2020 STATEWIDE LAND USE MAPPING ACCURACY ASSESSMENT

After completing the final classification dataset, a comprehensive accuracy assessment was completed. On average, about one quarter of the independent ground truth samples were set aside for this purpose. 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.

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. This method of minimum sample size determination is not always applicable to statistics with a spatial or temporal component. In this instance, it would require knowledge of the exact location and timing of cropping statewide in advance of the ground surveys, which is not available. Therefore, 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, particularly in the case of time sensitive crops, such as annuals, that need to be sampled within a narrow window of time. 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 calibration and validation) being collected for predominant, high acreage crops and less data being collected for minor, low acreage crops. While this method may result in unequal distribution of samples across classes, the distribution represents the true extent and probability of each class, ensuring that the overall accuracies are truly representative of hydrologic regions and the state as a whole. Additionally, a portion of data collection efforts is focused on crops for which data are more sparse, adjusting routes each year to capture more data in areas where these less prevalent crops are produced.

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 the 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 – Time series analysis is used 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.

Despite these efforts to gather representative data across cropping systems, the validation dataset may still contain a statistically small sample size for certain low prevalence crop classes. To include as much validation data as possible without skewing overall accuracies and maintaining statistical validity, a minimum sample size of 10 data points was enforced for inclusion in accuracy assessments. In the rare instance where a crop with high prevalence in a region did not have enough validation data from ground surveys, supplemental data was independently added using photo interpretation and/or prior year's ground truthing data.

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 determined 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 14). Accuracy measures that can be derived from an error matrix are described below.

OVERALL ACCURACY

Overall accuracy is calculated as the total number of correctly classified fields divided by the total number of fields. 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.

OMISSION ERROR

Omission error refers to the number of reference samples that were incorrectly classified. It is reported on the right side of the matrix.

PRODUCER'S ACCURACY

Producer's accuracy 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 also reported on the right side of the matrix and can be calculated as the inverse of the omission error.

COMMISSION ERROR

Commission error refers to the number of classified samples that were incorrectly classified. It is reported at the bottom of the matrix.

USER'S ACCURACY

User's accuracy is described as the probability that a predicted point is correctly classified. It indicated the reliability that a field classified on the map truly represents that class on the ground. It is also reported at the bottom of the matrix and can be calculated as the inverse of the commission error.

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

In the WY 2020 analysis, 10,168 samples were used for accuracy assessment. These sites were not used to train the classification process and therefore represent unbiased reference information. Accuracy was assessed based on both the DWR Crop Class legend level and the more refined subclass legend level and results are generated geographically for statewide mapping, as well as hydrologic regions. As the level of detail of these legends differed somewhat, the accuracy, or ability to correctly determine classifications, differs as well. It should be noted that some hydrologic regions and some crop classes within the regions were not assessed due to the lack of ground truth data.

The hydrologic regions used for the accuracy assessment are displayed in Figure 1. Due to the lack of available validation data for the 2020 mapping year, the North Lahontan, San Francisco Bay, South Lahontan Hydrologic Regions were excluded from the regional accuracy assessment. These regions also contain relatively smaller crop production areas. A concerted effort will be made in future ground surveys to capture data in these remote regions.

In the statewide and regional accuracy assessment, crops with less than 10 data points in the validation dataset were excluded. All excluded crops represent < 2% of the total cropped area in their respective regions. This indicates minimal impact of crop exclusion on the overall accuracy of the region.

Validation data was further cleaned and pre-processed using the following methods:

1. Data points that were not representative of the entire field were excluded from the analysis. This was evaluated by comparing against high to medium resolution imagery.

2. In the case of perennial fields, multiple ground survey points could have been recorded for the same field and the same class during consecutive survey events. This would result in an over-

representation of the field in the validation dataset. Such points were cleaned such that a single field contained only a single reference point.

3. In the case of annual fields, as these are grown over shorter periods, a crop may or may not have been observed during the ground survey depending on the timing or may have been observed multiple times in areas that are surveyed multiple times per year. In such cases, the reference points were linked to the corresponding cropping segment in order to correctly assess accuracy. In this way, multi-cropping instances were included in the accuracy assessment.

CA Hydrologic Regions

Figure 1. Hydrologic Regions Used for WY 2020 Regional Accuracy Assessment

OVERALL ACCURACY

Accuracy statistics were calculated independently for each region (statewide and hydrologic) as well as each level of legend (DWR Class and Subclass). The overall accuracy for WY 2020 crop mapping statewide was 99% at the DWR Crop Class legend level and 97.8% at the Subclass legend level (Table 6). Overall accuracy by hydrologic region is displayed in Table 2. Only crop classes represented by at least 10 fields in the validation data for a hydrologic region were included in the assessment.

Table 1. WY 2020 Overall Statewide Land Use Mapping Weighted Accuracy

Crop Legend	Overall Accuracy (%)
DWR Class	99.0
Subclass (Land IQ)	97.8

Table 2. WY 2020 Overall Land Use Mapping Weighted Accuracy by Hydrologic Region

Crop Legend	Central Coast	Colorado River	North Coast	Sacramento River	San Joaquin River	South Coast	Tulare Lake
DWR Class	99.0%	97.9%	98.2%	98.9%	99.5%	99.2%	99.2%
Subclass (Land IQ)	96.0%	97.1%	94.8%	96.7%	99.2%	97.6%	99.0%

The error matrices for crops at the DWR Crop Class legend level and the Subclass legend level for statewide and hydrologic regions (Tables 13-21 at the end of this report) show overall accuracy, omission and commission error, and kappa statistics by crop class (in acres).

ACCURACY BY CROP CLASS

Accuracy was calculated for each crop (percentage of reference fields correctly classified in each crop category) for both DWR Class and Subclass legends statewide (Tables 3 and 4). In addition to the statewide assessment, accuracy was also determined at the hydrologic region level (Tables 5 – 11). Some land cover types (e.g., apples, kiwis, subtropical fruits) and hydrologic regions are not included in the accuracy assessment due to insufficient data. In these cases, there were either no or less than ten samples available for accuracy assessment. A weighted accuracy assessment was conducted for each crop class by hydrologic region. Count based accuracies were first calculated for each crop class as the percent of reference fields correctly classified. Weights for each crop were independently calculated as the percent of total cropped area represented by the respective crop. The count-based accuracies were then multiplied by their respective weight by crop category and region. These weighted accuracies were then summed across all crops in the region to yield the overall weighted accuracy for the respective region. Crop weights and accuracies by region are included in Tables 5-11. Results for the same calculations applied to area-based accuracies are included starting with Table 22.

In total, the multi-crop resolution of mapping data in WY 2020 captures the vast majority of the cropping year-round in the state, allowing data users to characterize crop production and water use more accurately. Some crop rotations may occasionally be missed; this is because satellite data are intermittent and cropping is rotational and, in some cases, very short term. For this reason, available data will occasionally miss a rotational crop timing. However, any missed crops are short season in nature and therefore have a smaller impact on total water use analysis. It should also be noted that young perennials, while a smaller class, are challenging to detect with remote sensing approaches and can be confused with fallow until features are detectable. This is particularly true in years when higher resolution (e.g., NAIP) image resources are not available. NAIP imagery was available in WY 2020; many young perennial features undetectable in 2019 were detected in 2020 with higher resolution data availability.

Table 3. WY 2020 Statewide Land Use Mapping Weighted Accuracy by DWR Crop Class Legend Level

DWR Crop Class	Ground Truth Count	Classified Count	Weight	Unweighted Accuracy	Weighted Accuracy
Citrus and Subtropical	877	873	4.4%	99.5%	4.4%
Deciduous Fruits and Nuts	2799	2798	26.6%	100.0%	26.6%
Field Crops	1175	1154	9.6%	98.2%	9.4%
Grain and Hay	246	230	10.2%	93.5%	9.5%
Pasture	1403	1383	13.3%	98.6%	13.1%
Rice	492	491	5.2%	99.8%	5.2%
Truck, Nursery and Berry Crops	1887	1864	12.1%	98.8%	11.9%
Unclassified	496	494	11.4%	99.6%	11.4%
Vineyard	793	790	7.3%	99.6%	7.2%
Total Weighted Accuracy Statewide				**99.1%**	**98.7%**

Table 4. WY 2020 Statewide Land Use Mapping Weighted Accuracy by Subclass Legend Level

Crop Subclass	Ground Truth Count	Classified Count	Weight	Unweighted Accuracy	Weighted Accuracy
Alfalfa and Alfalfa Mixtures	878	861	6.2%	98.1%	6.1%
Almonds	1663	1660	15.1%	99.8%	15.0%
Avocados	445	441	0.5%	99.1%	0.5%
Beans (Dry)	40	34	0.3%	85.0%	0.3%
Bush Berries	74	71	0.2%	95.9%	0.2%
Carrots	38	36	0.5%	94.7%	0.5%
Cherries	67	67	0.4%	100.0%	0.4%
Citrus	303	296	3.1%	97.7%	3.0%
Cole Crops	426	399	1.8%	93.7%	1.7%
Corn, Sorghum and Sudan	846	834	6.3%	98.6%	6.2%
Cotton	159	158	1.8%	99.4%	1.8%
Dates	79	79	0.1%	100.0%	0.1%

Crop Subclass	Ground Truth Count	Classified Count	Weight	Unweighted Accuracy	Weighted Accuracy
Flowers, Nursery and Christmas Tree Farms	60	56	0.3%	93.3%	0.3%
Grapes	793	790	7.3%	99.6%	7.3%
Lettuce/Leafy Greens	495	485	2.9%	98.0%	2.9%
Melons, Squash and Cucumbers	66	65	0.6%	98.5%	0.6%
Miscellaneous Deciduous	23	23	0.2%	100.0%	0.2%
Miscellaneous Field Crops	45	43	0.4%	95.6%	0.3%
Miscellaneous Grain and Hay	246	230	10.2%	93.5%	9.5%
Miscellaneous Grasses	208	196	1.9%	94.2%	1.8%
Miscellaneous Truck Crops	192	187	1.6%	97.4%	1.6%
Mixed Pasture	317	295	5.3%	93.1%	4.9%
Olives	46	46	0.5%	100.0%	0.5%
Onions and Garlic	53	49	0.7%	92.5%	0.6%
Peaches/Nectarines	98	94	0.7%	95.9%	0.7%
Pears	15	15	0.1%	100.0%	0.1%
Peppers	30	28	0.1%	93.3%	0.1%
Pistachios	238	236	4.9%	99.2%	4.9%
Plums, Prunes and Apricots	107	101	0.7%	94.4%	0.7%
Pomegranates	18	18	0.2%	100.0%	0.2%
Potatoes or Sweet Potatoes	53	52	0.5%	98.1%	0.5%
Rice	492	491	5.2%	99.8%	5.2%
Safflower	32	29	0.4%	90.6%	0.3%
Strawberries	186	185	0.5%	99.5%	0.5%
Sunflowers	53	52	0.5%	98.1%	0.4%
Tomatoes	214	204	2.3%	95.3%	2.2%
Unclassified Fallow	496	494	11.4%	99.6%	11.4%
Walnuts	561	558	4.3%	99.5%	4.3%
Total Weighted Accuracy Statewide				**98.1%**	**97.8%**

