | | Pressure Bomb | 163,741 | 481 |
| | | Other | 108,575 | 618 |
| | | Soil Moisture Neutron Probe | 81,723 | 280 |
| | | No Selection | 5,425 | 111 |
| B | Primary Irrigation Practices | | | |
| | | Drip | 271,894 | 1,245 |
| | | Flood | 242,327 | 1,733 |
| | | Micro Sprinkler | 186,928 | 1,182 |
| | | Sprinkler | 183,311 | 1,481 |
| | | Furrow | 144,453 | 574 |
| | | Border Strip | 26,026 | 154 |
| | | No Selection | 11,768 | 85 |
| B | Secondary Irrigation Practices | | | |
| | | No Selection | 726,559 | 4,203 |
| | | Sprinkler | 105,183 | 424 |
| | | Flood | 60,822 | 358 |
| | | Drip | 46,266 | 220 |
| | | Micro Sprinkler | 36,072 | 195 |
| | | Furrow | 32,166 | 128 |
| | | Border Strip | 6,869 | 48 |

**Figure 5. Count of acreage associated with each irrigation efficiency.**

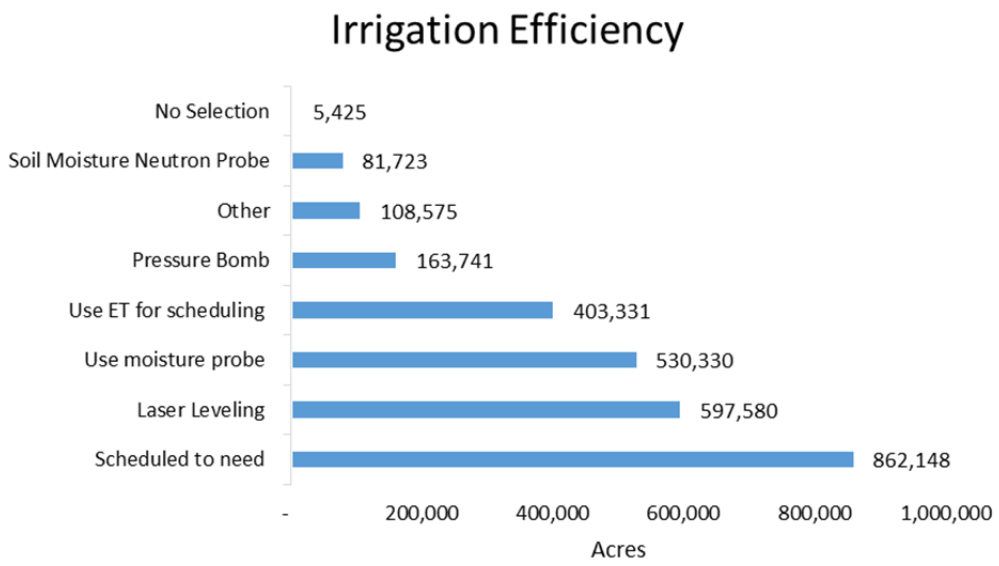
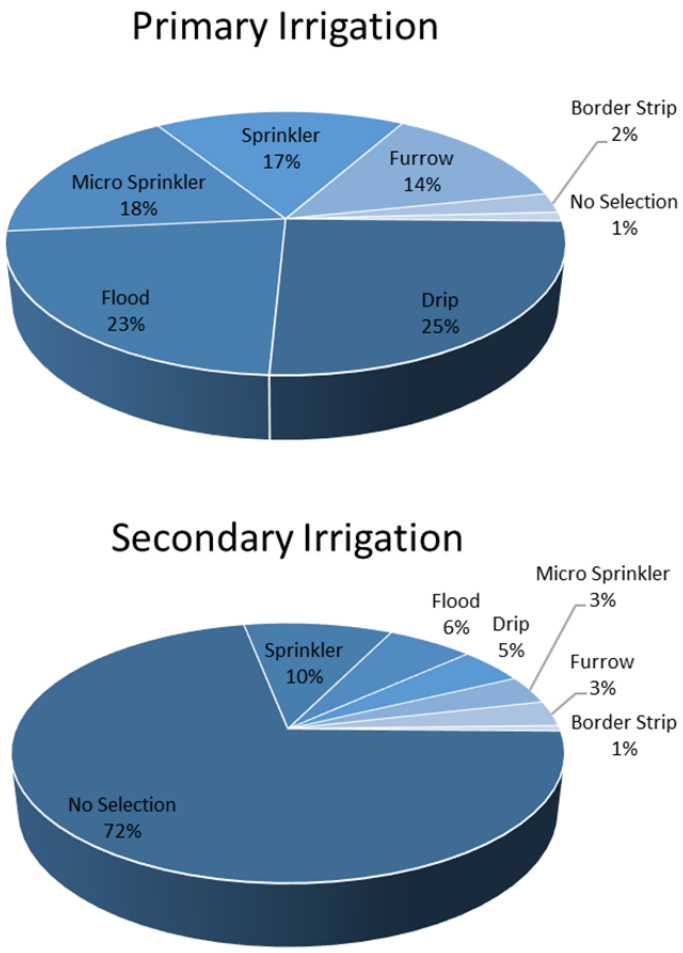



**Figure 6. Percent acreage associated with each type of irrigation practice (primary and secondary).**



## Sediment Management Practices

Members with approximately 60% of the reported acreage indicated they do not have the potential to discharge sediment to off-farm surface waters (Table 6). The majority of Coalition members use management practices to control the movement of sediment; members typically employ more than one method on a parcel (Table 6). Top reported practices for the 2015 crop year were also the top reported practices in the 2014 crop year. The most common cultural method to control sediment and erosion was increasing water penetration into the soil through amendments, such as deep ripping and aeration. Reducing tillage to a minimum and allowing native vegetation to stabilize soils were also commonly reported (Table 6, Figure 7). The most reported irrigation method used to control sediment and erosion was coordinated pesticide application and irrigation timing. Drip irrigation and shortened irrigation runs were also frequently noted (Table 6, Figure 8).

**Table 6. Sediment and erosion control management practices implemented by members in terms of associated parcel acreage.**

| Survey Section | Question | Response | Acreage | Response Count |
|---|---|---|---|---|
| A | Does your farm have the potential to discharge sediment to off-farm surface waters? | | | |
| | | No | 592,224 | 3,889 |
| | | Yes | 408,075 | 1,346 |
| | | No Selection | 15,478 | 71 |
| D | Cultural Practices to Manage Sediment and Erosion | | | |
| | | Soil water penetration increased with amendments (deep ripping/ aeration). | 671,069 | 2,246 |
| | | Minimum tillage incorporated to minimize erosion. | 590,330 | 2,607 |
| | | Cover crops or native vegetation are used to reduce erosion. | 554,763 | 2,699 |
| | | Vegetated ditches to remove sediment, pesticides, & fertilizers. | 486,574 | 1,632 |
| | | Crop rows are graded to optimize rain and irrigation water. | 467,786 | 1,534 |
| | | Creek banks and stream banks have been stabilized. | 309,417 | 871 |
| | | Vegetative filter strips and buffers are used to capture flows. | 294,818 | 1,070 |
| | | Berms capture runoff and trap sediment. | 270,307 | 1,102 |
| | | Storm water is captured using field borders. | 267,021 | 1,042 |
| | | Hedgerows/trees help stabilize soils & trap sediment movement. | 206,142 | 980 |
| | | Sediment basins/holding ponds settle out sediment & pesticides. | 183,722 | 639 |
| | | Subsurface pipelines are used to channel runoff water. | 175,646 | 449 |
| | | No storm drainage due to field or soil conditions. | 138,477 | 1,570 |
| | | Field is lower than surrounding terrain. | 78,767 | 527 |
| | | Other | 34,079 | 212 |
| | | No Selection | 21,812 | 107 |
| D | Irrigation Practices for Managing Sediment and Erosion | | | |
| | | The time increased between pesticide applications and irrigation. | 627,964 | 2,376 |
| | | Use drip or micro-irrigation to eliminate irrigation drainage. | 493,373 | 2,196 |
| | | Shorter irrigation runs with checks manage and capture flows. | 391,073 | 1,604 |
| | | No irrigation drainage due to field or soil conditions. | 319,268 | 2,500 |
| | | Tailwater Return System. | 215,958 | 524 |
| | | In-furrow dams used to increase infiltration and settle sediment. | 196,150 | 688 |
| | | Catchment Basin. | 186,033 | 622 |
| | | Use of flow dissipaters to minimize erosion at discharge point. | 101,065 | 310 |

| | | | | |
|---|---|---|---|---|
| | | Other | 60,374 | 340 |
| | | PAM used to bind sediment & increase infiltration. | 17,483 | 44 |
| | | No Selection | 10,305 | 94 |

