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# Technical Appendix 16

Socioeconomics

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# Acronyms and Abbreviations

| Acronym or Abbreviation | Full Phrase                                                                           |
|-------------------------|---------------------------------------------------------------------------------------|
| 2007 Final EIS          | 2007 Interim Guidelines Final Environmental Impact Statement                          |
| 2024 Final SEIS         | Near-term Colorado River Operations Final Supplemental Environmental Impact Statement |
| Basin                   | Colorado River Basin                                                                  |
| CAP                     | Central Arizona Project                                                               |
| CCS                     | Continued Current Strategies                                                          |
| cfs                     | cubic feet per second                                                                 |
| DMDU                    | Decision Making under Deep Uncertainty                                                |
| EIS                     | environmental impact statement                                                        |
| GCNP                    | Grand Canyon National Park                                                            |
| GDP                     | gross domestic product                                                                |
| kaf                     | thousand acre-feet                                                                    |
| LB Priority             | Lower Basin Priority                                                                  |
| LB Pro Rata             | Lower Basin Pro Rata                                                                  |
| maf                     | million acre-feet                                                                     |
| NPS                     | National Park Service                                                                 |
| NRA                     | National Recreation Area                                                              |
| NWR                     | National Wildlife Refuge                                                              |
| PPR                     | present perfected right                                                               |
| Reclamation             | Bureau of Reclamation                                                                 |
| SEIS                    | supplemental environmental impact statement                                           |
| U.S.                    | United States                                                                         |

# TA 16. Socioeconomics

## TA 16.1 Affected Environment

### TA 16.1.1 Socioeconomic Analysis Area

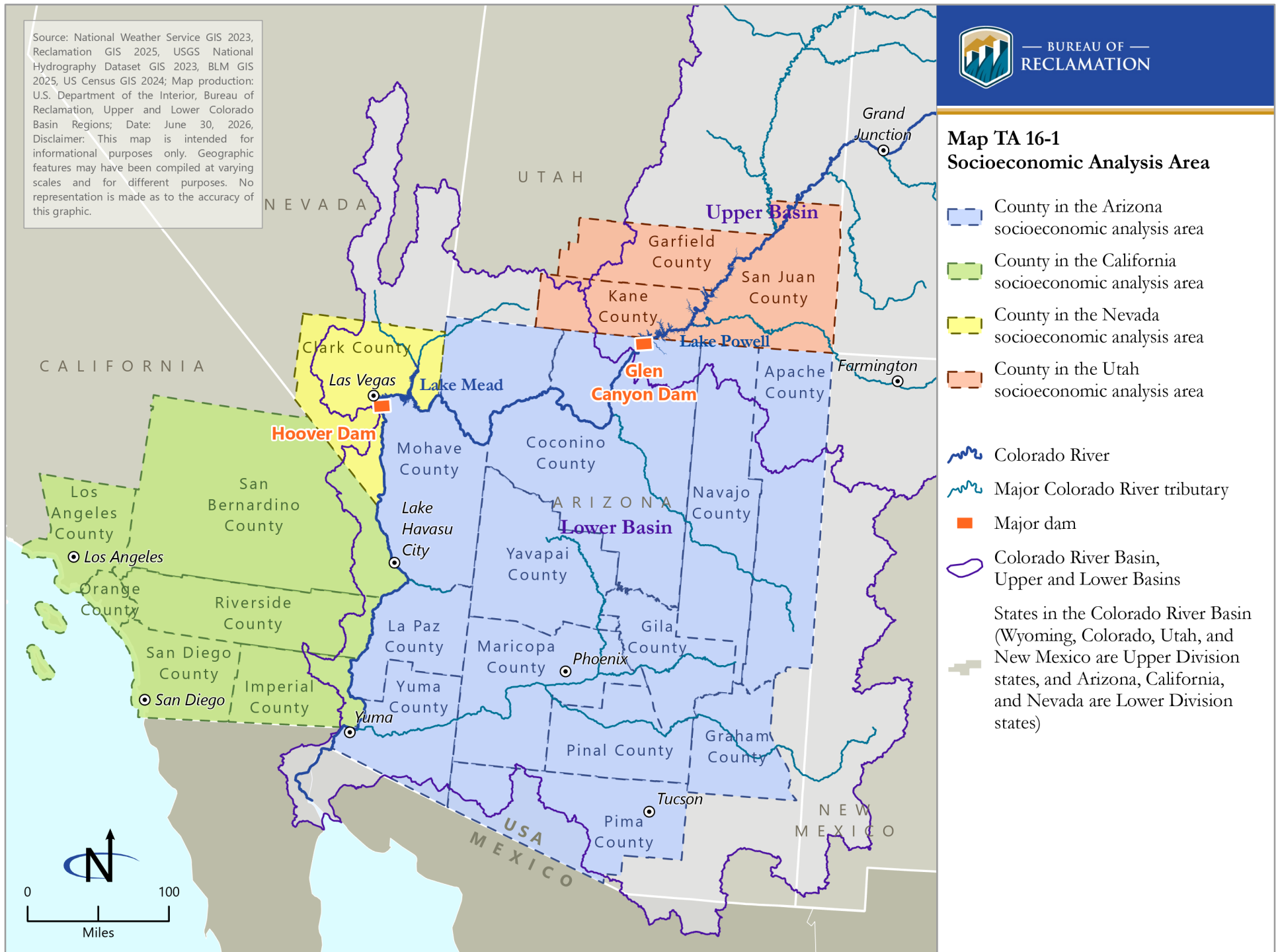
The analysis area for the socioeconomic analysis includes counties in Arizona, California, Nevada, and Utah (see **Map TA 16-1** for a map of the socioeconomic analysis area). In **Section TA 16.2.1, Methodology**, in the Impact Analysis Area subsection under the Agriculture, Recreation, and Ecosystem Services and Nonmarket Values subsections, the socioeconomic analysis area is further described as it relates to each issue statement that was analyzed in this technical appendix. The analysis of impacts on economic and social conditions due to changes in agricultural production included Arizona, California, and Nevada. The analysis on economic impacts from changes in recreational use included Arizona, California, Nevada, and Utah. The impact analysis on ecosystem services and nonmarket values included Arizona, California, Nevada, and Utah. The counties and communities that are included in the socioeconomic analysis area are described further below, by state.

The Arizona analysis area consists of Apache, Coconino, Gila, Graham, La Paz, Maricopa, Mohave, Navajo, Pima, Pinal, Yavapai, and Yuma Counties. These include counties that are directly adjacent to Lake Powell, Lake Mead, or the mainstream Colorado River; counties in which impacts from Colorado River shortages would likely occur; and counties where tribal reservations affected by Colorado River or Central Arizona Project (CAP) shortages are located.<sup>1</sup> The counties in which measurable mainstream Colorado River or CAP shortages could potentially occur to tribal and non-tribal irrigation entitlement holders, resulting in reductions in agricultural production, are La Paz, Maricopa, Mohave, Pinal, Pima, and Yuma Counties.

Apache, Coconino, Gila, Graham, Navajo, and Yavapai Counties would not experience a water shortage to irrigation entitlement holders attributable to the alternatives; however, they are included in the analysis area because of the ties these counties have to recreation-related economic activity on the Colorado River as well as ties to Indian water rights settlements involving CAP water and non-CAP Colorado River water delivered through the CAP. Please refer to **Table 18-3, CAP Water Entitlements**, in **Section TA 18.1.2, Water Entitlements, Water Deliveries, and Storage and Conservation Options**, in **TA 18, Indian Trust Assets**, for details on tribes with CAP contracts.

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<sup>1</sup> See **Section 1.5.1, Geographic Scope of Scope of the Proposed Federal Action and Affected Regions and Interests**, of the Final EIS, for more information on the geographic scope that would be affected by the alternatives analyzed.



The California analysis area consists of Imperial, Los Angeles, Orange, Riverside, San Bernardino, and San Diego Counties. These counties were selected because they are either directly adjacent to the Colorado River, or they are within the Metropolitan Water District of Southern California service area. Although Ventura County is also in the Metropolitan Water District of Southern California service area, it does not receive any water from the Colorado River; therefore, it is not included in the analysis area.

The Nevada analysis area consists of Clark County. The analysis area was limited to Clark County because Clark County is adjacent to Lake Mead and encompasses the Southern Nevada Water Authority's service area and other individual water providers. Shortages in Nevada would be limited to Southern Nevada Water Authority's service area.

The Utah analysis area consists of Garfield, Kane, and San Juan Counties. Utah will not experience shortages under any alternative, so Utah was not included in the analysis area for the agriculture economic impact analysis in this technical appendix. However, changes in storage at Lake Powell could result in changes in recreation-related expenditures made in these Utah analysis area counties; therefore, the following sections include baseline data for Utah because they relate to economic and social conditions due to changes in recreation.

### **TA 16.1.2 Baseline Economic Conditions**

This section provides an overview of baseline economic conditions related to Colorado River water use with the potential to be affected by water shortages. Baseline data used to inform this section were collected from the United States (U.S.) Bureau of Economic Analysis, the U.S. Bureau of Labor Statistics, the U.S. Census Bureau, and current, relevant literature. These data are county-level data on employment, labor income, unemployment rates, poverty, and the market value of agricultural production in the analysis areas. The county-level data do not distinguish between water sources that were used in support of the economic conditions presented, which may include a combination of the mainstream Colorado River, CAP, and other water sources.

#### ***Arizona***

##### **Employment and Personal Income**

**Table TA 16-1** and **Table TA 16-2**, below, provide an overview for employment by sector for the counties in the analysis area in Arizona in 2010 and 2022, respectively. Full- and part-time employment in Arizona totaled almost 4.3 million jobs in 2022, an increase of approximately 1.1 million jobs from 2010 levels. Farm employment totaled almost 28,000 jobs in 2022 and accounted for 0.6 percent of the total employment in the state; this is a small reduction from the number of jobs and the percentage of the total employment in 2010, at almost 29,000 jobs and 0.9 percent of the total employment.

**Table TA 16-1**  
**Arizona Employment by Industry (2010)**

| Employment                                                                 | Apache<br>County | Coconino<br>County | Gila<br>County  | Graham<br>County | La Paz<br>County | Maricopa<br>County | Mohave<br>County | Navajo<br>County | Pima<br>County   | Pinal<br>County | Yavapai<br>County | Yuma<br>County  | Arizona            |
|----------------------------------------------------------------------------|------------------|--------------------|-----------------|------------------|------------------|--------------------|------------------|------------------|------------------|-----------------|-------------------|-----------------|--------------------|
| Total employment                                                           | 29,145           | 76,339             | 20,545          | 11,169           | 7,120            | 2,128,893          | 64,093           | 39,742           | 476,916          | 81,029          | 87,126            | 79,896          | 3,181,563          |
| Wage and salary<br>employment                                              | 20,108           | 60,171             | 14,547          | 8,771            | 5,632            | 1,674,446          | 47,017           | 27,588           | 373,423          | 55,378          | 56,921            | 66,962          | 2,473,077          |
| Proprietors'<br>employment                                                 | 9,037            | 16,168             | 5,998           | 2,398            | 1,488            | 454,447            | 17,076           | 12,154           | 103,493          | 25,651          | 30,205            | 12,934          | 708,486            |
| Farm employment<br>(number and<br>percentage of total<br>employment)       | 5,097<br>17.5%   | 2,014<br>2.6%      | 223<br>1.1%     | 670<br>6.0%      | 254<br>3.6%      | 6,325<br>0.3%      | 529<br>0.8%      | 3,665<br>9.2%    | 1,177<br>0.2%    | 2,147<br>2.6%   | 937<br>1.1%       | 3,152<br>3.9%   | 28,609<br>0.9%     |
| Nonfarm<br>employment<br>(number and<br>percentage of total<br>employment) | 24,048<br>82.5%  | 74,325<br>97.4%    | 20,322<br>98.9% | 10,499<br>94.0%  | 6,866<br>96.4%   | 2,122,568<br>99.7% | 63,564<br>99.2%  | 36,077<br>90.8%  | 475,739<br>99.8% | 78,882<br>97.4% | 86,189<br>98.9%   | 76,744<br>96.1% | 3,152,954<br>99.1% |
| <b>Employment by Industry (Number and Percentage of Total Employment)</b>  |                  |                    |                 |                  |                  |                    |                  |                  |                  |                 |                   |                 |                    |
| Forestry, fishing,<br>and related                                          | 238              | 229                | 116             | (D)              | (D)              | 2,537              | (D)              | 235              | 391              | 616             | 308               | 9,444           | 15,507             |
|                                                                            | 0.8%             | 0.3%               | 0.6%            | (D)              | (D)              | 0.1%               | (D)              | 0.6%             | 0.1%             | 0.8%            | 0.4%              | 11.8%           | 0.5%               |
| Mining, quarrying,<br>and oil and gas<br>extraction                        | 59               | 220                | 1,082           | (D)              | (D)              | 6,348              | 592              | 575              | 3,241            | 1,540           | 1,690             | 121             | 17,968             |
|                                                                            | 0.2%             | 0.3%               | 5.3%            | (D)              | (D)              | 0.3%               | 0.9%             | 1.4%             | 0.7%             | 1.9%            | 1.9%              | 0.2%            | 0.6%               |
| Utilities                                                                  | (D)              | 107                | 66              | 72               | (D)              | 8,193              | 311              | 57               | 2,115            | 294             | 131               | 179             | 12,518             |
|                                                                            | (D)              | 0.1%               | 0.3%            | 0.6%             | (D)              | 0.4%               | 0.5%             | 0.1%             | 0.4%             | 0.4%            | 0.2%              | 0.2%            | 0.4%               |
| Construction                                                               | 1,046            | 3,144              | 1,228           | (D)              | 181              | 109,587            | 4,051            | 1,845            | 22,088           | 3,380           | 5,708             | 3,556           | 159,505            |
|                                                                            | 3.6%             | 4.1%               | 6.0%            | (D)              | 2.5%             | 5.1%               | 6.3%             | 4.6%             | 4.6%             | 4.2%            | 6.6%              | 4.5%            | 5.0%               |
| Manufacturing                                                              | 605              | 4,084              | 1,074           | 265              | 162              | 112,507            | 3,144            | 735              | 25,858           | 3,535           | 3,422             | 1,961           | 158,823            |
|                                                                            | 2.1%             | 5.3%               | 5.2%            | 2.4%             | 2.3%             | 5.3%               | 4.9%             | 1.8%             | 5.4%             | 4.4%            | 3.9%              | 2.5%            | 5.0%               |
| Wholesale trade                                                            | (D)              | 973                | 249             | 141              | 87               | 87,971             | 1,076            | 543              | 9,731            | 1,338           | 2,394             | 1,437           | 108,772            |
|                                                                            | (D)              | 1.3%               | 1.2%            | 1.3%             | 1.2%             | 4.1%               | 1.7%             | 1.4%             | 2.0%             | 1.7%            | 2.7%              | 1.8%            | 3.4%               |
| Retail trade                                                               | 1,709            | 8,514              | 2,349           | 1,538            | 1,239            | 236,685            | 9,859            | 4,357            | 48,909           | 9,071           | 11,185            | 8,411           | 353,032            |
|                                                                            | 5.9%             | 11.2%              | 11.4%           | 13.8%            | 17.4%            | 11.1%              | 15.4%            | 11.0%            | 10.3%            | 11.2%           | 12.8%             | 10.5%           | 11.1%              |