Table 5. WY 2020 Central Coast Hydrologic Region Land Use Mapping Acreage Weighted Accuracy by Subclass Legend Level

Crop Subclass	Ground Truth Count	Classified Count	Weight	Unweighted Accuracy	Weighted Accuracy
Avocados	37	37	1.6%	100.0%	1.6%
Bush Berries	34	31	0.9%	91.2%	0.8%
Cole Crops	341	324	18.6%	95.0%	17.6%
Flowers, Nursery and Christmas Tree Farms	20	18	0.9%	90.0%	0.8%
Grapes	179	176	16.6%	98.3%	16.3%
Lettuce/Leafy Greens	373	366	27.9%	98.1%	27.4%
Miscellaneous Grain and Hay	48	38	7.9%	79.2%	6.2%
Miscellaneous Truck Crops	101	100	9.8%	99.0%	9.7%
Strawberries	129	129	4.8%	100.0%	4.8%
Unclassified Fallow	30	29	11.1%	96.7%	10.8%
Total Weighted Accuracy by Region					**96.0%**

Table 6. WY 2020 Colorado River Hydrologic Region Land Use Mapping Acreage Weighted Accuracy by Subclass Legend Level

Crop Subclass	Ground Truth Count	Classified Count	Weight	Unweighted Accuracy	Weighted Accuracy
Alfalfa and Alfalfa Mixtures	385	377	27.9%	97.9%	27.3%
Carrots	32	30	2.7%	93.8%	2.5%
Citrus	36	36	2.6%	100.0%	2.6%
Cole Crops	64	55	3.6%	85.9%	3.1%
Corn, Sorghum and Sudan	60	55	8.3%	91.7%	7.6%
Cotton	16	16	1.1%	100.0%	1.1%
Dates	79	79	1.9%	100.0%	1.9%
Grapes	29	29	1.0%	100.0%	1.0%
Lettuce/Leafy Greens	120	117	9.3%	97.5%	9.1%
Melons, Squash and Cucumbers	11	11	1.2%	100.0%	1.2%
Miscellaneous Field Crops	39	38	3.7%	97.4%	3.6%
Miscellaneous Grain and Hay	29	29	3.6%	100.0%	3.6%
Miscellaneous Grasses	164	161	15.2%	98.2%	14.9%

Crop Subclass	Ground Truth Count	Classified Count	Weight	Unweighted Accuracy	Weighted Accuracy
Miscellaneous Truck Crops	24	21	1.6%	87.5%	1.4%
Onions and Garlic	21	20	2.3%	95.2%	2.2%
Unclassified Fallow	79	79	14.1%	100.0%	14.1%
Total Weighted Accuracy by Region					**97.2%**

Table 7. WY 2020 North Coast Hydrologic Region Land Use Mapping Acreage Weighted Accuracy by Subclass Legend Level

Crop Subclass	Ground Truth Count	Classified Count	Weight	Unweighted Accuracy	Weighted Accuracy
Alfalfa and Alfalfa Mixtures	84	83	15.8%	98.8%	15.6%
Grapes	100	100	16.4%	100.0%	16.4%
Miscellaneous Grain and Hay	33	32	16.3%	97.0%	15.8%
Mixed Grasses	10	6	6.0%	60.0%	3.6%
Mixed Pasture	33	31	35.4%	93.9%	33.3%
Unclassified Fallow	17	17	10.1%	100.0%	10.1%
Total Weighted Accuracy by Region					**94.8%**

Table 8. WY 2020 Sacramento River Hydrologic Region Land Use Acreage Weighted Mapping Accuracy by Subclass Legend Level

Crop Subclass	Ground Truth Count	Classified Count	Weight	Unweighted Accuracy	Weighted Accuracy
Alfalfa and Alfalfa Mixtures	108	102	4.7%	94.4%	4.5%
Almonds	337	336	12.1%	99.7%	12.1%
Beans (Dry)	12	9	0.6%	75.0%	0.4%
Corn, Sorghum and Sudan	74	71	2.8%	95.9%	2.7%
Grapes	69	69	2.6%	100.0%	2.6%
Melons, Squash and Cucumbers	16	16	0.7%	100.0%	0.7%
Miscellaneous Deciduous	12	12	0.2%	100.0%	0.2%
Miscellaneous Grain and Hay	42	40	8.7%	95.2%	8.3%
Miscellaneous Grasses	16	12	1.8%	75.0%	1.4%
Mixed Pasture	128	113	12.3%	88.3%	10.9%

Crop Subclass	Ground Truth Count	Classified Count	Weight	Unweighted Accuracy	Weighted Accuracy
Olives	26	26	1.2%	100.0%	1.2%
Peaches/Nectarines	30	29	0.5%	96.7%	0.5%
Pears	15	15	0.3%	100.0%	0.3%
Pistachios	12	11	0.6%	91.7%	0.5%
Plums, Prunes and Apricots	69	68	1.9%	98.6%	1.9%
Rice	482	481	23.6%	99.8%	23.5%
Safflower	19	16	0.8%	84.2%	0.7%
Sunflowers	51	50	2.0%	98.0%	2.0%
Tomatoes	82	81	3.1%	98.8%	3.0%
Unclassified Fallow	87	87	8.4%	100.0%	8.4%
Walnuts	291	289	11.0%	99.3%	10.9%
Total Weighted Accuracy by Region					**96.7%**

Table 9. WY 2020 San Joaquin River Hydrologic Region Land Use Mapping Acreage Weighted Accuracy by Subclass Legend Level

Crop Subclass	Ground Truth Count	Classified Count	Weight	Unweighted Accuracy	Weighted Accuracy
Alfalfa and Alfalfa Mixtures	173	6,929	5.8%	98.9%	5.8%
Almonds	870	30,932	28.7%	100.0%	28.7%
Beans (Dry)	18	1,248	0.5%	100.0%	0.5%
Cherries	46	860	1.1%	100.0%	1.1%
Corn, Sorghum and Sudan	368	13,388	11.3%	100.0%	11.3%
Cotton	86	3,583	2.2%	100.0%	2.2%
Grapes	178	5,608	8.7%	100.0%	8.7%
Melons, Squash and Cucumbers	27	1,235	0.9%	100.0%	0.9%
Miscellaneous Grain and Hay	42	1,510	13.9%	96.7%	13.5%
Miscellaneous Grasses	10	341	0.7%	100.0%	0.7%
Mixed Pasture	123	2,362	3.8%	99.1%	3.8%
Olives	11	395	0.3%	100.0%	0.3%

Crop Subclass	Ground Truth Count	Classified Count	Weight	Unweighted Accuracy	Weighted Accuracy
Peaches/Nectarines	16	180	0.4%	100.0%	0.4%
Pistachios	35	1,728	4.1%	100.0%	4.1%
Plums, Prunes and Apricots	10	182	0.3%	94.0%	0.2%
Potatoes or Sweet Potatoes	42	1,078	0.8%	100.0%	0.8%
Rice	10	413	0.4%	100.0%	0.4%
Tomatoes	82	3,789	2.9%	96.0%	2.8%
Unclassified Fallow	80	2,521	6.8%	99.8%	6.8%
Walnuts	164	4,626	5.4%	100.0%	5.4%
Total Weighted Accuracy by Region					**98.4%**

Table 10. WY 2020 South Coast Hydrologic Region Land Use Mapping Acreage Weighted Accuracy by Subclass Legend Level

Crop Subclass	Ground Truth Count	Classified Count	Weight	Unweighted Accuracy	Weighted Accuracy
Avocados	408	404	20.4%	99.0%	20.2%
Bush Berries	34	34	2.9%	100.0%	2.9%
Citrus	203	196	19.0%	96.6%	18.3%
Cole Crops	20	20	2.8%	100.0%	2.8%
Flowers, Nursery and Christmas Tree Farms	25	24	5.7%	96.0%	5.4%
Miscellaneous Grain and Hay	10	9	10.5%	90.0%	9.5%
Miscellaneous Truck Crops	57	56	15.9%	98.2%	15.6%
Strawberries	48	48	4.9%	100.0%	4.9%
Unclassified Fallow	36	36	17.8%	100.0%	17.8%
Total Weighted Accuracy by Region					**97.4%**

Table 11. WY 2020 Tulare Lake Hydrologic Region Land Use Mapping Acreage Weighted Accuracy by Subclass Legend Level

Crop	Ground Truth Count	Ground Truth Area	Weight	Unweighted Accuracy	Weighted Accuracy
Alfalfa and Alfalfa Mixtures	127	127	3.9%	100.0%	3.9%
Almonds	456	455	18.7%	99.8%	18.6%

Crop	Ground Truth Count	Ground Truth Area	Weight	Unweighted Accuracy	Weighted Accuracy
Citrus	47	47	7.3%	100.0%	7.3%
Corn, Sorghum and Sudan	339	337	8.0%	99.4%	8.0%
Cotton	55	55	3.7%	100.0%	3.7%
Grapes	235	235	8.6%	100.0%	8.6%
Miscellaneous Grain and Hay	42	41	10.9%	97.6%	10.7%
Mixed Pasture	17	16	0.5%	94.1%	0.5%
Onions and Garlic	17	14	1.2%	82.4%	1.0%
Peaches/Nectarines	52	49	1.5%	94.2%	1.4%
Pistachios	189	188	12.0%	99.5%	11.9%
Plums, Prunes and Apricots	25	22	0.7%	88.0%	0.6%
Pomegranates	11	11	0.5%	100.0%	0.5%
Tomatoes	43	40	2.9%	93.0%	2.7%
Unclassified Fallow	167	167	17.2%	100.0%	17.2%
Walnuts	99	99	2.2%	100.0%	2.2%
Total Weighted Accuracy by Region					**98.8%**

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 9 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, cherries were mapped at 98% accuracy with a confidence interval of plus or minus 1%. This means that 98% of the time, we are confident that the cherry classification was between 97 and 99% correct.

As Table 12 shows, 10 crops were mapped with 100% accuracy and 0% confidence interval (100% confidence or precision). An additional eight crops were mapped at accuracies ranging from 97 to 99% with 100% confidence). Table 12 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 because they are very distinct and relatively easy to distinguish from other crops. Other crops have a lower accuracy but relatively high precision (miscellaneous grasses) because the number of ground truth points was relatively high. Some crops were mapped with high accuracy but lower precision because of very few ground truth points.

