2018 Statewide Land Use Mapping Accuracy Assessment

After completing the final classification dataset, a comprehensive accuracy assessment was completed. Independent ground truth samples set aside for this purpose (25% of the initial ground truth data, approximately 22% after QA/QC). A stratified random sampling method was used for accuracy assessment sample selection. The datasets were stratified by land cover type and county boundary. Prior to the accuracy assessment, the validation dataset was cleaned so that each data point corresponded to a single crop at a single point in time in a single field. In the WY 2018 analysis, 12,218 samples were used for accuracy assessment. These sites were not used to train the classification algorithm and therefore represent unbiased reference information.

Accuracy assessment can be divided into three components:

1. Reference data sampling design – how much reference data is collected, when and where
2. Reference data response design – how reference data is collected
3. Analysis – how the reference data is used to determine accuracy and how that accuracy is expressed

In this section, Land IQ's approach to all three of these components is described, and results of the accuracy assessment are provided.

Sampling Design

In conventional accuracy assessment theory, the minimum number of samples corresponding to a specific accuracy level is calculated; however, this calculation does not take the size of the area being mapped into account. This method of minimum sample size determination is not always applicable to statistics with a spatial component. Therefore, rather than calculating the minimum number of samples needed for the reference data set, then dividing it up proportionately or equally among strata (crop types and cropped areas [e.g., counties]), Land IQ collects reference data by region or county and then partitions it into training and reference data sets for each crop based on an approximate 75%-25% split, respectively.

There are several reasons for this approach, but the main reason is that it is far more efficient to collect both training and validation data simultaneously when the reference data is collected by ground survey. This approach results in both types of data being concentrated where crops are concentrated (e.g., in counties with high acreage of agricultural crops). This approach also results in more data (for both training and testing) being collected for predominant, high acreage crops. The result of this approach repeated over multiple years is that representative reference data is accumulated, in some cases, beyond the minimum number of samples needed for some crops but can be lacking for other, less common crops. For this reason, Land IQ now focuses some of its data collection efforts on crops for which data lacks. These crops are typically lower acreage annual crops.

Response Design

Reference data can be collected by different means from different sources. Currently, Land IQ collects reference data for model training and validation from cropped areas in California by conducting on-the-ground "ground truth" survey. For the purposes here, ground truth data and reference data are synonymous.

Because the ground truth surveys are real-time (as opposed to using previously acquired data such as archival imagery) and require presence of staff, logistical considerations must be made. First, on-the-ground reference data surveys must be made when the crop is growing. This requirement introduces an element of timing, which is especially important for short-season crops. Second, because the area mapped in California is so large, knowledge of where some cropped fields are, especially for minor crops, is approximate and often changes from year to year. In addition, because so many crops are mapped that vary in acreage, some crops for which there is little existing reference data are prioritized for reference point data collection.

For these reasons, Land IQ uses the basic concepts of sampling design to achieve independent and random samples in addition to considering criteria to prioritize reference point data collection:

- Confidence level – Crops with estimated lower accuracy and confidence levels from the previous year's mapping effort are prioritized for ground truth data collection.
- Peak date –Land IQ uses remote sensing analysis to find dates of peak reflectance in fields to determine the seasonality of crops and help optimize timing of ground truth data collection around peak growing seasons.

ANALYSIS

Uncertainty in crop classification is related to two issues: accuracy and precision.

ACCURACY

Accuracy is a relative measure of the exactness of an estimate and accounts for systematic errors. Therefore, an accurate estimate does not systematically over- or underestimate the true value. Map accuracy can be quantified by creating an error matrix (also commonly called a confusion matrix), which compares the map classification with a reference classification.

The underlying principle of the accuracy assessment is that it compares the mapped land classification to reliable reference data, collected through sample-based approaches, as described above. The objective of a validation data set, therefore, is to provide a statistically sound estimate of the accuracy of the output map based on an independent reference information source. The accuracy of a map is assessed by measuring the degree of agreement between the output map and the validation data set. An error matrix can be generated that compares the pixels or polygons in the resulting classification map to the known reference points. From this matrix, overall accuracy and accuracy of each class can be determined.

