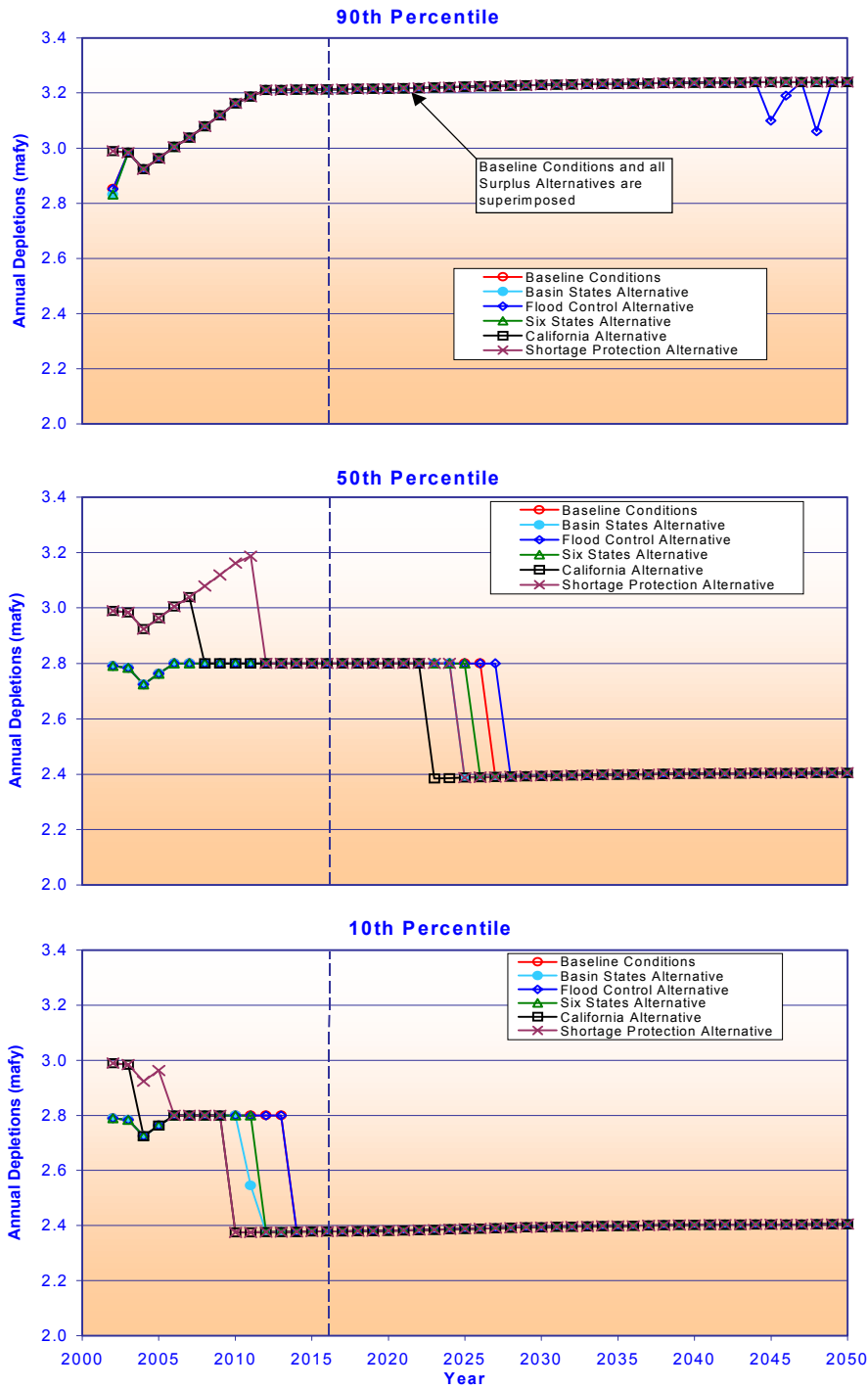


**Figure 3.4-8**  
**Arizona Modeled Annual Depletions**  
**Comparison of Surplus Alternatives to Baseline Conditions**  
**90th, 50th and 10th Percentile Values**



### 3.4.4.2 STATE OF CALIFORNIA

This section presents the simulated water deliveries to California under the baseline conditions and surplus alternatives. The analysis of California's water supply concentrated on total California water depletions. The underlying assumptions for California's depletions under the baseline conditions include: 1) California's normal annual depletion is 4.4 maf; 2) intrastate water transfers are included in the baseline conditions and all alternatives; and 3) surplus deliveries are made during flood control operations and under 70R criteria. The underlying assumption for California's depletions are that several transfers and exchanges will be carried out over a number of years. The transfers and exchanges proposed under California's Colorado River Water Use Plan will result in water transfers between MWD and the agricultural agencies, in particular IID and CVWD. The normal schedules for MWD, IID and CVWD with and without transfers as provided by California are tabulated in Attachment H.

#### 3.4.4.2.1 Baseline Conditions

The water deliveries to California are projected to fluctuate throughout the 50-year period of analysis reflecting variations in hydrologic conditions. The 90th, 50th and 10th percentile rankings of modeled water deliveries to California under the baseline conditions are presented in Figure 3.4-9.

The 90<sup>th</sup> percentile line generally coincides with California's depletion schedule during full surplus water supply conditions. As indicated by this 90<sup>th</sup> percentile line, the probability that the baseline conditions would provide California's full surplus depletion amount is at least 10 percent throughout the 50-year period of analysis.

From 2002 through 2050, under baseline conditions, the 50<sup>th</sup> percentile line for California coincides with its normal depletion schedule.

Annual water deliveries to California never fall below the apportionment of 4.4 maf available for use in California during a normal year. Therefore, no Level 2 shortage condition deliveries to California were observed.

Figure 3.4-9  
California Modeled Annual Depletions Under Baseline Conditions  
90<sup>th</sup>, 50<sup>th</sup> and 10<sup>th</sup> Percentile Values