| Employment                                             | Apache<br>County | Coconino<br>County | Gila<br>County | Graham<br>County | La Paz<br>County | Maricopa<br>County | Mohave<br>County | Navajo<br>County | Pima<br>County  | Pinal<br>County | Yavapai<br>County | Yuma<br>County  | Arizona          |
|--------------------------------------------------------|------------------|--------------------|----------------|------------------|------------------|--------------------|------------------|------------------|-----------------|-----------------|-------------------|-----------------|------------------|
| Transportation<br>and warehousing                      | 385<br>1.3%      | 1,971<br>2.6%      | 423<br>2.1%    | 158<br>1.4%      | (D)<br>(D)       | 64,320<br>3.0%     | 1,774<br>2.8%    | 1,081<br>2.7%    | 9,157<br>1.9%   | 1,887<br>2.3%   | 1,698<br>1.9%     | 1,794<br>2.2%   | 87,237<br>2.7%   |
| Information                                            | 120<br>0.4%      | 595<br>0.8%        | 218<br>1.1%    | 124<br>1.1%      | 29<br>0.4%       | 34,552<br>1.6%     | 1,036<br>1.6%    | 1,249<br>3.1%    | 5,866<br>1.2%   | 785<br>1.0%     | 1,080<br>1.2%     | 662<br>0.8%     | 47,208<br>1.5%   |
| Finance and<br>insurance                               | (D)<br>(D)       | 1,622<br>2.1%      | 493<br>2.4%    | 266<br>2.4%      | 120<br>1.7%      | 156,658<br>7.4%    | 2,043<br>3.2%    | 867<br>2.2%      | 22,093<br>4.6%  | 2,941<br>3.6%   | 3,390<br>3.9%     | 1,685<br>2.1%   | 194,156<br>6.1%  |
| Real estate rental<br>and leasing                      | 595<br>2.0%      | 3,236<br>4.2%      | 1,081<br>5.3%  | 330<br>3.0%      | 297<br>4.2%      | 140,169<br>6.6%    | 4,206<br>6.6%    | 1,592<br>4.0%    | 25,055<br>5.3%  | 4,431<br>5.5%   | 6,785<br>7.8%     | 2,555<br>3.2%   | 193,014<br>6.1%  |
| Professional,<br>scientific, and<br>technical services | 352<br>1.2%      | 3,020<br>4.0%      | (D)<br>(D)     | 912<br>8.2%      | 122<br>1.7%      | 147,900<br>6.9%    | 2,301<br>3.6%    | 1,012<br>2.5%    | 32,335<br>6.8%  | 3,575<br>4.4%   | 4,758<br>5.5%     | 2,515<br>3.1%   | 205,097<br>6.4%  |
| Management of<br>companies and<br>enterprises          | 38<br>0.1%       | 129<br>0.2%        | (D)<br>(D)     | (D)<br>(D)       | 32<br>0.4%       | 25,180<br>1.2%     | (D)<br>(D)       | 248<br>0.6%      | 3,173<br>0.7%   | 93<br>0.1%      | 138<br>0.2%       | 100<br>0.1%     | 29,569<br>0.9%   |
| Administrative,<br>support, and waste<br>management    | 375<br>1.3%      | 2,138<br>2.8%      | 882<br>4.3%    | (D)<br>(D)       | 322<br>4.5%      | 188,443<br>8.9%    | 3,888<br>6.1%    | 1,059<br>2.7%    | 33,965<br>7.1%  | 6,454<br>8.0%   | 3,850<br>4.4%     | 5,498<br>6.9%   | 250,885<br>7.9%  |
| Educational<br>services                                | 632<br>2.2%      | 951<br>1.2%        | 164<br>0.8%    | (D)<br>(D)       | (D)<br>(D)       | 51,118<br>2.4%     | 742<br>1.2%      | 979<br>2.5%      | 7,510<br>1.6%   | 1,143<br>1.4%   | 2,536<br>2.9%     | 575<br>0.7%     | 67,392<br>2.1%   |
| Health care and<br>social assistance                   | 2,357<br>8.1%    | 8,752<br>11.5%     | 2,181<br>10.6% | 1,360<br>12.2%   | (D)<br>(D)       | 221,074<br>10.4%   | 8,456<br>13.2%   | 3,564<br>9.0%    | 62,367<br>13.1% | 6,034<br>7.4%   | 10,131<br>11.6%   | 7,725<br>9.7%   | 340,074<br>10.7% |
| Arts,<br>entertainment, and<br>recreation              | 220<br>0.8%      | 2,687<br>3.5%      | 359<br>1.7%    | (D)<br>(D)       | (D)<br>(D)       | 45,043<br>2.1%     | 1,013<br>1.6%    | 634<br>1.6%      | 10,802<br>2.3%  | 1,598<br>2.0%   | 2,841<br>3.3%     | 570<br>0.7%     | 66,935<br>2.1%   |
| Accommodation<br>and food services                     | 1,239<br>4.3%    | 11,031<br>14.5%    | 1,487<br>7.2%  | (D)<br>(D)       | (D)<br>(D)       | 153,423<br>7.2%    | 5,820<br>9.1%    | 3,285<br>8.3%    | 35,864<br>7.5%  | 4,434<br>5.5%   | 6,752<br>7.7%     | 5,531<br>6.9%   | 235,695<br>7.4%  |
| Other services                                         | 713<br>2.4%      | 3,254<br>4.3%      | 957<br>4.7%    | 646<br>5.8%      | 326<br>4.6%      | 104,806<br>4.9%    | 4,303<br>6.7%    | 1,848<br>4.6%    | 25,669<br>5.4%  | 4,963<br>6.1%   | 5,835<br>6.7%     | 3,494<br>4.4%   | 160,513<br>5.0%  |
| Government and<br>government<br>enterprises            | 12,581<br>43.2%  | 17,668<br>23.1%    | 5,172<br>25.2% | 2,763<br>24.7%   | 2,334<br>32.8%   | 226,054<br>10.6%   | 8,661<br>13.5%   | 10,312<br>25.9%  | 89,550<br>18.8% | 20,770<br>25.6% | 11,557<br>13.3%   | 18,931<br>23.7% | 449,054<br>14.1% |

Source: BEA 2024a

D = not shown to avoid disclosure of confidential information; estimates are included in higher-level totals.

**Table TA 16-2**  
**Arizona Employment by Industry (2022)**

| Employment                                                                | Apache<br>County | Coconino<br>County | Gila<br>County  | Graham<br>County | La Paz<br>County | Maricopa<br>County | Mohave<br>County | Navajo<br>County | Pima<br>County   | Pinal<br>County  | Yavapai<br>County | Yuma<br>County  | Arizona            |
|---------------------------------------------------------------------------|------------------|--------------------|-----------------|------------------|------------------|--------------------|------------------|------------------|------------------|------------------|-------------------|-----------------|--------------------|
| Total employment                                                          | 26,932           | 88,910             | 21,663          | 14,234           | 8,161            | 3,038,704          | 81,675           | 43,690           | 557,893          | 116,876          | 112,493           | 95,822          | 4,287,595          |
| Wage and salary<br>employment                                             | 17,385           | 67,640             | 15,362          | 10,741           | 6,402            | 2,307,069          | 57,889           | 29,232           | 415,635          | 71,285           | 71,986            | 76,858          | 3,206,670          |
| Proprietors'<br>employment                                                | 9,547            | 21,270             | 6,301           | 3,493            | 1,759            | 731,635            | 23,786           | 14,458           | 142,258          | 45,591           | 40,507            | 18,964          | 1,080,925          |
| Farm employment<br>(number and<br>percentage of total<br>employment)      | 5,164<br>19.2%   | 2,088<br>2.3%      | 179<br>0.8%     | 405<br>2.8%      | 434<br>5.3%      | 5,775<br>0.2%      | 479<br>0.6%      | 3,819<br>8.7%    | 1,042<br>0.2%    | 2,051<br>1.8%    | 1,190<br>1.1%     | 3,110<br>3.2%   | 27,735<br>0.6%     |
| Nonfarm<br>employment (number<br>and percentage of<br>total employment)   | 21,768<br>80.8%  | 86,822<br>97.7%    | 21,484<br>99.2% | 13,829<br>97.2%  | 7,727<br>94.7%   | 3,032,929<br>99.8% | 81,196<br>99.4%  | 39,871<br>91.3%  | 556,851<br>99.8% | 114,825<br>98.2% | 111,303<br>98.9%  | 92,712<br>96.8% | 4,259,860<br>99.4% |
| <b>Employment by Industry (Number and Percentage of Total Employment)</b> |                  |                    |                 |                  |                  |                    |                  |                  |                  |                  |                   |                 |                    |
| Forestry, fishing,<br>and related                                         | (D)<br>(D)       | 254<br>0.3%        | 125<br>0.6%     | (D)<br>(D)       | (D)<br>(D)       | 2,678<br>0.1%      | (D)<br>(D)       | (D)<br>(D)       | 494<br>0.1%      | 569<br>0.5%      | 369<br>0.3%       | (D)<br>(D)      | 14,280<br>0.3%     |
| Mining, quarrying,<br>and oil and gas<br>extraction                       | (D)<br>(D)       | 178<br>0.2%        | 1,029<br>4.8%   | (D)<br>(D)       | 88<br>1.1%       | 5,733<br>0.2%      | 469<br>0.6%      | (D)<br>(D)       | 3,762<br>0.7%    | 1,313<br>1.1%    | 1,711<br>1.5%     | (D)<br>(D)      | 20,295<br>0.5%     |
| Utilities                                                                 | (D)<br>(D)       | 196<br>0.2%        | 70<br>0.3%      | (D)<br>(D)       | 11<br>0.1%       | 8,357<br>0.3%      | 418<br>0.5%      | 119<br>0.3%      | 2,064<br>0.4%    | 365<br>0.3%      | 220<br>0.2%       | 157<br>0.2%     | 12,818<br>0.3%     |
| Construction                                                              | 1,278<br>4.7%    | 4,086<br>4.6%      | 1,374<br>6.3%   | 699<br>4.9%      | 219<br>2.7%      | 197,947<br>6.5%    | 6,958<br>8.5%    | 2,718<br>6.2%    | 29,426<br>5.3%   | 6,691<br>5.7%    | 9,184<br>8.2%     | 5,253<br>5.5%   | 270,022<br>6.3%    |
| Manufacturing                                                             | 249<br>0.9%      | 3,852<br>4.3%      | 1,303<br>6.0%   | 265<br>1.9%      | 293<br>3.6%      | 148,956<br>4.9%    | 3,561<br>4.4%    | 533<br>1.2%      | 30,132<br>5.4%   | 5,641<br>4.8%    | 4,725<br>4.2%     | 3,483<br>3.6%   | 204,725<br>4.8%    |
| Wholesale trade                                                           | 403<br>1.5%      | 1,412<br>1.6%      | 190<br>0.9%     | (D)<br>(D)       | 131<br>1.6%      | 102,023<br>3.4%    | 1,827<br>2.2%    | 573<br>1.3%      | 9,631<br>1.7%    | 2,265<br>1.9%    | 2,460<br>2.2%     | 2,108<br>2.2%   | 126,540<br>3.0%    |
| Retail trade                                                              | 1,244<br>4.6%    | 8,866<br>10.0%     | 2,398<br>11.1%  | 1,984<br>13.9%   | 1,739<br>21.3%   | 289,783<br>9.5%    | 12,436<br>15.2%  | 4,775<br>10.9%   | 52,938<br>9.5%   | 14,351<br>12.3%  | 13,759<br>12.2%   | 10,107<br>10.5% | 422,975<br>9.9%    |
| Transportation<br>and warehousing                                         | (D)<br>(D)       | 2,709<br>3.0%      | 486<br>2.2%     | (D)<br>(D)       | 179<br>2.2%      | 181,284<br>6.0%    | 3,254<br>4.0%    | 1,592<br>3.6%    | 31,151<br>5.6%   | 7,177<br>6.1%    | 3,292<br>2.9%     | 3,558<br>3.7%   | 240,127<br>5.6%    |

| Employment                                             | Apache<br>County | Coconino<br>County | Gila<br>County | Graham<br>County | La Paz<br>County | Maricopa<br>County | Mohave<br>County | Navajo<br>County | Pima<br>County | Pinal<br>County | Yavapai<br>County | Yuma<br>County | Arizona |
|--------------------------------------------------------|------------------|--------------------|----------------|------------------|------------------|--------------------|------------------|------------------|----------------|-----------------|-------------------|----------------|---------|
| Information                                            | 114              | 791                | 184            | 76               | 98               | 52,979             | 769              | 364              | 7,813          | 1,138           | 1,077             | 531            | 66,692  |
|                                                        | 0.4%             | 0.9%               | 0.8%           | 0.5%             | 1.2%             | 1.7%               | 0.9%             | 0.8%             | 1.4%           | 1.0%            | 1.0%              | 0.6%           | 1.6%    |
| Finance and<br>insurance                               | (D)              | 2,295              | 727            | 513              | 181              | 256,443            | 3,078            | 1,167            | 28,136         | 5,261           | 5,394             | 4,265          | 309,879 |
|                                                        | (D)              | 2.6%               | 3.4%           | 3.6%             | 2.2%             | 8.4%               | 3.8%             | 2.7%             | 5.0%           | 4.5%            | 4.8%              | 4.5%           | 7.2%    |
| Real estate rental<br>and leasing                      | 745              | 4,777              | 1,271          | (D)              | 346              | 200,999            | 5,693            | 2,007            | 32,866         | 7,083           | 9,524             | 3,721          | 272,829 |
|                                                        | 2.8%             | 5.4%               | 5.9%           | (D)              | 4.2%             | 6.6%               | 7.0%             | 4.6%             | 5.9%           | 6.1%            | 8.5%              | 3.9%           | 6.4%    |
| Professional,<br>scientific, and<br>technical services | (D)              | 4,012              | 892            | 405              | (D)              | 222,987            | 3,643            | 1,350            | 35,199         | 5,573           | 6,610             | 3,652          | 289,301 |
|                                                        | (D)              | 4.5%               | 4.1%           | 2.8%             | (D)              | 7.3%               | 4.5%             | 3.1%             | 6.3%           | 4.8%            | 5.9%              | 3.8%           | 6.7%    |
| Management of<br>companies and<br>enterprises          | (D)              | 597                | 63             | (D)              | (D)              | 47,528             | 295              | 196              | 2,996          | 557             | 477               | 408            | 53,464  |
|                                                        | (D)              | 0.7%               | 0.3%           | (D)              | (D)              | 1.6%               | 0.4%             | 0.4%             | 0.5%           | 0.5%            | 0.4%              | 0.4%           | 1.2%    |
| Administrative,<br>support, and waste<br>management    | 477              | 2,948              | 733            | (D)              | 194              | 250,356            | 4,424            | 1,518            | 37,995         | 8,178           | 5,989             | 6,384          | 322,974 |
|                                                        | 1.8%             | 3.3%               | 3.4%           | (D)              | 2.4%             | 8.2%               | 5.4%             | 3.5%             | 6.8%           | 7.0%            | 5.3%              | 6.7%           | 7.5%    |
| Educational services                                   | 445              | 1,280              | 187            | (D)              | (D)              | 70,915             | 887              | 824              | 10,175         | 2,422           | 2,950             | 744            | 92,109  |
|                                                        | 1.7%             | 1.4%               | 0.9%           | (D)              | (D)              | 2.3%               | 1.1%             | 1.9%             | 1.8%           | 2.1%            | 2.6%              | 0.8%           | 2.1%    |
| Health care and<br>social assistance                   | 2,791            | 9,792              | 1,731          | 1,469            | (D)              | 342,031            | 9,709            | 4,640            | 69,969         | 7,418           | 10,981            | 9,589          | 476,659 |
|                                                        | 10.4%            | 11.0%              | 8.0%           | 10.3%            | (D)              | 11.3%              | 11.9%            | 10.6%            | 12.5%          | 6.3%            | 9.8%              | 10.0%          | 11.1%   |
| Arts, entertainment,<br>and recreation                 | 275              | 3,260              | 364            | 135              | (D)              | 60,822             | (D)              | 629              | 11,851         | 2,891           | 2,774             | 692            | 85,991  |
|                                                        | 1.0%             | 3.7%               | 1.7%           | 0.9%             | (D)              | 2.0%               | (D)              | 1.4%             | 2.1%           | 2.5%            | 2.5%              | 0.7%           | 2.0%    |
| Accommodation<br>and food services                     | 1,063            | 14,645             | 1,988          | 1,049            | (D)              | 212,406            | 8,557            | 4,067            | 41,557         | 7,739           | 10,622            | 7,560          | 317,706 |
|                                                        | 3.9%             | 16.5%              | 9.2%           | 7.4%             | (D)              | 7.0%               | 10.5%            | 9.3%             | 7.4%           | 6.6%            | 9.4%              | 7.9%           | 7.4%    |
| Other services                                         | 652              | 3,774              | 1,011          | 845              | (D)              | 145,117            | 5,424            | 2,061            | 31,225         | 7,789           | 7,869             | 4,636          | 214,742 |
|                                                        | 2.4%             | 4.2%               | 4.7%           | 5.9%             | (D)              | 4.8%               | 6.6%             | 4.7%             | 5.6%           | 6.7%            | 7.0%              | 4.8%           | 5.0%    |
| Government and<br>government<br>enterprises            | 10,090           | 17,098             | 5,358          | 3,057            | 2,017            | 233,585            | 8,539            | 9,828            | 87,471         | 20,404          | 11,316            | 18,370         | 445,732 |
|                                                        | 37.5%            | 19.2%              | 24.7%          | 21.5%            | 24.7%            | 7.7%               | 10.5%            | 22.5%            | 15.7%          | 17.5%           | 10.1%             | 19.2%          | 10.4%   |

Source: BEA 2024a

D = not shown to avoid disclosure of confidential information; estimates are included in higher-level totals.

Employment in the analysis area counties represents approximately 98.1 percent of the total employment in Arizona. Farm employment in the 12 counties totaled about 26,000 jobs in 2022 and represented about 0.6 percent of the total employment in the analysis area counties.<sup>2</sup> Farm employment made up a larger percentage of the total employment in Apache and Navajo Counties than in the rest of the counties in the analysis area, with 19.2 percent and 8.7 percent of the total employment, respectively (BEA 2024a). In 2022, employment in the arts, entertainment, and recreation sector totaled approximately 84,000 jobs (or 2.0 percent of the total employment in the analysis area), which was an increase from 2010 jobs by about 27 percent.

Total personal income in Arizona was almost \$430.1 billion in 2022, compared with \$293.8 billion in 2010 (adjusted to 2022 dollars). Likewise, per capita income increased from approximately \$46,000 in 2010 (adjusted to 2022 dollars) to approximately \$58,000 in 2022; this is a 27.3 percent increase (see **Table TA 16-3**; BEA 2024b). Arizona farm earnings per farm worker, in 2022, were about \$35,000 (\$965.1 million in farm earnings divided by 27,735 farm jobs), which was an increase of about \$3,000 from 2010 earnings (adjusted to 2022 dollars; BEA 2024a, 2024b).

The total personal income generated in the 12 counties represented 97.9 percent of the state total in 2022. Among the 12 counties, average per capita income ranged from a low of approximately \$42,000 per year in Graham County and Navajo County to a high of \$63,000 per year in Maricopa County. Only Maricopa and Coconino Counties had per capita income above that of the state of Arizona (about \$58,000). In 2022, farm earnings per farm worker, including proprietor's income, in the analysis area ranged from an accounting loss<sup>3</sup> of about \$3,000 in Apache County to earnings per worker of about \$112,000 in Yuma County (BEA 2024a, 2024b).