**Figure 7. Acreage reported for cultural practices to manage sediment and erosion.**

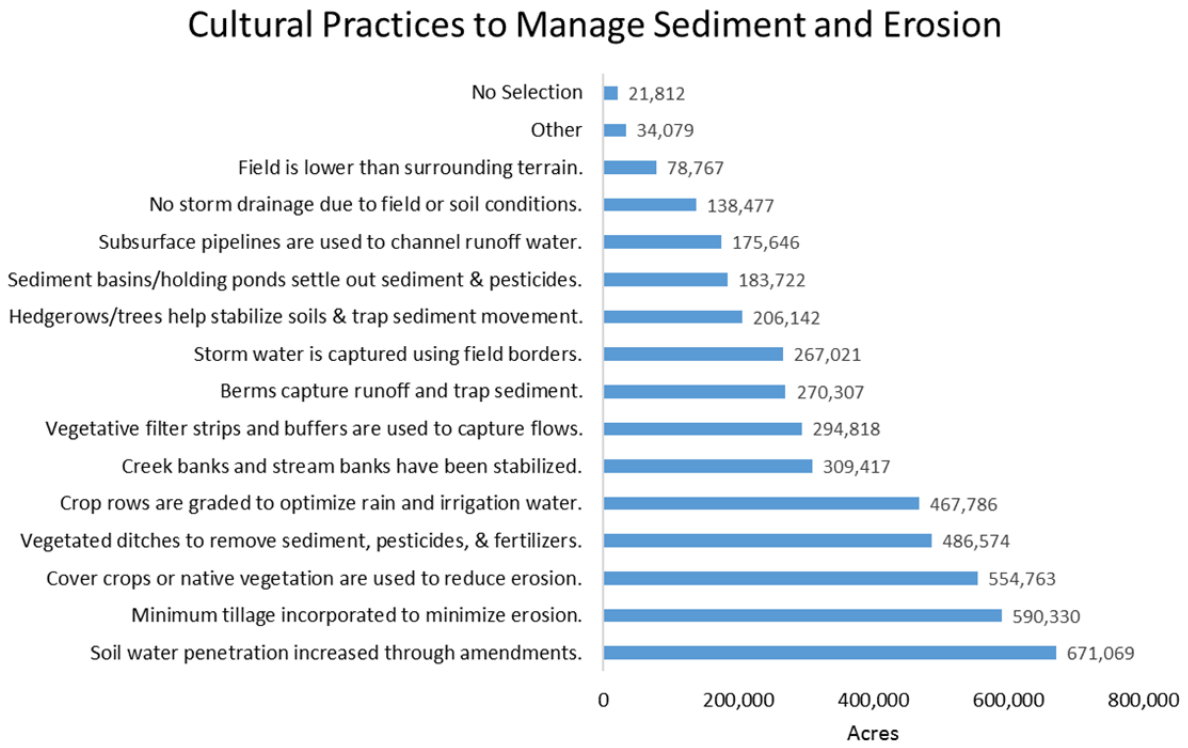
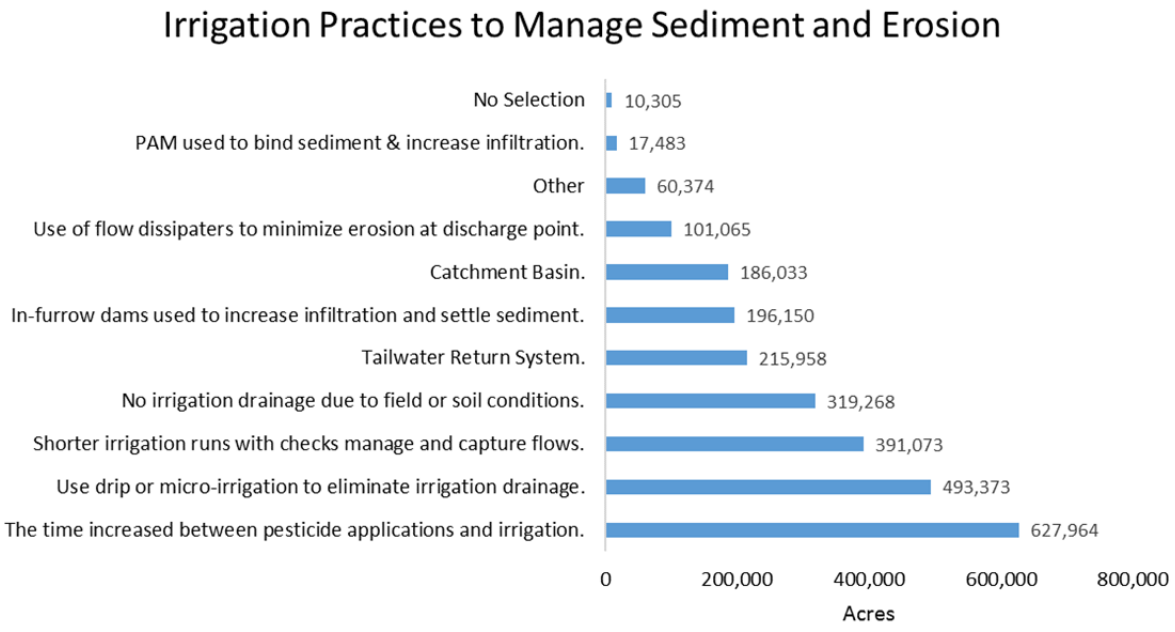



**Figure 8. Acreage reported for irrigation practices to manage sediment and erosion.**



## Pesticide & Nutrient Management

Minimal changes occurred in the prominence of each pesticide and nutrient management practice between 2014 and 2015 crop years. SVWQC members continue to employ several practices at one time to reduce the movement of pesticides and nutrients to surface waters (Table 7, Figure 9, Figure 10, and Figure 11). On average, members implemented eight different pesticide management practices; the three most reported pesticide management practices were following label restrictions, following county permit requirements, and monitoring wind conditions (Table 7, Figure 10).

As with 2014 surveys, a majority of the members employed PCAs and CCAs in 2015 to develop a crop fertility plan (Figure 9). The two most reported nitrogen management practices were splitting up fertilizer applications throughout the growing season and testing soil or plant tissue. Orchards cover the majority of the response acreage for each of these practices. Applying nitrogen fertilizers through fertigation and foliar treatments were also common (Figure 11).

**Table 7. Pesticide and nutrient management practices implemented by members shown in acreage and response count.**

| Survey Section | Question | Response | Acreage | Response Count |
|---|---|---|---|---|
| A | Pesticide Application Practices | | | |
| | | Follow Label Restrictions | 915,340 | 3,890 |
| | | County Permit Followed | 914,338 | 3,841 |
| | | Monitor Wind Conditions | 901,230 | 3,772 |
| | | Attend Trainings | 869,122 | 3,334 |
| | | Avoid Surface Water When Spraying | 865,202 | 3,471 |
| | | Use PCA Recommendations | 862,199 | 3,400 |
| | | Monitor Rain Forecasts | 857,255 | 3,431 |
| | | End of Row Shutoff When Spraying | 832,690 | 3,390 |
| | | Use Appropriate Buffer Zones | 790,892 | 2,998 |
| | | Use Drift Control Agents | 741,112 | 2,636 |
| | | Reapply Rinsate to Treated Field | 543,027 | 1,849 |
| | | Sensitive Areas Mapped | 527,880 | 1,797 |
| | | Use Vegetated Drain Ditches | 462,313 | 1,421 |
| | | Chemigation | 211,491 | 592 |
| | | Target Sensing Sprayer used | 172,842 | 627 |
| | | No Pesticides Applied | 78,085 | 1,242 |
| | | Other | 45,549 | 261 |
| | | No Selection | 1,412 | 28 |
| A | Who helps develop the crop fertility plan? | | | |
| | | Pest Control Advisor (PCA) | 857,630 | 3,405 |
| | | Certified Crop Advisor (CCA) | 448,218 | 1,660 |
| | | UC Farm Advisor | 283,855 | 903 |
| | | Professional Soil Scientist | 269,539 | 847 |
| | | Professional Agronomist | 257,766 | 743 |
| | | Independently Prepared by Member | 221,676 | 897 |
| | | None of the above | 67,842 | 1,068 |
| | | Certified Technical Service Providers by NRCS | 48,097 | 194 |
| | | No Selection | 2,473 | 48 |
| B | Nitrogen Management Practices | | | |
| | | Split Fertilizer Applications | 763,142 | 3033 |

| Survey Section | Question | Response | Acreage | Response Count |
|---|---|---|---|---|
| | | Soil Testing | 672,227 | 2,599 |
| | | Tissue/Petiole Testing | 591,096 | 2,247 |
| | | Fertigation | 386,775 | 1,344 |
| | | Foliar N Application | 349,995 | 1,379 |
| | | Cover Crops | 311,252 | 1,306 |
| | | Irrigation Water N Testing | 302,270 | 902 |
| | | Do Not Apply Nitrogen | 99,317 | 1,349 |
| | | Variable Rate Applications using GPS | 60,747 | 175 |
| | | Other | 34,495 | 293 |
| | | No Selection | 10,838 | 89 |