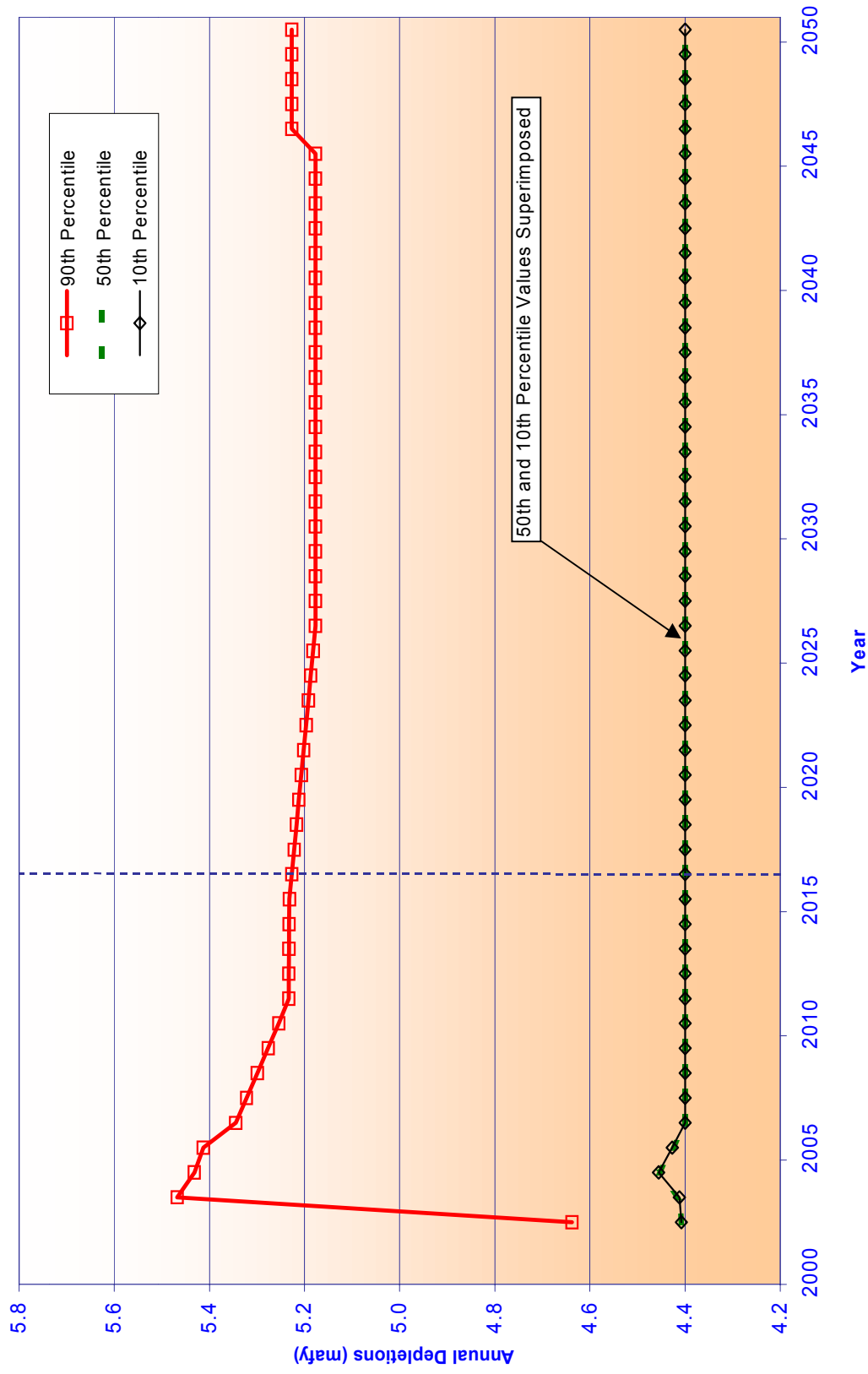
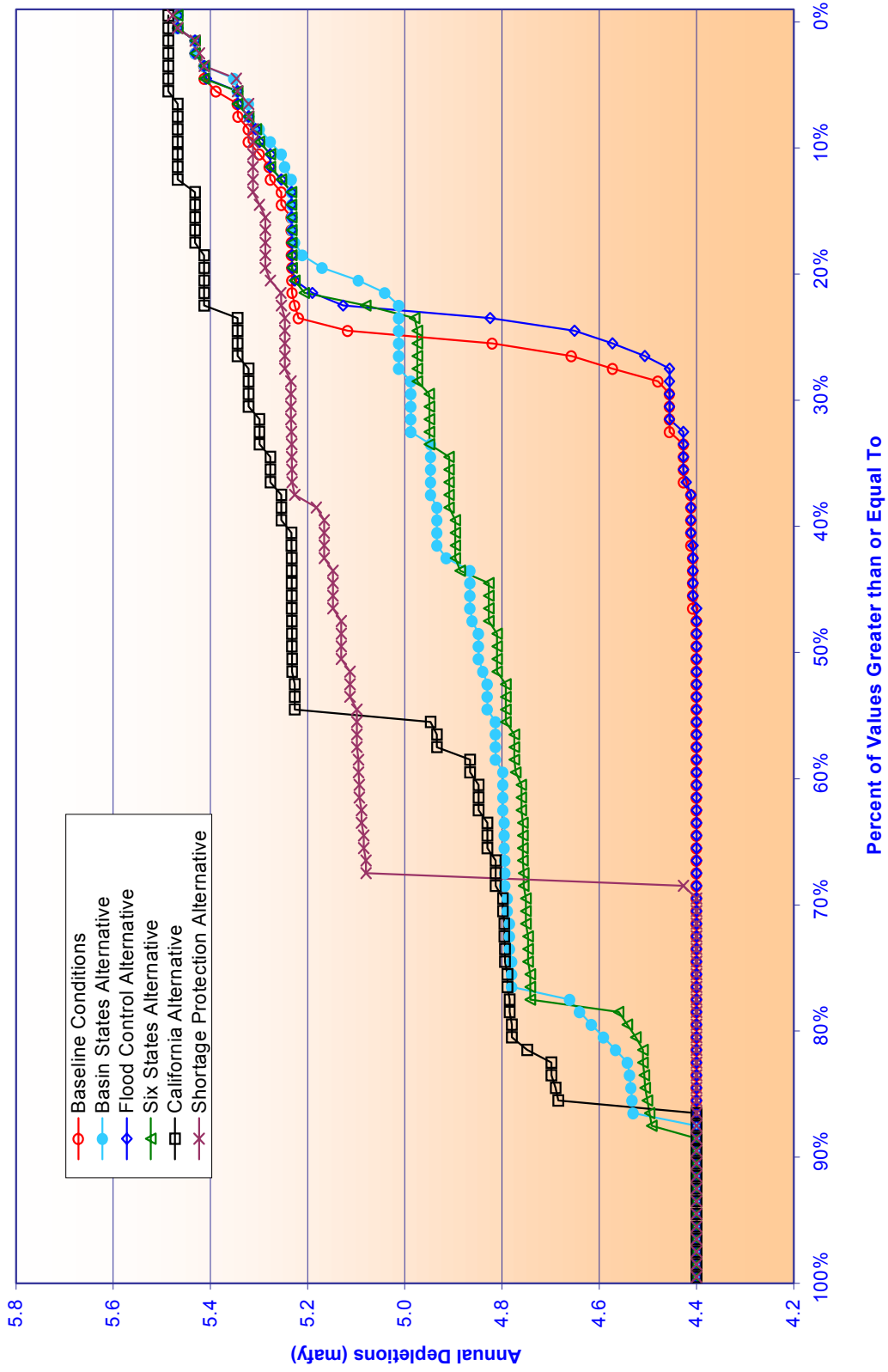


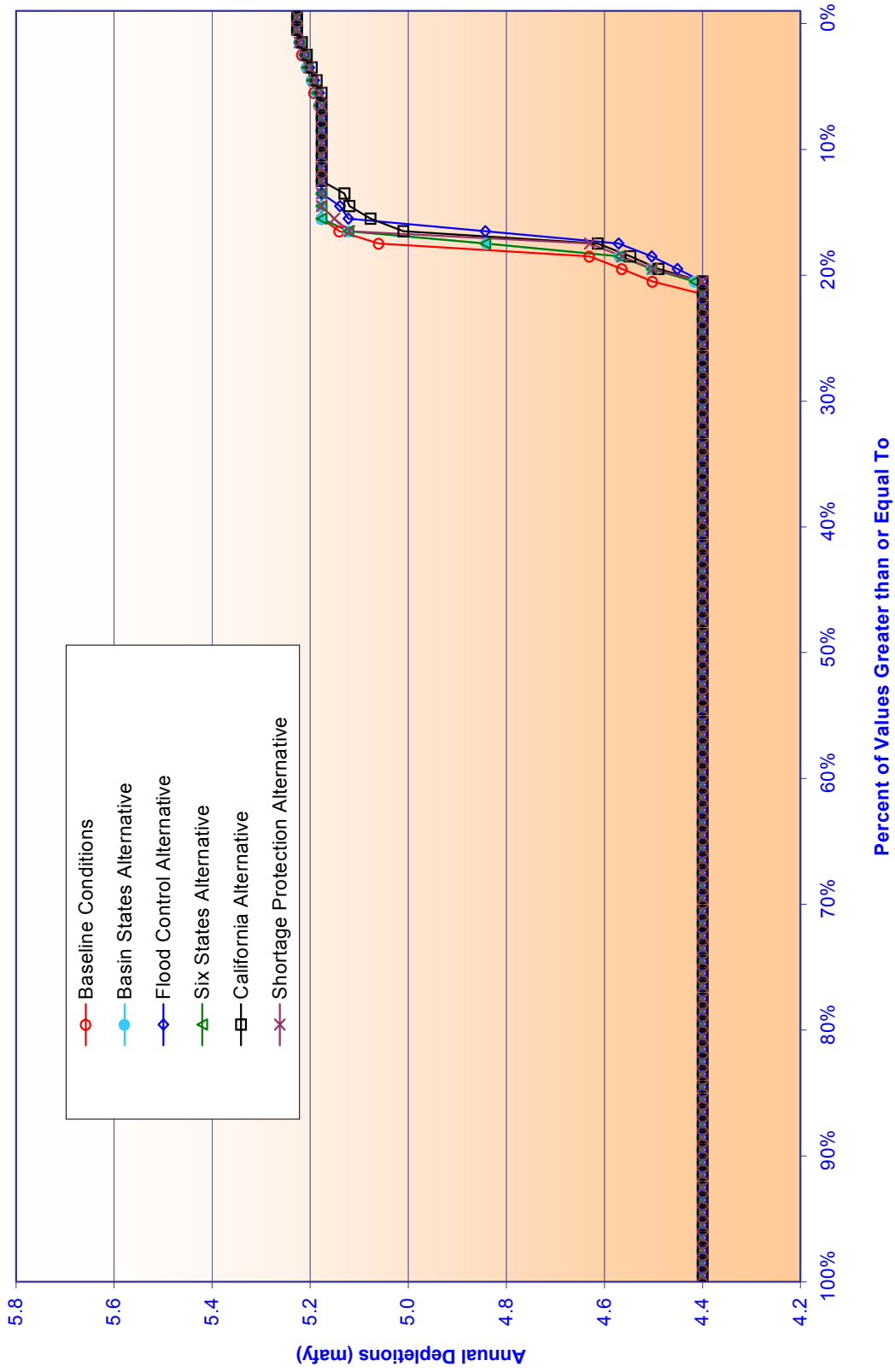
Figure 3.4-10 provides a comparison of the cumulative distribution of California's depletions under the surplus alternatives to those of the baseline conditions during the interim surplus criteria period (years 2002 to 2016). These graphs are best used to represent the frequency that different magnitude annual water deliveries to California occur in the respective period. The results presented in Figure 3.4-10 indicate a 100 percent probability that California's depletions would meet its normal depletion schedule during this period under the baseline conditions. The probability that California would receive surplus condition deliveries (any amount greater than 4.4 mafy) during this period under baseline conditions was approximately 47 percent. The maximum surplus condition depletions observed under the baseline conditions were 5.468 maf during this period.