**Table TA 16-4**, Arizona Employment by Industry (2010), displays the annual unemployment rate and the population below poverty. The unemployment rate is a key economic indicator, which can indicate the financial health of an economy; a low rate generally indicates a functioning economy, while a high rate is a concern for the general economy and likely indicates that some individuals in the labor force are in economic distress due to the lack of work and associated income. In 2023, eight of the study area counties in Arizona had annual unemployment rates that were higher than the state unemployment rate of 3.9 percent. Unemployment was notably high in Yuma County, with an unemployment rate of 13.2 percent, which is over three times greater than that of the state of Arizona.

<sup>2</sup> Farm employment does not include employment in other industries that are supported by the farming industry, such as employment in the transportation and warehousing, manufacturing (including food manufacturing), and retail trade (including food and beverage and grocery stores) industries. Changes in water availability that affect the farming industry would also indirectly affect these industries. More information on indirect impacts on employment, labor income, and economic output is discussed in **Section TA 16.2**, Environmental Consequences.

<sup>3</sup> Accounting losses occur when proprietors incur more expenses than the revenues they receive.

**Table TA 16-3**  
**2010 and 2022 Arizona Personal Income and Earnings (2022\$)**

| Geographic Area | Year | Personal Income (\$1,000s) <sup>1</sup> | Per Capita Personal Income (\$) | Earnings by Place of Work (\$1,000s) <sup>2</sup> | Wages and Salaries (\$1,000s) | Supplements to Wages and Salaries (\$1,000s) | Proprietors' Income (\$1,000s) | Farm Earnings (\$1,000s) <sup>3</sup> | Nonfarm Earnings (\$1,000s) |
|-----------------|------|-----------------------------------------|---------------------------------|---------------------------------------------------|-------------------------------|----------------------------------------------|--------------------------------|---------------------------------------|-----------------------------|
| Apache County   | 2010 | 2,609,269                               | 36,405                          | 1,414,013                                         | 1,022,775                     | 341,461                                      | 49,777                         | -16,648                               | 1,430,661                   |
|                 | 2022 | 2,985,841                               | 45,633                          | 1,258,823                                         | 933,078                       | 291,883                                      | 33,862                         | -17,685                               | 1,276,508                   |
| Coconino County | 2010 | 6,320,272                               | 46,927                          | 4,242,788                                         | 3,002,872                     | 858,815                                      | 381,102                        | 7,835                                 | 4,234,954                   |
|                 | 2022 | 8,489,905                               | 58,933                          | 5,104,144                                         | 3,429,711                     | 831,405                                      | 843,028                        | 18,221                                | 5,085,923                   |
| Gila County     | 2010 | 2,292,299                               | 42,815                          | 1,031,683                                         | 733,922                       | 202,274                                      | 95,487                         | -1,627                                | 1,033,310                   |
|                 | 2022 | 2,723,317                               | 50,505                          | 1,151,619                                         | 834,614                       | 199,452                                      | 117,553                        | 4,440                                 | 1,147,179                   |
| Graham County   | 2010 | 1,220,682                               | 32,868                          | 579,806                                           | 415,149                       | 119,880                                      | 44,776                         | 21,457                                | 558,349                     |
|                 | 2022 | 1,614,728                               | 41,593                          | 788,260                                           | 564,091                       | 144,457                                      | 79,712                         | 20,956                                | 767,304                     |
| La Paz County   | 2010 | 730,733                                 | 35,875                          | 350,640                                           | 233,038                       | 68,798                                       | 48,804                         | 7,817                                 | 342,823                     |
|                 | 2022 | 891,281                                 | 53,997                          | 438,520                                           | 303,349                       | 73,280                                       | 61,891                         | 2,279                                 | 436,241                     |
| Maricopa County | 2010 | 188,035,877                             | 49,196                          | 138,424,028                                       | 106,164,387                   | 23,093,967                                   | 9,165,674                      | 268,309                               | 138,155,719                 |
|                 | 2022 | 288,842,282                             | 63,461                          | 214,404,981                                       | 161,524,726                   | 29,587,729                                   | 23,292,526                     | 309,573                               | 214,095,408                 |
| Mohave County   | 2010 | 7,038,922                               | 35,149                          | 3,104,621                                         | 2,145,945                     | 557,828                                      | 400,848                        | 4,747                                 | 3,099,875                   |
|                 | 2022 | 9,858,399                               | 44,645                          | 4,264,281                                         | 2,855,094                     | 609,712                                      | 799,475                        | 29,302                                | 4,234,979                   |
| Navajo County   | 2010 | 3,602,578                               | 33,492                          | 1,871,351                                         | 1,341,136                     | 393,864                                      | 136,351                        | 9,635                                 | 1,861,715                   |
|                 | 2022 | 4,573,766                               | 42,096                          | 2,083,700                                         | 1,444,111                     | 385,028                                      | 254,561                        | 4,493                                 | 2,079,207                   |
| Pima County     | 2010 | 45,472,764                              | 46,340                          | 29,279,856                                        | 20,803,977                    | 5,403,156                                    | 3,072,723                      | 53,300                                | 29,226,556                  |
|                 | 2022 | 57,601,036                              | 54,464                          | 33,730,853                                        | 24,181,286                    | 5,425,568                                    | 4,123,999                      | 38,815                                | 33,692,038                  |
| Pinal County    | 2010 | 12,272,501                              | 32,462                          | 4,258,204                                         | 2,939,244                     | 822,156                                      | 496,804                        | 85,827                                | 4,172,376                   |
|                 | 2022 | 21,327,852                              | 45,950                          | 5,769,883                                         | 3,853,398                     | 898,204                                      | 1,018,281                      | 143,314                               | 5,626,569                   |
| Yavapai County  | 2010 | 8,281,422                               | 39,265                          | 3,767,437                                         | 2,601,263.42                  | 671,921.70                                   | 494,252.20                     | 3,424.65                              | 3,764,012.67                |
|                 | 2022 | 12,784,510                              | 51,921                          | 5,426,215                                         | 3,607,595                     | 776,457                                      | 1,042,163                      | 22,356                                | 5,403,859                   |
| Yuma County     | 2010 | 7,434,183                               | 37,768                          | 4,869,064                                         | 3,199,051                     | 929,114                                      | 740,899                        | 422,731                               | 4,446,333                   |
|                 | 2022 | 9,313,549                               | 44,811                          | 6,007,178                                         | 4,013,230                     | 1,047,861                                    | 946,087                        | 347,302                               | 5,659,876                   |
| Arizona         | 2010 | 293,846,986                             | 45,899                          | 198,706,221                                       | 148,343,547                   | 34,563,721                                   | 15,798,954                     | 912,061                               | 197,794,160                 |
|                 | 2022 | 430,083,534                             | 58,442                          | 285,840,783                                       | 211,131,613                   | 41,274,140                                   | 33,435,030                     | 965,062                               | 284,875,721                 |

Source: BEA 2024b

<sup>1</sup> Personal income is calculated at the place of residence and includes labor income as well as non-labor income, such as dividends, interest, and rent.<sup>2</sup> Earnings is calculated at the place of work based on labor income, such as wages and salaries, supplements, and proprietors' income.<sup>3</sup> Accounting losses in farm earnings occur when proprietors incur more expenses than the revenues they receive.

Across the Arizona analysis area, nine out of the 12 counties had a higher percentage of people living below the poverty level than the state (12.8 percent), with the largest percentage of people below poverty in Apache County (31.2 percent) and Navajo County (24.7 percent). This suggests that economic considerations are important factors for many individuals throughout the analysis area, and management actions that impact economic opportunities and economic conditions could greatly affect the surrounding communities.

**Table TA 16-4**  
**Arizona Analysis Area Unemployment and Poverty (2023)**

| Geographic Area | Unemployment (%) | % Below Poverty |
|-----------------|------------------|-----------------|
| Apache County   | 7.9              | 31.2            |
| Coconino County | 4.2              | 17.7            |
| Gila County     | 4.3              | 17.8            |
| Graham County   | 3.7              | 17.7            |
| La Paz County   | 4.8              | 18.4            |
| Maricopa County | 3.4              | 11.3            |
| Mohave County   | 4.5              | 16.8            |
| Navajo County   | 5.7              | 24.7            |
| Pima County     | 3.8              | 14.4            |
| Pinal County    | 4.1              | 10.9            |
| Yavapai County  | 3.6              | 12.6            |
| Yuma County     | 13.2             | 16.5            |
| <b>Arizona</b>  | <b>3.9</b>       | <b>12.8</b>     |

Sources: Bureau of Labor Statistics 2023; U.S. Census Bureau 2023a

### Agriculture

Agriculture is an important part of the economy in Arizona. Approximately 35 percent of Arizona's land area in 2022 was used for agricultural purposes (on cropland, pastureland, woodland, or other; USDA 2024). In 2022, the market value of agricultural products sold in Arizona contributed \$5.2 billion to Arizona's economy. Additional contributions to the economy from agriculture come from the manufacture of crop inputs, crop processing, marketing, and distribution, and agricultural income (Lahmers and Edan 2018). The key crops produced and sold in Arizona include corn, wheat, vegetables, and melons (USDA 2024). The types of crops, amount of water used for agriculture, and the role of agriculture in county economies vary across the state and analysis area. Additional information on irrigated agricultural acreage within the analysis area is provided in **TA 17**, Population and Land Use.

Central and southwestern Arizona farms contribute the largest share of agricultural production in terms of sales values. In 2022, the total market value of agricultural products sold in the Arizona analysis area contributed \$4.8 billion to Arizona's economy, which was about 91 percent of the market value of agricultural products sold in the state and about one percent of the Arizona total gross domestic product (GDP). The market value of crops sold in the analysis area (excluding values for La Paz and Yuma Counties to avoid disclosure of confidential information) was about \$1.3 billion. Across Maricopa, Pima, and Pinal Counties, the market value of crops sold in 2022 ranged

from about \$87.1 million in Pima County to about \$742.6 million in Maricopa County (USDA 2024). In 2024, compared with the other analysis area counties, Yuma County and La Paz County had the highest farming output as a percentage of the counties' total economic output, with about 9.2 percent and 7.4 percent of total output coming from the farming industry in La Paz and Yuma Counties, respectively (IMPLAN 2025).

**Table TA 16-5** presents a summary of the market value of on-farm agricultural production with respect to county and state GDP. **Table TA 16-6** presents the county-level economic output from the farming industry and the percentage of farming economic output to total county-level output.

**Table TA 16-5**  
**Market Value of Agricultural Production in Arizona Analysis Area (2022)**

| Area                                     | Market Value of Crops Sold (\$1,000) | Percentage of Market Value of Crops Sold to County GDP | Percentage of Market Value of Crops Sold to Arizona GDP | Market Value of Agricultural Products Sold (\$1,000) |
|------------------------------------------|--------------------------------------|--------------------------------------------------------|---------------------------------------------------------|------------------------------------------------------|
| Maricopa County                          | 742,596                              | 0.21                                                   | 0.16                                                    | 1,558,021                                            |
| Pima County                              | 87,130                               | 0.16                                                   | 0.02                                                    | 97,973                                               |
| Pinal County                             | 365,172                              | 3.06                                                   | 0.08                                                    | 1,169,581                                            |
| Total within CAP counties <sup>1</sup>   | 1,194,898                            | 0.29                                                   | 0.25                                                    | 2,825,575                                            |
| Apache County                            | 3,411                                | 0.12                                                   | 0.00                                                    | 16,985                                               |
| Coconino County                          | 1,437                                | 0.02                                                   | 0.00                                                    | 22,593                                               |
| Gila County                              | 412                                  | 0.02                                                   | 0.00                                                    | 9,351                                                |
| La Paz County <sup>2</sup>               | (D)                                  | (D)                                                    | (D)                                                     | 270,641                                              |
| Mohave County                            | 48,846                               | 0.63                                                   | 0.01                                                    | 56,558                                               |
| Navajo County                            | 4,898                                | 0.14                                                   | 0.00                                                    | 47,996                                               |
| Yuma County <sup>2</sup>                 | (D)                                  | (D)                                                    | (D)                                                     | 1,507,066                                            |
| Total Arizona analysis area <sup>3</sup> | 1,253,902                            | 0.28                                                   | 0.26                                                    | 4,756,765                                            |

Sources: BEA 2024c; USDA 2024

<sup>1</sup> CAP values are aggregated values for Maricopa, Pima, and Pinal Counties.

<sup>2</sup> D = not shown to avoid disclosure of confidential information.

<sup>3</sup> The totals for the Arizona analysis area do not include data for La Paz and Yuma Counties because the U.S. Department of Agriculture determined the data were too sensitive to disclose.

**Table TA 16-6**  
**Farming Economic Output in Arizona Analysis Area (2024)**

| Area                                   | Total Farming Output (thousand 2025\$) | Percentage of County Output |
|----------------------------------------|----------------------------------------|-----------------------------|
| Maricopa County                        | 845,776                                | 0.11                        |
| Pima County                            | 56,129                                 | 0.05                        |
| Pinal County                           | 371,328                                | 1.18                        |
| Total within CAP counties <sup>1</sup> | 1,273,233                              | 0.14                        |
| Apache County                          | 3,719                                  | 0.08                        |

| Area                        | Total Farming Output<br>(thousand 2025\$) | Percentage of County Output |
|-----------------------------|-------------------------------------------|-----------------------------|
| Coconino County             | 2,483                                     | 0.01                        |
| Gila County                 | 1,839                                     | 0.03                        |
| La Paz County               | 185,877                                   | 9.23                        |
| Mohave County               | 65,350                                    | 0.39                        |
| Navajo County               | 6,645                                     | 0.09                        |
| Yuma County                 | 1,429,958                                 | 7.43                        |
| Total Arizona analysis area | 2,969,103                                 | 0.30                        |

Source: IMPLAN 2025

<sup>1</sup> CAP values are aggregated values for Maricopa, Pima, and Pinal Counties.

In 2022, the CAP counties—Maricopa, Pima, and Pinal Counties—accounted for approximately 55 percent of Arizona’s harvested acres of hay and haylage crops, 65 percent of the state’s harvested acreage of cotton, and 44 percent of the harvested wheat acreage. In 2022, the three western Arizona counties that are located along the Colorado River—Mohave, La Paz, and Yuma Counties—accounted for approximately 33 percent of the statewide harvested hay and haylage acreage, 78 percent of the harvested acres of vegetable crops, and 53 percent of the harvested wheat acres. Yuma County alone accounted for 77 percent of the state’s total harvested acres of vegetable crops (USDA 2024).

## California

### Employment and Personal Income

**Table TA 16-7** and **Table TA 16-8**, below, provide an overview for employment by sector for the counties in the analysis area in California in 2010 and 2022, respectively.<sup>4</sup> Full- and part-time employment in California totaled 25.3 million jobs in 2022, an increase of approximately 5.7 million jobs from 2010 levels.

Full- and part-time employment in the six-county analysis area totaled 13.9 million jobs in 2022, representing 55 percent of total California employment. Farm employment in the six counties totaled about 31,000 jobs in 2022 and represented about 0.2 percent of the total employment in the analysis area counties.<sup>5</sup> Farm employment made up a larger percentage of the total employment in Imperial County than in the rest of the counties in the analysis area, with 4.7 percent of the total employment coming from the farm sector in Imperial County (BEA 2024a). In 2022, employment in the arts, entertainment, and recreation sector totaled approximately 395,000 jobs (or 2.8 percent of the total employment in the analysis area), which was an increase from 2010 jobs by about 19 percent.

<sup>4</sup> The analysis does not distinguish between the water source(s) that may support such employment, which may include sources other than, or blended with, mainstream Colorado River water.

<sup>5</sup> Farm employment does not include employment in other industries that are supported by the farming industry, such as employment in the transportation and warehousing, manufacturing (including food manufacturing), and retail trade (including food and beverage and grocery stores) industries. Changes in water availability that affect the farming industry would also indirectly affect these industries. More information on indirect impacts on employment, labor income, and economic output is discussed in **Section TA 16.2**, Environmental Consequences.