Table 12. WY 2020 Statewide Land Use Mapping Accuracy and Precision by Crop

Crop Class	User's Accuracy (area correctly classified/total area classified)	Total validation area (counts)	95% Two-tailed Confidence Interval
Alfalfa and Alfalfa Mixtures	99%	878	1%
Almonds	100%	1663	0%
Avocados	99%	445	1%
Beans (Dry)	90%	40	11%
Bush Berries	100%	74	4%
Carrots	88%	38	9%
Cherries	100%	67	3%
Citrus	99%	303	1%
Cole Crops	96%	426	2%
Corn, Sorghum and Sudan	99%	846	1%
Cotton	100%	159	0%
Dates	100%	79	0%
Flowers, Nursery and Christmas Tree Farms	85%	60	6%
Grapes	100%	793	0%
Lettuce/Leafy Greens	94%	495	2%
Melons, Squash and Cucumbers	89%	66	7%
Miscellaneous Deciduous	95%	23	8%
Miscellaneous Field Crops	98%	45	8%
Miscellaneous Grain and Hay	98%	246	3%
Miscellaneous Grasses	92%	208	4%
Miscellaneous Truck Crops	96%	192	3%
Mixed Pasture	95%	317	2%
Olives	100%	46	0%
Onions and Garlic	91%	53	7%
Peaches/Nectarines	97%	98	5%
Pears	100%	15	0%
Peppers	91%	30	9%
Pistachios	100%	238	0%
Plums, Prunes and Apricots	97%	107	3%
Pomegranates	100%	18	10%
Potatoes or Sweet Potatoes	93%	53	5%
Rice	100%	492	0%
Safflower	93%	32	7%
Strawberries	99%	186	1%
Sunflowers	100%	53	0%
Tomatoes	99%	214	2%
Unclassified Fallow	97%	496	2%
Walnuts	100%	561	0%

Table 13. Statewide Land Use Mapping Validation Data Error Matrix by DWR Class Legend Level (count)

		Predicted									Reference Total	Ommission Error	Producers Accuracy	Kappa Coefficient
		Citrus and Subtropical	Deciduous Fruits and Nuts	Field Crops	Grain and Hay Crops	Pasture	Rice	Truck, Nursery and Berry Crops	Unclassified Fallow	Vineyard				
Reference	Citrus and Subtropical	873	0	0	0	0	0	1	3	0	877	0%	100%	
	Deciduous Fruits and Nuts	0	2,798	0	0	0	0	0	0	1	2,799	0%	100%	
	Field Crops	0	0	1,154	0	6	1	13	1	0	1,175	2%	98%	
	Grain and Hay Crops	0	0	1	230	3	0	8	4	0	246	7%	93%	
	Pasture	0	0	3	7	1,383	0	1	9	0	1,403	1%	99%	
	Rice	0	0	1	0	0	491	0	0	0	492	0%	100%	
	Truck, Nursery and Berry Crops	1	1	9	4	2	0	1,864	6	0	1,887	1%	99%	
	Unclassified Fallow	0	1	0	0	0	0	1	494	0	496	0%	100%	
	Vineyard	0	0	0	0	1	0	1	1	790	793	0%	100%	
	Predicted Total	874	2,800	1,168	241	1,395	492	1,889	518	791	10,168			
	Commission Error	0%	0%	1%	5%	1%	0%	1%	5%	0%				
	Users Accuracy	100%	100%	99%	95%	99%	100%	99%	95%	100%				
	Kappa Coefficient													0.99

Table 14. Statewide Land Use Mapping Validation Data Error Matrix by Subclass Legend Level (count)

Reference \ Predicted	Alfalfa and Alfalfa Mixtures	Almonds	Avocados	Beans (Dry)	Bush Berries	Carrots	Cherries	Citrus	Cole Crops	Corn, Sorghum and Sudan	Cotton	Dates	Flowers, Nursery and Christmas Tree Farms	Grapes	Lettuce/Leafy Greens	Melons, Squash and Cucumbers	Miscellaneous Deciduous	Miscellaneous Field Crops	Miscellaneous Grain and Hay	Miscellaneous Grasses	Miscellaneous Truck Crops	Mixed Pasture	Olives	Onions and Garlic	Peaches/Nectarines	Pears	Peppers	Pistachios	Plums, Prunes and Apricots	Pomegranates	Potatoes or Sweet Potatoes	Rice	Safflower	Strawberries	Sunflowers	Tomatoes	Unclassified Fallow	Walnuts	Reference Total	Ommission Error	Producers Error
Alfalfa and Alfalfa Mixtures	861	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	2	3	8	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	878	2%	98%
Almonds	0	1,660	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1,663	0%	100%
Avocados	0	0	441	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	445	1%	99%
Beans (Dry)	0	0	0	34	0	0	0	0	0	2	0	0	0	0	0	0	0	0	2	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	40	15%	85%
Bush Berries	0	0	0	0	71	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	74	4%	96%
Carrots	0	0	0	0	0	36	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	38	5%	95%
Cherries	0	0	0	0	0	0	67	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	67	0%	100%
Citrus	0	0	5	0	0	0	0	296	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	303	2%	98%
Cole Crops	0	0	0	0	0	3	0	0	399	1	0	0	0	0	19	0	0	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	426	6%	94%
Corn, Sorghum and Sudan	2	0	0	0	0	0	0	0	0	834	0	0	0	1	0	0	0	0	3	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	2	0	0	846	1%	99%
Cotton	0	0	0	0	0	0	0	0	0	1	158	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	159	1%	99%
Dates	0	0	0	0	0	0	0	0	0	0	0	79	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	79	0%	100%
Flowers, Nursery and Christmas Tree Farms	0	0	0	0	1	0	0	0	0	0	0	0	56	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	60	7%	93%
Grapes	0	0	0	0	1	0	0	0	0	0	0	0	0	790	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	793	0%	100%
Lettuce/Leafy Greens	0	0	0	0	0	0	0	8	0	0	0	0	0	0	485	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	495	2%	98%
Melons, Squash and Cucumbers	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	65	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	66	2%	98%
Miscellaneous Deciduous	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	23	0%	100%
Miscellaneous Field Crops	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	43	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	45	4%	96%
Miscellaneous Grain and Hay	0	0	0	0	0	1	0	0	2	1	0	0	0	0	0	0	3	0	230	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	246	7%	93%
Miscellaneous Grasses	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	196	0	2	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	208	6%	94%
Miscellaneous Truck Crops	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	1	187	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	192	3%	97%
Mixed Pasture	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	11	0	295	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	0	317	7%	93%
Olives	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	46	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	46	0%	100%
Onions and Garlic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	49	0	0	0	0	0	1	0	0	0	0	0	0	2	0	53	8%	92%
Peaches/Nectarines	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	94	0	0	0	1	0	0	0	0	0	0	0	0	1	98	4%	96%
Pears	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	0	0	0	0	0	0	0	0	0	0	0	0	15	0%	100%
Peppers	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	28	0	0	0	0	0	0	0	0	0	0	0	30	7%	93%
Pistachios	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	236	1	0	0	0	0	0	0	0	0	0	238	1%	99%
Plums, Prunes and Apricots	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	101	0	0	0	0	0	0	0	0	1	107	6%	94%
Pomegranates	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18	0	0	0	0	0	0	0	0	18	0%	100%
Potatoes or Sweet Potatoes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	52	0	0	0	0	0	0	0	53	2%	98%
Rice	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	491	0	0	0	0	0	0	492	0%	100%
Safflower	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	29	0	0	1	0	0	32	9%	91%
Strawberries	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	185	0	0	0	0	186	1%	99%
Sunflowers	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	52	0	0	0	53	2%	98%
Tomatoes	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	204	0	0	214	5%	95%
Unclassified Fallow	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	494	0	496	0%	100%
Walnuts	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	558	561	1%	99%
Predicted Total	871	1,665	446	39	73	40	68	299	411	842	158	79	59	791	510	71	24	47	241	222	195	302	46	53	100	15	30	236	104	19	54	492	30	186	52	207	518	560	10,155		
Commission Error	1%	0%	1%	13%	3%	10%	1%	1%	3%	1%	0%	0%	5%	0%	5%	8%	4%	9%	5%	12%	4%	2%	0%	8%	6%	0%	7%	0%	3%	5%	4%	0%	3%	1%	0%	1%	5%	0%			
Users Accuracy	99%	100%	99%	87%	97%	90%	99%	99%	97%	99%	100%	100%	95%	100%	95%	92%	96%	91%	95%	88%	96%	98%	100%	92%	94%	100%	93%	100%	97%	95%	96%	100%	97%	99%	100%	99%	95%	100%			
Kappa Coefficient																																									0.98

Table 15. Central Coast Hydrologic Region Land Use Mapping Validation Data Error Matrix by Subclass Legend Level (count)

		Predicted										Reference Total	Omisison Error	Producers Accuracy	Kappa Coefficient
		Avocados	Bush Berries	Cole Crops	Flowers, Nursery and Christmas Tree Farms	Grapes	Lettuce/Leafy Greens	Miscellaneous Grain and Hay	Miscellaneous Truck Crops	Strawberries	Unclassified Fallow				
Reference	Avocados	37	0	0	0	0	0	0	0	0	0	37	0%	100%	
	Bush Berries	0	31	0	1	0	0	1	0	0	1	34	9%	91%	
	Cole Crops	0	0	324	0	0	14	2	0	1	0	341	5%	95%	
	Flowers, Nursery and Christmas Tree Farms	0	0	0	18	0	1	0	0	0	1	20	10%	90%	
	Grapes	0	1	0	0	176	0	0	0	0	1	179	2%	98%	
	Lettuce/Leafy Greens	0	0	7	0	0	366	0	0	0	0	373	2%	98%	
	Miscellaneous Grain and Hay	0	0	2	0	0	3	38	2	0	1	48	21%	79%	
	Miscellaneous Truck Crops	0	0	0	0	0	0	0	100	0	1	101	1%	99%	
	Strawberries	0	0	0	0	0	0	0	0	129	0	129	0%	100%	
	Unclassified Fallow	0	0	0	1	0	0	0	0	0	29	30	3%	97%	
Predicted Total		37	32	333	20	176	384	41	102	130	34	1,292			
Commision Error		0%	3%	3%	10%	0%	5%	7%	2%	1%	15%				
Users Accuracy		100%	97%	97%	90%	100%	95%	93%	98%	99%	85%				
Kappa Coefficient															0.96

Table 16. Colorado River Hydrologic Region Land Use Mapping Validation Data Error Matrix by Subclass Legend Level (count)

Reference \ Predicted	Alfalfa and Alfalfa Mixtures	Carrots	Citrus	Cole Crops	Corn, Sorghum and Sudan	Cotton	Dates	Grapes	Lettuce/Leafy Greens	Melons, Squash and Cucumbers	Miscellaneous Field Crops	Miscellaneous Grain and Hay	Miscellaneous Grasses	Miscellaneous Truck Crops	Onions and Garlic	Unclassified Fallow	Reference Total	Ommission Error	Producers Accuracy	Kappa Coefficient
Alfalfa and Alfalfa Mixtures	377	0	0	0	0	0	0	0	0	0	0	0	8	0	0	0	385	2%	98%	
Carrots	0	30	0	1	0	0	0	0	1	0	0	0	0	0	0	0	32	6%	94%	
Citrus	0	0	36	0	0	0	0	0	0	0	0	0	0	0	0	0	36	0%	100%	
Cole Crops	0	3	0	55	0	0	0	0	5	0	0	0	1	0	0	0	64	14%	86%	
Corn, Sorghum and Sudan	0	0	0	0	55	0	0	0	0	0	0	0	2	1	2	0	60	8%	92%	
Cotton	0	0	0	0	0	16	0	0	0	0	0	0	0	0	0	0	16	0%	100%	
Dates	0	0	0	0	0	0	79	0	0	0	0	0	0	0	0	0	79	0%	100%	
Grapes	0	0	0	0	0	0	0	29	0	0	0	0	0	0	0	0	29	0%	100%	
Lettuce/Leafy Greens	0	0	0	1	0	0	0	0	117	0	0	0	0	0	1	1	120	3%	98%	
Melons, Squash and Cucumbers	0	0	0	0	0	0	0	0	0	11	0	0	0	0	0	0	11	0%	100%	
Miscellaneous Field Crops	0	0	0	0	0	0	0	0	0	0	38	0	0	1	0	0	39	3%	97%	
Miscellaneous Grain and Hay	0	0	0	0	0	0	0	0	0	0	0	29	0	0	0	0	29	0%	100%	
Miscellaneous Grasses	2	0	0	0	0	0	0	0	0	0	0	0	161	0	0	1	164	2%	98%	
Miscellaneous Truck Crops	1	0	0	0	0	0	0	0	0	0	1	1	0	21	0	0	24	13%	88%	
Onions and Garlic	0	0	0	0	0	0	0	0	0	0	1	0	0	0	20	0	21	5%	95%	
Unclassified Fallow	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	79	79	0%	100%	
Predicted Total	380	33	36	57	55	16	79	29	123	11	40	30	172	23	23	81	1,188			
Commission Error	1%	9%	0%	4%	0%	0%	0%	0%	5%	0%	5%	3%	6%	9%	13%	2%				
Users Accuracy	99%	91%	100%	96%	100%	100%	100%	100%	95%	100%	95%	97%	94%	91%	87%	98%				
Kappa Coefficient																				0.97