There are three measures of accuracy that can be determine from an error matrix:

1. Overall accuracy
2. Producer's accuracy (omission error)
3. User's accuracy (commission error

Typically, accuracy of remotely sensed maps is demonstrated using an error (or confusion) matrix (Table 5). Accuracy measures that can be derived from an error matrix are described below.

OVERALL ACCURACY

Overall accuracy is calculated by dividing the total number of correct pixels by the total number of pixels in the error matrix. In other words, the total number of correctly classified samples are divided by the total number of samples. It measures the accuracy of the whole map but does not refer to any individual classes. It is the probability that a randomly selected location on the map is correctly classified. Overall accuracy is sensitive to sample size and is thus more reliable in classes with larger samples. It is the sum of the major diagonal in an error matrix that runs from the upper left corner to the bottom right corner of the matrix.

PRODUCER'S ACCURACY (OMISSION ERROR)

Producer's accuracy is also called the omission error and is described by the probability that a reference point is correctly classified. It indicates how well the area represented by the map can be classified. It is shown on the right side of the matrix.

USER'S ACCURACY (COMMISSION ERROR)

User's accuracy is the number of correct fields in an individual class divided by the number of pixels that were actually classified in that class. It is called user's accuracy because it is the probability that a field classified on the map actually represents that class on the ground. This measure is also called commission error and is reported at the bottom of the matrix.

PRECISION

Precision is related to the random error, which can be quantified by a confidence interval. A confidence interval gives a range that encloses the true value of an unknown fixed quantity with a specified probability. A precise estimate would thus have a small confidence interval.

RESULTS

Accuracy was assessed based on both the DWR standard legend and Land IQ Legend. As the level of detail of these legends differed somewhat, the accuracy, or ability to correctly determine classifications, differs as well.

OVERALL ACCURACY

The overall accuracy for WY 2018 crop mapping statewide was 98.3% at the DWR legend level and 96.5% at the Land IQ legend level (Table 1).

Table 1. WY 2018 Overall Accuracy of Statewide Land Use Mapping

Crop Legend	Overall Accuracy
DWR	98.3
Land IQ	96.5

The error matrices for crops classed by the DWR legend and the Land IQ legend (Tables 5 and 6 at the end of this report) show overall accuracy as well as omission and commission error, by crop class (in acres).

ACCURACY BY CROP CLASS

Accuracy was calculated for each crop class (number of correct acres divided by total acres in each crop category) for both DWR and Land IQ legends (Tables 2 and 3). Some land cover types (e.g., apples, avocados, bush berries, carrots, cole crops, dates, kiwis) are not included in the accuracy assessment due to insufficient data. In these cases, there were either no or less than five samples available for accuracy assessment. It is notable that some crops are missed; it is challenging to detect every crop instance because satellite data are intermittent and cropping is rotational and, in some cases, short term. For this reason, available data will not always align well with rotational crop timing. However, most missed crops are short season in nature and therefore have a smaller impact on total water use analysis. In total, the new multi crop resolution of mapping data in WY 2018 captures a vast majority of the cropping year-round in the state, allowing data users to characterize crop production and water use more accurately.

Table 2. WY 2018 Statewide Land Use Mapping Accuracy by DWR Crop Legend

Crop	Correct Acres	Total Acres	Accuracy
Young Perennials	4,128	4,128	100.0%
Citrus and Subtropical	16,074	16,000	99.5%
Rice	26,210	26,210	100.0%
Vineyard	29,479	29,320	99.5%
Unclassified	37,380	35,873	96.0%

Crop	Correct Acres	Total Acres	Accuracy
Pasture	39,141	38,115	97.4%
Grain and Hay	39,757	37,201	93.6%
Field Crops	58,440	57,185	97.9%
Truck, Nursery and Berry Crops	63,011	62,335	98.9%
Deciduous Fruits and Nuts	123,175	122,914	99.8%