**Table TA 16-7**  
**California Employment by Industry (2010)**

| Employment                                                                | Imperial County | Los Angeles County | Orange County      | Riverside County | San Bernardino County | San Diego County   | California          |
|---------------------------------------------------------------------------|-----------------|--------------------|--------------------|------------------|-----------------------|--------------------|---------------------|
| Total employment                                                          | 72,569          | 5,361,888          | 1,882,771          | 806,985          | 831,765               | 1,804,100          | 19,642,544          |
| Wage and salary employment                                                | 59,701          | 4,023,825          | 1,435,527          | 582,005          | 639,579               | 1,405,940          | 14,946,351          |
| Proprietors' employment                                                   | 12,868          | 1,338,063          | 447,244            | 224,980          | 192,186               | 398,160            | 4,696,193           |
| Farm employment (number and percentage of total employment)               | 3,705<br>5.1%   | 5,410<br>0.1%      | 2,423<br>0.1%      | 7,491<br>0.9%    | 2,755<br>0.3%         | 12,151<br>0.7%     | 232,546<br>1.2%     |
| Nonfarm employment (number and percentage of total employment)            | 68,864<br>94.9% | 5,356,478<br>99.9% | 1,880,348<br>99.9% | 799,494<br>99.1% | 829,010<br>99.7%      | 1,791,949<br>99.3% | 19,409,998<br>98.8% |
| <b>Employment by Industry (Number and Percentage of Total Employment)</b> |                 |                    |                    |                  |                       |                    |                     |
| Forestry, fishing, and related                                            | (D)<br>(D)      | 2,807<br>0.1%      | 1,497<br>0.1%      | 7,556<br>0.9%    | 1,005<br>0.1%         | 2,801<br>0.2%      | 212,035<br>1.1%     |
| Mining, quarrying, and oil and gas extraction                             | (D)<br>(D)      | 13,967<br>0.3%     | 5,426<br>0.3%      | 1,967<br>0.2%    | 1,350<br>0.2%         | 4,016<br>0.2%      | 60,312<br>0.3%      |
| Utilities                                                                 | 485<br>0.7%     | 12,288<br>0.2%     | 4,224<br>0.2%      | 1,811<br>0.2%    | 4,308<br>0.5%         | 7,556<br>0.4%      | 59,332<br>0.3%      |
| Construction                                                              | 1,853<br>2.6%   | 179,611<br>3.3%    | 93,087<br>4.9%     | 55,658<br>6.9%   | 41,158<br>4.9%        | 81,056<br>4.5%     | 865,756<br>4.4%     |
| Manufacturing                                                             | 2,899<br>4.0%   | 399,993<br>7.5%    | 160,589<br>8.5%    | 41,833<br>5.2%   | 50,826<br>6.1%        | 100,816<br>5.6%    | 1,322,647<br>6.7%   |
| Wholesale trade                                                           | 2,187<br>3.0%   | 248,880<br>4.6%    | 95,232<br>5.1%     | 24,772<br>3.1%   | 35,659<br>4.3%        | 50,542<br>2.8%     | 724,352<br>3.7%     |
| Retail trade                                                              | 8,504<br>11.7%  | 486,294<br>9.1%    | 176,906<br>9.4%    | 99,926<br>12.4%  | 96,247<br>11.6%       | 163,881<br>9.1%    | 1,880,137<br>9.6%   |
| Transportation and warehousing                                            | 2,478<br>3.4%   | 189,424<br>3.5%    | 31,791<br>1.7%     | 26,524<br>3.3%   | 55,234<br>6.6%        | 29,650<br>1.6%     | 567,941<br>2.9%     |
| Information                                                               | 448<br>0.6%     | 232,777<br>4.3%    | 31,550<br>1.7%     | 12,969<br>1.6%   | 7,892<br>0.9%         | 31,710<br>1.8%     | 508,677<br>2.6%     |

| Employment                                          | Imperial<br>County | Los Angeles<br>County | Orange<br>County | Riverside<br>County | San Bernardino<br>County | San Diego<br>County | California         |
|-----------------------------------------------------|--------------------|-----------------------|------------------|---------------------|--------------------------|---------------------|--------------------|
| Finance and insurance                               | 1,504<br>2.1%      | 258,386<br>4.8%       | 128,200<br>6.8%  | 31,148<br>3.9%      | 30,991<br>3.7%           | 83,127<br>4.6%      | 953,934<br>4.9%    |
| Real estate rental<br>and leasing                   | 1,748<br>2.4%      | 299,202<br>5.6%       | 131,862<br>7.0%  | 45,325<br>5.6%      | 33,414<br>4.0%           | 100,269<br>5.6%     | 1,033,813<br>5.3%  |
| Professional, scientific, and<br>technical services | 1,659<br>2.3%      | 436,666<br>8.1%       | 182,266<br>9.7%  | 40,460<br>5.0%      | 37,815<br>4.5%           | 188,902<br>10.5%    | 1,703,247<br>8.7%  |
| Management of companies<br>and enterprises          | 257<br>0.4%        | 58,381<br>1.1%        | 25,158<br>1.3%   | 3,384<br>0.4%       | 6,176<br>0.7%            | 18,993<br>1.1%      | 207,094<br>1.1%    |
| Administrative, support, and<br>waste management    | 3,201<br>4.4%      | 353,393<br>6.6%       | 156,216<br>8.3%  | 59,039<br>7.3%      | 69,840<br>8.4%           | 110,621<br>6.1%     | 1,248,610<br>6.4%  |
| Educational services                                | 257<br>0.4%        | 144,272<br>2.7%       | 37,274<br>2.0%   | 10,599<br>1.3%      | 13,530<br>1.6%           | 40,478<br>2.2%      | 439,531<br>2.2%    |
| Health care and<br>social assistance                | 8,420<br>11.6%     | 531,002<br>9.9%       | 162,038<br>8.6%  | 71,692<br>8.9%      | 86,653<br>10.4%          | 150,232<br>8.3%     | 1,868,599<br>9.5%  |
| Arts, entertainment, and<br>recreation              | 354<br>0.5%        | 198,153<br>3.7%       | 55,081<br>2.9%   | 18,853<br>2.3%      | 12,728<br>1.5%           | 45,621<br>2.5%      | 538,952<br>2.7%    |
| Accommodation<br>and food services                  | 3,554<br>4.9%      | 349,498<br>6.5%       | 143,507<br>7.6%  | 64,109<br>7.9%      | 53,619<br>6.4%           | 139,829<br>7.8%     | 1,369,985<br>7.0%  |
| Other services                                      | 3,832<br>5.3%      | 360,755<br>6.7%       | 102,584<br>5.4%  | 55,348<br>6.9%      | 52,257<br>6.3%           | 103,313<br>5.7%     | 1,166,383<br>5.9%  |
| Government<br>and government enterprises            | 18,455<br>25.4%    | 600,729<br>11.2%      | 155,860<br>8.3%  | 126,521<br>15.7%    | 138,308<br>16.6%         | 338,536<br>18.8%    | 2,678,661<br>13.6% |

Source: BEA 2024a

D = not shown to avoid disclosure of confidential information; estimates are included in higher-level totals.

**Table TA 16-8**  
**California Employment by Industry (2022)**

| <b>Employment</b>                                                         | <b>Imperial County</b> | <b>Los Angeles County</b> | <b>Orange County</b> | <b>Riverside County</b> | <b>San Bernardino County</b> | <b>San Diego County</b> | <b>California</b>   |
|---------------------------------------------------------------------------|------------------------|---------------------------|----------------------|-------------------------|------------------------------|-------------------------|---------------------|
| Total employment                                                          | 84,886                 | 6,805,191                 | 2,386,649            | 1,199,971               | 1,193,681                    | 2,270,595               | 25,300,974          |
| Wage and salary employment                                                | 69,201                 | 4,843,059                 | 1,758,050            | 859,500                 | 903,758                      | 1,713,934               | 18,814,316          |
| Proprietors' employment                                                   | 15,685                 | 1,962,132                 | 628,599              | 340,471                 | 289,923                      | 556,661                 | 6,486,658           |
| Farm employment (number and percentage of total employment)               | 3,967<br>4.7%          | 4,197<br>0.1%             | 1,271<br>0.1%        | 7,156<br>0.6%           | 2,466<br>0.2%                | 11,749<br>0.5%          | 228,186<br>0.9%     |
| Nonfarm employment (number and percentage of total employment)            | 80,919<br>95.3%        | 6,800,994<br>99.9%        | 2,385,378<br>99.9%   | 1,192,815<br>99.4%      | 1,191,215<br>99.8%           | 2,258,846<br>99.5%      | 25,072,788<br>99.1% |
| <b>Employment by Industry (Number and Percentage of Total Employment)</b> |                        |                           |                      |                         |                              |                         |                     |
| Forestry, fishing, and related                                            | 6,356<br>7.5%          | 2,862<br>0.0%             | 1,115<br>0.0%        | 6,845<br>0.6%           | 1,201<br>0.1%                | 2,763<br>0.1%           | 259,767<br>1.0%     |
| Mining, quarrying, and oil and gas extraction                             | 421<br>0.5%            | 6,494<br>0.1%             | 2,850<br>0.1%        | 1,674<br>0.1%           | 1,603<br>0.1%                | 2,088<br>0.1%           | 36,926<br>0.1%      |
| Utilities                                                                 | 522<br>0.6%            | 13,497<br>0.2%            | 3,504<br>0.1%        | 1,910<br>0.2%           | 4,112<br>0.3%                | 5,984<br>0.3%           | 67,516<br>0.3%      |
| Construction                                                              | 2,583<br>3.0%          | 247,498<br>3.6%           | 134,674<br>5.6%      | 100,111<br>8.3%         | 61,113<br>5.1%               | 115,692<br>5.1%         | 1,259,662<br>5.0%   |
| Manufacturing                                                             | 2,572<br>3.0%          | 347,301<br>5.1%           | 161,360<br>6.8%      | 50,990<br>4.2%          | 60,001<br>5.0%               | 125,914<br>5.5%         | 1,419,413<br>5.6%   |
| Wholesale trade                                                           | 2,385<br>2.8%          | 253,705<br>3.7%           | 94,090<br>3.9%       | 34,573<br>2.9%          | 49,500<br>4.1%               | 59,274<br>2.6%          | 773,657<br>3.1%     |
| Retail trade                                                              | 9,800<br>11.5%         | 538,484<br>7.9%           | 191,282<br>8.0%      | 124,022<br>10.3%        | 116,117<br>9.7%              | 180,091<br>7.9%         | 2,090,805<br>8.3%   |
| Transportation and warehousing                                            | 3,939<br>4.6%          | 412,112<br>6.1%           | 78,540<br>3.3%       | 118,550<br>9.9%         | 177,757<br>14.9%             | 92,798<br>4.1%          | 1,474,413<br>5.8%   |
| Information                                                               | 322<br>0.4%            | 297,427<br>4.4%           | 34,274<br>1.4%       | 9,851<br>0.8%           | 8,061<br>0.7%                | 31,637<br>1.4%          | 727,797<br>2.9%     |

| Employment                                       | Imperial County | Los Angeles County | Orange County    | Riverside County | San Bernardino County | San Diego County | California         |
|--------------------------------------------------|-----------------|--------------------|------------------|------------------|-----------------------|------------------|--------------------|
| Finance and insurance                            | 2,053<br>2.4%   | 354,030<br>5.2%    | 179,340<br>7.5%  | 49,195<br>4.1%   | 43,147<br>3.6%        | 116,913<br>5.1%  | 1,318,004<br>5.2%  |
| Real estate rental and leasing                   | 2,264<br>2.7%   | 458,500<br>6.7%    | 180,924<br>7.6%  | 61,940<br>5.2%   | 48,684<br>4.1%        | 133,935<br>5.9%  | 1,454,721<br>5.7%  |
| Professional, scientific, and technical services | 2,184<br>2.6%   | 560,569<br>8.2%    | 232,574<br>9.7%  | 56,146<br>4.7%   | 50,533<br>4.2%        | 247,892<br>10.9% | 2,231,632<br>8.8%  |
| Management of companies and enterprises          | 187<br>0.2%     | 79,182<br>1.2%     | 45,272<br>1.9%   | 4,747<br>0.4%    | 5,669<br>0.5%         | 28,457<br>1.3%   | 284,267<br>1.1%    |
| Administrative, support, and waste management    | 3,625<br>4.3%   | 425,270<br>6.2%    | 202,696<br>8.5%  | 86,326<br>7.2%   | 94,572<br>7.9%        | 143,628<br>6.3%  | 1,581,853<br>6.3%  |
| Educational services                             | 477<br>0.6%     | 174,096<br>2.6%    | 56,410<br>2.4%   | 15,397<br>1.3%   | 16,960<br>1.4%        | 48,273<br>2.1%   | 554,586<br>2.2%    |
| Health care and social assistance                | 11,607<br>13.7% | 890,342<br>13.1%   | 243,499<br>10.2% | 136,687<br>11.4% | 140,876<br>11.8%      | 231,189<br>10.2% | 2,942,827<br>11.6% |
| Arts, entertainment, and recreation              | 381<br>0.4%     | 231,016<br>3.4%    | 72,196<br>3.0%   | 23,911<br>2.0%   | 15,433<br>1.3%        | 51,915<br>2.3%   | 617,031<br>2.4%    |
| Accommodation and food services                  | 4,667<br>5.5%   | 462,052<br>6.8%    | 179,676<br>7.5%  | 96,865<br>8.1%   | 79,767<br>6.7%        | 177,272<br>7.8%  | 1,775,446<br>7.0%  |
| Other services                                   | 4,465<br>5.3%   | 438,487<br>6.4%    | 128,353<br>5.4%  | 77,159<br>6.4%   | 70,526<br>5.9%        | 124,990<br>5.5%  | 1,423,034<br>5.6%  |
| Government and government enterprises            | 20,109<br>23.7% | 608,070<br>8.9%    | 162,749<br>6.8%  | 135,916<br>11.3% | 145,583<br>12.2%      | 338,141<br>14.9% | 2,779,431<br>11.0% |

Source: BEA 2024a

Total personal income in California was approximately \$3.0 trillion in 2022, compared with about \$2.2 trillion in 2010 (adjusted for inflation to 2022 dollars). Statewide per capita income also increased from approximately \$59,000 in 2010 (adjusted to 2022 dollars) to approximately \$77,000 in 2022 (BEA 2024b; see **Table TA 16-9**). In 2022, California farm earnings per farm worker were about \$70,000 (\$16.0 billion in farm earnings divided by about 228,000 farm jobs), which was a decrease of about \$7,000 from 2010 earnings (adjusted to 2022 dollars; BEA 2024a, 2024b).

The total personal income generated in the six analysis area counties represented 48.9 percent of the state total in 2022. Among the six counties, average per capita income ranged from a low of approximately \$45,000 per year in Imperial County to a high of \$84,000 per year in Orange County. Only Orange County had per capita income above that of the state of California (about \$77,000 in 2022). In 2022, farm earnings per farm worker in the analysis area ranged from about \$42,000 in San Diego County to about \$147,000 in Imperial County (BEA 2024a, 2024b).

**Table TA 16-10**, Unemployment and Poverty, displays the annual unemployment rate and the percentage of the population living below poverty. In California, all counties excluding Imperial and Los Angeles Counties had 2023 annual unemployment rates below the state annual unemployment rate of 4.8 percent. Unemployment was notably high in Imperial County, with an unemployment rate of 17.3 percent, which is over 3 times greater than that of the state of California.

Across the California analysis area, half of the counties—Imperial, Los Angeles, and San Bernardino Counties—had a higher percentage of people living below the poverty level than the state (12.0 percent). The largest percentage of people below poverty was in Imperial County (19.6 percent). This suggests that economic considerations are important factors, especially in these counties with high percentages of people living below poverty. Management actions that impact economic opportunities and economic conditions could affect the surrounding communities in these counties.

### Agriculture

Approximately 24 percent of California's land area in 2022 was used for agricultural purposes (on cropland, pastureland, woodland, or other; USDA 2024). In 2022, the market value of agricultural products sold in California contributed approximately \$59 billion to the statewide economy (USDA 2024). The types of crops, amount of water used for agriculture, and the role of agriculture in county economics vary across the state and analysis area. Additional information on irrigated agricultural acreage within the analysis area is provided in **TA 17**, Population and Land Use.

In 2022, the total market value of agricultural products sold in the California analysis area contributed \$6.1 billion to California's economy. The market value of crops sold in the analysis area was about \$4.7 billion, ranging from about \$69.5 million in Orange County to about \$2.2 billion in Imperial County (USDA 2024). In 2024, compared with other counties in the analysis area, Imperial County had the highest farming output as a percentage of the county's total economic output, with 15.5 percent of total economic output coming from the farming industry (IMPLAN 2025). **Table TA 16-11** presents a summary of the market value of on-farm agricultural production with respect to county and state GDP. **Table TA 16-12** presents the county-level economic output from the farming industry and the percentage of farming economic output to total county-level output.