Table 17. North Coast Hydrologic Region Land Use Mapping Validation Data Error Matrix by Subclass Legend Level (count)

		Alfalfa and Alfalfa Mixtures	Grapes	Miscellaneous Grain and Hay	Miscellaneous Grasses	Mixed Pasture	Unclassified Fallow	Reference Total	Omission Error	Producers Accuracy	Kappa Coefficient
Reference	Alfalfa and Alfalfa Mixtures	83	0	0	0	1	0	84	1%	99%	
	Grapes	0	100	0	0	0	0	100	0%	100%	
	Miscellaneous Grain and Hay	0	0	32	0	0	1	33	3%	97%	
	Miscellaneous Grasses	2	0	0	6	1	0	10	40%	60%	
	Mixed Pasture	0	0	1	0	31	1	33	6%	94%	
	Unclassified Fallow	0	0	0	0	0	17	17	0%	100%	
	Predicted Total	85	100	33	6	33	19	277			
	Comission Error	2%	0%	3%	0%	6%	11%				
	Users Accuracy	98%	100%	97%	100%	94%	89%				
	Kappa Coefficient										0.96

Table 18. Sacramento River Hydrologic Region Land Use Mapping Validation Data Error Matrix by Subclass Legend Level (count)

Reference \ Predicted	Alfalfa and Alfalfa Mixtures	Almonds	Beans (Dry)	Corn, Sorghum and Sudan	Grapes	Melons, Squash and Cucumbers	Miscellaneous Deciduous	Miscellaneous Grain and Hay	Miscellaneous Grasses	Mixed Pasture	Olives	Peaches/Nectarines	Pears	Pistachios	Plums, Prunes and Apricots	Rice	Safflower	Sunflowers	Tomatoes	Unclassified Fallow	Walnuts	Reference Total	Omission Error	Producers Accuracy	Kappa Coefficient
Alfalfa and Alfalfa Mixtures	102	0	0	0	0	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	108	6%	94%	
Almonds	0	336	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	337	0%	100%	
Beans (Dry)	0	0	9	2	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	12	25%	75%	
Corn, Sorghum and Sudan	1	0	0	71	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	74	4%	96%	
Grapes	0	0	0	0	69	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	69	0%	100%	
Melons, Squash and Cucumbers	0	0	0	0	0	16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16	0%	100%	
Miscellaneous Deciduous	0	0	0	0	0	0	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	0%	100%	
Miscellaneous Grain and Hay	0	0	0	0	0	0	0	40	0	1	0	0	0	0	0	0	0	0	0	1	0	42	5%	95%	
Miscellaneous Grasses	3	0	0	0	0	0	0	0	12	1	0	0	0	0	0	0	0	0	0	0	0	16	25%	75%	
Mixed Pasture	0	0	0	0	0	0	0	1	9	113	0	0	0	0	0	0	0	0	0	5	0	128	12%	88%	
Olives	0	0	0	0	0	0	0	0	0	0	26	0	0	0	0	0	0	0	0	0	0	26	0%	100%	
Peaches/Nectarines	0	0	0	0	0	0	0	0	0	0	0	29	0	0	0	0	0	0	0	0	1	30	3%	97%	
Pears	0	0	0	0	0	0	0	0	0	0	0	0	15	0	0	0	0	0	0	0	0	15	0%	100%	
Pistachios	0	1	0	0	0	0	0	0	0	0	0	0	0	11	0	0	0	0	0	0	0	12	8%	92%	
Plums, Prunes and Apricots	0	0	0	0	0	0	0	0	0	0	0	0	0	0	68	0	0	0	0	0	1	69	1%	99%	
Rice	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	481	0	0	0	0	0	482	0%	100%	
Safflower	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	16	0	1	0	0	19	16%	84%	
Sunflowers	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	50	0	0	0	51	2%	98%	
Tomatoes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	81	0	0	82	1%	99%	
Unclassified Fallow	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	87	0	87	0%	100%	
Walnuts	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	289	291	1%	99%	
Predicted Total	106	338	9	75	69	17	12	43	22	117	26	29	15	11	69	482	17	50	84	93	291	1,978			
Comission Error	4%	1%	0%	5%	0%	6%	0%	7%	45%	3%	0%	0%	0%	0%	1%	0%	6%	0%	4%	6%	1%				
Users Error	96%	99%	100%	95%	100%	94%	100%	93%	55%	97%	100%	100%	100%	100%	99%	100%	94%	100%	96%	94%	99%				
Kappa Coefficient																									0.97

Table 19. San Joaquin River Hydrologic Region Land Use Mapping Validation Data Error Matrix by Subclass Legend Level (count)

Reference \ Predicted	Alfalfa and Alfalfa Mixtures	Almonds	Beans (Dry)	Cherries	Corn, Sorghum and Sudan	Cotton	Grapes	Melons, Squash and Cucumbers	Miscellaneous Grain and Hay	Miscellaneous Grasses	Mixed Pasture	Olives	Peaches/Nectarines	Pistachios	Plums, Prunes and Apricots	Potatoes or Sweet Potatoes	Rice	Tomatoes	Unclassified Fallow	Walnuts	Reference Total	Omission Error	Producers Accuracy	Kappa Coefficient
Alfalfa and Alfalfa Mixtures	171	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	173	1%	99%	
Almonds	0	869	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	870	0%	100%	
Beans (Dry)	0	0	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18	0%	100%	
Cherries	0	0	0	46	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	46	0%	100%	
Corn, Sorghum and Sudan	0	0	0	0	367	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	367	0%	100%	
Cotton	0	0	0	0	0	86	0	0	0	0	0	0	0	0	0	0	0	0	0	0	86	0%	100%	
Grapes	0	0	0	0	0	0	178	0	0	0	0	0	0	0	0	0	0	0	0	0	178	0%	100%	
Melons, Squash and Cucumbers	0	0	0	0	0	0	0	27	0	0	0	0	0	0	0	0	0	0	0	0	27	0%	100%	
Miscellaneous Grain and Hay	0	0	0	0	0	0	0	0	41	1	0	0	0	0	0	0	0	0	0	0	42	2%	98%	
Miscellaneous Grasses	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	10	0%	100%	
Mixed Pasture	0	0	0	0	0	0	0	0	1	1	121	0	0	0	0	0	0	0	0	0	123	2%	98%	
Olives	0	0	0	0	0	0	0	0	0	0	0	11	0	0	0	0	0	0	0	0	11	0%	100%	
Peaches/Nectarines	0	0	0	0	0	0	0	0	0	0	0	0	16	0	0	0	0	0	0	0	16	0%	100%	
Pistachios	0	0	0	0	0	0	0	0	0	0	0	0	0	35	0	0	0	0	0	0	35	0%	100%	
Plums, Prunes and Apricots	0	0	0	0	0	0	0	0	0	0	0	0	2	0	8	0	0	0	0	0	10	20%	80%	
Potatoes or Sweet Potatoes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	42	0	0	0	0	42	0%	100%	
Rice	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	10	0%	100%	
Tomatoes	0	0	4	0	0	0	0	1	0	0	0	0	0	0	0	0	0	77	0	0	82	6%	94%	
Unclassified Fallow	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	79	0	80	1%	99%	
Walnuts	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	163	164	1%	99%	
Predicted Total	171	870	22	47	368	86	178	28	43	12	121	11	19	35	8	42	10	77	79	163	2,390			
Comission Error	0%	0%	18%	2%	0%	0%	0%	4%	5%	17%	0%	0%	16%	0%	0%	0%	0%	0%	0%	0%				
Users Accuracy	100%	100%	82%	98%	100%	100%	100%	96%	95%	83%	100%	100%	84%	100%	100%	100%	100%	100%	100%	100%				
Kappa Coefficient																								0.99

Table 20. South Coast Hydrologic Region Land Use Mapping Validation Data Error Matrix by Subclass Legend Level (count)

Reference \ Predicted	Avocados	Bush Berries	Citrus	Cole Crops	Flowers, Nursery and Christmas Tree Farms	Miscellaneous Grain and Hay	Miscellaneous Truck Crops	Strawberries	Unclassified Fallow	Reference Total	Omission Error	Producers Accuracy	Kappa Coefficient
Avocados	404	0	2	0	0	0	0	0	2	408	1%	99%	
Bush Berries	0	34	0	0	0	0	0	0	0	34	0%	100%	
Citrus	5	0	196	0	0	0	1	0	1	203	3%	97%	
Cole Crops	0	0	0	20	0	0	0	0	0	20	0%	100%	
Flowers, Nursery and Christmas Tree Farms	0	1	0	0	24	0	0	0	0	25	4%	96%	
Miscellaneous Grain and Hay	0	0	0	0	0	9	0	0	1	10	10%	90%	
Miscellaneous Truck Crops	0	0	1	0	0	0	56	0	0	57	2%	98%	
Strawberries	0	0	0	0	0	0	0	48	0	48	0%	100%	
Unclassified Fallow	0	0	0	0	0	0	0	0	36	36	0%	100%	
Predicted Total	409	35	199	20	24	9	57	48	40	841			
Comission Error	1%	3%	2%	0%	0%	0%	2%	0%	10%				
Users Accuracy	99%	97%	98%	100%	100%	100%	98%	100%	90%				
Kappa Coefficient													0.98

Table 21. Tulare Lake Hydrologic Region Land Use Mapping Validation Data Error Matrix by Subclass Legend Level (count)