Table 3. WY 2018 Statewide Land Use Mapping Accuracy by Land IQ Crop Legend

Crop	Correct Acres	Total Acres	Accuracy
Alfalfa and Alfalfa Mixtures	26,843	27,851	96%
Almonds	74,409	74,441	100%
Apples	235	265	89%
Avocados	1,694	1,761	96%
Beans (Dry)	2,492	2,617	95%
Bush Berries	591	622	95%
Carrots	2,880	3,010	96%
Cherries	1,416	1,416	100%
Citrus	10,813	10,939	99%
Cole Crops	9,848	12,430	79%
Corn, Sorghum and Sudan	34,073	35,208	97%
Cotton	12,399	12,575	99%
Dates	333	333	100%
Flowers, Nursery & Christmas Tree Farms	615	766	80%
Grapes	29,320	29,491	99%
Kiwis	183	183	100%
Lettuce/Leafy Greens	9,891	11,615	85%
Melons, Squash and Cucumbers	3,745	4,052	92%
Miscellaneous Deciduous	227	392	58%
Miscellaneous Field Crops	2,487	2,581	96%
Miscellaneous Grain and Hay	37,201	40,316	92%
Miscellaneous Grasses	2,885	4,296	67%
Miscellaneous Subtropical Fruits	16	33	48%
Miscellaneous Truck Crops	4,756	6,713	71%
Mixed Pasture	6,969	7,179	97%
Olives	2,885	2,886	100%
Onions and Garlic	5,549	5,846	95%
Peaches/Nectarines	2,523	2,572	98%
Pears	571	606	94%
Peppers	1,208	1,469	82%
Pistachios	16,243	16,243	100%
Plums, Prunes and Apricots	3,717	3,731	100%
Pomegranates	857	861	100%
Potatoes or Sweet Potatoes	2,624	2,716	97%

Crop	Correct Acres	Total Acres	Accuracy
Rice	26,210	26,210	100%
Safflower	1,827	1,998	91%
Strawberries	2,339	2,565	91%
Sunflowers	3,622	3,635	100%
Tomatoes	12,313	12,478	99%
Unclassified Fallow	35,873	37,380	96%
Walnuts	22,552	22,648	100%
Young Perennials	4,128	4,128	100%

PRECISION BY CROP

Two-tailed confidence intervals (95%) were calculated using the method in Olofsson et al. (2014) for the commission error of each crop class and are shown in Table 4 in order of highest to lowest precision. As noted above, precision is related to the random error, which can be quantified by a confidence interval. A confidence interval gives a range that encompasses the true value of an unknown fixed quantity with a specified probability. A precise estimate would thus have a small confidence interval. For example, pears were mapped at 94% accuracy with a confidence interval of plus or minus 1%. This means that 95% of the time, we are confident that the pear classification was between 93 and 95% correct.

As Table 4 shows, twelve crops were mapped with 100% accuracy and 0% confidence interval (100% confidence or precision): almonds, citrus, cotton, kiwi fruit, olives, pistachios, pomegranates, rice, young perennials, plums, prunes and apricots, sunflowers and walnuts. An additional seven crops were mapped at accuracies ranging from 97 to 99% with 100% confidence). Table 9 also shows that the number of ground truth points directly influences the level of precision. As the number of ground truth points increases, precision (confidence) generally also increases and the confidence interval becomes smaller. Some crops are mapped with high accuracy with few ground truth points (such as kiwi fruit) because they are very distinct and relatively easy to distinguish from other crops. Other crops have a lower accuracy but relatively high precision (miscellaneous truck crops) because the number of ground truth points was relatively high. Some crops, such as apples, were mapped with high accuracy but lower precision (e.g. apples, dates) because of very few ground truth points.