**Table TA 16-9**  
**2010 and 2022 California Personal Income and Earnings (2022\$)**

| Geographic Area       | Year | Personal Income (\$1,000s) <sup>1</sup> | Per Capita Personal Income (\$) | Earnings by Place of Work (\$1,000s) <sup>2</sup> | Wages and Salaries (\$1,000s) | Supplements to Wages and Salaries (\$1,000s) | Proprietors' Income (\$1,000s) | Farm Earnings (\$1,000s) | Nonfarm Earnings (\$1,000s) |
|-----------------------|------|-----------------------------------------|---------------------------------|---------------------------------------------------|-------------------------------|----------------------------------------------|--------------------------------|--------------------------|-----------------------------|
| Imperial County       | 2010 | 6,913,837                               | 39,579                          | 4,965,502                                         | 2,896,362                     | 997,334                                      | 1,071,806                      | 637,013                  | 4,328,489                   |
|                       | 2022 | 8,075,656                               | 45,188                          | 5,545,837                                         | 3,539,261                     | 1,131,471                                    | 875,105                        | 582,341                  | 4,963,496                   |
| Los Angeles County    | 2010 | 571,262,353                             | 58,157                          | 439,310,025                                       | 300,244,372                   | 70,443,822                                   | 68,621,832                     | 254,816                  | 439,055,210                 |
|                       | 2022 | 720,740,528                             | 74,142                          | 528,971,677                                       | 388,176,660                   | 80,851,366                                   | 59,943,651                     | 212,840                  | 528,758,837                 |
| Orange County         | 2010 | 199,435,828                             | 66,110                          | 152,270,377                                       | 105,862,790                   | 23,550,515                                   | 22,857,071                     | 158,606                  | 152,111,771                 |
|                       | 2022 | 263,290,135                             | 83,553                          | 188,481,620                                       | 137,331,567                   | 27,686,976                                   | 23,463,077                     | 75,693                   | 188,405,927                 |
| Riverside County      | 2010 | 92,596,623                              | 42,088                          | 48,434,234                                        | 31,451,692                    | 9,018,065                                    | 7,964,477                      | 456,367                  | 47,977,867                  |
|                       | 2022 | 127,195,983                             | 51,415                          | 69,321,008                                        | 49,411,833                    | 11,980,844                                   | 7,928,331                      | 416,727                  | 68,904,281                  |
| San Bernardino County | 2010 | 81,631,592                              | 40,003                          | 52,124,985                                        | 36,642,144                    | 10,488,171                                   | 4,994,669                      | 196,452                  | 51,928,532                  |
|                       | 2022 | 108,081,645                             | 49,270                          | 74,624,680                                        | 53,932,299                    | 13,234,262                                   | 7,458,119                      | 181,780                  | 74,442,900                  |
| San Diego County      | 2010 | 185,043,527                             | 59,645                          | 138,585,701                                       | 100,107,049                   | 25,985,297                                   | 12,493,354                     | 798,029                  | 137,787,672                 |
|                       | 2022 | 243,506,541                             | 74,326                          | 178,214,544                                       | 134,153,290                   | 30,704,869                                   | 13,356,385                     | 490,452                  | 177,724,092                 |
| California            | 2010 | 2,187,979,553                           | 58,624                          | 1,611,764,720                                     | 1,105,813,512                 | 265,592,922                                  | 240,358,285                    | 17,899,555               | 1,593,865,165               |
|                       | 2022 | 3,006,647,281                           | 77,036                          | 2,168,542,286                                     | 1,607,341,273                 | 323,041,105                                  | 238,159,908                    | 16,004,335               | 2,152,537,951               |

Source: BEA 2024b

<sup>1</sup> Personal income is calculated at the place of residence and includes labor income as well as non-labor income, such as dividends, interest, and rent.<sup>2</sup> Earnings is calculated at the place of work based on labor income, such as wages and salaries, supplements, and proprietors' income.

**Table TA 16-10**  
**California Analysis Area Unemployment and Poverty (2023)**

| Geographic Area       | Unemployment (%) | % Below Poverty |
|-----------------------|------------------|-----------------|
| Imperial County       | 17.3             | 19.6            |
| Los Angeles County    | 5.0              | 13.6            |
| Orange County         | 3.6              | 9.5             |
| Riverside County      | 4.8              | 11.1            |
| San Bernardino County | 4.7              | 13.6            |
| San Diego County      | 3.9              | 10.4            |
| <b>California</b>     | <b>4.8</b>       | <b>12.0</b>     |

Source: Bureau of Labor Statistics 2023

**Table TA 16-11**  
**Market Value of Agricultural Production in California Analysis Area (2022)**

| Area                           | Market Value of Crops Sold (\$1,000) | Percentage of Market Value of Crops Sold to County GDP | Percentage of Market Value of Crops Sold to Arizona GDP | Market Value of Agricultural Products Sold (\$1,000) |
|--------------------------------|--------------------------------------|--------------------------------------------------------|---------------------------------------------------------|------------------------------------------------------|
| Imperial County                | 2,236,942                            | 20.22                                                  | 0.06                                                    | 3,046,146                                            |
| Los Angeles County             | 177,940                              | 0.02                                                   | 0.00                                                    | 199,849                                              |
| Orange County                  | 69,533                               | 0.02                                                   | 0.00                                                    | 70,707                                               |
| Riverside County               | 1,113,260                            | 0.96                                                   | 0.03                                                    | 1,273,498                                            |
| San Bernardino County          | 99,258                               | 0.08                                                   | 0.00                                                    | 457,547                                              |
| San Diego County               | 1,004,974                            | 0.34                                                   | 0.03                                                    | 1,092,921                                            |
| Total California analysis area | 4,701,907                            | 0.27                                                   | 0.02                                                    | 6,140,668                                            |

Sources: BEA 2024c; USDA 2024

**Table TA 16-12**  
**Farming Economic Output in California Analysis Area (2024)**

| Area                           | Total Farming Output (thousand 2025\$) | Percentage of County Output |
|--------------------------------|----------------------------------------|-----------------------------|
| Imperial County                | 3,051,320                              | 15.50                       |
| Los Angeles County             | 216,001                                | 0.01                        |
| Orange County                  | 109,134                                | 0.02                        |
| Riverside County               | 1,391,224                              | 0.59                        |
| San Bernardino County          | 136,645                                | 0.05                        |
| San Diego County               | 1,338,263                              | 0.23                        |
| Total California analysis area | 6,242,586                              | 0.18                        |

Source: IMPLAN 2025

The key crops in the California analysis area include hay, vegetables, and wheat. In 2022, the California analysis area counties accounted for approximately 30 percent of California's harvested acres of hay and haylage crops, 16 percent of the state's harvested acreage of vegetables, and 35 percent of the harvested wheat acreage (USDA 2024).

## **Nevada**

### **Employment and Personal Income**

**Table TA 16-13**, below, provides an overview for employment by sector for Clark County and the state of Nevada in 2010 and 2022. Full- and part-time employment in Nevada totaled almost 2.1 million jobs in 2022, an increase of approximately 584,000 jobs from 2010 levels. In 2022, employment in the arts, entertainment, and recreation sector totaled almost 62,000 jobs, or approximately 3 percent of the state's total employment. Farm employment represented only 0.3 percent of the total employment, with a little more than 5,000 jobs.

Full- and part-time employment in Clark County totaled about 1.5 million jobs in 2022; this is an increase of approximately 466,000 jobs from 2010. Total employment in Clark County represented almost 74 percent of the total employment in Nevada. In 2022, employment in the arts, entertainment, and recreation sector totaled almost 47,000 jobs, or 3.1 percent of the total employment in the county. Farm employment represented less than 0.1 percent of the total employment, with a little more than 400 jobs (see **Table TA 16-13**).<sup>6</sup>

**Table TA 16-13**  
**Nevada Employment by Industry (2010 and 2022)**

| Employment                                                                | Clark County        |                     | Nevada             |                    |
|---------------------------------------------------------------------------|---------------------|---------------------|--------------------|--------------------|
|                                                                           | 2010                | 2022                | 2010               | 2022               |
| Total employment                                                          | 1,057,024           | 1,523,197           | 1,478,082          | 2,061,871          |
| Wage and salary employment                                                | 834,301             | 1,120,039           | 1,153,906          | 1,528,778          |
| Proprietors' employment                                                   | 222,723             | 403,158             | 324,176            | 533,093            |
| Farm employment (number and percentage of total employment)               | 384<br>0.0%         | 437<br>0.0%         | 5,354<br>0.4%      | 5,208<br>0.3%      |
| Nonfarm employment (number and percentage of total employment)            | 1,056,640<br>100.0% | 1,522,760<br>100.0% | 1,472,728<br>99.6% | 2,056,663<br>99.7% |
| <b>Employment by Industry (Number and Percentage of Total Employment)</b> |                     |                     |                    |                    |
| Forestry, fishing, and related                                            | 330<br>0.0%         | 491<br>0.0%         | 1,585<br>0.1%      | 2,214<br>0.1%      |
| Mining, quarrying, and oil and gas extraction                             | 2,389<br>0.2%       | 1,726<br>0.1%       | 17,016<br>1.2%     | 19,165<br>0.9%     |
| Utilities                                                                 | 3,015<br>0.3%       | 2,899<br>0.2%       | 4,544<br>0.3%      | 4,612<br>0.2%      |

<sup>6</sup> Farm employment does not include employment in other industries that are supported by the farming industry, such as employment in the transportation and warehousing, manufacturing (including food manufacturing), and retail trade (including food and beverage and grocery stores) industries. Changes in water availability that affect the farming industry would also indirectly affect these industries. More information on indirect impacts on employment, labor income, and economic output is discussed in **Section TA 16.2**, Environmental Consequences.

| Employment                                       | Clark County |         | Nevada  |         |
|--------------------------------------------------|--------------|---------|---------|---------|
|                                                  | 2010         | 2022    | 2010    | 2022    |
| Construction                                     | 55,382       | 93,558  | 75,643  | 129,422 |
|                                                  | 5.2%         | 6.1%    | 5.1%    | 6.3%    |
| Manufacturing                                    | 21,605       | 32,929  | 41,667  | 71,259  |
|                                                  | 2.0%         | 2.2%    | 2.8%    | 3.5%    |
| Wholesale trade                                  | 24,620       | 32,949  | 37,489  | 48,807  |
|                                                  | 2.3%         | 2.2%    | 2.5%    | 2.4%    |
| Retail trade                                     | 109,280      | 141,831 | 152,355 | 191,956 |
|                                                  | 10.3%        | 9.3%    | 10.3%   | 9.3%    |
| Transportation and warehousing                   | 36,634       | 115,664 | 53,212  | 153,001 |
|                                                  | 3.5%         | 7.6%    | 3.6%    | 7.4%    |
| Information                                      | 13,000       | 19,593  | 17,693  | 25,517  |
|                                                  | 1.2%         | 1.3%    | 1.2%    | 1.2%    |
| Finance and insurance                            | 61,578       | 95,406  | 83,043  | 122,182 |
|                                                  | 5.8%         | 6.3%    | 5.6%    | 5.9%    |
| Real estate rental and leasing                   | 66,955       | 95,228  | 94,363  | 130,455 |
|                                                  | 6.3%         | 6.3%    | 6.4%    | 6.3%    |
| Professional, scientific, and technical services | 56,485       | 88,272  | 81,695  | 121,060 |
|                                                  | 5.3%         | 5.8%    | 5.5%    | 5.9%    |
| Management of companies and enterprises          | 16,574       | 31,130  | 21,739  | 37,971  |
|                                                  | 1.6%         | 2.0%    | 1.5%    | 1.8%    |
| Administrative, support, and waste management    | 72,349       | 116,287 | 95,138  | 146,587 |
|                                                  | 6.8%         | 7.6%    | 6.4%    | 7.1%    |
| Educational services                             | 9,889        | 18,131  | 13,960  | 23,945  |
|                                                  | 0.9%         | 1.2%    | 0.9%    | 1.2%    |
| Health care and social assistance                | 75,170       | 127,645 | 109,647 | 170,804 |
|                                                  | 7.1%         | 8.4%    | 7.4%    | 8.3%    |
| Arts, entertainment, and recreation              | 32,432       | 46,868  | 46,698  | 61,968  |
|                                                  | 3.1%         | 3.1%    | 3.2%    | 3.0%    |
| Accommodation and food services                  | 242,559      | 263,173 | 290,879 | 314,012 |
|                                                  | 22.9%        | 17.3%   | 19.7%   | 15.2%   |
| Other services                                   | 46,024       | 75,466  | 65,246  | 99,734  |
|                                                  | 4.4%         | 5.0%    | 4.4%    | 4.8%    |
| Government and government enterprises            | 110,370      | 123,514 | 169,116 | 181,992 |
|                                                  | 10.4%        | 8.1%    | 11.4%   | 8.8%    |

Source: BEA 2024a

Total personal income in Nevada was approximately \$197.3 billion in 2022, compared with about \$136.9 billion in 2010 (adjusted for inflation to 2022 dollars). Statewide per capita income increased from approximately \$51,000 in 2010 (adjusted to 2022 dollars) to approximately \$62,000 in 2022 (BEA 2024b; see **Table TA 16-14**). In 2022, Nevada farm earnings per farm worker were about \$34,000 (\$177.9 million in farm earnings divided by 5,208 farm jobs), which was a decrease of about \$3,000 from 2010 earnings (adjusted to 2022 dollars; BEA 2024a, 2024b).

The total personal income in Clark County represented 69.6 percent of the state total in 2022. In 2022, the per capita income in Clark County was approximately \$59,000, which was slightly lower than the per capita income for the state. Farm earnings were not a major portion of total earnings in Clark County, with less than 0.1 percent of earnings coming from the farm industry (BEA 2024b; see **Table TA 16-14**).

**Table TA 16-14**  
**2010 and 2022 Nevada Personal Income and Earnings (2022\$)**

| Income/Earnings                                   | Clark County |             | Nevada      |             |
|---------------------------------------------------|--------------|-------------|-------------|-------------|
|                                                   | 2010         | 2022        | 2010        | 2022        |
| Personal income (\$1,000s) <sup>1</sup>           | 94,708,479   | 137,403,632 | 136,919,356 | 197,290,898 |
| Per capita personal income (\$)                   | 48,526       | 59,150      | 50,674      | 62,085      |
| Earnings by place of work (\$1,000s) <sup>2</sup> | 67,818,266   | 94,377,994  | 96,935,404  | 131,549,693 |
| Wages and salaries (\$1,000s)                     | 49,631,728   | 69,754,265  | 68,438,673  | 96,490,818  |
| Supplements to wages and salaries (\$1,000s)      | 12,230,529   | 14,242,958  | 17,494,798  | 20,144,396  |
| Proprietors' income (\$1,000s)                    | 5,956,009    | 10,380,771  | 11,001,933  | 14,914,479  |
| Farm earnings (\$1,000s)                          | 5,080        | 491         | 196,486     | 177,935     |
| Nonfarm earnings (\$1,000s)                       | 67,813,186   | 94,377,503  | 96,738,917  | 131,371,758 |

Source: BEA 2024b

<sup>1</sup> Personal income is calculated at the place of residence and includes labor income as well as non-labor income, such as dividends, interest, and rent.

<sup>2</sup> Earnings is calculated at the place of work based on labor income, such as wages and salaries, supplements, and proprietors' income.

**Table TA 16-15**, below, displays the annual unemployment rate and the percentage of the population below poverty. In 2023, the Nevada analysis area—Clark County—had an annual unemployment rate (5.4 percent) that was slightly higher than the state annual unemployment rate (5.1 percent). Similarly, the percentage of people living below poverty in Clark County (13.2 percent) was slightly higher than the percentage for Nevada (12.6 percent).

**Table TA 16-15**  
**Nevada Analysis Area Unemployment and Poverty (2023)**

| Geographic Area | Unemployment (%) | % Below Poverty |
|-----------------|------------------|-----------------|
| Clark County    | 5.4              | 13.2            |
| Nevada          | 5.1              | 12.6            |

Sources: Bureau of Labor Statistics 2023; U.S. Census Bureau 2023a

## Agriculture

Approximately 8.4 percent of Nevada's land area in 2022 was used for agricultural purposes (on cropland, pastureland, woodland, or other; USDA 2024). In 2022, the market value of agricultural

products sold in Nevada contributed nearly \$1 billion to the statewide economy. Additional information on irrigated agricultural acreage within the analysis area is provided in **TA 17, Population and Land Use**.

## **Utah**

### **Employment and Personal Income**

**Table TA 16-16**, below, provides an overview for employment by sector for the Utah analysis area in 2010 and 2022. Full- and part-time employment in Utah totaled almost 2.4 jobs in 2022, an increase of approximately 747,000 jobs from 2010 levels. In 2022, employment in the arts, entertainment, and recreation sector totaled almost 51,000 jobs, or approximately 2.2 percent of the total employment in the state.

Full- and part-time employment in the Utah analysis area totaled about 17,000 jobs in 2022, an increase of approximately 3,000 jobs from 2010. Total employment in the analysis area represented approximately 1.0 percent of the total employment in Utah. In 2022, employment in the arts, entertainment, and recreation sector totaled approximately 400 jobs (or 2.6 percent of the total employment in the analysis area) and represented 6.0 percent of employment in Kane County (see **Table TA 16-16**).

Total personal income in Utah was approximately \$205.5 billion in 2022, compared with about \$120.9 billion in 2010 (adjusted for inflation to 2022 dollars). Statewide per capita income increased from approximately \$44,000 in 2010 (adjusted to 2022 dollars) to approximately \$61,000 in 2022 (BEA 2024b; see **Table TA 16-17**).

The total personal income in the analysis area represented 0.6 percent of the state total in 2022. Among the counties in the analysis area, average per capita income ranged from a low of approximately \$37,000 per year in San Juan County to a high of \$52,000 per year in Garfield County. All counties in the analysis area had per capita income below that of the state of Utah (about \$61,000 in 2022; BEA 2024b; see **Table TA 16-17**).

**Table TA 16-18**, below, displays the annual unemployment rate and the percentage of the population below poverty. In 2023 in the Utah analysis area, all the counties had a higher annual unemployment rate and percentage of population living below poverty than the state of Utah. This suggests that economic considerations are important factors for many individuals throughout the analysis area, and management actions that impact economic opportunities and economic conditions could greatly affect the surrounding communities.