**Figure 9. Parties involved in developing crop fertility plans.**

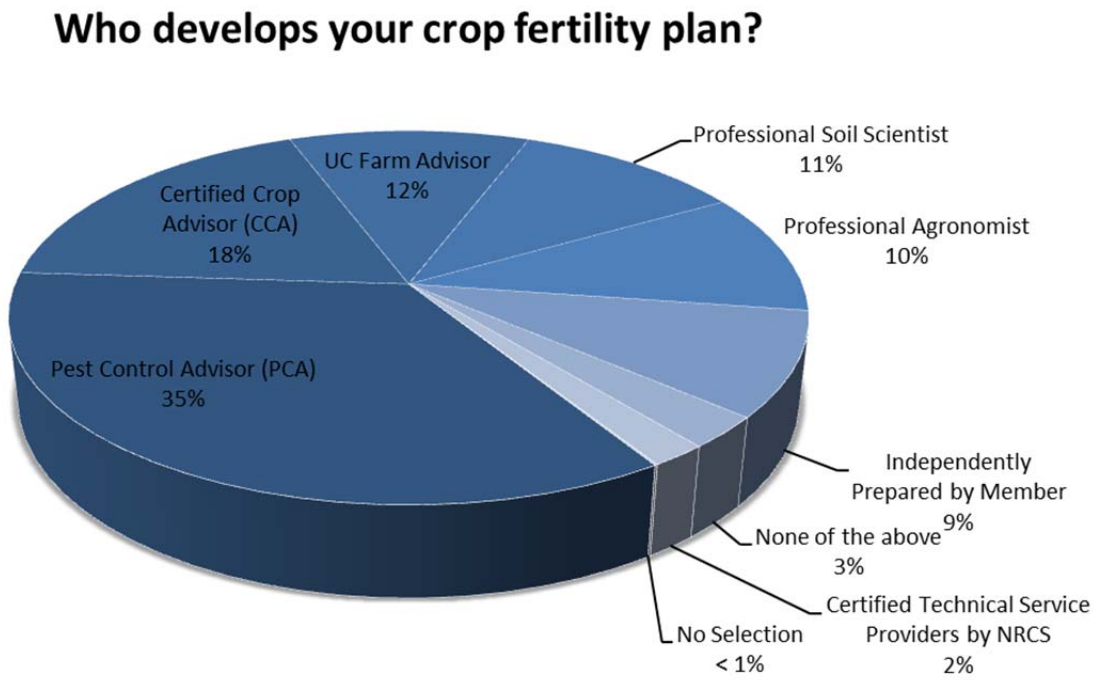


**Figure 10. Pesticide management practices implemented by members shown in terms of reported parcel acreage.**

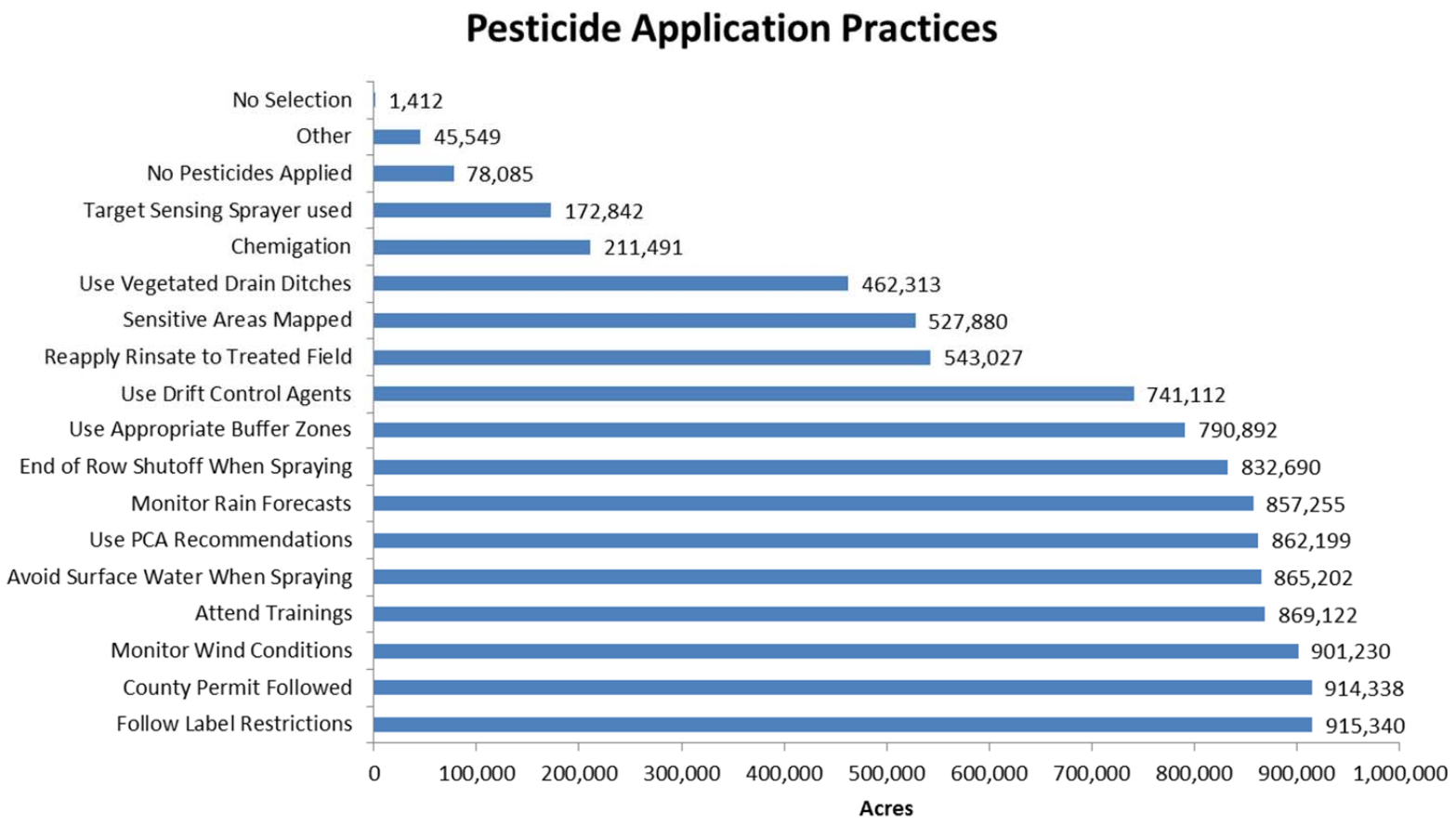
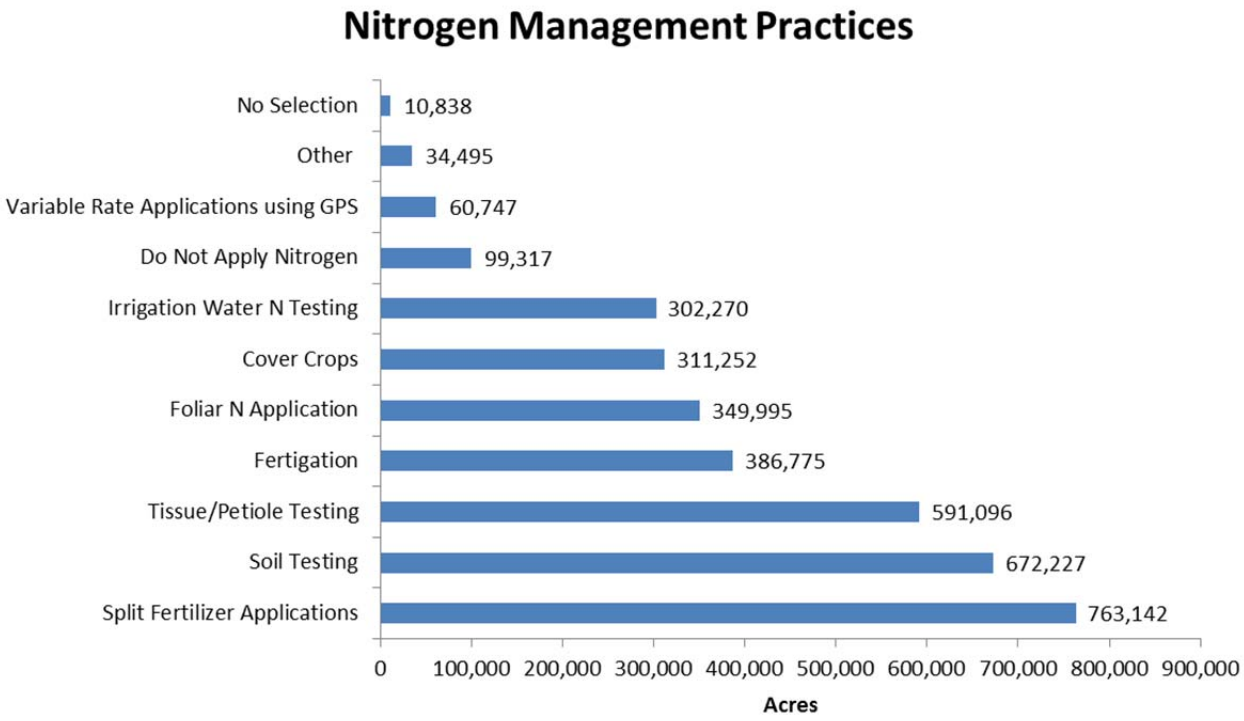


**Figure 11. Nitrogen management practices implemented by members shown in reported parcel acreage.**




## Well Management Practices

### *Irrigation Wells*

The majority of enrolled parcels have at least one irrigation well (Figure 12). Wellhead protection practices implemented on active irrigation wells are meant to prevent pollution to the groundwater system through wellheads. Most wells were reported to have four to five practices used to prevent groundwater pollution. The most common practices used by Coalition members include following good housekeeping procedures and preventing standing water around the wellhead (Table 8, Figure 13). There were no noteworthy changes to wellhead management practices between 2014 and 2015 crop years.

**Table 8. Irrigation well info by membership acreage, member count, and well count.**

| Survey Section | Question | Response | Acreage | Count |
|---|---|---|---|---|
| C | Do you have any irrigation wells on parcels associated with this Farm Evaluation? | | | Response |
| | | Yes | 770,644 | 3,240 |
| | | No | 223,823 | 2,004 |
| | | No Selection | 5,192 | 25 |
| C | Wellhead Protection Practices | | | Well |
| | | Good "Housekeeping" Practices | - | 8,508 |
| | | Standing water avoided around wellhead | - | 8,156 |
| | | Ground Sloped Away from Wellhead | - | 7,890 |
| | | Cement Pad | - | 7,227 |
| | | Backflow Preventive / Check Valve | - | 6,431 |
| | | No Selection | - | 69 |
| | | | **Unique Irrigation Wells** | **9,258** |