Table 4. WY 2018 Statewide Land Use Mapping Accuracy and Precision by Crop

Crop Class	User's Accuracy (Number of correctly classified acres/total acres)	Number of Groundtruth (Reference Sample Acres)	95% Two-tailed Confidence Interval
Almonds	100%	74,441	0%
Cherries	100%	10,940	0%
Dates	100%	12,575	0%
Kiwis	100%	183	0%
Olives	100%	2,886	0%
Pistachios	100%	16,243	0%
Rice	100%	862	0%
Young Perennials	100%	26,210	0%
Plums, Prunes and Apricots	100%	22,648	0%
Sunflowers	100%	29,491	0%
Walnuts	100%	40,315	0%
Pomegranates	100%	2,572	0%
Grapes	99%	3,635	0%
Citrus	99%	3,010	0%
Tomatoes	99%	35,209	0%
Cotton	99%	3,730	0%
Peaches/Nectarines	98%	12,478	0%
Mixed Pasture	97%	27,851	0%
Corn, Sorghum and Sudan	97%	37,381	0%
Potatoes or Sweet Potatoes	97%	1,416	1%
Alfalfa and Alfalfa Mixtures	96%	393	1%
Miscellaneous Field Crops	96%	1,760	1%
Avocados	96%	2,565	1%
Unclassified Fallow	96%	4,052	1%
Carrots	96%	606	1%
Beans (Dry)	95%	2,580	1%
Bush Berries	95%	5,847	1%
Onions and Garlic	95%	2,716	1%
Pears	94%	4,128	1%
Melons, Squash and Cucumbers	92%	1,998	1%
Miscellaneous Grain and Hay	92%	2,617	1%
Safflower	91%	12,429	1%
Strawberries	91%	7,179	1%
Apples	89%	11,615	1%
Lettuce/Leafy Greens	85%	4,297	1%
Peppers	82%	6,713	1%
Flowers, Nursery and Christmas Tree Farms	80%	265	2%
Cole Crops	79%	766	2%
Miscellaneous Truck Crops	71%	622	2%
Miscellaneous Grasses	67%	1,469	2%
Miscellaneous Deciduous	58%	333	3%
Miscellaneous Subtropical Fruits	48%	32	11%

Table 5. Statewide Land Use Mapping Error Matrix by DWR Crop Legend (acres)

Reference \ Predicted	Citrus and Subtropical	Deciduous Fruits and Nuts	Field Crops	Grain and Hay Crops	Pasture	Rice	Truck, Nursery and Berry Crops	Unclassified	Vineyard	Young Perennial	Total Acres	Correct Acres	Incorrect Acres	% Correct	Commission Error
Citrus and Subtropical	16,000	1	-	-	-	-	8	65	-	-	16,074	16,000	74	99.5%	0.5%
Deciduous Fruits and Nuts	9	122,914	-	-	-	-	-	214	3	35	123,175	122,914	261	99.8%	0.2%
Field Crops	-	5	57,185	-	560	-	668	21	-	-	58,439	57,185	1,254	97.9%	2.1%
Grain and Hay Crops	-	-	258	37,201	159	-	683	1,456	-	-	39,757	37,201	2,556	93.6%	6.4%
Pasture	-	-	393	309	38,115	-	7	317	-	-	39,141	38,115	1,026	97.4%	2.6%
Rice	-	-	-	-	-	26,210	-	-	-	-	26,210	26,210	-	100.0%	0.0%
Truck, Nursery and Berry Crops	3	-	335	118	176	-	62,335	19	23	1	63,010	62,335	675	98.9%	1.1%
Unclassified	-	46	-	-	1,070	-	7	35,873	188	196	37,380	35,873	1,507	96.0%	4.0%
Vineyard	-	-	-	-	5	-	-	80	29,320	74	29,479	29,320	159	99.5%	0.5%
Young Perennial	-	-	-	-	-	-	-	-	-	4,128	4,128	4,128	-	100.0%	0.0%
Total Acres	16,012	122,966	58,171	37,628	40,085	26,210	63,708	38,045	29,534	4,434	436,793				
Correct Acres	16,000	122,914	57,185	37,201	38,115	26,210	62,335	35,873	29,320	4,128		429,281			
Incorrect Acres	12	52	986	427	1,970	-	1,373	2,172	214	306			7,512		
% Correct	99.9%	100.0%	98.3%	98.9%	95.1%	100.0%	97.8%	94.3%	99.3%	93.1%				98.3%	
Commission Error	0.1%	0.0%	1.7%	1.1%	4.9%	0.0%	2.2%	5.7%	0.7%	6.9%					