Figure 3.4-11 provides a comparison of the cumulative distribution of the water deliveries to California under the surplus alternatives to those of the baseline conditions for the 34-year period (years 2017 to 2050) that follows the interim surplus criteria period. The results presented in Figure 3.4-11 indicate a 100 percent probability that water deliveries to California would meet its normal depletion schedule during this period under the baseline conditions. The probability that California would receive surplus condition deliveries during this same period under the baseline conditions was approximately 21 percent. The maximum surplus condition depletions under the baseline conditions were 5.227 maf during this period. During this period, California did not receive shortage condition deliveries.

Figure 3.4-10  
California Modeled Depletions  
Comparison of Surplus Alternatives to Baseline Conditions  
Years 2002 to 2016



**Figure 3.4-11**  
**California Modeled Depletions**  
**Comparison of Surplus Alternatives to Baseline Conditions**  
**Years 2017 to 2050**

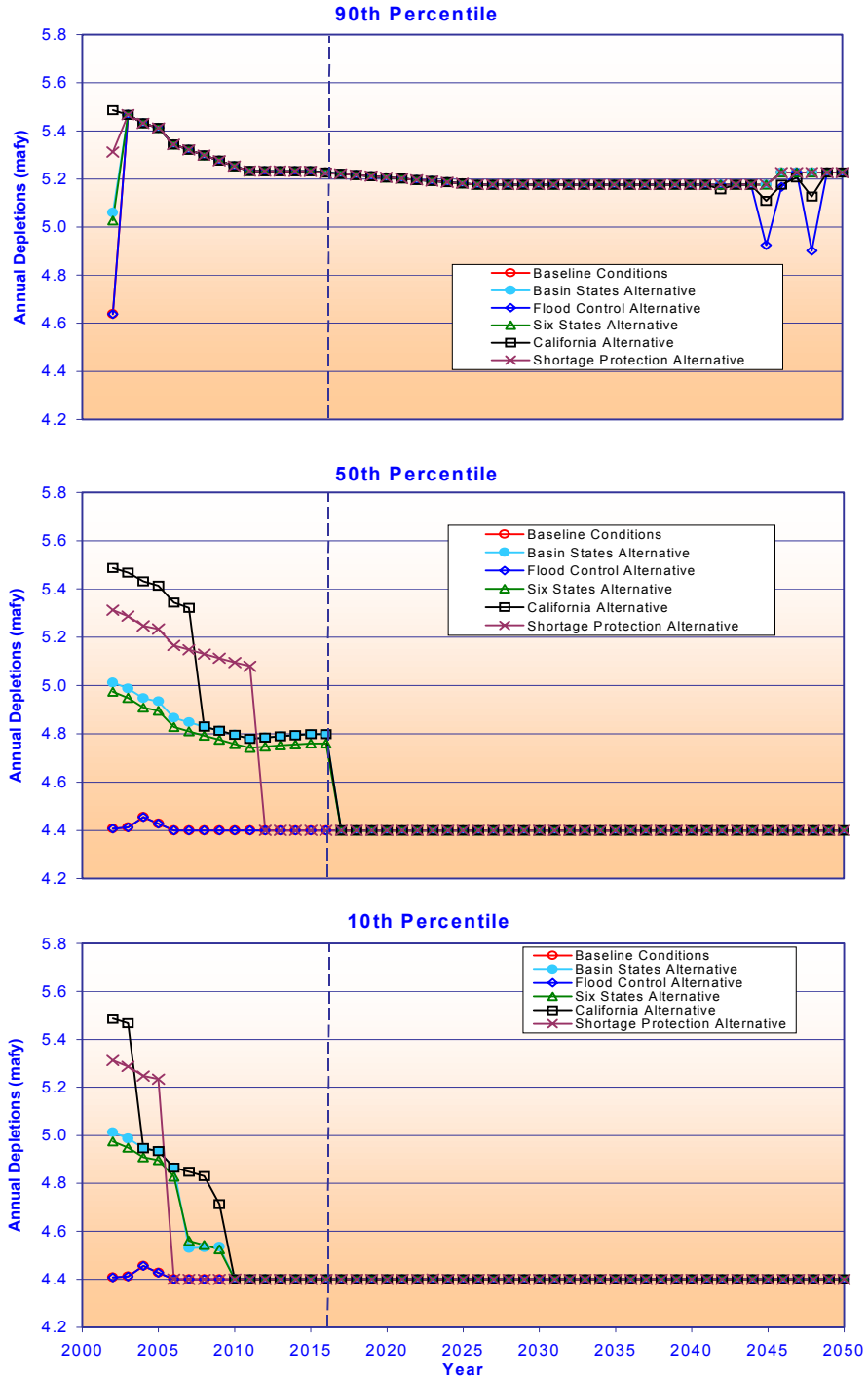


#### **3.4.4.2.2 Comparison of Surplus Alternatives to Baseline Conditions**

Figure 3.4-12 provides a comparison of the 90<sup>th</sup>, 50<sup>th</sup> and 10<sup>th</sup> percentile values for California's depletions under the surplus alternatives to those of the baseline conditions.

As noted in Figure 3.4-12, there is little difference in the 90<sup>th</sup> percentile values resulting from the surplus alternatives to those of the baseline conditions. The exceptions to this are in year one and years 2045 to 2050 where the 90<sup>th</sup> percentile values are less than the full surplus amounts and indicating the occurrence of frequent limited surplus conditions. The 90<sup>th</sup> percentile lines generally coincide with California's surplus depletion schedule.

**Figure 3.4-12**  
**California Modeled Annual Depletions**  
**Comparison of Surplus Alternatives to Baseline Conditions**  
**90th, 50th and 10th Percentile Values**





The 50<sup>th</sup> percentile lines for the Basin States, Six States, California, and Shortage Protection alternatives are above California's normal depletion schedule during all or most of the 15-year interim surplus criteria, indicating a high probability of surplus conditions under these alternatives. The 50<sup>th</sup> percentile lines for the baseline conditions and Flood Control Alternative generally coincide with California's normal depletion schedule throughout the 50-year period of analysis. Beyond 2016, the 50<sup>th</sup> percentile lines for all of the surplus alternatives also coincide with California's normal depletion schedule.

The 10<sup>th</sup> percentile lines for the baseline conditions and the Flood Control Alternative coincide with California's normal depletion schedule throughout the 50-year period of analysis. The 10<sup>th</sup> percentile values for the Basin States, Six States, California, and Shortage Protective alternatives are essentially above the normal depletion schedule through year 2009 (2005 for the Shortage Protection Alternative). The 10<sup>th</sup> percentile lines for the baseline conditions and the surplus alternatives converge after 2009.

Figures 3.4-10 and 3.4-11 presented comparisons of the cumulative distribution of California's depletions under the surplus alternatives to those of the baseline conditions during the interim surplus criteria period (years 2002 to 2016) and the 34-year period that would follow the interim surplus criteria (years 2017 to 2050), respectively. Table 3.4-2 provides a tabular summary and comparison for these two periods.