**Figure 12. Percent acres where members reported the presence or absence of irrigation wells on their property.**

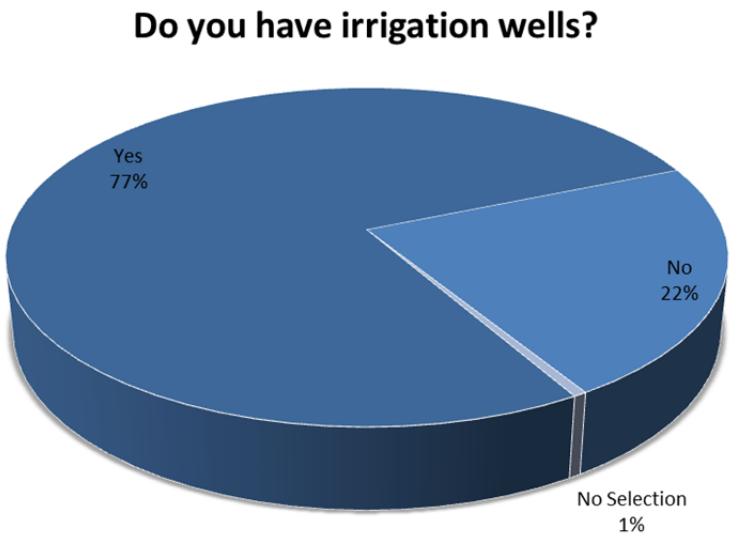
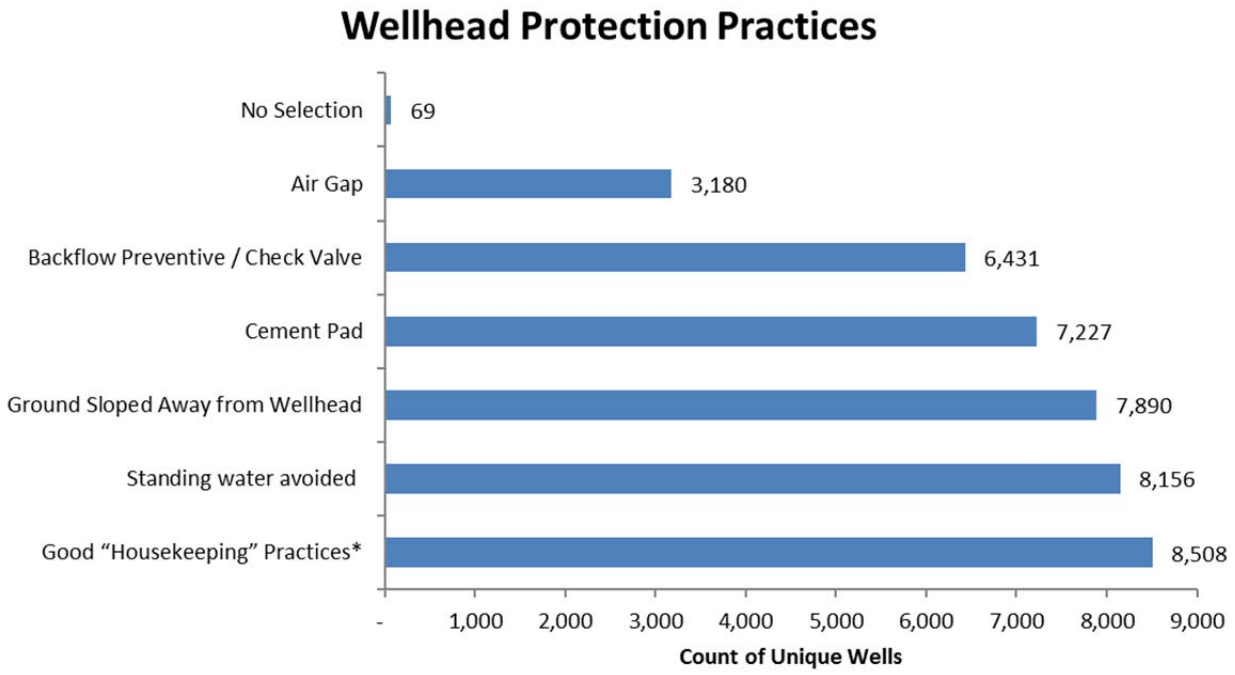


**Figure 13. Count of unique wells reported with each wellhead protection practice.**




## *Abandoned Wells*

The Coalition region does contain abandoned wells; most of these abandoned wells have been properly destroyed. Many members with abandoned wells selected more than one response in the Well Chart (Table 9, Figure 14). The number of wells abandoned over the years has fluctuated. The greatest number of wells abandoned in a single year was 2014 when 19 wells were abandoned; however, 92 wells have an unknown year of abandonment (Table 10).

**Table 9. Abandoned well practices to minimize the potential for ground water pollution by membership acreage, member count, and well count.**

| Survey Section | Question | Response | Acreage | Count |
|---|---|---|---|---|
| C | Are you aware of any known abandoned wells associated with this Farm Evaluation? | | | Response |
| | | No | 894,684 | 4,908 |
| | | Yes | 97,819 | 276 |
| | | No Selection | 7,156 | 42 |
| C | Abandoned Well Practices | | | Wells |
| | | Destroyed - Unknown method | - | 185 |
| | | Destroyed by licensed professional | - | 61 |
| | | Destroyed – certified by county | - | 30 |
| | | No Selection | - | 139 |

**Table 10. Count of wells abandoned each year as reported by members.**

| Survey Section | Question | Response | Count of Wells |
|---|---|---|---|
| C | Well Abandoned Year | | |
| | | 1920 | 1 |

| Survey Section | Question | Response | Count of Wells |
|---|---|---|---|
| | | 1940 | 3 |
| | | 1950 | 4 |
| | | 1951 | 1 |
| | | 1955 | 1 |
| | | 1958 | 2 |
| | | 1960 | 6 |
| | | 1968 | 2 |
| | | 1970 | 4 |
| | | 1972 | 1 |
| | | 1973 | 1 |
| | | 1974 | 1 |
| | | 1975 | 1 |
| | | 1977 | 1 |
| | | 1978 | 2 |
| | | 1979 | 4 |
| | | 1980 | 8 |
| | | 1983 | 2 |
| | | 1984 | 1 |
| | | 1985 | 2 |
| | | 1986 | 2 |
| | | 1987 | 3 |
| | | 1988 | 3 |
| | | 1989 | 2 |
| | | 1990 | 5 |
| | | 1991 | 1 |
| | | 1992 | 1 |
| | | 1993 | 1 |
| | | 1994 | 2 |
| | | 1995 | 2 |
| | | 1997 | 3 |
| | | 1998 | 2 |
| | | 1999 | 2 |
| | | 2000 | 7 |
| | | 2001 | 4 |
| | | 2002 | 2 |
| | | 2004 | 2 |
| | | 2005 | 2 |
| | | 2006 | 8 |
| | | 2007 | 2 |
| | | 2008 | 3 |
| | | 2009 | 5 |
| | | 2010 | 8 |
| | | 2011 | 5 |
| | | 2012 | 10 |
| | | 2013 | 10 |
| | | 2014 | 19 |
| | | 2015 | 14 |
| | | 2016 | 1 |

| Survey Section | Question | Response | Count of Wells |
|---|---|---|---|
| | | UNK | 92 |
| | | **Total** | **272** |

**Figure 14. Percent acres where members reported the presence or absence of abandoned wells on their property.**

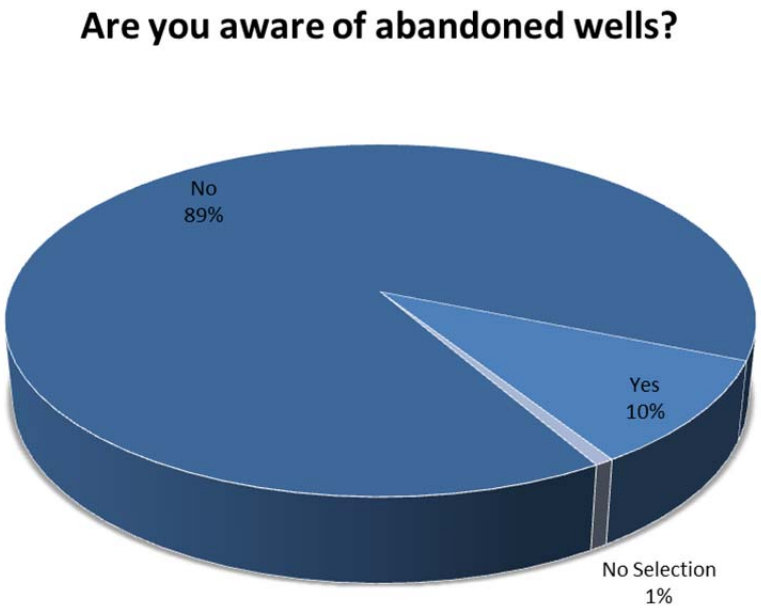
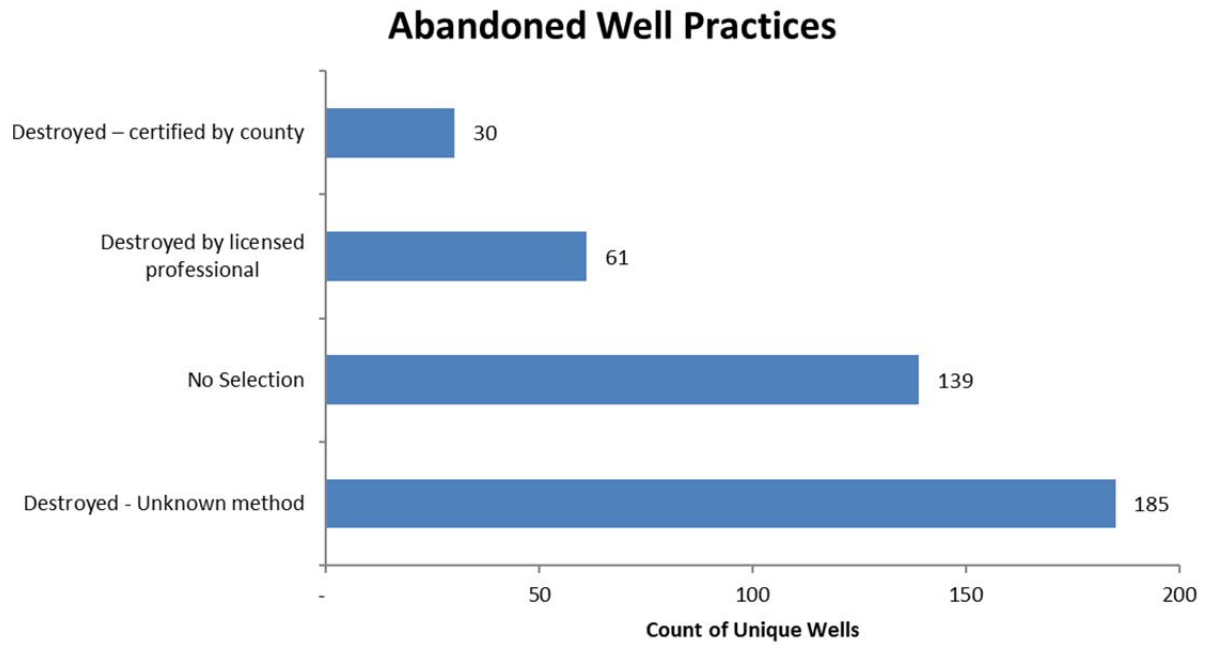