Table 6. Statewide Land Use Mapping Error Matrix by Land IQ Crop Legend (acres)

Predicted

Reference	Alfalfa and Alfalfa Mixtures	Almonds	Apples	Avocados	Beans (Dry)	Bush Berries	Carrots	Cherries	Citrus	Cole Crop	Corn, Sorghum and Sudan	Cotton	Dates	Flowers, Nursery and Christmas Tree Farms	Grapes	Kiwis	Lettuce/Leafy Greens	Melons, Squash and Cucumbers	Miscellaneous Deciduous	Miscellaneous Field Crops	Miscellaneous Grain and Hay	Miscellaneous Grasses	Miscellaneous Subtropical Fruits	Miscellaneous Truck Crops	Mixed Pasture	Olives	Onions and Garlic	Peaches/Nectarines	Pears	Peppers	Pistachios	Plums, Prunes and Apricots	Pomegranates	Potatoes and Sweet Potatoes	Rice	Safflower	Strawberries	Sunflowers	Tomatoes	Unclassified Fallow	Walnuts	Young Perennials	Total Acres	Correct Acres	Incorrect Acres	% Correct Acres	Omission Error
Alfalfa and Alfalfa Mixtures	26,843	-	-	-	-	-	-	-	-	-	132	-	-	-	-	-	-	-	-	-	88	327	-	-	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	260	-	-	27,667	26,843	824	97.0%	3.0%
Almonds	-	74,409	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	32	-	-	-	-	-	-	-	-	-	-	-	74,441	74,409	32	100.0%	0.0%
Apples	-	-	235	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12	18	-	-	-	-	-	-	-	-	-	-	-	-	-	265	235	30	88.7%	11.3%
Avocados	-	-	-	1,694	-	-	-	-	10	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	54	-	-	1,760	1,694	66	96.3%	3.8%
Beans (Dry)	-	-	-	-	2,492	-	-	-	-	-	-	-	-	-	-	-	12	-	-	-	-	-	-	24	-	-	-	-	-	-	-	-	-	89	-	-	-	-	-	-	-	-	2,617	2,492	125	95.2%	4.8%
Bush Berries	-	-	-	-	-	591	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	592	591	1	99.8%	0.2%
Carrots	-	-	-	-	-	-	2,880	-	-	9	-	-	-	-	-	-	24	-	-	-	-	-	-	97	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3,010	2,880	130	95.7%	4.3%
Cherries	-	-	-	-	-	-	-	1,416	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,416	1,416	-	100.0%	0.0%
Citrus	-	-	-	27	-	8	-	-	10,813	-	-	-	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11	-	-	10,879	10,813	66	99.4%	0.6%
Cole Crops	-	-	-	-	-	-	17	-	-	9,848	-	-	-	16	-	-	1,486	-	-	-	10	139	-	652	-	-	-	-	-	58	-	-	-	-	-	-	27	-	-	-	-	-	12,253	9,848	2,405	80.4%	19.6%
Corn, Sorghum and Sudan	9	5	-	-	134	-	-	-	-	-	34,073	30	-	-	-	-	-	82	-	-	-	474	-	100	71	-	184	-	-	-	-	-	-	-	-	-	-	-	22	21	-	-	35,205	34,073	1,132	96.8%	3.2%
Cotton	-	-	-	-	-	-	-	-	-	-	-	12,399	-	-	-	-	-	-	-	38	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	138	-	-	-	12,575	12,399	176	98.6%	1.4%
Dates	-	-	-	-	-	-	-	-	-	-	-	-	333	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	333	333	-	100.0%	0.0%