**Table 3.4-2**  
**Summary of California Modeled Annual Depletions**  
**Comparison of Surplus Alternatives to Baseline Conditions**

| Alternative/Conditions | Years 2002 to 2016 |         |          | Years 2017 to 2050 |         |          |
|------------------------|--------------------|---------|----------|--------------------|---------|----------|
|                        | Normal*            | Surplus | Shortage | Normal*            | Surplus | Shortage |
| Baseline Conditions    | 100%               | 47%     | 0%       | 100%               | 21%     | 0%       |
| Basin States           | 100%               | 87%     | 0%       | 100%               | 21%     | 0%       |
| Flood Control          | 100%               | 46%     | 0%       | 100%               | 20%     | 0%       |
| Six States             | 100%               | 69%     | 0%       | 100%               | 21%     | 0%       |
| California             | 100%               | 86%     | 0%       | 100%               | 20%     | 0%       |
| Shortage Protection    | 100%               | 69%     | 0%       | 100%               | 20%     | 0%       |

The percentage values presented under the column heading labeled "Normal" in Table 3.4-2 represent the total percentage of time that depletions under the noted conditions would be at or above the normal depletion schedule amount. The values presented under the column labeled "Surplus" represent the total percentage of time that depletions under the noted conditions exceed the normal depletion schedule amount. The values presented under the column labeled "Shortage" represent the total percentage of time that depletions under the noted conditions would be below the normal depletion schedule amount.

### 3.4.4.3 STATE OF NEVADA

This section presents the simulated water deliveries to Nevada under the baseline conditions and surplus alternatives. The analysis of Nevada's water supply concentrated on total Nevada water depletions.

#### 3.4.4.3.1 Baseline Conditions

The water deliveries to Nevada are projected to fluctuate throughout the 50-year period of analysis reflecting variations in hydrologic conditions. The 90<sup>th</sup>, 50<sup>th</sup> and 10<sup>th</sup> percentile ranking of modeled water deliveries to Nevada under the baseline conditions is presented in Figure 3.4-13. The 90<sup>th</sup> percentile line generally coincides with Nevada's depletion schedule during full surplus water supply conditions. As indicated by this 90<sup>th</sup> percentile line, the probability that the baseline conditions would provide Nevada's full surplus depletion amount is at least 10 percent throughout the 50-year period of analysis.

The 50<sup>th</sup> percentile line generally coincides with Nevada's normal depletion schedule under baseline conditions through year 2026. Thereafter, the 50<sup>th</sup> percentile line drops to and coincides with Nevada's Level 1 shortage depletion schedule.

As noted in Section 3.4.3, the SNWA and CAP essentially take all the reductions in water deliveries during shortage conditions (for modeling purposes). The model sets the SNWA's shortage condition delivery reductions to four percent of the total shortage condition delivery reduction amount when the Lake Mead water level is between elevation 1000 feet msl and the assumed shortage protection line as discussed in Section 3.3.3.4. This modeling assumption kept Nevada's annual delivery above 280 kaf until further cuts to the SNWA and CAP were necessary to maintain the Lake Mead water level above the 1000 feet msl elevation, a level 2 shortage condition. Under the baseline conditions, deliveries to Nevada below 280 kaf occurred less than four percent of the time during the 15-year interim surplus criteria period.

Under the baseline conditions, the 10<sup>th</sup> percentile line remains at or above Nevada's normal depletion schedule until 2013. Beyond 2013, the 10<sup>th</sup> percentile line drops to Nevada's Level 1 shortage condition depletion schedule.

Figure 3.4-13  
Nevada Modeled Annual Depletions Under Baseline Conditions  
90th, 50th and 10th Percentile Values

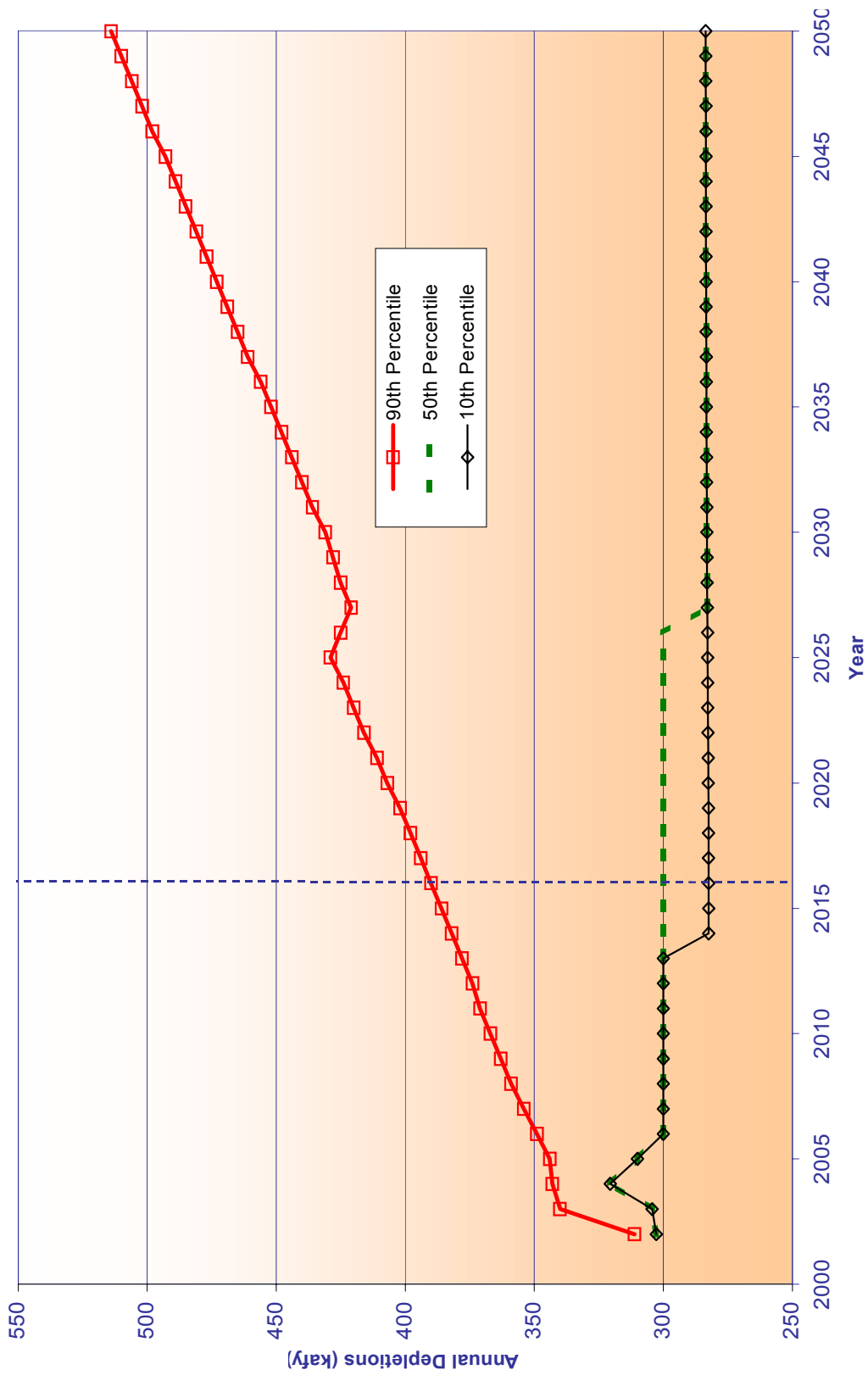


Figure 3.4-14 provides a comparison of the cumulative distribution of Nevada's depletions under the surplus alternatives to those of the baseline conditions during the interim surplus criteria period (years 2002 to 2016). This graph is best used to represent the frequency that different magnitude water deliveries to Nevada occurred during the 15-year interim surplus criteria period. The results presented in Figure 3.4-14 indicate a 96 percent probability that water deliveries to Nevada would meet or exceed its normal depletion schedule during this period under the baseline conditions. The probability that Nevada would receive surplus condition deliveries under the baseline conditions during this period was approximately 47 percent. The maximum surplus condition depletions under the baseline conditions were 390 kaf during this period. The probability that Nevada would receive shortage condition deliveries under baseline conditions was less than four percent. The minimum shortage condition depletion was 282.3 kaf.