**Figure 15. Count of unique wills reported with each abandoned well practice.**



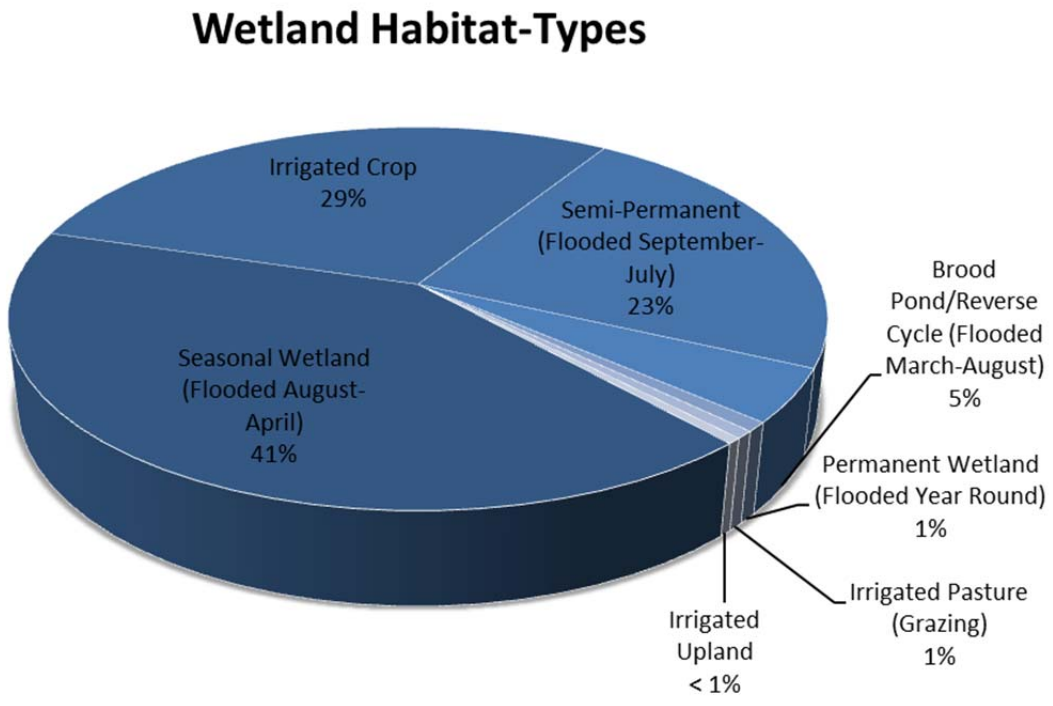
## MANAGED WETLAND EVALUATIONS

Of the returned evaluations, two percent were Managed Wetland Evaluations, which represents three percent of the total Coalition acreage (Table 3, Figure 1, and Figure 2). Coalition members with managed wetlands reported specific habitat-types contained on their parcels. A majority of the wetland habitat associated with MWE's is Seasonal Wetland indicating that it is flooded between August and April (Table 11, Figure 16). Figure 16 illustrates the percentage of total reported acreage for each primary habitat listed by members on returned MWEs.

**Table 11. Acreage associated with each reported managed wetland habitat type.**

| HABITAT TYPE | ACREAGE | RESPONSE COUNT |
|---|---|---|
| Seasonal Wetland (Flooded August-April) | 16,667 | 23 |
| Irrigated Crop | 11,816 | 5 |
| Semi-Permanent (Flooded September-July) | 9,249 | 9 |
| Brood Pond/Reverse Cycle (Flooded March-August) | 1,819 | 3 |
| Irrigated Upland | 200 | 2 |
| Permanent Wetland (Flooded Year Round) | 320 | 2 |
| Irrigated Pasture (Grazing) | 260 | 1 |

**Figure 16. Managed Wetland habitat types reported on 2015 evaluations, displayed in percent acreage.**



## Irrigation Practices

Managed wetlands fall into any of six habitat types: seasonal wetland, semi-permanent, permanent wetland, brood pond, irrigated pasture, or irrigated upland. For all wetland types and brood ponds, the land is irrigated in order to flood the field for a portion of the year. Then the water is released to support different stages of waterfowl and other wetland wildlife lifecycles. The most common habitat type in the Coalition is seasonal wetland, which is flooded from August to April (Figure 16). Members reported the time periods of their irrigation, flood-up, and drawdown by writing in the months in which these occur.

Irrigation generally occurs in late spring through summer for brood ponds, irrigated pasture, and semi-permanent wetlands. For seasonal wetlands, irrigation was reported for various periods throughout the year (Figure 17). Flood up for seasonal and semi-permanent wetland generally occurs in fall and winter (Figure 18). Drawdown was most commonly reported to occur in spring; although there are many other instances throughout the year as well (Figure 19). Irrigation, flood up, and drawdown patterns are consistent with those reported for 2013-2014 MWEs.

**Figure 17. Time periods for irrigation provided on surveys; the color of the bar reflects the percent of surveys returned with that specific irrigation time period specified.**

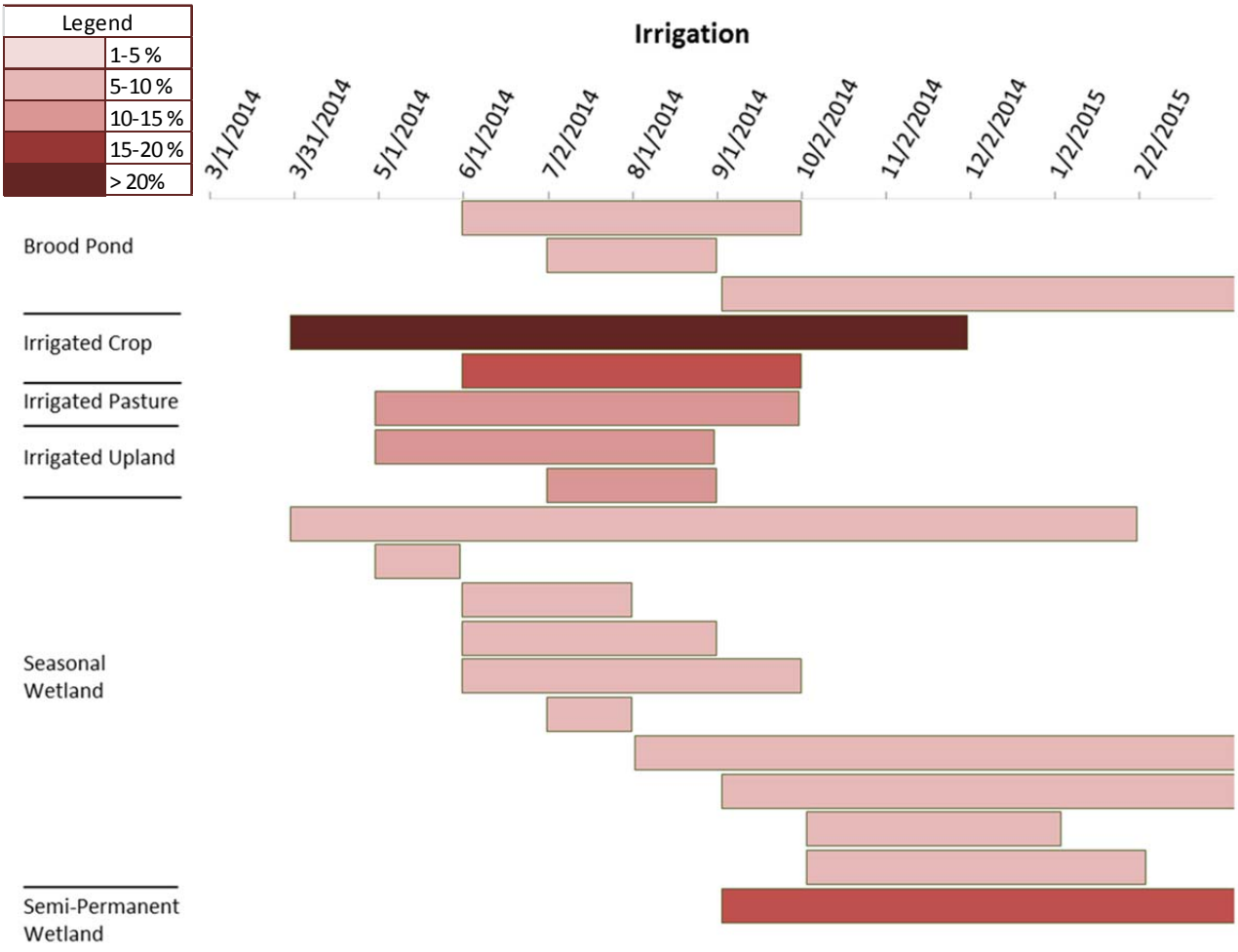


**Figure 18. Time periods for flood up provided on surveys; the color of the bar reflects the percent of surveys returned with that specific drawdown time period specified.**