Flowers, Nursery and Christmas Tree Farms	-	-	-	-	-	16	-	-	1	44	-	-	2	615	22	-	16	-	-	-	-	-	-	29	-	-	-	-	-	-	-	-	-	-	-	-	16	-	-	4	-	1	766	615	151	80.3%	19.7%
Grapes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	29,320	-	-	-	-	-	-	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	80	-	74	29,479	29,320	159	99.5%	0.5%
Kiwis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	183	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	183	183	-	100.0%	0.0%
Lettuce/Leafy Greens	-	-	-	-	-	-	-	-	-	569	-	-	-	-	-	-	9,891	-	-	-	31	-	-	484	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10,975	9,891	1,084	90.1%	9.9%
Melons, Squash and Cucumbers	-	-	-	-	11	-	-	-	-	37	-	-	-	-	-	-	22	3,745	-	-	-	-	-	119	-	-	42	-	-	40	-	-	-	17	-	-	-	19	-	-	-	-	4,052	3,745	307	92.4%	7.6%
Miscellaneous Deciduous	-	-	10	-	-	-	-	-	9	-	-	-	-	-	-	-	-	-	227	-	-	-	-	-	-	-	-	-	-	-	-	44	-	-	-	-	-	-	-	102	1	-	393	227	166	57.8%	42.2%
Miscellaneous Field Crops	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2,487	-	5	-	5	-	-	-	-	-	-	-	-	-	-	-	83	-	-	-	-	-	-	2,580	2,487	93	96.4%	3.6%
Miscellaneous Grain and Hay	93	-	-	-	-	-	-	-	-	124	185	-	-	-	-	-	93	-	-	73	37,201	35	-	280	30	-	141	-	-	-	-	-	-	45	-	-	-	-	-	1,456	-	-	39,756	37,201	2,555	93.6%	6.4%
Miscellaneous Grasses	761	-	-	-	-	-	-	-	-	-	261	-	-	-	-	-	-	-	-	-	208	2,885	-	-	176	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6	-	-	4,297	2,885	1,412	67.1%	32.9%
Miscellaneous Subtropical Fruits	-	-	-	-	-	-	-	-	16	-	-	-	-	-	-	-	-	-	-	-	-	-	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	32	16	16	50.0%	50.0%
Miscellaneous Truck Crops	-	-	-	-	113	18	35	-	-	343	-	-	-	30	-	-	909	17	-	-	32	37	-	4,756	-	-	11	-	-	29	-	-	-	-	-	71	17	-	-	2	-	-	6,420	4,756	1,664	74.1%	25.9%
Mixed Pasture	53	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14	85	-	7	6,969	-	-	-	-	-	-	-	-	-	-	-	-	-	-	51	-	-	7,179	6,969	210	97.1%	2.9%
Olives	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2,885	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	2,886	2,885	1	100.0%	0.0%
Onions and Garlic	-	-	-	-	-	-	-	-	-	147	-	-	-	-	-	-	35	-	-	-	45	-	-	8	-	-	5,549	-	-	-	-	-	-	54	-	-	-	-	-	-	-	-	5,838	5,549	289	95.0%	5.0%
Peaches/Nectarines	-	7	-	-	-	-	-	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2,523	-	-	-	14	-	-	-	-	-	-	-	9	-	-	2,572	2,523	49	98.1%	1.9%
Pears	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	571	-	-	-	-	-	-	-	-	-	-	-	-	35	606	571	35	94.2%	5.8%
Peppers	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	37	6	-	-	-	-	-	139	-	-	-	-	-	1,208	-	-	-	-	-	-	-	-	78	-	-	-	1,468	1,208	260	82.3%	17.7%
Pistachios	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	16,243	-	-	-	-	-	-	-	-	-	-	-	16,243	16,243	-	100.0%	0.0%