	Alfalfa and Alfalfa Mixtures	Almonds	Citrus	Corn, Sorghum and Sudan	Cotton	Grapes	Miscellaneous Grain and Hay	Mixed Pasture	Onions and Garlic	Peaches/Nectarines	Pistachios	Plums, Prunes and Apricots	Pomegranates	Tomatoes	Unclassified Fallow	Walnuts	Reference Total	Omission Error	Producers Accuracy	Kappa Coefficient
Alfalfa and Alfalfa Mixtures	127	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	127	0%	100%	
Almonds	0	455	0	0	0	1	0	0	0	0	0	0	0	0	0	0	456	0%	100%	
Citrus	0	0	47	0	0	0	0	0	0	0	0	0	0	0	0	0	47	0%	100%	
Corn, Sorghum and Sudan	0	0	0	337	0	0	0	0	0	0	0	0	0	0	0	0	339	1%	99%	
Cotton	0	0	0	0	55	0	0	0	0	0	0	0	0	0	0	0	55	0%	100%	
Grapes	0	0	0	0	0	235	0	0	0	0	0	0	0	0	0	0	235	0%	100%	
Miscellaneous Grain and Hay	0	0	0	1	0	0	41	0	0	0	0	0	0	0	0	0	42	2%	98%	
Mixed Pasture	0	0	0	0	0	0	0	16	0	0	0	0	0	0	1	0	17	6%	94%	
Onions and Garlic	0	0	0	0	0	0	0	0	14	0	0	0	0	0	2	0	17	18%	82%	
Peaches/Nectarines	0	2	0	0	0	0	0	0	0	49	0	1	0	0	0	0	52	6%	94%	
Pistachios	0	0	0	0	0	0	0	0	0	0	188	1	0	0	0	0	189	1%	99%	
Plums, Prunes and Apricots	0	0	0	0	0	0	0	0	0	3	0	22	0	0	0	0	25	12%	88%	
Pomegranates	0	0	0	0	0	0	0	0	0	0	0	0	11	0	0	0	11	0%	100%	
Tomatoes	0	0	0	0	0	0	0	0	0	0	0	0	0	40	0	0	43	7%	93%	
Unclassified Fallow	0	0	0	0	0	0	0	0	0	0	0	0	0	0	167	0	167	0%	100%	
Walnuts	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	99	99	0%	100%	
Predicted Total	127	457	47	338	55	236	41	16	14	52	188	24	11	40	170	99	1,921			
Comission Error	0%	0%	0%	0%	0%	0%	0%	0%	0%	6%	0%	8%	0%	0%	2%	0%				
Users Accuracy	100%	100%	100%	100%	100%	100%	100%	100%	100%	94%	100%	92%	100%	100%	98%	100%				
Kappa Coefficient																				0.99

ACCURACY ASSESSMENT BY AREA (ACRES)

WEIGHTED ACCURACY BY CROP CLASS

Table 22. WY 2020 Statewide Land Use Mapping Weighted Accuracy by DWR Crop Class Legend Level

DWR Crop Class	Ground Truth Area	Classified Area	Weight	Unweighted Accuracy	Weighted Accuracy
Citrus and Subtropical	10,364	10,354	4.4%	99.9%	4.4%
Deciduous Fruits and Nuts	113,389	113,370	26.6%	100.0%	26.6%
Field Crops	60,990	59,766	9.6%	98.0%	9.4%
Grain and Hay	12,596	11,951	10.2%	94.9%	9.6%
Pasture	69,098	68,619	13.3%	99.3%	13.2%
Rice	28,806	28,753	5.2%	99.8%	5.2%
Truck, Nursery and Berry Crops	51,986	51,208	12.1%	98.5%	11.9%
Unclassified	24,031	24,018	11.4%	99.9%	11.4%
Vineyard	21,520	21,451	7.3%	99.7%	7.3%
Total Weighted Accuracy Statewide					**99.0%**

Table 23. WY 2020 Statewide Land Use Mapping Weighted Accuracy by Subclass Legend Level

Crop Subclass	Ground Truth Area	Classified Area	Weight	Unweighted Accuracy	Weighted Accuracy
Alfalfa and Alfalfa Mixtures	47,989	48,648	6.2%	98.6%	6.1%
Almonds	71,743	71,770	15.1%	100.0%	15.1%
Apples	2,877	2,896	0.5%	99.3%	0.5%
Avocados	1,869	2,256	0.3%	82.8%	0.3%
Beans (Dry)	709	728	0.2%	97.3%	0.2%
Bush Berries	1,728	1,830	0.5%	94.4%	0.5%
Carrots	1,203	1,203	0.4%	100.0%	0.4%
Cherries	4,675	4,713	3.1%	99.2%	3.0%
Citrus	9,200	10,087	1.8%	91.2%	1.6%
Cole Crops	38,542	39,208	6.3%	98.3%	6.2%
Corn, Sorghum and Sudan	10,892	10,998	1.8%	99.0%	1.8%
Cotton	1,130	1,130	0.1%	100.0%	0.1%
Dates	485	557	0.3%	87.1%	0.3%
Flowers, Nursery and Christmas Tree Farms	21,451	21,520	7.3%	99.7%	7.3%
Grapes	12,691	13,051	2.9%	97.2%	2.8%
Lettuce/Leafy Greens	2,969	2,995	0.6%	99.1%	0.6%

Crop Subclass	Ground Truth Area	Classified Area	Weight	Unweighted Accuracy	Weighted Accuracy
Melons, Squash and Cucumbers	445	445	0.2%	100.0%	0.2%
Miscellaneous Deciduous	3,251	3,302	0.4%	98.5%	0.4%
Miscellaneous Field Crops	11,951	12,596	10.2%	94.9%	9.7%
Miscellaneous Grain and Hay	11,697	12,252	1.9%	95.5%	1.8%
Miscellaneous Grasses	3,809	3,866	1.6%	98.5%	1.6%
Miscellaneous Truck Crops	7,719	8,197	5.3%	94.2%	5.0%
Mixed Pasture	1,587	1,587	0.5%	100.0%	0.5%
Olives	3,081	3,340	0.7%	92.2%	0.6%
Onions and Garlic	1,676	1,755	0.7%	95.5%	0.6%
Peaches/Nectarines	319	319	0.1%	100.0%	0.1%
Pears	700	729	0.1%	96.0%	0.1%
Peppers	16,232	16,337	4.9%	99.4%	4.9%
Pistachios	2,402	2,443	0.7%	98.4%	0.7%
Plums, Prunes and Apricots	627	627	0.2%	100.0%	0.2%
Pomegranates	1,628	1,691	0.5%	96.3%	0.5%
Potatoes or Sweet Potatoes	28,753	28,806	5.2%	99.8%	5.2%
Rice	1,975	2,052	0.4%	96.2%	0.4%
Safflower	2,087	2,160	0.5%	96.6%	0.5%
Strawberries	3,035	3,174	0.5%	95.6%	0.4%
Sunflowers	10,413	10,953	2.3%	95.1%	2.2%
Tomatoes	24,018	24,031	11.4%	99.9%	11.4%
Unclassified Fallow	18,328	18,353	4.3%	99.9%	4.3%
Walnuts	47,989	48,648	6.2%	98.6%	6.1%
Total Weighted Accuracy Statewide				**98.3%**	**98.1%**

Table 24. WY 2020 Central Coast Hydrologic Region Land Use Mapping Acreage Weighted Accuracy by Subclass Legend Level

Crop Subclass	Ground Truth Area	Classified Area	Weight	Unweighted Accuracy	Weighted Accuracy
Avocados	513	513	1.6%	100.1%	1.6%
Bush Berries	228	209	0.9%	91.5%	0.8%
Cole Crops	6,969	6,602	18.6%	94.7%	17.6%
Flowers, Nursery and Christmas Tree Farms	202	153	0.9%	75.9%	0.7%
Grapes	4,268	4,198	16.6%	98.4%	16.3%

Crop Subclass	Ground Truth Area	Classified Area	Weight	Unweighted Accuracy	Weighted Accuracy
Lettuce/Leafy Greens	8,012	7,885	27.9%	98.4%	27.5%
Miscellaneous Grain and Hay	1,032	804	7.9%	77.9%	6.1%
Miscellaneous Truck Crops	1,802	1,795	9.8%	99.6%	9.7%
Strawberries	954	954	4.8%	100.0%	4.8%
Unclassified Fallow	620	611	11.1%	98.6%	11.0%
Total Weighted Accuracy					**97.0%**

Table 25. WY 2020 Colorado River Hydrologic Region Land Use Mapping Acreage Weighted Accuracy by Subclass Legend Level

Crop Subclass	Ground Truth Area	Classified Area	Weight	Unweighted Accuracy	Weighted Accuracy
Alfalfa and Alfalfa Mixtures	23,201	22,792	27.9%	98.2%	27.4%
Carrots	1,516	1,414	2.7%	93.3%	2.5%
Citrus	967	967	2.6%	100.0%	2.6%
Cole Crops	2,609	2,106	3.6%	80.7%	2.9%
Corn, Sorghum and Sudan	3,923	3,710	8.3%	94.6%	7.9%
Cotton	878	878	1.1%	100.0%	1.1%
Dates	1,130	1,130	1.9%	100.0%	1.9%
Grapes	486	486	1.0%	100.0%	1.0%
Lettuce/Leafy Greens	5,016	4,783	9.3%	95.3%	8.9%
Melons, Squash and Cucumbers	526	526	1.2%	100.1%	1.2%
Miscellaneous Field Crops	2,961	2,946	3.7%	99.5%	3.7%
Miscellaneous Grain and Hay	1,886	1,886	3.6%	100.0%	3.6%
Miscellaneous Grasses	10,581	10,472	15.2%	99.0%	15.0%
Miscellaneous Truck Crops	582	543	1.6%	93.2%	1.4%
Onions and Garlic	1,263	1,227	2.3%	97.1%	2.2%
Unclassified Fallow	2,877	2,877	14.1%	100.0%	14.1%
Total Weighted Accuracy					**97.0%**

Table 26. WY 2020 North Coast Hydrologic Region Land Use Mapping Acreage Weighted Accuracy by Subclass Legend Level

Crop Subclass	Ground Truth Area	Classified Area	Weight	Unweighted Accuracy	Weighted Accuracy
Alfalfa and Alfalfa Mixtures	5,552	5,525	15.8%	99.5%	15.7%
Grapes	755	755	16.4%	100.0%	16.5%
Miscellaneous Grain and Hay	1,975	1,919	16.3%	97.2%	15.8%
Mixed Pasture	333	210	6.0%	63.0%	3.8%
Unclassified Fallow	1,362	1,346	35.4%	98.8%	35.0%
Total Weighted Accuracy					**86.8%**

Table 27. WY 2020 Sacramento River Hydrologic Region Land Use Acreage Weighted Mapping Accuracy by Subclass Legend Level

Crop Subclass	Ground Truth Area	Classified Area	Weight	Unweighted Accuracy	Weighted Accuracy
Alfalfa and Alfalfa Mixtures	4,918	4,772	4.7%	97.0%	4.6%
Almonds	15,831	15,829	12.1%	100.0%	12.1%
Beans (Dry)	477	322	0.6%	67.6%	0.4%
Corn, Sorghum and Sudan	3,792	3,608	2.8%	95.2%	2.6%
Grapes	2,453	2,453	2.6%	100.0%	2.6%
Melons, Squash and Cucumbers	589	589	0.7%	100.1%	0.7%
Miscellaneous Deciduous	218	218	0.2%	99.8%	0.2%
Miscellaneous Grain and Hay	2,455	2,172	8.7%	88.5%	7.7%
Miscellaneous Grasses	817	520	1.8%	63.6%	1.2%
Mixed Pasture	4,050	3,713	12.3%	91.7%	11.3%
Olives	703	703	1.2%	100.0%	1.2%
Peaches/Nectarines	570	557	0.5%	97.7%	0.5%
Pears	319	319	0.3%	100.1%	0.3%
Pistachios	553	497	0.6%	89.8%	0.5%
Plums, Prunes and Apricots	1,796	1,795	1.9%	100.0%	1.9%