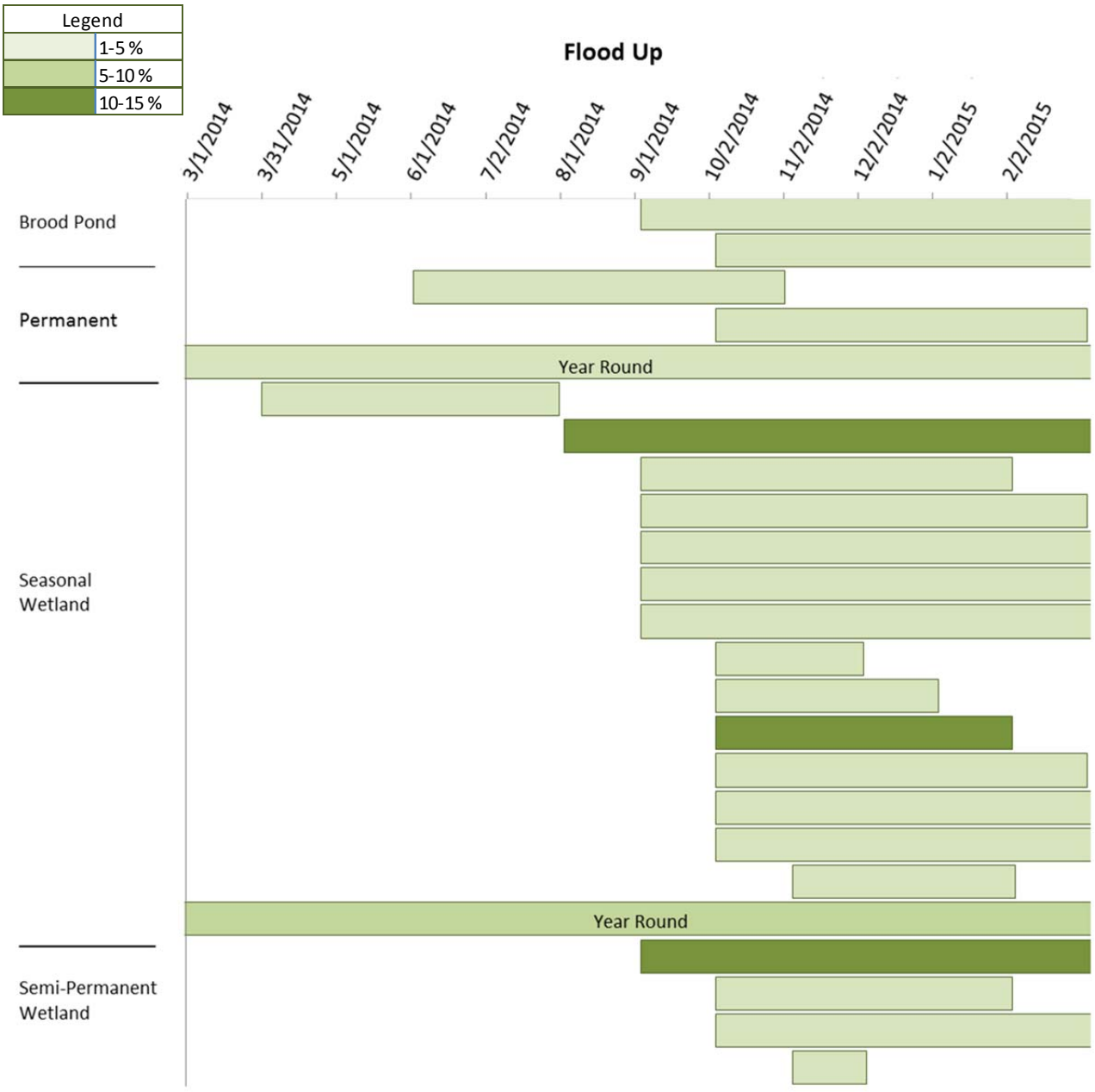
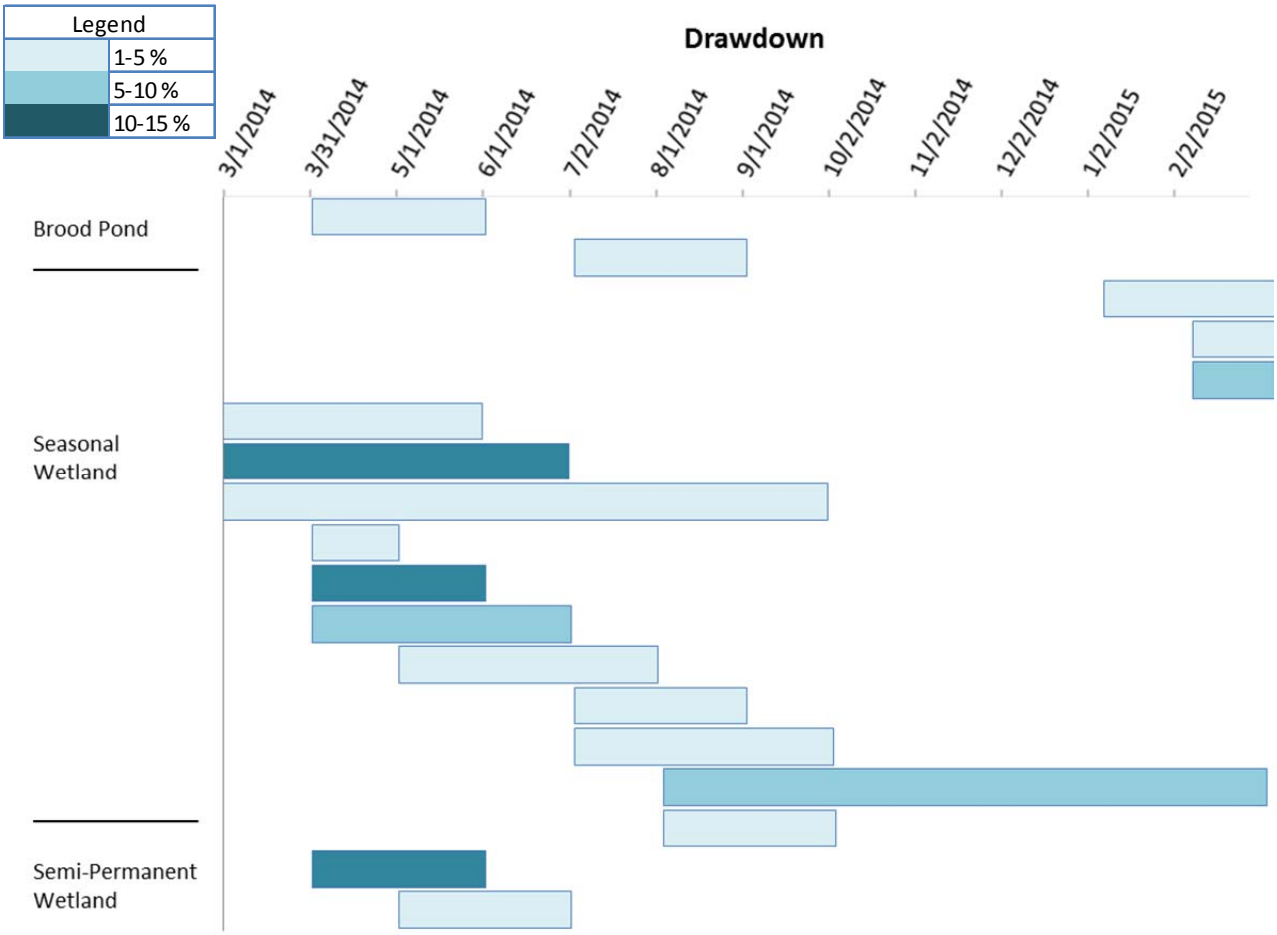


**Figure 19. Time periods for drawdown provided on surveys; the color of the bar reflects the percent of surveys returned with that specific drawdown time period specified.**



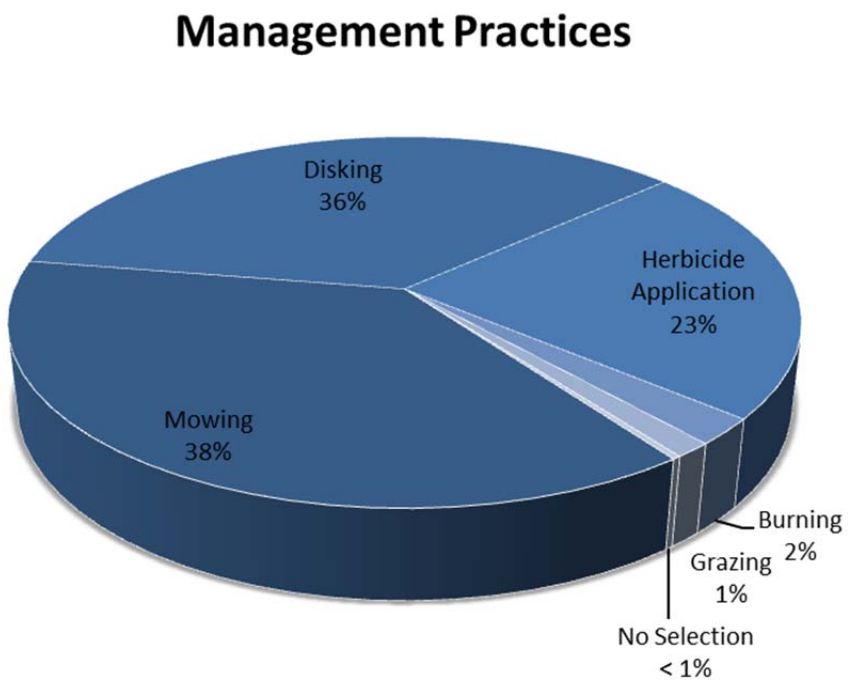
## Management Practices

Members use a variety of practices to manage wetland habitat and make improvements for wildlife. In general, Coalition members managing wetlands employ more than one practice throughout the year. As shown by the response counts and acreage, two to three practices are commonly used by members to improve habitat (Table 12). The two most reported management practices on 2015 surveys, similar to 2014, were mowing and disking, each reported on over half of the acreage associated with MWEs (Table 12, Figure 20).