**Table TA 16-16**  
**Utah Employment by Industry (2010 and 2022)**

| Employment                                                                | Garfield County |       | Kane County |       | San Juan County |       | Utah      |           |
|---------------------------------------------------------------------------|-----------------|-------|-------------|-------|-----------------|-------|-----------|-----------|
|                                                                           | 2010            | 2022  | 2010        | 2022  | 2010            | 2022  | 2010      | 2022      |
| Total employment                                                          | 3,432           | 3,907 | 4,376       | 6,101 | 6,310           | 6,836 | 1,620,793 | 2,367,996 |
| Wage and salary employment                                                | 2,505           | 2,733 | 3,122       | 4,214 | 4,566           | 4,630 | 1,235,032 | 1,759,886 |
| Proprietors' employment                                                   | 927             | 1,174 | 1,254       | 1,887 | 1,744           | 2,206 | 385,761   | 608,110   |
| Farm employment                                                           | 293             | 289   | 159         | 169   | 724             | 715   | 20,007    | 21,081    |
| (number and percentage of total employment)                               | 8.5%            | 7.4%  | 3.6%        | 2.8%  | 11.5%           | 10.5% | 1.2%      | 0.9%      |
| Nonfarm employment                                                        | 3,139           | 3,618 | 4,217       | 5,932 | 5,586           | 6,121 | 1,600,786 | 2,346,915 |
| (number and percentage of total employment)                               | 91.5%           | 92.6% | 96.4%       | 97.2% | 88.5%           | 89.5% | 98.8%     | 99.1%     |
| <b>Employment by Industry (Number and Percentage of Total Employment)</b> |                 |       |             |       |                 |       |           |           |
| Forestry, fishing, and related                                            | (D)             | (D)   | (D)         | (D)   | 39              | 88    | 3,314     | 4,704     |
|                                                                           | (D)             | (D)   | (D)         | (D)   | 0.6%            | 1.3%  | 0.2%      | 0.2%      |
| Mining, quarrying, and oil and gas extraction                             | (D)             | (D)   | (D)         | (D)   | 423             | 331   | 14,664    | 13,730    |
|                                                                           | (D)             | (D)   | (D)         | (D)   | 6.7%            | 4.8%  | 0.9%      | 0.6%      |
| Utilities                                                                 | (D)             | 34    | (D)         | (D)   | (D)             | (D)   | 4,276     | 5,064     |
|                                                                           | (D)             | 0.9%  | (D)         | (D)   | (D)             | (D)   | 0.3%      | 0.2%      |
| Construction                                                              | 137             | 148   | 214         | 332   | 370             | 345   | 91,001    | 166,041   |
|                                                                           | 4.0%            | 3.8%  | 4.9%        | 5.4%  | 5.9%            | 5.0%  | 5.6%      | 7.0%      |
| Manufacturing                                                             | 66              | 64    | (D)         | (D)   | 155             | 112   | 118,124   | 160,756   |
|                                                                           | 1.9%            | 1.6%  | (D)         | (D)   | 2.5%            | 1.6%  | 7.3%      | 6.8%      |
| Wholesale trade                                                           | 48              | 44    | (D)         | 47    | (D)             | (D)   | 49,833    | 65,904    |
|                                                                           | 1.4%            | 1.1%  | (D)         | 0.8%  | (D)             | (D)   | 3.1%      | 2.8%      |
| Retail trade                                                              | 236             | 300   | 456         | 587   | 404             | 440   | 172,249   | 235,054   |
|                                                                           | 6.9%            | 7.7%  | 10.4%       | 9.6%  | 6.4%            | 6.4%  | 10.6%     | 9.9%      |

| Employment                                       | Garfield County |       | Kane County |       | San Juan County |       | Utah    |         |
|--------------------------------------------------|-----------------|-------|-------------|-------|-----------------|-------|---------|---------|
|                                                  | 2010            | 2022  | 2010        | 2022  | 2010            | 2022  | 2010    | 2022    |
| Transportation and warehousing                   | (D)             | 61    | 76          | (D)   | 80              | (D)   | 50,898  | 105,686 |
|                                                  | (D)             | 1.6%  | 1.7%        | (D)   | 1.3%            | (D)   | 3.1%    | 4.5%    |
| Information                                      | (D)             | 156   | 28          | 47    | (D)             | (D)   | 34,346  | 54,369  |
|                                                  | (D)             | 4.0%  | 0.6%        | 0.8%  | (D)             | (D)   | 2.1%    | 2.3%    |
| Finance and insurance                            | 59              | 74    | 126         | 117   | 114             | 151   | 111,560 | 174,506 |
|                                                  | 1.7%            | 1.9%  | 2.9%        | 1.9%  | 1.8%            | 2.2%  | 6.9%    | 7.4%    |
| Real estate rental and leasing                   | 95              | 177   | 271         | 584   | (D)             | (D)   | 93,563  | 154,826 |
|                                                  | 2.8%            | 4.5%  | 6.2%        | 9.6%  | (D)             | (D)   | 5.8%    | 6.5%    |
| Professional, scientific, and technical services | 53              | (D)   | 124         | 219   | (D)             | 167   | 107,012 | 194,639 |
|                                                  | 1.5%            | (D)   | 2.8%        | 3.6%  | (D)             | 2.4%  | 6.6%    | 8.2%    |
| Management of companies and enterprises          | 0               | 35    | 0           | 39    | (D)             | (D)   | 22,683  | 36,775  |
|                                                  | 0.0%            | 0.9%  | 0.0%        | 0.6%  | (D)             | (D)   | 1.4%    | 1.6%    |
| Administrative, support, and waste management    | (D)             | (D)   | 114         | 234   | 190             | (D)   | 89,810  | 121,592 |
|                                                  | (D)             | (D)   | 2.6%        | 3.8%  | 3.0%            | (D)   | 5.5%    | 5.1%    |
| Educational services                             | (D)             | (D)   | (D)         | 31    | (D)             | 167   | 48,952  | 77,750  |
|                                                  | (D)             | (D)   | (D)         | 0.5%  | (D)             | 2.4%  | 3.0%    | 3.3%    |
| Health care and social assistance                | (D)             | (D)   | (D)         | 201   | (D)             | 919   | 137,119 | 193,936 |
|                                                  | (D)             | (D)   | (D)         | 3.3%  | (D)             | 13.4% | 8.5%    | 8.2%    |
| Arts, entertainment, and recreation              | (D)             | 64    | 97          | 369   | 80              | (D)   | 34,472  | 51,311  |
|                                                  | (D)             | 1.6%  | 2.2%        | 6.0%  | 1.3%            | (D)   | 2.1%    | 2.2%    |
| Accommodation and food services                  | (D)             | 1,127 | 876         | 1,208 | 622             | (D)   | 99,679  | 145,448 |
|                                                  | (D)             | 28.8% | 20.0%       | 19.8% | 9.9%            | (D)   | 6.2%    | 6.1%    |
| Other services                                   | 117             | 150   | 623         | 727   | 295             | (D)   | 82,781  | 111,237 |
|                                                  | 3.4%            | 3.8%  | 14.2%       | 11.9% | 4.7%            | (D)   | 5.1%    | 4.7%    |
| Government and government enterprises            | 613             | 560   | 740         | 783   | 1,691           | 1,687 | 234,450 | 273,587 |
|                                                  | 17.9%           | 14.3% | 16.9%       | 12.8% | 26.8%           | 24.7% | 14.5%   | 11.6%   |

Source: BEA 2024a

D = not shown to avoid disclosure of confidential information; estimates are included in higher-level totals.

**Table TA 16-17**  
**2010 and 2022 Utah Personal Income and Earnings (2022\$)**

| Income/Earnings                                   | Garfield County |         | Kane County |         | San Juan County |         | Utah        |             |
|---------------------------------------------------|-----------------|---------|-------------|---------|-----------------|---------|-------------|-------------|
|                                                   | 2010            | 2022    | 2010        | 2022    | 2010            | 2022    | 2010        | 2022        |
| Personal income (\$1,000s) <sup>1</sup>           | 200,913         | 273,047 | 292,876     | 421,930 | 434,479         | 526,823 | 120,869,769 | 205,519,377 |
| Per capita personal income (\$)                   | 38,659          | 51,930  | 40,633      | 51,436  | 29,322          | 36,570  | 43,538      | 60,782      |
| Earnings by place of work (\$1,000s) <sup>2</sup> | 132,965         | 173,287 | 170,158     | 268,139 | 277,096         | 319,986 | 90,872,067  | 148,445,176 |
| Wages and salaries (\$1,000s)                     | 96,926          | 128,996 | 121,971     | 186,110 | 204,063         | 214,016 | 67,410,631  | 108,895,737 |
| Supplements to wages and salaries (\$1,000s)      | 28,391          | 27,523  | 33,009      | 40,507  | 62,030          | 59,217  | 16,534,956  | 22,614,907  |
| Proprietors' income (\$1,000s)                    | 7,648           | 16,768  | 15,179      | 41,522  | 11,004          | 46,753  | 6,926,480   | 16,934,532  |
| Farm earnings (\$1,000s) <sup>3</sup>             | -1,634          | 13,149  | 540         | 3,590   | -2,808          | 6,216   | 295,906     | 784,034     |
| Nonfarm earnings (\$1,000s)                       | 134,599         | 160,138 | 169,619     | 264,549 | 279,904         | 313,770 | 90,576,160  | 147,661,142 |

Source: BEA 2024b

<sup>1</sup> Personal income is calculated at the place of residence and includes labor income as well as non-labor income, such as dividends, interest, and rent.

<sup>2</sup> Earnings is calculated at the place of work based on labor income, such as wages and salaries, supplements, and proprietors' income.

<sup>3</sup> Accounting losses in farm earnings occur when proprietors incur more expenses than the revenues they receive.

**Table TA 16-18**  
**Utah Analysis Area Unemployment and Poverty (2023)**

| Geographic Area | Unemployment | % Below Poverty |
|-----------------|--------------|-----------------|
| Garfield County | 7.8          | 11.1            |
| Kane County     | 3.2          | 10.4            |
| San Juan County | 3.8          | 18.4            |
| <b>Utah</b>     | <b>2.7</b>   | <b>8.6</b>      |

Sources: Bureau of Labor Statistics 2023; U.S. Census Bureau 2023a

### **TA 16.1.3 Economic Contributions from Recreational Use**

As discussed in **TA 14**, Recreation, recreational activities with the potential to be affected by proposed management include recreation such as boating, camping, and hiking on and adjacent to reservoirs at Lake Powell and Lake Mead, as well as river-based recreation downstream in Glen Canyon and Grand Canyon. Information is also included on wildlife refuges on the Colorado River because the alternatives may affect these refuges.

When visitors recreate on lakes or rivers, the dollars they spend on purchases, such as lodging, gas, food, and outdoor equipment, support local and regional economic contributions, including direct, indirect, and induced jobs; labor income; and economic output.<sup>7</sup> Direct economic contributions occur when businesses sell goods and services to area visitors, such as outfitter services. Indirect economic contributions are additional jobs and economic activity supported when businesses purchase supplies and services from other local businesses, such as supplies used by outfitter businesses. Induced economic contributions occur when employees use their income to purchase goods and services in the local economy, resulting in further induced effects from visitor spending. Economic output is a measure of the total estimated value of the production of goods and services supported by visitor spending, including the direct, indirect, and induced effects.

**Table TA 16-19**, below, displays the total economic contributions from lake-based recreation occurring in the Glen Canyon National Recreation Area (NRA), which includes Lake Powell, and in the Lake Mead NRA, which includes Lake Mohave. **Table TA 16-20** displays economic contributions associated with Grand Canyon National Park (GCNP).

<sup>7</sup> Direct, indirect, and induced impacts—as used in this context—are economic terms used to describe the impacts from changes in economic activity. For more information on the types of economic activity that are included in each type of impact, please refer to **Section TA 16.2.1**, Methodology.

**Table TA 16-19**  
**Summary of Economic Contributions for National Park Service (NPS) Lake-Based Recreation (2023)**

| NPS Unit           | Total<br>Recreational<br>Visits | Visitor Spending<br>(1,000s of<br>2023\$) | Jobs <sup>1</sup> | Labor Income<br>(1,000s of<br>2023\$) <sup>2</sup> | Value Added<br>(1,000s of<br>2023\$) <sup>3</sup> | Economic<br>Output (1,000s<br>of 2023\$) <sup>4</sup> | % of Spending<br>from Nonlocals |
|--------------------|---------------------------------|-------------------------------------------|-------------------|----------------------------------------------------|---------------------------------------------------|-------------------------------------------------------|---------------------------------|
| Glen Canyon<br>NRA | 5,206,934                       | \$539,912                                 | 6,298             | \$226,266                                          | \$384,281                                         | \$670,369                                             | 96.3                            |
| Lake Mead NRA      | 5,798,541                       | \$292,463                                 | 3,131             | \$130,744                                          | \$219,232                                         | \$357,760                                             | 88.3                            |

Source: Flyr and Koontz 2024

<sup>1</sup> Jobs measure annualized full- and part-time jobs that are supported by NPS visitor spending.

<sup>2</sup> Labor income includes employee wages, salaries, and payroll benefits, as well as proprietors' incomes, that are supported by NPS visitor spending.

<sup>3</sup> Value added measures the contribution of NPS visitor spending to the GDP of a regional economy. Value added is equal to the difference between the amount an industry sells a product for and the product's production cost.

<sup>4</sup> Economic output is a measure of the total estimated value of the production of goods and services supported by NPS visitor spending. Economic output is the sum of all intermediate sales (business to business) and final demand (sales to consumers and exports).

**Table TA 16-20**  
**Summary of Economic Contributions for NPS River-Based Recreation (2023)**

| NPS Unit | Total<br>Recreational<br>Visits | Visitor Spending<br>(1,000s of<br>2023\$) | Jobs <sup>1</sup> | Labor Income<br>(1,000s of<br>2023\$) <sup>2</sup> | Value Added<br>(1,000s of<br>2023\$) <sup>3</sup> | Economic Output<br>(1,000s of 2023\$) <sup>4</sup> | % of Spending<br>from Nonlocals |
|----------|---------------------------------|-------------------------------------------|-------------------|----------------------------------------------------|---------------------------------------------------|----------------------------------------------------|---------------------------------|
| GCNP     | 4,733,705                       | \$768,411                                 | 10,060            | \$350,177                                          | \$582,513                                         | \$1,022,191                                        | 98.8                            |

Source: Flyr and Koontz 2024

<sup>1</sup> Jobs measure annualized full- and part-time jobs that are supported by NPS visitor spending.

<sup>2</sup> Labor income includes employee wages, salaries, and payroll benefits, as well as proprietors' incomes, that are supported by NPS visitor spending.

<sup>3</sup> Value added measures the contribution of NPS visitor spending to the GDP of a regional economy. Value added is equal to the difference between the amount an industry sells a product for and the product's production cost.

<sup>4</sup> Economic output is a measure of the total estimated value of the production of goods and services supported by NPS visitor spending. Economic output is the sum of all intermediate sales (business to business) and final demand (sales to consumers and exports).

Total economic output for lake-based recreation was \$358 million from Lake Mead NRA and \$670 million from Glen Canyon NRA. These amounts reflect total economic output from visitor spending, including spending by local visitors who live in gateway regions and nonlocal visitors who travel to National Park Service (NPS) sites from outside gateway regions. Spending by nonlocal visitors represents an influx of dollars from outside the local economy. In addition, nonlocal visitors typically have higher levels of spending on food, lodging, and other activities on a per-trip basis. Glen Canyon NRA and Lake Mead NRA had 96.3 percent and 88.3 percent of spending from nonlocal visitors, respectively (Flyr and Koontz 2024).

Total economic output for river-based recreation was \$1,022 million in GCNP. This amount accounts for total visitor spending, which includes spending by local visitors who live in gateway regions and nonlocal visitors who travel to NPS sites from outside gateway regions. Spending by nonlocal visitors represents an influx of dollars from outside the local economy. In addition, nonlocal visitors typically have higher levels of spending on food, lodging, and other activities on a per-trip basis. GCNP had 98.8 percent of spending from nonlocal visitors (Flyr and Koontz 2024).

River-based recreation is a major component of visitor use and economic activity along the Colorado River corridor. Two activities stand out for their economic and experiential importance: angling in Glen Canyon and whitewater rafting in Grand Canyon. Angling in Glen Canyon below Glen Canyon Dam attracts visitors seeking high-quality trout fishing opportunities, which depend on stable flows and accessible river conditions. These trips generate spending on guide services, lodging, food, and equipment in nearby communities. Similarly, whitewater rafting in Grand Canyon is a nationally important recreational experience, drawing thousands of visitors annually for multiday trips that require specialized guides, equipment, and logistical support. These trips contribute to local economies through outfitter services, transportation, and hospitality sectors. For additional details on recreation and levels of use, see **TA 14**, Recreation.

Beyond direct spending, these activities provide considerable nonmarket recreational benefits, often expressed as consumer surplus. Consumer surplus represents the additional benefit participants receive beyond their actual costs, reflecting the unique quality and scarcity of these experiences. Flow conditions influence both angling success and rafting trip quality, making river operations an important factor in sustaining these values.

Recreational visits to Glen Canyon NRA and Lake Mead NRA correspond with a wide array of job sectors within local (predominately small town and rural) economies. **Table TA 16-21** shows the key sectors supported through recreation in Glen Canyon NRA and Lake Mead NRA. In 2023, Glen Canyon NRA recreation supported 6,300 jobs, including 1,467 indirect and induced jobs. In 2023, Lake Mead NRA recreation supported 3,131 total jobs, including 872 indirect and induced jobs (Flyr and Koontz 2024).

**Table TA 16-21**  
**Jobs by Sector Supported by Economic Contributions**  
**from NPS Lake-Based Recreation (2023)**

| Jobs                                 | Glen Canyon<br>NRA | Lake Mead<br>NRA |
|--------------------------------------|--------------------|------------------|
| <b>Direct jobs by sector</b>         |                    |                  |
| Camping                              | 130                | 122              |
| Gas                                  | 108                | 79               |
| Groceries                            | 145                | 155              |
| Hotels                               | 2,112              | 613              |
| Recreational industries <sup>1</sup> | 851                | 261              |
| Restaurants                          | 1,009              | 792              |
| Retail                               | 257                | 185              |
| Transportation                       | 221                | 52               |
| Indirect and induced jobs            | 1,467              | 872              |
| <b>Total jobs</b>                    | <b>6,300</b>       | <b>3,131</b>     |

Source: Flyr and Koontz 2024

<sup>1</sup>Recreational industry jobs include those associated with expenditures on equipment rentals, amusement activities and guide/tour fees.