**Figure 3.4-14**  
**Nevada Modeled Depletions**  
**Comparison of Surplus Alternatives to Baseline Conditions**  
**Years 2002 to 2016**

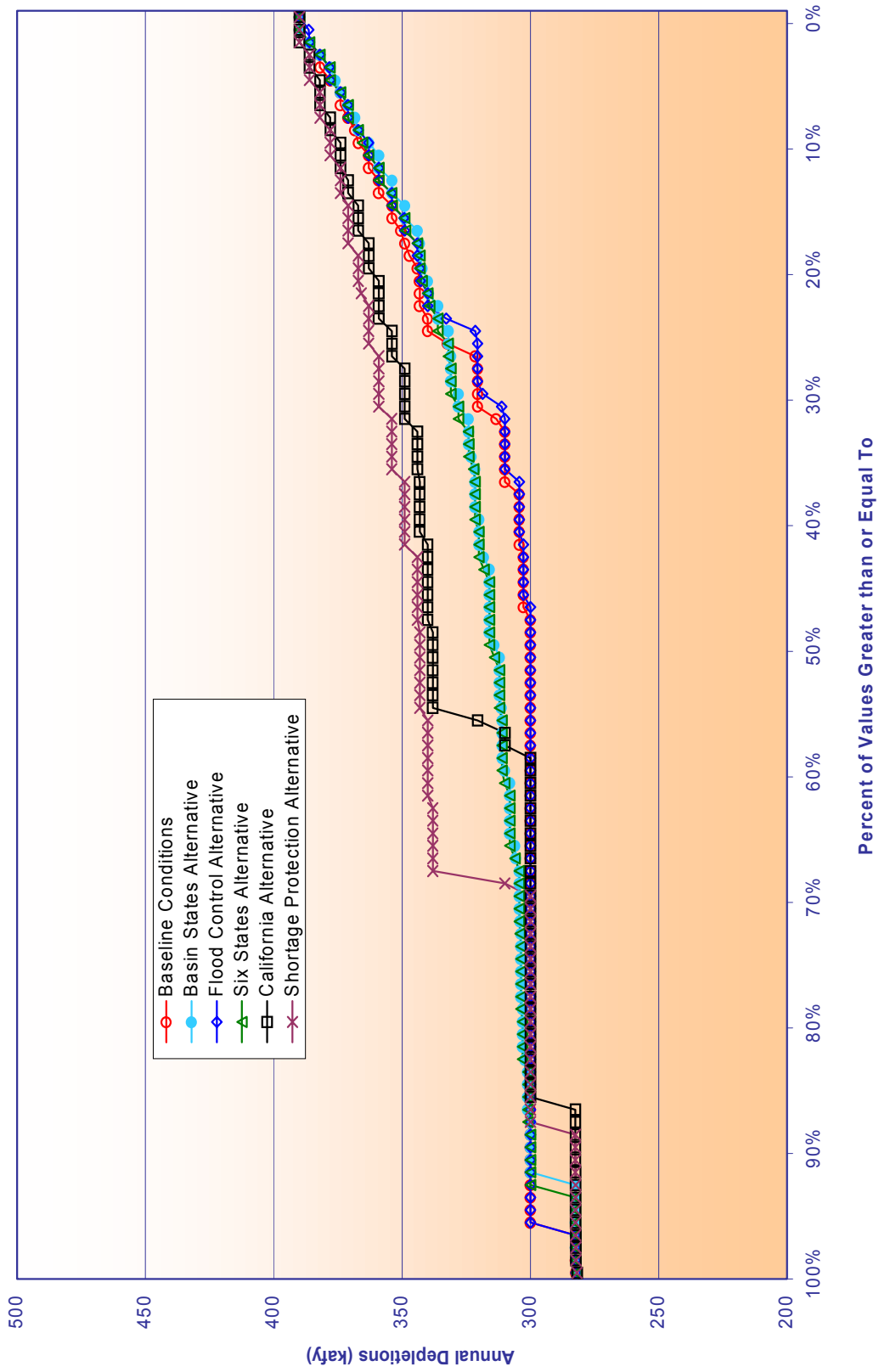


Figure 3.4-15 provides a comparison of the cumulative distribution of the water deliveries to Nevada under the surplus alternatives to those of the baseline conditions for the 34-year period (years 2017 to 2050) that would follow the interim surplus criteria period. The results presented in Figure 3.4-15 indicate a 50 percent probability that water deliveries to Nevada would meet or exceed its normal depletion schedule during this period under the baseline conditions. The probability that Nevada would receive surplus condition deliveries during this same period under the baseline conditions was approximately 21 percent. The maximum surplus condition depletions under the baseline conditions were 514 kaf during this period. The probability that Nevada would receive shortage condition deliveries was approximately 50 percent. The minimum shortage condition depletion during this period was 249.8 kaf.

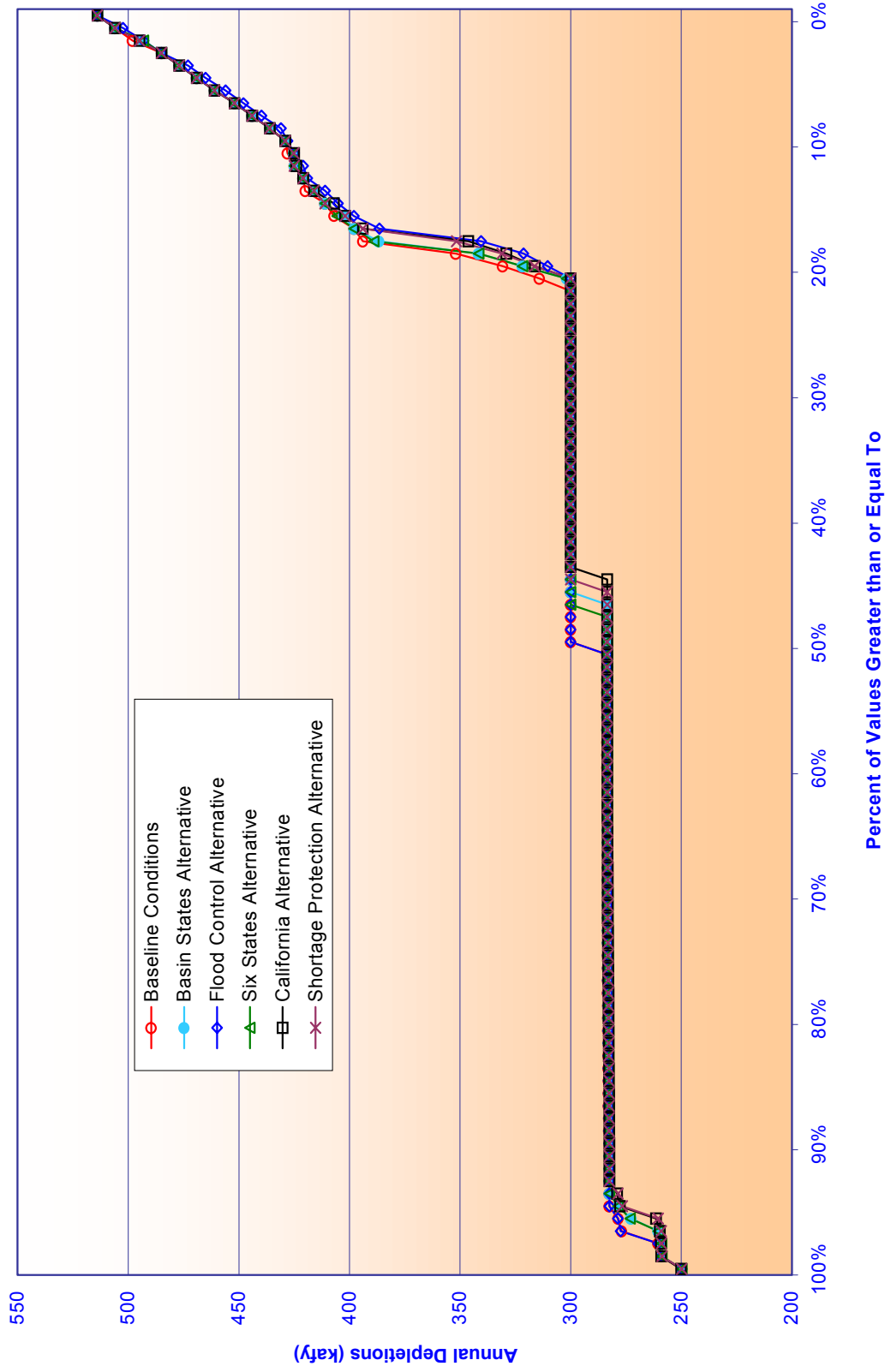
#### **3.4.4.3.2 Comparison of Surplus Alternatives to Baseline Conditions**

Figure 3.4-16 provides a comparison of the 90<sup>th</sup>, 50<sup>th</sup> and 10<sup>th</sup> percentile values for Nevada's depletions under the baseline conditions to those of the surplus alternatives.