**Table 12. Summary of management practices implemented by members to improve wildlife habitat on managed wetlands.**

| Survey Section | Question | Response | Acreage | Response Count |
|---|---|---|---|---|
| MW | Herbicide Application Practices | | | |
| | | Mowing | 35,238 | 29 |
| | | Disking | 33,647 | 25 |
| | | Herbicide Application | 21,320 | 13 |
| | | Burning | 2,164 | 3 |
| | | Grazing | 1,242 | 2 |
| | | No Selection | 280 | 3 |

**Figure 20. Wetland management practices reported by members, displayed in percent reported acreage.**



## Herbicide Management

Similar to pesticide applications, certain management practices are implemented to manage herbicide applications to protect surface and groundwater systems. Of the 2015 managed wetland surveys, about 35% of members reported that herbicides are applied to their fields. Members employ several practices to reduce the movement of herbicides to surface waters (Table 13, Figure 21). The most common management practices were following label restrictions and counter permits, using PCA recommendations, and avoiding surface waters while spraying the herbicides. Of the reported herbicides, 32% were glyphosate based formulations (Figure 22).

**Table 13. Herbicide management practices used by members on Managed Wetland fields.**

| Survey Section | Question | Response | Acreage | Response Count |
|---|---|---|---|---|
| MW | Herbicide Application Practices | | | |
| | | Follow Label Restrictions | 21,320 | 13 |
| | | County Permit Followed | 21,301 | 11 |
| | | Use PCA Recommendations | 20,944 | 10 |
| | | Avoid Surface Water When Spraying | 12,946 | 9 |
| | | Monitor Wind Conditions | 12,866 | 8 |
| | | Monitor Rain Forecasts | 12,662 | 7 |
| | | Attend Trainings | 12,460 | 5 |
| | | Other | 2,824 | 12 |
| | | Sensitive Areas Mapped | 2,690 | 3 |
| | | No Selection | 585 | 5 |

**Figure 21. Herbicide management practices implemented by Coalition members, displayed in reported acreage.**

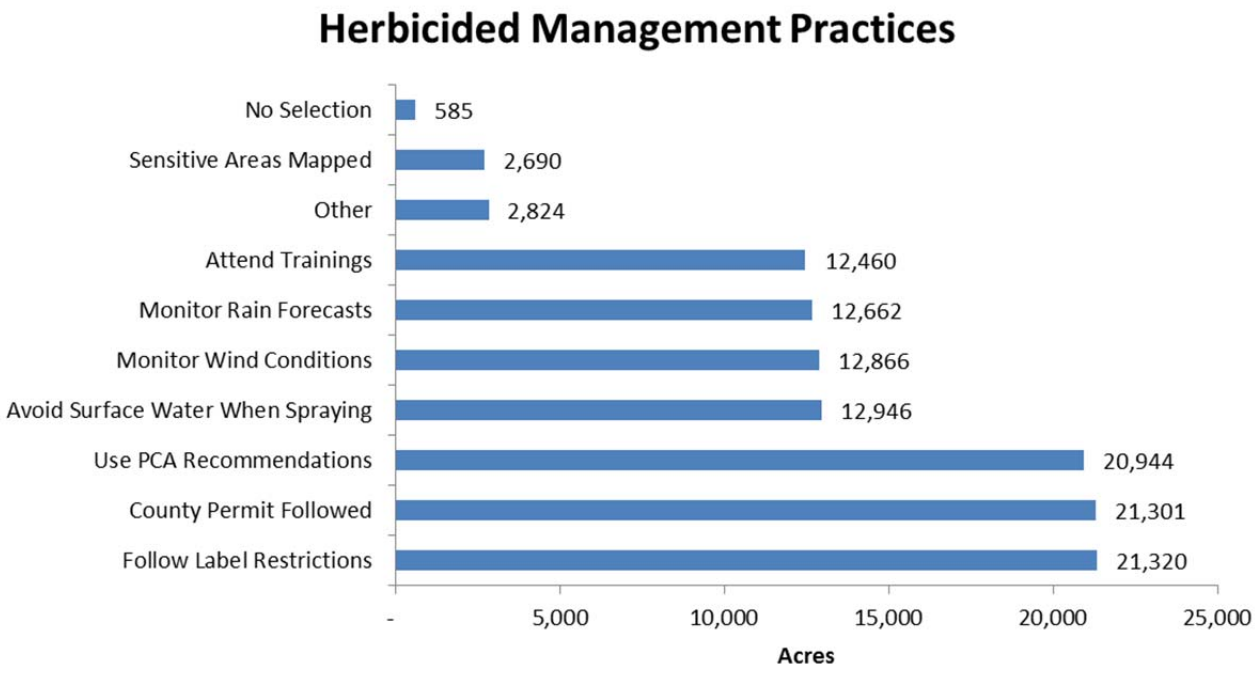
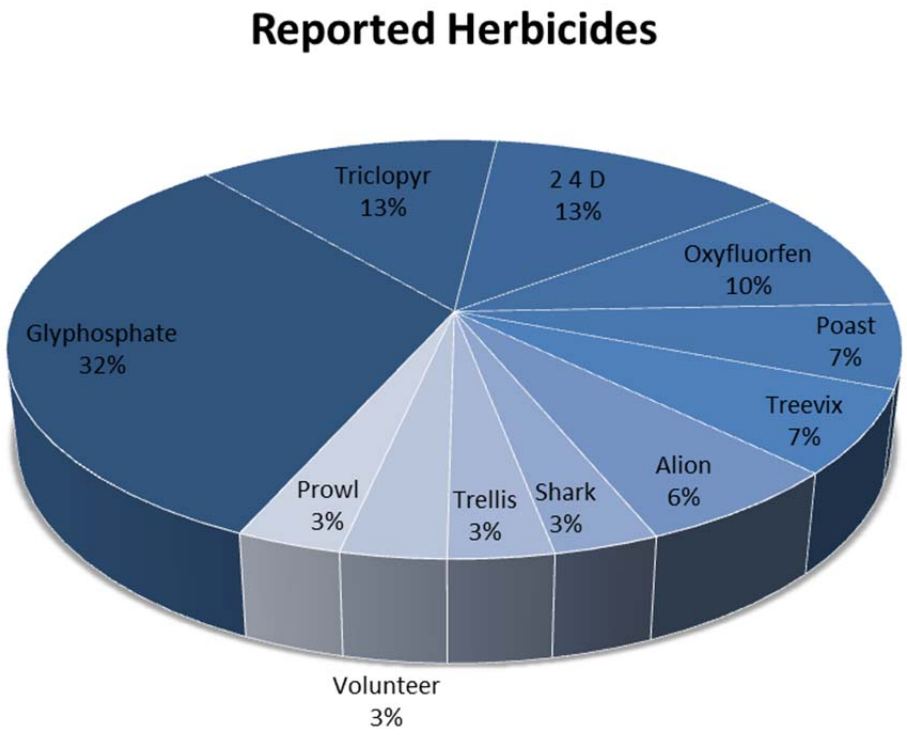