Crop Subclass	Ground Truth Area	Classified Area	Weight	Unweighted Accuracy	Weighted Accuracy
Rice	28,393	28,340	23.6%	99.8%	23.5%
Safflower	784	706	0.8%	90.1%	0.7%
Sunflowers	3,055	2,916	2.0%	95.5%	1.9%
Tomatoes	4,551	4,407	3.1%	96.8%	3.0%
Unclassified Fallow	4,129	4,129	8.4%	100.0%	8.4%
Walnuts	10,564	10,540	11.0%	99.8%	11.0%
Total Weighted Accuracy					**96.3%**

Table 28. WY 2020 San Joaquin River Hydrologic Region Land Use Mapping Acreage Weighted Accuracy by Subclass Legend Level

Crop Subclass	Ground Truth Area	Classified Area	Weight	Unweighted Accuracy	Weighted Accuracy
Alfalfa and Alfalfa Mixtures	6,929	6,851	5.9%	98.9%	5.8%
Almonds	30,932	30,927	29.0%	100.0%	29.0%
Beans (Dry)	1,248	1,248	0.5%	100.0%	0.5%
Cherries	860	860	1.1%	100.0%	1.1%
Corn, Sorghum and Sudan	13,362	13,362	11.4%	100.0%	11.4%
Cotton	3,583	3,583	2.2%	100.0%	2.2%
Grapes	5,608	5,608	8.8%	100.0%	8.8%
Melons, Squash and Cucumbers	1,235	1,235	0.9%	100.0%	0.9%
Miscellaneous Grain and Hay	1,510	1,460	14.1%	96.7%	13.6%
Miscellaneous Grasses	341	341	0.7%	100.0%	0.7%
Mixed Pasture	2,362	2,340	3.8%	99.1%	3.8%
Olives	395	395	0.3%	100.0%	0.3%
Peaches/Nectarines	180	180	0.4%	100.2%	0.4%
Pistachios	1,728	1,728	4.1%	100.0%	4.1%
Plums, Prunes and Apricots	182	171	0.3%	93.8%	0.2%
Potatoes or Sweet Potatoes	1,078	1,078	0.8%	100.0%	0.8%

Crop Subclass	Ground Truth Area	Classified Area	Weight	Unweighted Accuracy	Weighted Accuracy
Rice	413	413	0.4%	100.0%	0.4%
Tomatoes	3,789	3,637	2.9%	96.0%	2.8%
Unclassified Fallow	2,521	2,516	6.9%	99.8%	6.9%
Walnuts	4,626	4,625	5.5%	100.0%	5.5%
Total Weighted Accuracy					**99.2%**

Table 29. WY 2020 South Coast Hydrologic Region Land Use Mapping Acreage Weighted Accuracy by Subclass Legend Level

Crop Subclass	Ground Truth Area	Classified Area	Weight	Unweighted Accuracy	Weighted Accuracy
Avocados	2,383	2,363	20.4%	99.2%	20.2%
Bush Berries	398	398	2.9%	99.9%	2.9%
Citrus	2,033	1,996	19.0%	98.2%	18.7%
Cole Crops	492	492	2.8%	100.0%	2.8%
Flowers, Nursery and Christmas Tree Farms	153	153	5.7%	99.8%	5.7%
Miscellaneous Grain and Hay	191	186	10.5%	97.2%	10.2%
Miscellaneous Truck Crops	1,243	1,233	15.9%	99.2%	15.8%
Strawberries	699	699	4.9%	100.0%	4.9%
Unclassified Fallow	344	344	17.8%	100.1%	17.8%
Total Weighted Accuracy					**99.0%**

Table 30. WY 2020 Tulare Lake Hydrologic Region Land Use Mapping Acreage Weighted Accuracy by Subclass Legend Level

Crop	Ground Truth Area	Classified Area	Weight	Unweighted Accuracy	Weighted Accuracy
Alfalfa and Alfalfa Mixtures	8,048	8,048	3.9%	100.0%	3.9%
Almonds	25,006	24,987	18.7%	99.9%	18.7%
Citrus	1,337	1,337	7.3%	100.0%	7.3%

Crop	Ground Truth Area	Classified Area	Weight	Unweighted Accuracy	Weighted Accuracy
Corn, Sorghum and Sudan	17,930	17,812	8.0%	99.3%	8.0%
Cotton	6,379	6,379	3.7%	100.0%	3.7%
Grapes	7,938	7,938	8.6%	100.0%	8.6%
Miscellaneous Grain and Hay	3,545	3,524	10.9%	99.4%	10.9%
Mixed Pasture	279	183	0.5%	65.4%	0.3%
Onions and Garlic	1,463	1,240	1.2%	84.8%	1.0%
Peaches/Nectarines	1,005	939	1.5%	93.4%	1.4%
Pistachios	13,951	13,903	12.0%	99.7%	12.0%
Plums, Prunes and Apricots	440	411	0.7%	93.5%	0.7%
Pomegranates	478	478	0.5%	100.1%	0.5%
Tomatoes	2,490	2,288	2.9%	91.9%	2.7%
Unclassified Fallow	12,469	12,469	17.2%	100.0%	17.2%
Walnuts	2,961	2,961	2.2%	100.0%	2.2%
Total Weighted Accuracy					**99.1%**

PRECISION BY CROP

Table 311. Statewide Land Use Mapping Validation Data Error Matrix by DWR Class (acres)

		Predicted											
		Citrus and Subtropical	Deciduous Fruits and Nuts	Field Crops	Grain and Hay Crops	Pasture	Rice	Truck, Nursery and Berry Crops	Unclassified Fallow	Vineyard	Reference Total	Ommission Error	Producers Accuracy	Kappa Coefficient
Reference	Citrus and Subtropical	10,354	0	0	0	0	0	1	9	0	10,364	0%	100%	
	Deciduous Fruits and Nuts	0	113,370	0	0	0	0	0	0	19	113,389	0%	100%	
	Field Crops	0	0	59,766	0	348	69	772	36	0	60,990	2%	98%	
	Grain and Hay Crops	0	0	21	11,951	201	0	212	211	0	12,596	5%	95%	
	Pasture	0	0	77	147	68,619	0	57	198	0	69,098	1%	99%	
	Rice	0	0	53	0	0	28,753	0	0	0	28,806	0%	100%	
	Truck, Nursery and Berry Crops	10	23	398	77	78	0	51,208	192	0	51,986	1%	99%	
	Unclassified Fallow	0	5	0	0	0	0	9	24,018	0	24,031	0%	100%	
	Vineyard	0	0	0	0	7	0	0	62	21,451	21,520	0%	100%	
	Predicted Total	10,365	113,398	60,316	12,175	69,252	28,822	52,259	24,726	21,470	392,781			
	Commission Error	0%	0%	1%	2%	1%	0%	2%	3%	0%				
	Users Accuracy	100%	100%	99%	98%	99%	100%	98%	97%	100%				
	Kappa Coefficient													0.99

Table 32. Statewide Land Use Mapping Validation Data Error Matrix by Subclass Legend Level (acres)

Columns below are the **Predicted** classes; rows are the **Reference** classes.