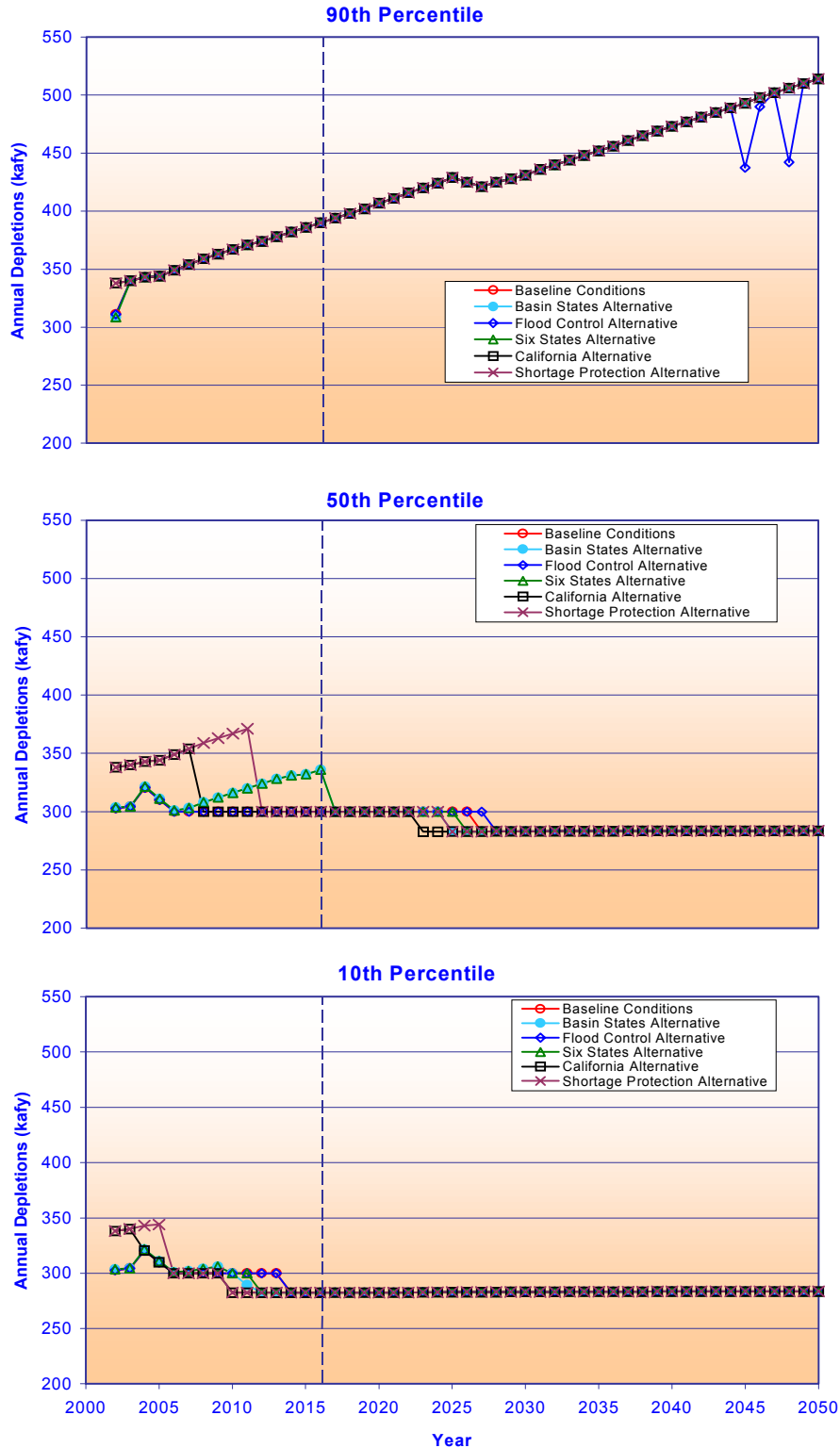
As noted in Figure 3.4-16, there is little difference in the 90<sup>th</sup> percentile values generally resulting from the surplus alternatives when compared to those of the baseline conditions. The 90<sup>th</sup> percentile lines coincide with Nevada's surplus depletion schedule.

The 50<sup>th</sup> percentile lines for the baseline conditions generally stay at or above Nevada's normal depletion schedule through year 2022. From 2022 through 2027, the 10<sup>th</sup> percentile values for the baseline conditions and surplus alternatives drop to and remain at a level equal to Nevada's Level 1 shortage depletion schedule.

**Figure 3.4-15**  
**Nevada Modeled Depletions**  
**Comparison of Surplus Alternatives to Baseline Conditions**  
**Years 2017 to 2050**



**Figure 3.4-16**  
**Nevada Modeled Annual Depletions**  
**Comparison of Surplus Alternatives to Baseline Conditions**  
**90th, 50th and 10th Percentile Values**





The 10<sup>th</sup> percentile lines for the baseline conditions and surplus alternatives generally stay at or above Nevada’s Level 1 shortage depletion schedule through year 2009. Between years 2009 through 2013, the 10<sup>th</sup> percentile lines for the baseline conditions and surplus alternatives drop to and remain at a level equal to Nevada’s Level 1 shortage depletion schedule.

Figures 3.4-14 and 3.4-15 presented comparisons of the cumulative distribution of Nevada’s depletions under the surplus alternatives to those of the baseline conditions during the interim surplus criteria period (years 2002 to 2016) and the 34-year period that would follow the interim surplus criteria (years 2017 to 2050), respectively. These graphs represent the frequency that different magnitude annual deliveries to Nevada occurred under each respective period. Table 3.4-3 provides a tabular summary of the comparison for these two periods.

**Table 3.4-3**  
**Summary of Nevada Modeled Annual Depletions**  
**Comparison of Surplus Alternatives to Baseline Conditions**

| Alternative/Conditions | Years 2002 to 2016 |         |          | Years 2017 to 2050 |         |          |
|------------------------|--------------------|---------|----------|--------------------|---------|----------|
|                        | Normal             | Surplus | Shortage | Normal             | Surplus | Shortage |
| Baseline Conditions    | > 96%              | 47%     | < 4%     | 50%                | 21%     | 50%      |
| Basin States           | > 92%              | 87%     | < 8%     | > 46%              | 21%     | < 54%    |
| Flood Control          | > 96%              | 91%     | < 4%     | 50%                | 20%     | 50%      |
| Six States             | > 93%              | 88%     | < 7%     | > 47%              | 27%     | < 53%    |
| California             | > 86%              | 58%     | < 14%    | > 44%              | 21%     | < 56%    |
| Shortage Protection    | > 88%              | 11%     | < 12%    | > 46%              | 20%     | < 54%    |

\*The values under normal represent the total percentage of time that depletions would be at or above the normal depletion conditions.

The percentage values presented under the column heading labeled “Normal” in Table 3.4-3 represent the total percentage of time that depletions under the noted conditions would be at or above the normal depletion schedule amount. The values presented under the column labeled “Surplus” represent the total percentage of time that depletions under the noted conditions exceed the normal depletion schedule amount. The values presented under the column labeled “Shortage” represent the total percentage of time that depletions under the noted conditions would be below the normal depletion schedule amount.

#### 3.4.4.4 UPPER BASIN STATES

There are no specific criteria in the *Law of the River* for surplus or shortage condition water deliveries to users within the Upper Basin states. The normal depletion schedule of the Upper Basin states would be met under most water supply conditions. The exceptions are potential reductions to certain Upper Basin users whose diversions are located upstream of Lake Powell. For these users, the potential reductions would be attributed to dry hydrologic conditions and inadequate regulating reservoir storage capacity upstream of their diversions.

The proposed interim surplus criteria were determined to have no effect on water deliveries to the Upper Basin states, including the Upper Basin Tribes. Therefore, detailed analyses were not necessary for the Upper Basin states' water supply.