**Table TA 16-22** shows that GCNP recreation supported 10,064 jobs, including 2,316 indirect and induced jobs, in 2023. In addition to the direct economic impact from gross revenues on GCNP and the NPS, it is estimated that the regional economic impact of commercial river trips supports hundreds of additional jobs and generates millions in additional revenue throughout the mostly rural communities and small businesses of northern Arizona and southern Utah each season.

**Table TA 16-22**  
**Jobs by Sector Supported by Economic Contributions from NPS River-Based**  
**Recreation (2023)**

| Jobs                         | GCNP          |
|------------------------------|---------------|
| <b>Direct jobs by sector</b> |               |
| Camping                      | 156           |
| Gas                          | 99            |
| Groceries                    | 134           |
| Hotels                       | 2,630         |
| Recreational industries      | 2,032         |
| Restaurants                  | 1,631         |
| Retail                       | 460           |
| Transportation               | 606           |
| Indirect and induced jobs    | 2,316         |
| <b>Total jobs</b>            | <b>10,064</b> |

Source: Flyr and Koontz 2024

<sup>1</sup>Recreational industry jobs include those associated with expenditures on equipment rentals, amusement activities and guide/tour fees.

In addition to general recreation sector contributions, visitor use supports concessionaires, including those associated with water-based recreation, such as commercial river trips. In GCNP, commercial river trips hosted 17,313 passengers in 2023, which was a decrease from 19,990 passengers in 2022 and 20,749 passengers in 2021. From these river trips, river concessionaires contributed \$63.6 million in 2023 in gross revenue, representing 29 percent of the total concessionaire revenue at GCNP, which amounted to \$220 million that year. Gross revenue from river concessionaires remained relatively consistent from 2021 to 2023, with a small decrease from \$66.4 million in 2021 to \$61.8 million in 2022, followed by a small increase to \$63.6 million in 2023 (2021 and 2022 values adjusted for inflation to 2023\$). River concessioner franchise fees paid to the NPS in 2023 totaled \$6.25 million, 80 percent of which stays at GCNP.<sup>8</sup> It should be noted that concessionaires include those operated by tribes, particularly at the Antelope Valley Marina, which is on the Navajo Nation’s reservation.

National wildlife refuges (NWRs) also support economic contributions through expenditures from recreational visitors, such as expenditures for entrance fees, lodging near the refuges, and purchases from local businesses for items to pursue the visitors’ recreational experience, including, but not limited to, food and recreational gear. This spending supports economic activity throughout the local economy (Caudill and Carver 2019). Three refuges receive Colorado River water: Imperial NWR, Cibola NWR, and Havasu NWR. Based on 2017 data, the most recent publicly available information, Imperial NWR, located in Arizona and California, had 274,159 visits and supported 100 jobs and \$11.1 million in total economic output (see **Table TA 16-23**). Equivalent data are not available for Cibola and Havasu NWRs.

**Table TA 16-23**  
**Economic Contributions from NWRs (2017)<sup>1</sup>**

| NWR                                      | Total<br>Recreational<br>Visits | Total Economic<br>Output (\$1,000) | Total Employment<br>Income (\$1,000) | Total Jobs |
|------------------------------------------|---------------------------------|------------------------------------|--------------------------------------|------------|
| Imperial NWR (Arizona<br>and California) | 274,159                         | \$11,069.8                         | \$3,228.6                            | 100        |

Source: Caudill and Carver 2019

<sup>1</sup> The data shown are presented for 2017, which is the most recent publicly available data.

#### TA 16.1.4 Demographics

Population is a driver of demand for consumptive water use. Populations throughout much of the western U.S. have followed trends of increasing populations over the past decade. Details of population trends and forecasts are provided in **TA 17**, Population and Land Use.

In addition to overall population trends, racial and ethnic composition can play a role in determining social and cultural groups with potential for impacts from changes to river operations.

**Table TA 16-24**, Study Area Demographics (2023), shows the racial and Hispanic composition for the study area counties, as well as the composition for Arizona, California, Nevada, and Utah.

<sup>8</sup> Laurie Dyer, NPS supervisory concessions management specialist in the Commercial Services Division at GCNP, personal communication provided on September 27, 2024.

**Table TA 16-24**  
**Study Area Demographics (2023)**

| Geographic Area                   | Total<br>Population | White<br>(%) | Black or<br>African<br>American<br>(%) | American<br>Indian<br>and<br>Alaska<br>Native<br>(%) | Asian<br>(%) | Native<br>Hawaiian<br>and<br>Other<br>Pacific<br>Islander<br>(%) | Some<br>Other<br>Race<br>(%) | Two<br>or<br>More<br>Races<br>(%) | Hispanic<br>or<br>Latino<br>(of Any<br>Race)<br>(%) | White<br>Alone,<br>not<br>Hispanic<br>or Latino<br>(%) |
|-----------------------------------|---------------------|--------------|----------------------------------------|------------------------------------------------------|--------------|------------------------------------------------------------------|------------------------------|-----------------------------------|-----------------------------------------------------|--------------------------------------------------------|
| <b>State Data</b>                 |                     |              |                                        |                                                      |              |                                                                  |                              |                                   |                                                     |                                                        |
| Arizona                           | 7,268,175           | 63.20        | 4.60                                   | 4.10                                                 | 3.40         | 0.20                                                             | 8.20                         | 16.2                              | 31.00                                               | 53.40                                                  |
| California                        | 39,242,785          | 44.00        | 5.50                                   | 1.10                                                 | 15.30        | 0.40                                                             | 17.40                        | 16.30                             | 39.80                                               | 34.60                                                  |
| Nevada                            | 3,141,000           | 53.20        | 9.40                                   | 1.30                                                 | 8.70         | 0.70                                                             | 11.80                        | 14.80                             | 29.20                                               | 46.00                                                  |
| Utah                              | 3,331,187           | 80.70        | 1.10                                   | 1.00                                                 | 2.40         | 0.90                                                             | 5.60                         | 8.30                              | 15.40                                               | 75.70                                                  |
| <b>County Data</b>                |                     |              |                                        |                                                      |              |                                                                  |                              |                                   |                                                     |                                                        |
| Apache County, Arizona            | 65,680              | 20.20        | 1.00                                   | 72.10                                                | 0.60         | 0.10                                                             | 1.30                         | 4.70                              | 6.20                                                | 18.60                                                  |
| Coconino County, Arizona          | 144,643             | 57.00        | 1.50                                   | 25.20                                                | 1.80         | 0.10                                                             | 5.40                         | 8.90                              | 15.20                                               | 52.50                                                  |
| Gila County, Arizona              | 53,610              | 67.70        | 0.60                                   | 13.20                                                | 0.80         | 0.10                                                             | 4.50                         | 13.10                             | 17.80                                               | 62.00                                                  |
| Graham County, Arizona            | 38,860              | 66.20        | 1.30                                   | 11.40                                                | 0.60         | 0.70                                                             | 3.90                         | 15.80                             | 30.30                                               | 53.10                                                  |
| La Paz County, Arizona            | 16,605              | 61.30        | 0.40                                   | 14.20                                                | 1.10         | 0.00                                                             | 6.90                         | 16.00                             | 25.50                                               | 57.80                                                  |
| Maricopa County, Arizona          | 4,491,987           | 63.00        | 5.80                                   | 1.90                                                 | 4.40         | 0.20                                                             | 8.40                         | 16.40                             | 30.90                                               | 53.40                                                  |
| Mohave County, Arizona            | 217,420             | 81.50        | 1.20                                   | 1.60                                                 | 1.10         | 0.20                                                             | 4.90                         | 9.50                              | 16.70                                               | 75.60                                                  |
| Navajo County, Arizona            | 107,744             | 45.40        | 1.20                                   | 43.10                                                | 0.40         | 0.20                                                             | 3.30                         | 6.50                              | 10.60                                               | 42.40                                                  |
| Pima County, Arizona              | 1,049,947           | 63.20        | 3.60                                   | 3.10                                                 | 3.00         | 0.20                                                             | 9.90                         | 17.00                             | 36.10                                               | 51.20                                                  |
| Pinal County, Arizona             | 449,219             | 66.00        | 5.00                                   | 4.70                                                 | 1.70         | 0.40                                                             | 8.30                         | 13.90                             | 29.30                                               | 55.90                                                  |
| Yavapai County, Arizona           | 241,656             | 82.70        | 0.60                                   | 1.50                                                 | 1.10         | 0.10                                                             | 4.40                         | 9.70                              | 15.00                                               | 78.30                                                  |
| Yuma County, Arizona              | 207,685             | 48.40        | 1.70                                   | 1.40                                                 | 1.10         | 0.10                                                             | 13.20                        | 34.10                             | 64.40                                               | 29.60                                                  |
| Imperial County, California       | 179,319             | 30.40        | 2.50                                   | 1.60                                                 | 1.50         | 0.00                                                             | 37.80                        | 26.20                             | 85.60                                               | 9.40                                                   |
| Los Angeles County,<br>California | 9,848,406           | 35.40        | 7.80                                   | 1.30                                                 | 15.00        | 0.20                                                             | 23.60                        | 16.70                             | 48.30                                               | 25.20                                                  |
| Orange County, California         | 3,164,063           | 46.40        | 1.60                                   | 0.80                                                 | 21.90        | 0.30                                                             | 14.10                        | 14.90                             | 34.10                                               | 37.70                                                  |
| Riverside County,<br>California   | 2,449,909           | 42.20        | 6.50                                   | 1.20                                                 | 7.00         | 0.30                                                             | 24.30                        | 18.50                             | 50.60                                               | 32.00                                                  |

| Geographic Area                      | Total<br>Population | White<br>(%) | Black or<br>African<br>American<br>(%) | American<br>Indian<br>and<br>Alaska<br>Native<br>(%) | Asian<br>(%) | Native<br>Hawaiian<br>and<br>Other<br>Pacific<br>Islander<br>(%) | Some<br>Other<br>Race<br>(%) | Two<br>or<br>More<br>Races<br>(%) | Hispanic<br>or<br>Latino<br>(of Any<br>Race)<br>(%) | White<br>Alone,<br>not<br>Hispanic<br>or Latino<br>(%) |
|--------------------------------------|---------------------|--------------|----------------------------------------|------------------------------------------------------|--------------|------------------------------------------------------------------|------------------------------|-----------------------------------|-----------------------------------------------------|--------------------------------------------------------|
| San Bernardino County,<br>California | 2,187,816           | 39.10        | 8.00                                   | 1.30                                                 | 8.10         | 0.30                                                             | 24.50                        | 18.60                             | 54.60                                               | 25.60                                                  |
| San Diego County,<br>California      | 3,282,782           | 53.00        | 4.70                                   | 0.90                                                 | 12.20        | 0.40                                                             | 10.60                        | 18.10                             | 34.30                                               | 43.20                                                  |
| Clark County, Nevada                 | 2,293,764           | 47.10        | 12.10                                  | 1.10                                                 | 10.50        | 0.80                                                             | 12.90                        | 15.50                             | 31.40                                               | 39.40                                                  |
| Garfield County, Utah                | 5,170               | 94.70        | 0.10                                   | 2.10                                                 | 0.00         | 0.50                                                             | 0.90                         | 1.70                              | 7.00                                                | 89.30                                                  |
| Kane County, Utah                    | 7,996               | 90.80        | 0.20                                   | 2.20                                                 | 0.10         | 0.10                                                             | 2.40                         | 4.20                              | 4.80                                                | 88.70                                                  |
| San Juan County, Utah                | 14,466              | 46.70        | 0.10                                   | 45.90                                                | 0.50         | 0.40                                                             | 3.00                         | 3.30                              | 5.60                                                | 44.90                                                  |

Source: U.S. Census Bureau 2023b

Several counties in the study area had American Indian and Alaska Native populations that were higher than the respective state level. In Arizona, Apache (72.1 percent), Coconino (25.2), Gila (13.2 percent), Graham (11.4 percent), La Paz (14.2 percent), and Navajo (43.1 percent) Counties had American Indian and Alaska Native populations far exceeding the state population of 4.1 percent.

According to 2023 census data, 13 of the study area counties had Hispanic or Latino populations exceeding 25 percent of the total population. In Arizona, the Hispanic or Latino population exceeds 25 percent in Graham (30.3 percent), La Paz (25.5 percent), Maricopa (30.9 percent), Pima (36.1 percent), Pinal (29.3 percent), and Yuma (64.4 percent) Counties. In California, the Hispanic or Latino population exceeded 31 percent in Imperial (85.6 percent), Los Angeles (48.3 percent), Orange (34.1 percent), Riverside (50.6 percent), San Bernardino (54.6 percent), and San Diego (34.3 percent) Counties. Clark County, Nevada, had a Hispanic or Latino population of 31.4 percent. In contrast, in the three Utah study area counties, the Hispanic or Latino population comprised between 4.8 percent and 7.0 percent of the total population.

### **TA 16.1.5 Social and Nonmarket Values**

Nonmarket values refer to resource benefits that are not captured in market transactions or traditional economic measures. Along the Colorado River, these values include the enjoyment of natural scenery, opportunities for recreation and solitude, preservation of landscapes, and the symbolic and ecological importance of the river itself. Such values are important for understanding how river operations affect people's experiences, sense of place, and well-being, even when no direct economic exchange is involved.

Place-based communities along the Colorado River corridor derive nonmarket values from their proximity to the river and its resources. Gateway communities such as Page, Arizona; Boulder City, Nevada; Bullhead City, Arizona; and Lake Havasu City, Arizona, benefit from river-related recreation and tourism and identify with the surrounding landscape as part of their community character. Agricultural communities in counties in Arizona and California are closely tied to irrigated farmland supported by Colorado River water, and their identity is shaped in part by this long-standing relationship between land and water. Residents of these communities often emphasize quality of life, access to outdoor spaces, and continuity of traditional uses as nonmarket dimensions of the river.

In addition to supporting place-based communities, the river also supports nonmarket values for non-place-based communities. These include recreationists and visitors from across the U.S. who seek rafting, boating, angling, or other experiences on the river, as well as individuals who may never visit but who value the river for its ecological health, scenic integrity, or symbolic importance as a national resource. Conservation organizations and advocacy groups also emphasize the preservation of nonmarket values such as wilderness character and ecosystem health.

The expression of these values varies, but they generally encompass cultural identity, recreational quality, aesthetics, and existence values. For local communities, this may involve community identity or reliance on a healthy river system for recreational opportunities. For nonlocal stakeholders, it often reflects support for maintaining the river's ecological and scenic qualities. These values are not

measured through market activity but are nevertheless a critical part of how people interact with and assign meaning to the Colorado River.

Together, these social and nonmarket values establish a baseline for evaluating the social and cultural environment in the Colorado River Basin (Basin). They highlight that the river provides more than economic contributions; the river supports community identity, recreational experiences, and environmental quality that extend beyond direct market measures. These values provide important context for assessing potential changes under the post-2026 operational alternatives.

## **TA 16.2 Environmental Consequences**

### **TA 16.2.1 Methodology**

The following subsection outlines the methodology, impact analysis area, and assumptions used in the analysis of impacts on economic and social conditions from changes in agriculture and recreation as well as the analysis of impacts on ecosystem services and nonmarket values. For an analysis of impacts on hydropower, including impacts on energy generation, electricity rates, and market value, refer to **TA 15**, Dams and Electrical Power Resources. For an analysis of impacts on social and economic conditions from changes in domestic water, including impacts on municipal and industrial water users, refer to **TA 17**, Population and Land Use.

#### ***Agriculture***

The purpose of the agricultural impact assessment is to estimate the change in economic conditions from changes in agricultural production from a reduction of irrigation water. The change in the value of agricultural production is directly related to the acres of cropland assumed to be fallowed and the estimated forgone revenue per acre of the fallowed crop. In addition to revenue loss from agricultural products, agricultural jobs and wages would potentially be lost. To analyze the impacts on economic conditions from these changes in agriculture, the U.S. Bureau of Reclamation (Reclamation) used a similar agricultural modeling framework that was applied in the Colorado River Interim Guidelines for Lower Basin Shortages and the Coordinated Operations for Lake Powell and Lake Mead Final Environmental Impact Statement (2007 Final EIS; Reclamation 2007) and the Near-term Colorado River Operations Final Supplemental Environmental Impact Statement (2024 Final SEIS; Reclamation 2024), with some changes and updates as discussed below.

As described in **TA 4**, Water Deliveries, Reclamation used the Colorado River Simulation System to analyze water deliveries across the alternatives. Modeling details for each alternative are described in **Chapter 2**, Description of Alternatives and **Appendix S**, Additional Description of Alternatives. Additionally, as described in **Appendix C**, Shortage Allocation Model and Alternative Distribution Model Documentation, Reclamation used Shortage Allocation Models and Alternative Distribution Models in addition to the Colorado River Simulation System to analyze the potential impacts of the alternatives on individual agricultural water users within each Lower Division State under different shortage scenarios. Based on the Shortage Allocation and Alternative Distribution Models, Reclamation estimated the change in agricultural revenue for each priority group by county and state in the analysis area where the individual agricultural and tribal agricultural water users were being

affected from water shortages at a variety of shortage levels across each alternative and comparative baseline.