Reference \ Predicted	Alfalfa and Alfalfa Mixtures	Almonds	Avocados	Beans (Dry)	Bush Berries	Carrots	Cherries	Citrus	Cole Crops	Corn, Sorghum and Sudan	Cotton	Dates	Flowers, Nursery and Christmas Tree Farms	Grapes	Lettuce/Leafy Greens	Melons, Squash and Cucumbers	Miscellaneous Deciduous	Miscellaneous Field Crops	Miscellaneous Grain and Hay	Miscellaneous Grasses	Miscellaneous Truck Crops	Mixed Pasture	Olives	Onions and Garlic	Peaches/Nectarines	Pears	Peppers	Pistachios	Plums, Prunes and Apricots	Pomegranates	Potatoes or Sweet Potatoes	Rice	Safflower	Strawberries	Sunflowers	Tomatoes	Unclassified Fallow	Walnuts	Reference Total	Ommission Error	Producers Error
Alfalfa and Alfalfa Mixtures	47,989	0	0	0	0	0	0	0	0	44	0	0	0	0	0	0	0	0	33	409	89	83	0	5	0	0	0	0	2	0	0	0	0	0	0	0	0	0	48,648	1.4%	98.6%
Almonds	0	71,743	0	0	0	0	0	0	0	0	0	0	0	19	0	0	0	0	0	0	0	0	0	5	0	0	0	0	2	0	0	0	0	0	0	0	0	0	71,770	0.0%	100.0%
Avocados	0	0	2,877	0	0	0	0	14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	2,896	0.7%	99.3%
Beans (Dry)	0	0	0	1,869	0	0	0	0	0	86	0	0	0	0	0	0	0	0	153	0	0	0	0	80	0	0	0	0	0	0	0	0	0	0	0	0	69	0	2,256	17.2%	82.8%
Bush Berries	0	0	0	0	709	0	0	0	0	0	0	0	0	4	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	0	728	2.6%	97.4%
Carrots	0	0	0	0	0	1,728	0	0	72	0	0	0	0	0	0	0	0	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,830	5.6%	94.4%
Cherries	0	0	0	0	0	0	1,203	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,203	0.0%	100.0%
Citrus	0	0	32	0	0	0	0	4,675	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	4,713	0.8%	99.2%
Cole Crops	0	0	0	0	0	211	0	0	9,200	0	0	0	0	0	530	0	0	0	0	0	0	0	0	40	0	0	0	0	0	0	0	0	0	0	0	16	0	0	10,087	8.8%	91.2%
Corn, Sorghum and Sudan	139	0	0	0	0	0	0	0	0	38,542	0	0	0	0	78	0	0	0	0	181	77	0	0	72	0	0	0	0	0	0	0	0	0	0	0	0	119	0	39,208	1.7%	98.3%
Cotton	0	0	0	0	0	0	0	0	0	106	10,892	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10,998	1.0%	99.0%
Dates	0	0	0	0	0	0	0	0	0	0	0	1,130	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,130	0.0%	100.0%
Flowers, Nursery and Christmas Tree Farms	0	0	0	0	1	0	0	0	0	0	0	0	485	0	35	0	23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13	0	557	12.9%	87.1%
Grapes	0	0	0	0	0	0	0	0	0	0	0	0	0	21,451	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	62	0	21,520	0.3%	99.7%
Lettuce/Leafy Greens	0	0	0	0	0	0	0	0	261	0	0	0	0	0	12,691	0	0	0	0	0	0	0	0	90	0	0	0	0	0	0	0	0	0	0	0	0	10	0	13,051	2.8%	97.2%
Melons, Squash and Cucumbers	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2,969	0	0	0	0	0	0	0	0	0	0	26	0	0	0	0	0	0	0	0	0	0	0	2,995	0.9%	99.1%
Miscellaneous Deciduous	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	445	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	445	0.0%	100.0%
Miscellaneous Field Crops	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3,251	0	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	36	0	3,302	1.5%	98.5%
Miscellaneous Grain and Hay	0	0	0	0	0	18	0	0	27	21	0	0	0	0	164	0	0	0	11,951	50	4	150	0	0	0	0	0	0	0	0	0	0	0	0	0	0	211	0	12,596	5.1%	94.9%
Miscellaneous Grasses	322	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25	11,697	0	144	0	0	0	0	0	0	57	0	0	0	0	0	0	0	7	0	12,252	4.5%	95.5%
Miscellaneous Truck Crops	5	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	3	32	3,809	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	3,866	1.5%	98.5%
Mixed Pasture	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	254	33	7,719	0	0	0	0	0	0	0	0	0	0	0	0	0	0	191	0	8,197	5.8%	94.2%
Olives	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,587	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,587	0.0%	100.0%
Onions and Garlic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	37	0	0	0	0	0	0	0	3,081	0	0	0	0	0	0	70	0	0	0	0	0	152	0	3,340	7.8%	92.2%
Peaches/Nectarines	0	52	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,676	0	0	0	14	0	0	0	0	0	0	0	0	13	1,755	4.5%	95.5%
Pears	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	319	0	0	0	0	0	0	0	0	0	0	0	0	319	0.0%	100.0%
Peppers	0	0	0	0	0	0	0	19	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	700	0	0	0	0	0	0	0	0	0	0	0	729	4.0%	96.0%
Pistachios	0	56	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16,232	48	0	0	0	0	0	0	0	0	0	16,337	0.6%	99.4%
Plums, Prunes and Apricots	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40	0	0	0	0	2,402	0	0	0	0	0	0	0	0	1	2,443	1.7%	98.3%
Pomegranates	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	627	0	0	0	0	0	0	0	0	627	0.0%	100.0%
Potatoes or Sweet Potatoes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	62	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,628	0	0	0	0	0	0	0	1,691	3.7%	96.3%
Rice	0	0	0	0	0	0	0	0	53	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	28,753	0	0	0	0	0	0	28,806	0.2%	99.8%
Safflower	0	0	0	0	0	0	0	0	0	11	0	0	0	0	0	0	0	0	0	0	0	0	0	28	0	0	0	0	0	0	0	0	1,975	0	0	39	0	0	2,052	3.8%	96.2%
Strawberries	0	0	0	0	0	0	0	0	0	0	0	0	74	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2,087	0	0	0	0	2,160	3.4%	96.6%
Sunflowers	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	139	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3,035	0	0	0	3,174	4.4%	95.6%
Tomatoes	0	0	0	199	0	0	0	0	0	0	0	0	0	0	0	154	0	0	0	0	0	0	0	0	0	43	0	0	0	0	0	143	0	0	0	10,413	0	0	10,953	4.9%	95.1%
Unclassified Fallow	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	24,018	0	24,031	0.1%	99.9%
Walnuts	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17	0	0	0	0	0	18,328	18,353	0.1%	99.9%
Predicted Total	48,455	71,859	2,909	2,068	709	1,957	1,208	4,700	9,578	38,879	10,892	1,130	572	21,470	13,527	3,335	468	3,324	12,175	12,700	3,987	8,097	1,587	3,395	1,721	319	768	16,232	2,481	629	1,755	28,822	2,118	2,103	3,035	10,570	24,726	18,342	392,605		
Commission Error	1%	0%	1%	10%	0%	12%	0%	1%	4%	1%	0%	0%	15%	0%	6%	11%	5%	2%	2%	8%	4%	5%	0%	9%	3%	0%	9%	0%	3%	0%	7%	0%	7%	1%	0%	1%	3%	0%			
Users Accuracy	99%	100%	99%	90%	100%	88%	100%	99%	96%	99%	100%	100%	85%	100%	94%	89%	95%	98%	98%	92%	96%	95%	100%	91%	97%	100%	91%	100%	97%	100%	93%	100%	93%	99%	100%	99%	97%	100%			
Kappa Coefficient																																									0.98

Table 33. Central Coast Hydrologic Region Land Use Mapping Validation Data Error Matrix by Subclass Legend Level (acres)

Reference	Avocados	Bush Berries	Cole Crops	Flowers, Nursery and Christmas Tree Farms	Grapes	Lettuce/Leafy Greens	Miscellaneous Grain and Hay	Miscellaneous Truck Crops	Strawberries	Unclassified Fallow	Reference Total	Omission Error	Producers Accuracy	Kappa Coefficient
Avocados	513	0	0	0	0	0	0	0	0	0	513	0%	100%	
Bush Berries	0	209	0	4	0	0	4	0	0	11	228	8%	92%	
Cole Crops	0	0	6,602	0	0	311	40	0	16	0	6,969	5%	95%	
Flowers, Nursery and Christmas Tree Farms	0	0	0	153	0	35	0	0	0	13	202	24%	76%	
Grapes	0	0	0	0	4,198	0	0	0	0	62	4,268	2%	98%	
Lettuce/Leafy Greens	0	0	127	0	0	7,885	0	0	0	0	8,012	2%	98%	
Miscellaneous Grain and Hay	0	0	27	0	0	164	804	4	0	5	1,032	22%	78%	
Miscellaneous Truck Crops	0	0	0	0	0	0	0	1,795	0	6	1,802	0%	100%	
Strawberries	0	0	0	0	0	0	0	0	954	0	954	0%	100%	
Unclassified Fallow	0	0	0	9	0	0	0	0	0	611	620	1%	99%	
Predicted Total	513	209	6,755	166	4,198	8,394	848	1,800	970	708	24,599			
Commision Error	0%	0%	2%	8%	0%	6%	5%	0%	2%	14%				
Users Accuracy	100%	100%	98%	92%	100%	94%	95%	100%	98%	86%				
Kappa Coefficient														0.96

(Column group header: Predicted)

Table 34. Colorado River Hydrologic Region Land Use Mapping Validation Data Error Matrix by Subclass Legend Level (acres)

	Predicted																Reference Total	Ommission Error	Producers Accuracy	Kappa Coefficient
Reference	Alfalfa and Alfalfa Mixtures	Carrots	Citrus	Cole Crops	Corn, Sorghum and Sudan	Cotton	Dates	Grapes	Lettuce/Leafy Greens	Melons, Squash and Cucumbers	Miscellaneous Field Crops	Miscellaneous Grain and Hay	Miscellaneous Grasses	Miscellaneous Truck Crops	Onions and Garlic	Unclassified Fallow				
Alfalfa and Alfalfa Mixtures	22,792	0	0	0	0	0	0	0	0	0	0	0	409	0	0	0	23,201	2%	98%	
Carrots	0	1,414	0	72	0	0	0	0	30	0	0	0	0	0	0	0	1,516	7%	93%	
Citrus	0	0	967	0	0	0	0	0	0	0	0	0	0	0	0	0	967	0%	100%	
Cole Crops	0	211	0	2,106	0	0	0	0	219	0	0	0	73	0	0	0	2,609	19%	81%	
Corn, Sorghum and Sudan	0	0	0	0	3,710	0	0	0	0	0	0	0	105	35	72	0	3,923	5%	95%	
Cotton	0	0	0	0	0	878	0	0	0	0	0	0	0	0	0	0	878	0%	100%	
Dates	0	0	0	0	0	0	1,130	0	0	0	0	0	0	0	0	0	1,130	0%	100%	
Grapes	0	0	0	0	0	0	0	486	0	0	0	0	0	0	0	0	486	0%	100%	
Lettuce/Leafy Greens	0	0	0	134	0	0	0	0	4,783	0	0	0	0	0	90	10	5,016	5%	95%	
Melons, Squash and Cucumbers	0	0	0	0	0	0	0	0	0	526	0	0	0	0	0	0	526	0%	100%	
Miscellaneous Field Crops	0	0	0	0	0	0	0	0	0	0	2,946	0	0	15	0	0	2,961	1%	99%	
Miscellaneous Grain and Hay	0	0	0	0	0	0	0	0	0	0	0	1,886	0	0	0	0	1,886	0%	100%	
Miscellaneous Grasses	102	0	0	0	0	0	0	0	0	0	0	0	10,472	0	0	7	10,581	1%	99%	
Miscellaneous Truck Crops	5	0	0	0	0	0	0	0	0	0	3	32	0	543	0	0	582	7%	93%	
Onions and Garlic	0	0	0	0	0	0	0	0	0	0	37	0	0	0	1,227	0	1,263	3%	97%	
Unclassified Fallow	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2,877	2,877	0%	100%	
Predicted Total	22,899	1,625	967	2,312	3,710	878	1,130	486	5,031	526	2,986	1,918	11,059	593	1,389	2,894	60,404			
Commission Error	0%	13%	0%	9%	0%	0%	0%	0%	5%	0%	1%	2%	5%	8%	12%	1%				
Users Accuracy	100%	87%	100%	91%	100%	100%	100%	100%	95%	100%	99%	98%	95%	92%	88%	99%				
Kappa Coefficient																				0.97

Table 35. North Coast Hydrologic Region Land Use Mapping Validation Data Error Matrix by Subclass Legend Level (acres)

		Predicted									
		Alfalfa and Alfalfa Mixtures	Grapes	Miscellaneous Grain and Hay	Miscellaneous Grasses	Mixed Pasture	Unclassified Fallow	Reference Total	Omission Error	Producers Accuracy	Kappa Coefficient
Reference	Alfalfa and Alfalfa Mixtures	5,525	0	0	0	27	0	5,552	0%	100%	
	Grapes	0	755	0	0	0	0	755	0%	100%	
	Miscellaneous Grain and Hay	0	0	1,919	0	0	56	1,975	3%	97%	
	Miscellaneous Grasses	56	0	0	210	10	0	333	37%	63%	
	Mixed Pasture	0	0	10	0	1,346	5	1,362	1%	99%	
	Unclassified Fallow	0	0	0	0	0	1,072	1,072	0%	100%	
	Predicted Total	5,581	755	1,929	210	1,383	1,133	11,048			
	Comission Error	1%	0%	1%	0%	3%	5%				
	Users Accuracy	99%	100%	99%	100%	97%	95%				
	Kappa Coefficient										0.96

Table 36. Sacramento River Hydrologic Region Land Use Mapping Validation Data Error Matrix by Subclass Legend Level (acres)