#### **3.4.4.5 MEXICO**

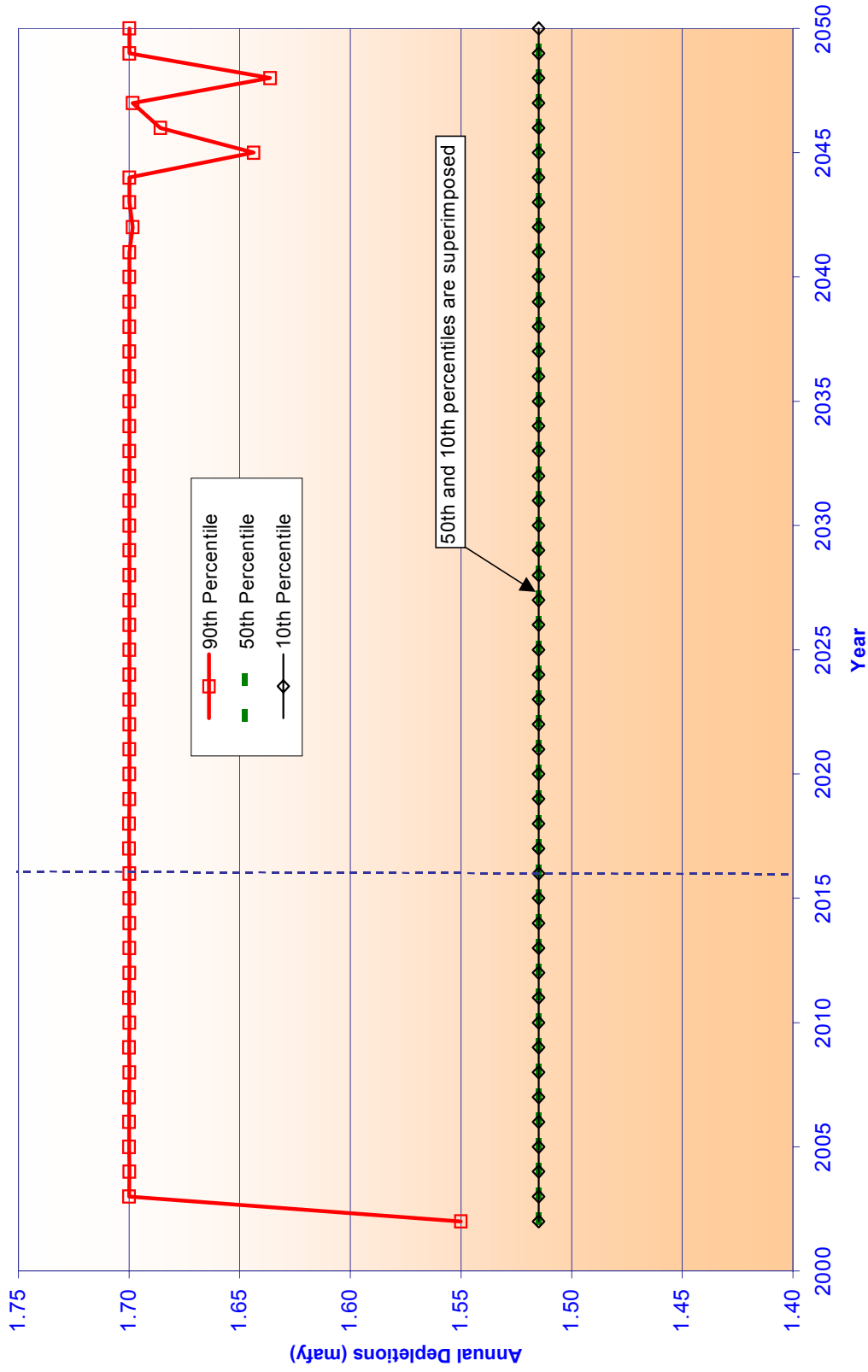
This section presents the simulated water deliveries to Mexico under the baseline conditions and surplus alternatives. As discussed previously, Mexico's normal depletion schedule is modeled as 1.515 maf. An additional 15,000 af is included to account for typical scheduling errors and water that is ordered by the Lower Basin users but that is not diverted. Surplus deliveries to Mexico of up to 200 kaf are delivered under baseline conditions and the surplus alternatives only when Lake Mead makes flood control releases. Shortage deliveries to Mexico would only occur if the CAP were cut to zero and further cuts to MWD and Mexico were necessary to keep the Lake Mead water elevation above 1000 feet msl. This condition was not observed under the baseline conditions or the surplus alternatives.

##### **3.4.4.5.1 Baseline Conditions**

The water deliveries to Mexico are projected to be at or above Mexico's normal delivery schedule throughout the 50-year period of analysis. The 90th, 50th and 10th percentile ranking of modeled water deliveries to Mexico under the baseline conditions are presented in Figure 3.4-17.

The 90<sup>th</sup> percentile line generally coincides with Mexico's depletion schedule during surplus water supply conditions throughout the 50-year period of analysis. The exception to these are the years between 2045 to 2050 when 90<sup>th</sup> percentile values drop to levels slightly below the full surplus schedule amounts. As indicated by this 90<sup>th</sup> percentile line, the probability that the baseline conditions would provide Mexico's surplus depletion amount is at least 10 percent throughout the 50-year period of analysis.

Figure 3.4-17  
Mexico Modeled Annual Depletions Under Baseline Conditions  
90<sup>th</sup>, 50<sup>th</sup> and 10<sup>th</sup> Percentile Values

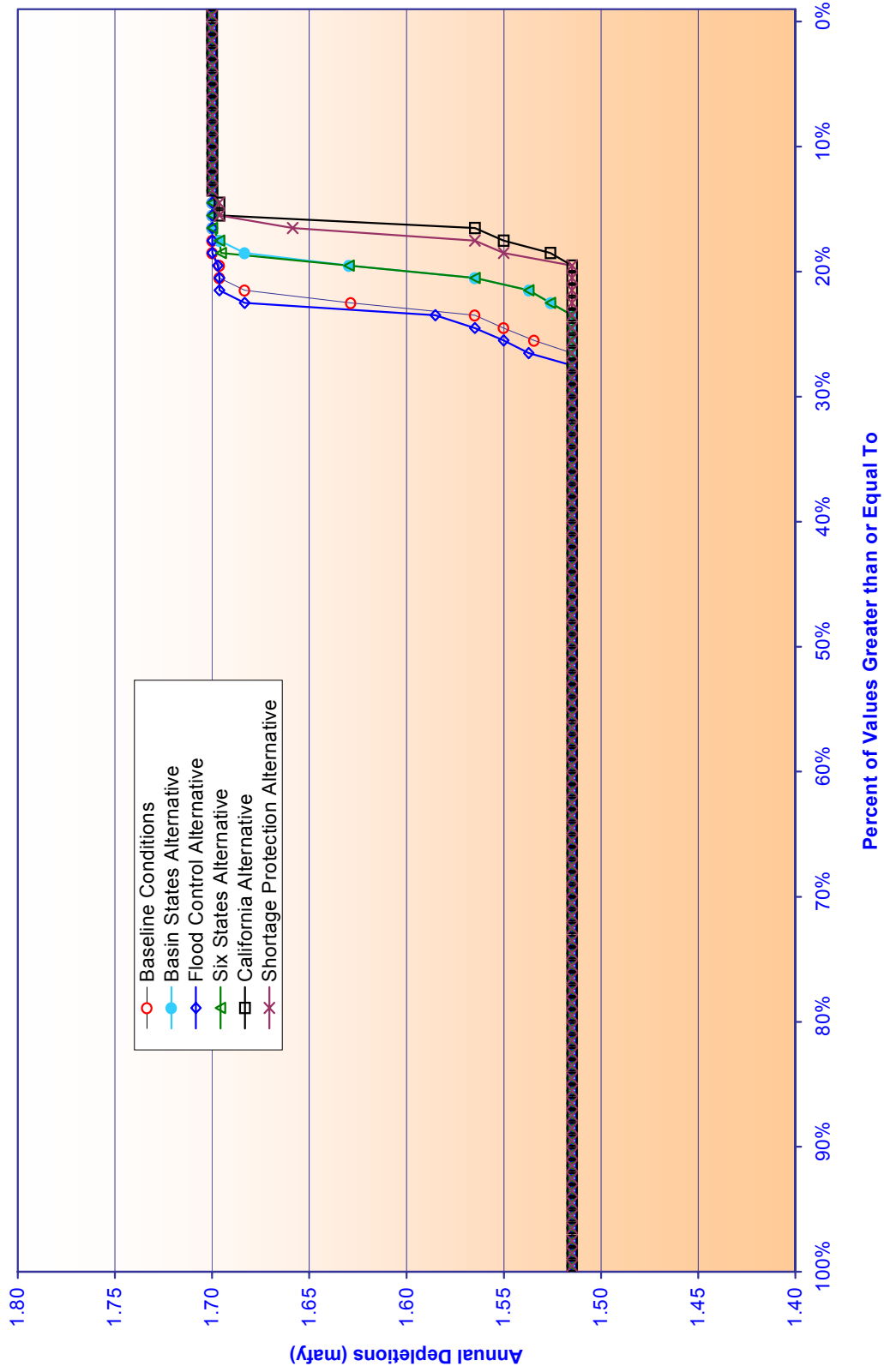


Under baseline conditions, the 50<sup>th</sup> and 10<sup>th</sup> percentile lines coincide with Mexico's normal depletion schedule. Again, it is noted that the depletion amount depicted by both the 50<sup>th</sup> and 10<sup>th</sup> percentile lines is equal to 1.515 maf. The 15,000 af above the 1.5 maf Mexico apportionment was added to the model to account for typical scheduling errors and water that is ordered by the Lower Basin users but that is not diverted. Also, it should be noted that the modeled water deliveries to Mexico never dropped below Mexico's normal depletion schedule.