**Figure 22. Specific herbicide use reported by the members whom apply herbicides, displayed as percent of responses.**



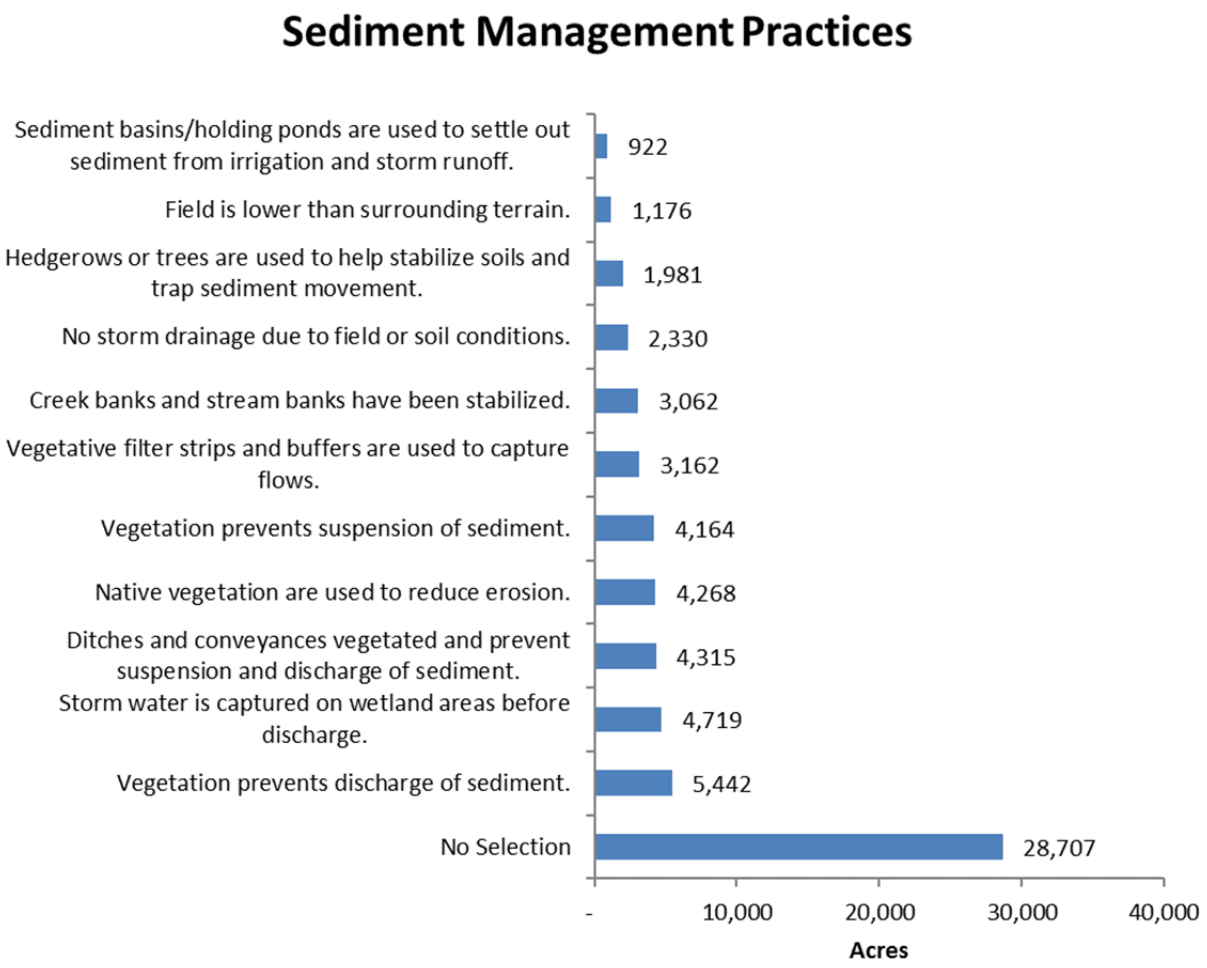
## Sediment Management Practices

Many Coalition members who manage wetlands use management practices to control the movement of sediment; members typically employ more than one method on a parcel (Table 14, Figure 23). While 36% of the memberships with managed wetlands did not report sediment management practices, those that did most commonly utilize native vegetation and planted vegetation to capture sediment and strengthen soils. Other top reported practices were capturing sediment in storm water and irrigation water using wetlands and vegetated ditches and filter strips prior to discharge in order to settle out sediment (Table 14).

**Table 14. Practices used by Coalition members to manage sediment and control erosion on their managed wetland fields.**

| Survey Section | Question | Response | Acreage | Response Count |
|---|---|---|---|---|
| MW | Sediment and Erosion Control Practices | | | |
| | | No Selection | 28,707 | 13 |
| | | Vegetation prevents discharge of sediment. | 5,442 | 15 |
| | | Storm water is captured on wetland areas before discharge. | 4,719 | 17 |
| | | Ditches and conveyances vegetated and prevent suspension and discharge of sediment. | 4,315 | 8 |
| | | Native vegetation are used to reduce erosion. | 4,268 | 15 |
| | | Vegetation prevents suspension of sediment. | 4,164 | 12 |
| | | Vegetative filter strips and buffers are used to capture flows. | 3,162 | 7 |
| | | Creek banks and stream banks have been stabilized. | 3,062 | 8 |
| | | No storm drainage due to field or soil conditions. | 2,330 | 8 |
| | | Hedgerows or trees are used to help stabilize soils and trap sediment movement. | 1,981 | 10 |
| | | Field is lower than surrounding terrain. | 1,176 | 5 |
| | | Sediment basins/holding ponds are used to settle out sediment from irrigation and storm runoff. | 922 | 4 |

**Figure 23. Sediment control practices used by members to minimize or eliminate the movement of sediment.**




## Well Management Practices

### *Irrigation Wells*

Most members with managed wetlands reported at least one irrigation well on their property with three to four Wellhead Protection Practices in place. Implementing good housekeeping methods, constructing cement pads, and sloping surrounding ground away from the wellhead were the three most reported practices on MWEs. (Table 15, Figure 24).

**Table 15. Wellhead protection practice information for wells on managed wetlands.**

| Survey Section | Question | Response | Acreage | Count |
|---|---|---|---|---|
| C | Do you have any irrigation wells on parcels associated with this Farm Evaluation? | | | Response |
| | | Yes | 18,301 | 17 |
| | | No | 14,791 | 20 |
| | | No Selection | 20 | 1 |
| C | Wellhead Protection Practices | | | Well |
| | | Good "Housekeeping" Practices | - | 25 |

| Survey Section | Question | Response | Acreage | Count |
|---|---|---|---|---|
| | | Cement Pad | - | 24 |
| | | Ground Sloped Away | - | 23 |
| | | Standing water avoided | - | 22 |
| | | Air Gap | - | 14 |
| | | Backflow Preventive / Check Valve | - | 13 |
| | | No Selection | - | 2 |
| | | | **Unique Irrigation Wells** | **27** |

**Figure 24. A summary of MWEs with irrigation wells, shown by percent reported acres.**

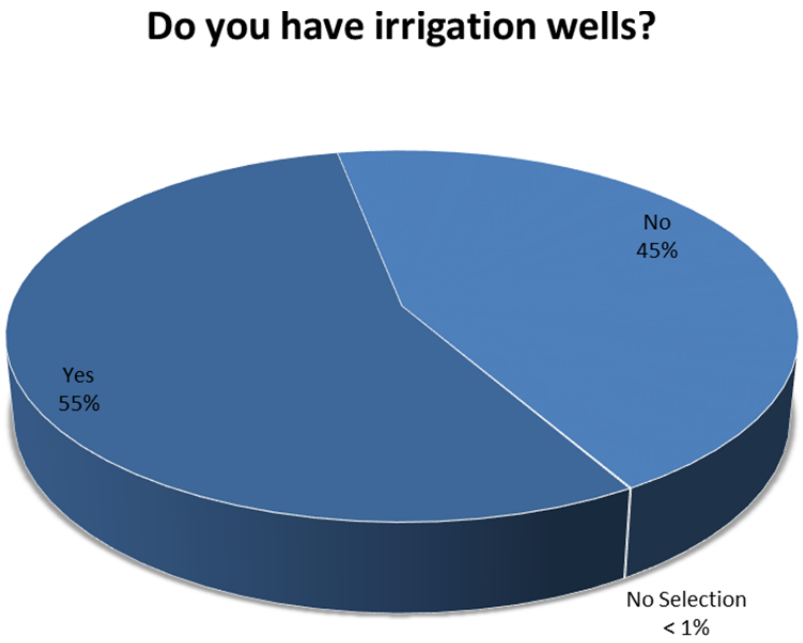
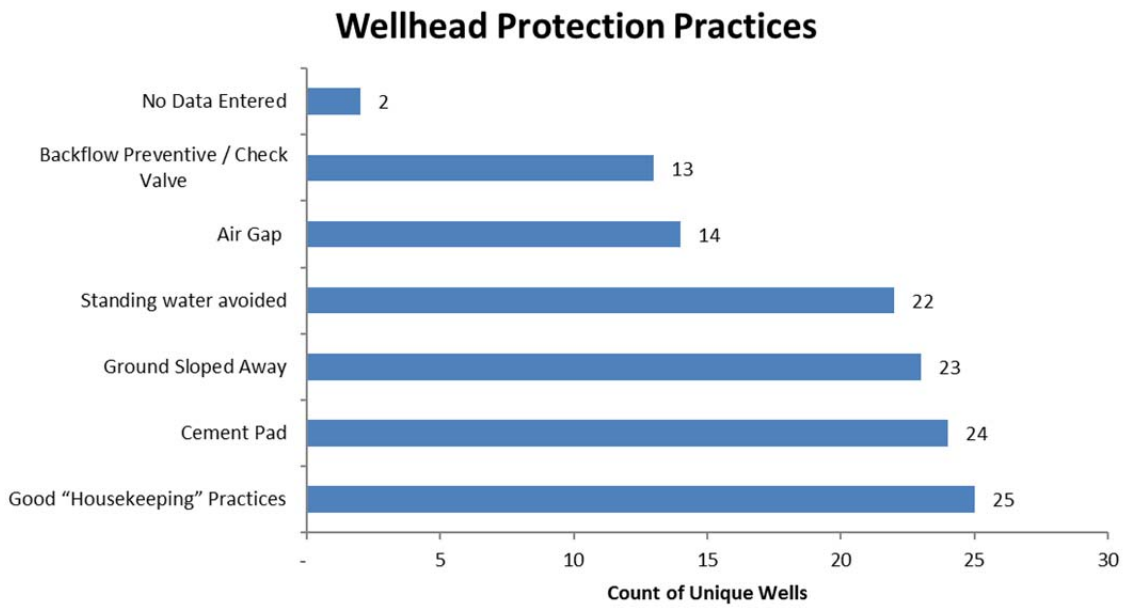


**Figure 25. Count of unique wells reported with wellhead protection practices on managed wetlands.**




## *Abandoned Wells*

Managed wetlands in the Coalition area contain few abandoned wells. Surveys for the three abandoned wells did not provide management practice information, although one member did report the year of abandonment (Table 16 and Table 17, Figure 26).

**Table 16. Summary information for known abandoned wells on managed wetlands.**

| Survey Section | Question | Response | Acreage | Count |
|---|---|---|---|---|
| C | Are you aware of any known abandoned wells associated with this Farm Evaluation? | | | Response |
| | | No | 32,711 | 35 |
| | | Yes | 382 | 2 |
| | | No Selection | 20 | 1 |
| C | Abandoned Well Practices | | | Wells |
| | | N/A (Has No Abandoned Wells) | - | 36 |
| | | No Selection | - | 3 |

**Table 17. Reported year of abandonment on abandoned wells on managed wetlands.**

| Survey Section | Question | Response | Count of Wells |
|---|---|---|---|
| C | Year Abandoned | | |
| | | 2013 | 1 |
| | | Unknown | 1 |
| | | (blank) | 1 |

**Figure 26. Reported presence of abandoned wells by membership acreage.**