Plums, Prunes and Apricots	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6	-	-	-	3,717	-	-	-	-	-	-	-	7	-	-	3,730	3,717	13	99.7%	0.3%
Pomegranates	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	857	-	-	-	-	-	-	-	-	-	862	857	5	99.4%	0.6%
Potatoes or Sweet Potatoes	-	-	-	-	-	-	-	-	-	-	83	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2,624	-	-	-	-	-	-	-	-	2,707	2,624	83	96.9%	3.1%
Rice	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	26,210	-	-	-	-	-	-	-	26,210	26,210	-	100.0%	0.0%
Safflower	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,827	-	-	-	-	-	-	1,827	1,827	-	100.0%	0.0%
Strawberries	-	-	-	-	-	22	-	-	-	65	-	-	-	-	-	-	-	-	-	-	-	-	-	12	-	-	-	-	-	-	-	-	-	-	-	-	2,339	-	-	12	-	-	2,450	2,339	111	95.5%	4.5%
Sunflowers	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3,622	13	-	-	-	3,635	3,622	13	99.6%	0.4%
Tomatoes	-	-	-	-	-	-	-	-	-	-	-	16	-	-	-	-	13	15	-	-	-	-	-	4	-	-	-	-	-	96	-	-	-	-	-	-	-	21	12,313	-	-	-	12,478	12,313	165	98.7%	1.3%
Unclassified Fallow	252	46	-	-	-	7	-	-	-	-	-	-	-	-	188	-	-	-	-	-	-	74	-	-	745	-	-	-	-	-	-	-	-	-	-	-	-	-	-	35,873	-	196	37,381	35,873	1,508	96.0%	4.0%
Walnuts	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	96	22,552	-	22,648	22,552	96	99.6%	0.4%
Young Perennials	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4,128	4,128	4,128	-	100.0%	0.0%
Total Acres	28,011	74,467	245	1,721	2,750	662	2,932	1,435	10,849	11,186	34,734	12,445	355	661	29,534	183	12,538	3,865	229	2,598	37,629	4,066	18	6,716	8,008	2,885	5,927	2,541	589	1,431	16,275	3,775	858	2,829	26,210	1,981	2,399	3,662	12,564	38,044	22,553	4,434	436,794				
Correct Acres	26,843	74,409	235	1,694	2,492	591	2,880	1,416	10,813	9,848	34,073	12,399	333	615	29,320	183	9,891	3,745	227	2,487	37,201	2,885	16	4,756	6,969	2,885	5,549	2,523	571	1,208	16,243	3,717	857	2,624	26,210	1,827	2,339	3,622	12,313	35,873	22,552	4,128		421,362			
Incorrect Acres	1,168	58	10	27	258	71	52	19	36	1,338	661	46	22	46	214	-	2,647	120	2	111	428	1,181	2	1,960	1,039	-	378	18	18	223	32	58	1	205	-	154	60	40	251	2,171	1	306			15,432		
% Correct Acres	95.8%	99.9%	95.9%	98.4%	90.6%	89.3%	98.2%	98.7%	99.7%	88.0%	98.1%	99.6%	93.8%	93.0%	99.3%	100.0%	78.9%	96.9%	99.1%	95.7%	98.9%	71.0%	88.9%	70.8%	87.0%	100.0%	93.6%	99.3%	96.9%	84.4%	99.8%	98.5%	99.9%	92.8%	100.0%	92.2%	97.5%	98.9%	98.0%	94.3%	100.0%	93.1%				96.5%	
Commission Error	4.2%	0.1%	4.1%	1.6%	9.4%	10.7%	1.8%	1.3%	0.3%	12.0%	1.9%	0.4%	6.2%	7.0%	0.7%	0.0%	21.1%	3.1%	0.9%	4.3%	1.1%	29.0%	11.1%	29.2%	13.0%	0.0%	6.4%	0.7%	3.1%	15.6%	0.2%	1.5%	0.1%	7.2%	0.0%	7.8%	2.5%	1.1%	2.0%	5.7%	0.0%	6.9%					