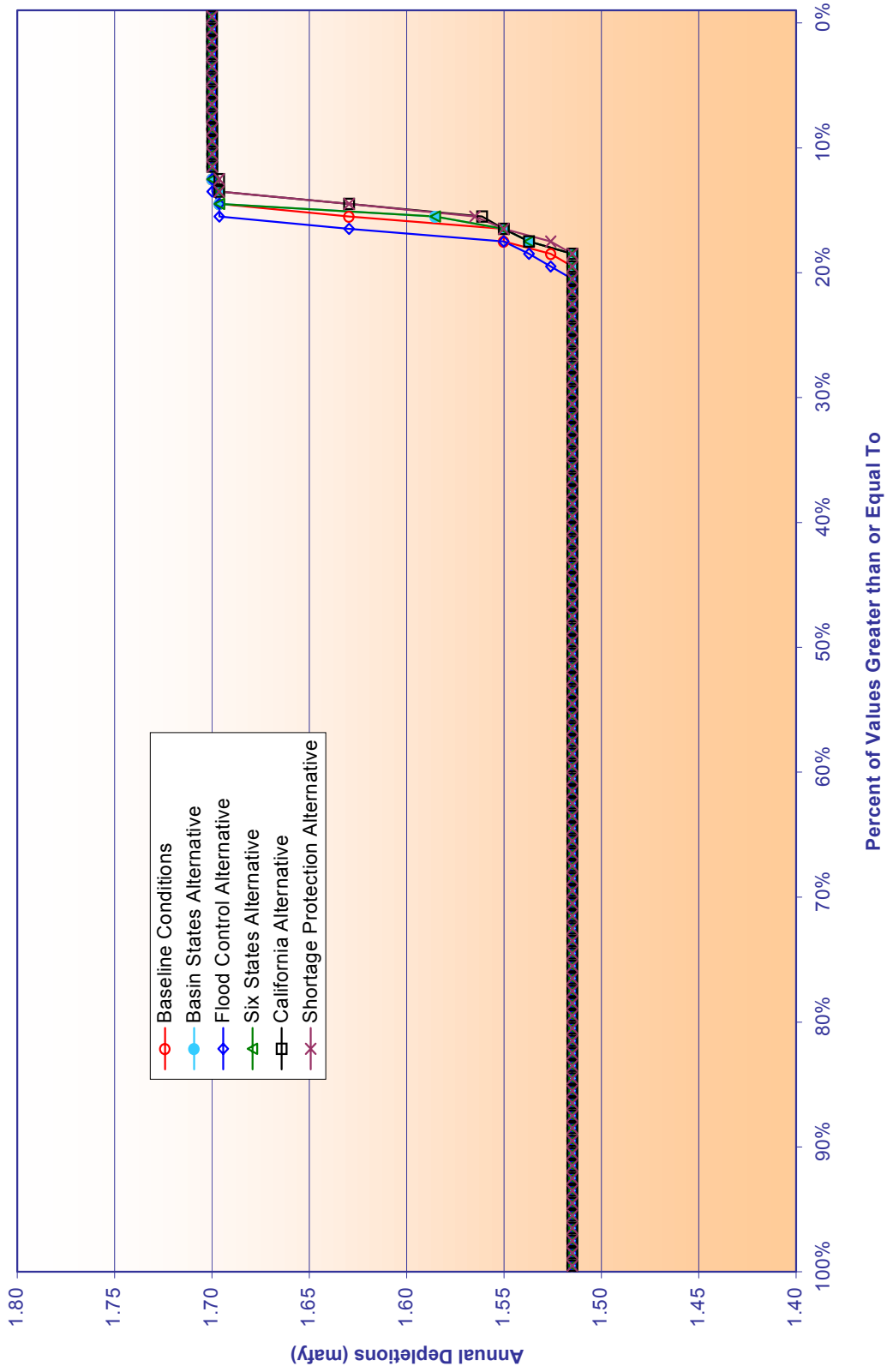
Figure 3.4-18 provides a comparison of the cumulative distribution of Mexico's depletions under the surplus alternatives to those of the baseline conditions during the interim surplus criteria period (years 2002 to 2016). Again, this type of graph is used to represent the frequency that annual deliveries of different magnitudes occur in the respective period. The results presented in Figure 3.4-18 indicate a 100 percent probability that Mexico's depletions would meet or exceed its normal depletion schedule during this period under the baseline conditions. The probability that Mexico would receive surplus condition deliveries during this period was approximately 26 percent under baseline conditions. The maximum surplus condition depletion under the baseline conditions was 1.7 maf during this period.

Figure 3.4-19 provides a comparison of the cumulative distribution of the water deliveries to Mexico under the surplus alternatives to those of the baseline conditions for the 34-year period (years 2017 to 2050) that would follow the interim surplus criteria period. The results presented in Figure 3.4-19 also indicate a 100 percent probability that water deliveries to Mexico would meet its normal depletion schedule during this period under the baseline conditions. The probability that Mexico would receive surplus condition deliveries during this same period under the baseline conditions was approximately 19 percent. The maximum surplus condition depletion under the baseline conditions was also 1.7 maf during this period.

**Figure 3.4-18**  
**Mexico Modeled Depletions**  
**Comparison of Surplus Alternatives to Baseline Conditions**  
**Years 2002 to 2016**



**Figure 3.4-19**  
**Mexico Modeled Depletions**  
**Comparison of Surplus Alternatives to Baseline Conditions**  
**Years 2017 to 2050**



### 3.4.4.5.2 Comparison of Surplus Alternatives to Baseline Conditions

Figure 3.4-20 provides a comparison of the 90<sup>th</sup>, 50<sup>th</sup> and 10<sup>th</sup> percentile values for Mexico's depletions under the surplus alternatives to those of the baseline conditions.

As noted in Figure 3.4-20, there is essentially no difference in the 90<sup>th</sup> percentile lines resulting from the surplus alternatives when compared to those of the baseline conditions. The 90<sup>th</sup> percentile lines generally coincide with Mexico's surplus depletion schedule.

The 50<sup>th</sup> and percentile lines for all the surplus alternatives and the baseline conditions coincide with Mexico's normal depletion schedule. Again, water deliveries to Mexico were not observed to fall below Mexico's 1.5 maf apportionment.

Figures 3.4-18 and 3.4-19 presented comparisons of the cumulative distribution of Mexico's depletions under the surplus alternatives to those of the baseline conditions during the interim surplus criteria period for years 2002 to 2016 and the 34-year period that follows the interim surplus criteria (years 2017 to 2050), respectively. Table 3.4-4 provides a tabular summary of the comparison for these two periods.

**Table 3.4-4**  
**Summary of Mexico Modeled Annual Depletions**  
**Comparison of Surplus Alternatives to Baseline Conditions**

| Alternative/Conditions | Years 2002 to 2016 |         |          | Years 2017 to 2050 |         |          |
|------------------------|--------------------|---------|----------|--------------------|---------|----------|
|                        | Normal*            | Surplus | Shortage | Normal*            | Surplus | Shortage |
| Baseline Conditions    | 100%               | 26%     | 0%       | 100%               | 19%     | 0%       |
| Basin States           | 100%               | 23%     | 0%       | 100%               | 18%     | 0%       |
| Flood Control          | 100%               | 27%     | 0%       | 100%               | 20%     | 0%       |
| Six States             | 100%               | 23%     | 0%       | 100%               | 18%     | 0%       |
| California             | 100%               | 19%     | 0%       | 100%               | 18%     | 0%       |
| Shortage Protection    | 100%               | 19%     | 0%       | 100%               | 18%     | 0%       |

\*The values under normal represent the total percentage of time that depletions would be at or above the normal depletion conditions.

The percentage values presented under the column heading labeled "Normal" in Table 3.4-4 represent the total percentage of time that depletions under the noted conditions would be at or above the normal depletion schedule amount. The values presented under the column labeled "Surplus" represent the total percentage of time that depletions under the noted conditions exceed the normal depletion schedule amount. The values presented under the column labeled "Shortage" represent the total percentage of time that depletions under the noted conditions would be below the normal depletion schedule amount.

**Figure 3.4-20**  
**Mexico Modeled Annual Depletions**  
**Comparison of Surplus Alternatives to Baseline Conditions**  
**90th, 50th and 10th Percentile Values**