Reference \ Predicted	Alfalfa and Alfalfa Mixtures	Almonds	Beans (Dry)	Corn, Sorghum and Sudan	Grapes	Melons, Squash and Cucumbers	Miscellaneous Deciduous	Miscellaneous Grain and Hay	Miscellaneous Grasses	Mixed Pasture	Olives	Peaches/Nectarines	Pears	Pistachios	Plums, Prunes and Apricots	Rice	Safflower	Sunflowers	Tomatoes	Unclassified Fallow	Walnuts	Reference Total	Omission Error	Producers Accuracy	Kappa Coefficient
Alfalfa and Alfalfa Mixtures	4,772	0	0	0	0	0	0	56	0	57	0	0	0	0	0	0	0	0	0	0	0	4,918	3%	97%	
Almonds	0	15,829	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15,831	0%	100%	
Beans (Dry)	0	0	322	86	0	0	0	0	0	0	0	0	0	0	0	69	0	0	0	0	0	477	32%	68%	
Corn, Sorghum and Sudan	65	0	0	3,608	0	0	0	0	0	0	0	0	0	0	0	0	0	0	119	0	0	3,792	5%	95%	
Grapes	0	0	0	0	2,453	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2,453	0%	100%	
Melons, Squash and Cucumbers	0	0	0	0	0	589	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	589	0%	100%	
Miscellaneous Deciduous	0	0	0	0	0	0	218	0	0	0	0	0	0	0	0	0	0	0	0	0	0	218	0%	100%	
Miscellaneous Grain and Hay	0	0	0	0	0	0	0	2,172	0	139	0	0	0	0	0	0	0	0	0	144	0	2,455	12%	88%	
Miscellaneous Grasses	163	0	0	0	0	0	0	0	520	134	0	0	0	0	0	0	0	0	0	0	0	817	36%	64%	
Mixed Pasture	0	0	0	0	0	0	0	14	234	3,713	0	0	0	0	0	0	0	0	0	88	0	4,050	8%	92%	
Olives	0	0	0	0	0	0	0	0	0	0	703	0	0	0	0	0	0	0	0	0	0	703	0%	100%	
Peaches/Nectarines	0	0	0	0	0	0	0	0	0	0	0	557	0	0	0	0	0	0	0	0	13	570	2%	98%	
Pears	0	0	0	0	0	0	0	0	0	0	0	0	319	0	0	0	0	0	0	0	0	319	0%	100%	
Pistachios	0	56	0	0	0	0	0	0	0	0	0	0	0	497	0	0	0	0	0	0	0	553	10%	90%	
Plums, Prunes and Apricots	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,795	0	0	0	0	0	1	1,796	0%	100%	
Rice	0	0	0	53	0	0	0	0	0	0	0	0	0	0	0	28,340	0	0	0	0	0	28,393	0%	100%	
Safflower	0	0	0	11	0	0	0	0	28	0	0	0	0	0	0	0	706	0	39	0	0	784	10%	90%	
Sunflowers	0	0	0	0	0	139	0	0	0	0	0	0	0	0	0	0	0	2,916	0	0	0	3,055	5%	95%	
Tomatoes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	143	0	4,407	0	0	4,551	3%	97%	
Unclassified Fallow	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4,129	0	4,129	0%	100%	
Walnuts	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0	17	0	0	0	0	10,540	10,564	0%	100%	
Predicted Total	5,000	15,892	322	3,758	2,453	728	218	2,243	782	4,043	703	557	319	497	1,812	28,409	850	2,916	4,565	4,361	10,553	91,016			
Comission Error	5%	0%	0%	4%	0%	19%	0%	3%	34%	8%	0%	0%	0%	0%	1%	0%	17%	0%	3%	5%	0%				
Users Error	95%	100%	100%	96%	100%	81%	100%	97%	66%	92%	100%	100%	100%	100%	99%	100%	83%	100%	97%	95%	100%				
Kappa Coefficient																									0.97

Table 37. San Joaquin River Hydrologic Region Land Use Mapping Validation Data Error Matrix by Subclass Legend Level (acres)

Reference \ Predicted	Alfalfa and Alfalfa Mixtures	Almonds	Beans (Dry)	Cherries	Corn, Sorghum and Sudan	Cotton	Grapes	Melons, Squash and Cucumbers	Miscellaneous Grain and Hay	Miscellaneous Grasses	Mixed Pasture	Olives	Peaches/Nectarines	Pistachios	Plums, Prunes and Apricots	Potatoes or Sweet Potatoes	Rice	Tomatoes	Unclassified Fallow	Walnuts	Reference Total	Omission Error	Producers Accuracy	Kappa Coefficient
Alfalfa and Alfalfa Mixtures	6,851	0	0	0	44	0	0	0	33	0	0	0	0	0	0	0	0	0	0	0	6,929	1%	99%	
Almonds	0	30,927	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	30,932	0%	100%	
Beans (Dry)	0	0	1,248	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,248	0%	100%	
Cherries	0	0	0	860	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	860	0%	100%	
Corn, Sorghum and Sudan	0	0	0	0	13,362	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13,362	0%	100%	
Cotton	0	0	0	0	0	3,583	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3,583	0%	100%	
Grapes	0	0	0	0	0	0	5,608	0	0	0	0	0	0	0	0	0	0	0	0	0	5,608	0%	100%	
Melons, Squash and Cucumbers	0	0	0	0	0	0	0	1,235	0	0	0	0	0	0	0	0	0	0	0	0	1,235	0%	100%	
Miscellaneous Grain and Hay	0	0	0	0	0	0	0	0	1,460	50	0	0	0	0	0	0	0	0	0	0	1,510	3%	97%	
Miscellaneous Grasses	0	0	0	0	0	0	0	0	0	341	0	0	0	0	0	0	0	0	0	0	341	0%	100%	
Mixed Pasture	0	0	0	0	0	0	0	0	9	13	2,340	0	0	0	0	0	0	0	0	0	2,362	1%	99%	
Olives	0	0	0	0	0	0	0	0	0	0	0	395	0	0	0	0	0	0	0	0	395	0%	100%	
Peaches/Nectarines	0	0	0	0	0	0	0	0	0	0	0	0	180	0	0	0	0	0	0	0	180	0%	100%	
Pistachios	0	0	0	0	0	0	0	0	0	0	0	0	0	1,728	0	0	0	0	0	0	1,728	0%	100%	
Plums, Prunes and Apricots	0	0	0	0	0	0	0	0	0	0	0	0	11	0	171	0	0	0	0	0	182	6%	94%	
Potatoes or Sweet Potatoes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,078	0	0	0	0	1,078	0%	100%	
Rice	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	413	0	0	0	413	0%	100%	
Tomatoes	0	0	150	0	0	0	0	1	0	0	0	0	0	0	0	0	0	3,637	0	0	3,789	4%	96%	
Unclassified Fallow	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2,516	0	2,521	0%	100%	
Walnuts	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4,625	4,626	0%	100%	
Predicted Total	6,851	30,928	1,398	865	13,407	3,583	5,608	1,236	1,501	405	2,340	395	196	1,728	171	1,078	413	3,637	2,516	4,625	82,881			
Comission Error	0%	0%	11%	1%	0%	0%	0%	0%	3%	16%	0%	0%	8%	0%	0%	0%	0%	0%	0%	0%				
Users Accuracy	100%	100%	89%	99%	100%	100%	100%	100%	97%	84%	100%	100%	92%	100%	100%	100%	100%	100%	100%	100%				
Kappa Coefficient																								0.99

Table 38. South Coast Hydrologic Region Land Use Mapping Validation Data Error Matrix by Subclass Legend Level (acres)

Reference \ Predicted	Avocados	Bush Berries	Citrus	Cole Crops	Flowers, Nursery and Christmas Tree Farms	Miscellaneous Grain and Hay	Miscellaneous Truck Crops	Strawberries	Unclassified Fallow	Reference Total	Omission Error	Producers Accuracy	Kappa Coefficient
Avocados	2,363	0	14	0	0	0	0	0	5	2,383	1%	99%	
Bush Berries	0	398	0	0	0	0	0	0	0	398	0%	100%	
Citrus	32	0	1,996	0	0	0	1	0	4	2,033	2%	98%	
Cole Crops	0	0	0	492	0	0	0	0	0	492	0%	100%	
Flowers, Nursery and Christmas Tree Farms	0	1	0	0	153	0	0	0	0	153	0%	100%	
Miscellaneous Grain and Hay	0	0	0	0	0	186	0	0	6	191	3%	97%	
Miscellaneous Truck Crops	0	0	10	0	0	0	1,233	0	0	1,243	1%	99%	
Strawberries	0	0	0	0	0	0	0	699	0	699	0%	100%	
Unclassified Fallow	0	0	0	0	0	0	0	0	344	344	0%	100%	
Predicted Total	2,395	398	2,021	492	153	186	1,234	699	359	7,937			
Comission Error	1%	0%	1%	0%	0%	0%	0%	0%	4%				
Users Accuracy	99%	100%	99%	100%	100%	100%	100%	100%	96%				
Kappa Coefficient													0.98

Table 39. Tulare Lake Hydrologic Region Land Use Mapping Validation Data Error Matrix by Subclass Legend Level (acres)

Reference \ Predicted	Alfalfa and Alfalfa Mixtures	Almonds	Citrus	Corn, Sorghum and Sudan	Cotton	Grapes	Miscellaneous Grain and Hay	Mixed Pasture	Onions and Garlic	Peaches/Nectarines	Pistachios	Plums, Prunes and Apricots	Pomegranates	Tomatoes	Unclassified Fallow	Walnuts	Reference Total	Omission Error	Producers Accuracy	Kappa Coefficient
Alfalfa and Alfalfa Mixtures	8,048	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8,048	0%	100%	
Almonds	0	24,987	0	0	0	19	0	0	0	0	0	0	0	0	0	0	25,006	0%	100%	
Citrus	0	0	1,337	0	0	0	0	0	0	0	0	0	0	0	0	0	1,337	0%	100%	
Corn, Sorghum and Sudan	0	0	0	17,812	0	0	0	0	0	0	0	0	0	0	0	0	17,930	1%	99%	
Cotton	0	0	0	0	6,379	0	0	0	0	0	0	0	0	0	0	0	6,379	0%	100%	
Grapes	0	0	0	0	0	7,938	0	0	0	0	0	0	0	0	0	0	7,938	0%	100%	
Miscellaneous Grain and Hay	0	0	0	21	0	0	3,524	0	0	0	0	0	0	0	0	0	3,545	1%	99%	
Mixed Pasture	0	0	0	0	0	0	0	183	0	0	0	0	0	0	97	0	279	34%	66%	
Onions and Garlic	0	0	0	0	0	0	0	0	1,240	0	0	0	0	0	152	0	1,463	15%	85%	
Peaches/Nectarines	0	52	0	0	0	0	0	0	0	939	0	14	0	0	0	0	1,005	7%	93%	
Pistachios	0	0	0	0	0	0	0	0	0	0	13,903	48	0	0	0	0	13,951	0%	100%	
Plums, Prunes and Apricots	0	0	0	0	0	0	0	0	0	29	0	411	0	0	0	0	440	7%	93%	
Pomegranates	0	0	0	0	0	0	0	0	0	0	0	0	478	0	0	0	478	0%	100%	
Tomatoes	0	0	0	0	0	0	0	0	0	0	0	0	0	2,288	0	0	2,490	8%	92%	
Unclassified Fallow	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12,469	0	12,469	0%	100%	
Walnuts	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2,961	2,961	0%	100%	
Predicted Total	8,048	25,039	1,337	17,833	6,379	7,957	3,524	183	1,240	967	13,903	474	478	2,288	12,717	2,961	105,720			
Comission Error	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%	0%	13%	0%	0%	2%	0%				
Users Accuracy	100%	100%	100%	100%	100%	100%	100%	100%	100%	97%	100%	87%	100%	100%	98%	100%				
Kappa Coefficient																				0.99