Irrigated crops in the analysis area that were analyzed include field crops, vegetables, and fruit and nut trees and vines, separated out into agricultural crop group types, where at least approximately one percent of a county's harvested acres come from the crop group (USDA 2024; Reclamation 2016; Imperial County 2019, 2020, 2021, 2022, 2023; Riverside County 2020, 2021, 2022, 2023; San Bernardino County 2019, 2020, 2021, 2022, 2023). The methodology for estimating which crops would be fallowed first is the same as that used in the 2007 Final EIS and the 2024 Final SEIS and is based on the crops' water use and the farmer's ability to cover the variable cost of production of a given crop, which is based on the profitability of the crop (Dale and Dixon 1998; Frisvold et al. 2013). The analysis assumes that the least profitable crop would be fallowed first, analyzed for each priority group in each county separately. Crops would continue to be fallowed in the order of least profitable crop, until the full volume of water shortage is offset.

Calculation of crop profitability per acre-foot of water followed the method outlined in Appendix H of the 2007 Final EIS, which used the difference between revenue and the variable costs per acre of land required to grow a given crop. Based on the order of fallowing and the shortages analyzed across the alternatives, the following eight crop group types were analyzed: alfalfa, cotton, cruciferous vegetables, field grains, fruit and tree nuts and vines, other hay and haylage, small grains, and small vegetables.

To determine how much a farmer would be willing to pay for water before a choice is made to fallow a crop, the cost of irrigation for growing each crop was added back to the calculated revenue minus the variable production cost. To account for each crop's required amount of water (different for each crop), the estimated return plus the irrigation cost was divided by the amount of water per acre needed to grow that crop (USDA 2024; Reclamation 2016; University of Arizona 1999, 2001, 2023, 2025; University of Nevada 2004, 2007, 2010, 2012, 2022; University of California 1956, 1962, 1963, 1964, 1965, 1967, 1972, 1973, 1974, 1975, 1977, 1978, 1979, 1984, 1988, 1989, 1992, 1995, 1996, 1997, 1998, 2000, 2002, 2004, 2011). Based on this method, the order in which crops would be fallowed varied across the counties in the study area.

County-level operational cost data for each crop, including the difference in irrigation cost, are not updated frequently. To capture the difference in the irrigation cost for each crop in different counties in Arizona, California, and Nevada, variable costs-of-production estimates were based on historical crop and livestock budgets developed by the University of Arizona, University of California Davis, and University of Nevada Reno, respectively, for a range of years, depending on the type of crop and county for which it was developed (University of Arizona 1999, 2001, 2023, 2025; University of Nevada 2004, 2007, 2010, 2012, 2022; University of California 1956, 1962, 1963, 1964, 1965, 1967, 1972, 1973, 1974, 1975, 1977, 1978, 1979, 1984, 1988, 1989, 1992, 1995, 1996, 1997, 1998, 2000, 2002, 2004, 2011; USDA ERS 2025). For operational cost and irrigation cost data that were not available for specific crops grown in the county, estimated data were used based on data from nearby counties or from nearby states or regions for the same or similar crops. All dollar values were converted to 2022 dollars. The purpose of using the cost estimates was only to

determine the order in which crops would be fallowed; the estimates are not considered an accurate measure of the current cost and return estimates.

Forgone agricultural revenue from fallowed crops was estimated by multiplying the county-level revenue per acre by the number of acres reduced (or fallowed) for each crop. The county-level revenue was calculated based on the most recent available data on yields and prices. The number of acres reduced for each crop was modeled based on the order in which crops would be fallowed, the level of shortages and available water for each priority group by county and state, and the most recent available data on acres harvested (USDA NASS 2024; Reclamation 2016; Imperial County 2019, 2020, 2021, 2022, 2023; Riverside County 2020, 2021, 2022, 2023; San Bernardino County 2019, 2020, 2021, 2022, 2023). For data that were not available for specific crops grown in the county, estimated data were used based on statewide averages, data from nearby counties, or averages from nearby states or regions for the same or similar crops.

Reclamation acknowledges that it is difficult to project exactly how individual farmers, irrigation districts, or each Lower Division State may mitigate potential future agricultural impacts from shortages. For example, farmers may use groundwater and other surface water resources to mitigate impacts from allocated shortages; however, the amount of groundwater that the farmers would use to replace the surface water depends on many factors, such as the amount of groundwater available, local and state restrictions on groundwater pumping, and the cost of pumping. Therefore, similar to the assumption made in the 2007 Final EIS and the 2024 Final SEIS, the quantitative projected change in agricultural production did not include the use of groundwater as a replacement water source; however, the use of groundwater to replace the estimated water shortage is discussed qualitatively.

As in the 2007 Final EIS and the 2024 Final SEIS, impacts on economic conditions, such as jobs and income, from changes in agricultural production were analyzed using the IMPLAN input-output economic model. IMPLAN is a regional economic model that describes the flow of money, goods, and services from producers to intermediate and final consumers using a series of economic multipliers. The IMPLAN model provides annual average estimates of how a direct change in economic spending (such as through reduced agricultural revenues) would ripple through the broader economy and other industries. These ripple or multiplier effects include (1) indirect impacts resulting from changes in economic activity in industries that sell inputs to the industries that may be directly affected (for example, changes in supply purchases made by agricultural producers or farmers) and (2) induced impacts resulting from changes in household spending as households adjust their spending in response to changes in labor income supported by industries affected by management actions (for example, changes in purchases at local stores for personal groceries).

This analysis used IMPLAN Cloud and data from IMPLAN's 2023 data release (the most recent period of data available on the IMPLAN Cloud platform at the time of analysis; IMPLAN 2025). Prior to running the model, cost data were converted to a consistent dollar year (2025). Unless stated otherwise, monetary values are reported in the year 2025 dollars.

The modeled shortage volumes, based on the Shortage Allocation and Alternative Distribution Models, are presented in terms of consumptive use shortage relative to the consumptive use (or

modeled equivalent) entitlement, in order to allow for comparison across the alternatives and shortage distribution methods. This is a change to volumetric shortage modeling from the 2007 Final EIS and the 2024 Final SEIS, which modeled shortages relative to future demand schedule or recent history of use, respectively. However, the quantitative agricultural economic analysis in this Final Environmental Impact Statement (EIS) captures the impacts that occur from immediate reductions in available water; it does not capture impacts on future water consumption expansion and development opportunities for irrigation entitlement holders with current consumptive use that is less than their entitlement. Many uncertain factors impact future consumption, so impacts from shortages on water consumption expansion opportunities for irrigation entitlement holders with current consumptive use that is less than their entitlement will be discussed qualitatively.

### **Impact Analysis Area**

Potential changes in economic contributions and social conditions from agricultural production within the analysis area due to estimated shortages were quantitatively assessed for the counties expected to experience impacts; these are Apache, Coconino, Gila, Graham, La Paz, Maricopa, Mohave, Navajo, Pima, Pinal, Yavapai, and Yuma Counties in Arizona; Imperial, Riverside, and San Bernardino Counties in California; and Clark County in Nevada.

Quantitative impacts were analyzed at the county level and presented at the state level, for comparison purposes.

### **Assumptions**

For the purposes of this analysis, Reclamation included the assumptions listed below. Any future changes in these assumptions would change the impacts on economic contributions and social conditions associated with agriculture. The extent to which impacts on economic contributions and social conditions change due to changes in assumptions depends on many factors and future conditions that Reclamation cannot predict with sufficient certainty to quantify in this EIS; however, where possible and as stated below, a qualitative discussion on the impacts of changes in the assumptions is provided in the impacts analysis.

- All dollar values in the impacts analysis are reported in 2025 dollars, unless otherwise noted.
- Farmers would fallow irrigated crops in response to water shortages or an increased cost of irrigation. Farmers would fallow the land rather than switch from one crop to an alternative, more profitable or less water-intensive crop due to investments and institutional knowledge that have been made in plants, supply chains and relationships, and/or machinery that create barriers for changing crops. Reclamation understands there could be farmers who are able to switch crops rather than fallow; however, for the purpose of this analysis, this assumption provides a bound to the analysis, and any changes in this assumption would likely result in less impacts than discussed below.
- As discussed above, the analysis assumes the least profitable crop would be fallowed first, analyzed for each county separately, and crops were assumed to have constant profitability per acre of land and per acre-foot of water. Reclamation understands that often farmers will plant lower-valued crops on an annual or seasonal rotation to support or prepare the soil for higher-valued crops; additionally, Reclamation acknowledges that markets fluctuate and that reduced availability or production of crops could change the prices, which could change

crop profitability and farmers' decisions of which crop to plant or fallow. Reclamation cannot predict with sufficient certainty the crop rotation patterns that farmers may choose or how markets will react to changes in crop production. The analysis assumption that crops would be fallowed in order of profitability and that profitability is held constant provides an estimated benchmark to allow for a comparison of impacts across alternatives.

- Changes in irrigated crop acreages would result from changes in water deliveries from the Colorado River sources; they do not involve changes to allocations or to irrigation water from groundwater or other surface water sources. Due to the uncertainties associated with the quantity of Colorado River irrigation water that would switch to groundwater, as well as other market factors that affect groundwater availability and cost, it is not possible to quantify the impacts on social and economic conditions from switching to groundwater; however, the use of groundwater to replace the estimated water shortage is discussed qualitatively.
- Estimated shortages in the agricultural sector are based on the Shortage Allocation and Alternative Distribution Models (**Appendix C**, Shortage Allocation Model and Alternative Distribution Model Documentation). Shortages to individual entitlement holders are measured in terms of consumptive use for a common basis of comparison with state apportionments and volumes of total shortage. Impacts on future opportunities to expand water use due to shortages for irrigation entitlement holders who currently use less than their entitlement are discussed qualitatively.
- The analysis does not assume that compensated conservation programs or other incentives for fallowing land are employed. This assumption provides a bound to the analysis; however, Reclamation acknowledges that conservation programs and adaptation measures could be implemented in the future and would lessen the impacts discussed below.
- In most cases, the contractor, subcontractor, or entitlement holder of an allocation is shown as the entity bearing shortage. In some cases, water allocated to an entitlement holder (for example, a tribal CAP contractor) may lease its allocation to other users (for example, to a non-Indian municipality). The Shortage Allocation and Alternative Distribution Models do not attempt to replicate those arrangements, and they only provide approximate estimates at the level of the entitlement holder, contractor, or subcontractor. The entitlement holder, contractor, or subcontractor to the leasing arrangements would have specific decisions to make during Shortage Conditions to administer those arrangements; Reclamation cannot predict these decisions with sufficient certainty to analyze in this EIS.
- If an entitlement holder leases water allocation to another type of user (for example, if an irrigation entitlement holder leases water to a tribal or non-tribal municipality or if a tribal or non-tribal CAP contractor leases to an agricultural water user), then a shortage in water deliveries would likely result in a financial impact on the entitlement holder. This would also result in an impact from a reduction in water availability on the end users; these impacts would be similar to those impacts discussed below for agricultural end users or as discussed in **TA 17**, Population and Land Use, for municipal and industrial end users.

**Impact Indicators**

- Change in acres of fallowed cropland
- Change in production value or revenue associated with fallowed cropland
- Change in jobs and income associated with agriculture
- Change in nonmarket values and social conditions associated with changes in agriculture

**Recreation**

The recreational economic impact analysis evaluates how operational changes under the alternatives may influence visitor spending and related economic activity in the Colorado River corridor (see **TA 14**, Recreation, for discussion of impacts on recreation). For an analysis of impacts of reservoir elevation on hydropower, including impacts on energy generation, refer to **TA 15**, Dams and Electrical Power Resources. For lake-based recreational economic contributions, the approach integrates estimates of baseline visitor use with spending profiles and applies a regional economic modeling framework, primarily IMPLAN, to estimate total economic contributions. Visitor use levels are derived from data reported by the NPS Public Use Statistics Office and Reclamation visitor counts, with visits categorized by activity type (for example, day use, overnight camping, and boating). Total visitor counts were divided by the average party-size data from the NPS to estimate the number of visiting parties for analysis; this is because the spending profile data are by party.

Visitors are further classified by type to reflect differences in recreational behavior and spending. Categories include local versus nonlocal visitors, day trips versus overnight stays, and distinctions among camping and lodging in nearby communities or other site-specific recreational activities. For each visit type, spending profiles are assigned based on available NPS and regional survey data. Profiles capture expenditures across categories such as lodging, food and beverages, transportation, recreational equipment and guide services, entrance and activity fees, and miscellaneous retail purchases.

Visitor spending estimates are then aggregated and input into the IMPLAN regional input-output model to estimate economic impacts. The model distinguishes among direct effects (visitor purchases in the local economy), indirect effects (business-to-business transactions, such as hotel purchases of supplies), and induced effects (household spending supported by recreation-related employment). Results are reported as total visitor spending, jobs supported, labor income, value added (contribution to gross regional product), and total sales. Impacts on direct, indirect, and induced economic contributions by alternative are discussed qualitatively.

A baseline assessment of economic contributions from river-based general recreation using the input-output analysis is included; it uses the same methodology as described above for lake-based recreation.

For the action alternatives, potential changes to recreation's contributions are discussed qualitatively, based on the Decision Making under Deep Uncertainty (DMDU) modeling output and conclusions related to Lake Powell and Lake Mead access to recreation and river-based recreation, as determined by river flow levels and fluctuations, as discussed in **TA 14**, Recreation.

In addition, for boating and angling, the socioeconomic analysis includes changes in the net economic value for a subset of activities, specifically angling in Glen Canyon and whitewater rafting in Grand Canyon. This approach follows the methods used in the Glen Canyon Dam Long-Term Experimental and Management Plan Final Supplemental Environmental Impact Statement (SEIS), where past survey research (Bishop et al. 1987; Neher et al. 2017) informed models to project the change in net economic value under different river flow scenarios. These models link willingness-to-pay estimates for anglers and boaters to hydrologic conditions, providing a measure of recreational benefits that extends beyond market spending (Bair 2026).

Reclamation used similar methods for the analysis of potential impacts on recreation as were used in the 2007 Final EIS and 2024 Final SEIS to assess the effects on recreational value associated with whitewater boating and angling. This analysis also incorporates additional DMDU concepts, specifically robustness heat maps and conditional box plots, developed to provide an indicator of an alternative's performance across many possible hydrologic futures. Refer to **Section TA 3.2.6 in TA 3, Hydrologic Resources**, for an overview of interpreting the DMDU robustness heat maps and conditional box plots.

Impacts on river-based concessionaires are also assessed qualitatively using existing NPS and outfitters' data and informed by modeled flow thresholds from **TA 14, Recreation**.

For recreation at Imperial NWR and Bill Williams River NWR, baseline economic contribution data are drawn from U.S. Fish and Wildlife Service visitor spending reports, with impacts discussed qualitatively due to limited modeling inputs.

### Impact Analysis Area

The analysis area is consistent with the general socioeconomic study area defined in **Chapter 3**. This includes major recreational hubs, gateway communities, and rural areas where economies rely heavily on river- and reservoir-based recreation. Specifically, the recreation impact analysis area encompasses three primary NPS units: Lake Mead NRA, Glen Canyon NRA, and GCNP.

Gateway counties associated with these areas include the following:

- Lake Mead NRA—Clark County and Lincoln County (Nevada); Mohave County (Arizona)
- Glen Canyon NRA (Lake Powell)—Coconino County (Arizona); Garfield, Kane, San Juan, and Wayne Counties (Utah)
- GCNP—Coconino, Mohave, Navajo, and Yavapai Counties (Arizona)

These counties represent the primary economic regions where visitor spending and recreation-related employment occur.

### Assumptions

For the purposes of this analysis, Reclamation included the assumptions listed below. Any future changes in these assumptions would change the impacts on economic contributions associated with recreation. The extent to which impacts on economic contributions and social conditions change

due to changes in assumptions depends on many factors and future conditions that Reclamation cannot predict with sufficient certainty to analyze in this EIS.

- All dollar values in the impacts analysis are reported in 2025 dollars, unless otherwise noted.
- Lake-based recreational spending per visitor trip is based on the most recent NPS Visitor Spending Profiles.
- IMPLAN results represent regional effects, including direct, indirect, and induced economic activity associated with lake-based recreation.
- Recreational spending per trip for anglers and whitewater rafting (adjusted for inflation) would follow results from willingness-to-pay surveys (Gaston et al. 2015) with variation based on river flows.

### **Impact Indicators**

- Changes in direct recreational visitor spending across the affected NPS units and recreation sites
- Changes in regional employment, labor income, value added, and total economic output from lake-based recreation-related activities
- Impacts on the recreational value associated with river-based boating and angling
- Effects on commercial outfitters, concessionaires, and permittees, especially in areas dependent on rafting, boating, and guided recreation

### **Ecosystem Services and Nonmarket Values**

The discussion of ecosystem services and nonmarket values is provided in a qualitative format based on existing literature.

### **Impact Analysis Area**

- The analysis area for social and nonmarket values is the Colorado River corridor from Lake Powell to the Southerly International Boundary, consistent with the overall socioeconomic study area.
- Consideration is focused on but not limited to geographic boundaries; this is because non-place-based communities also hold nonmarket values. Therefore, the area includes both local communities along the river and the broader public for whom the river holds symbolic, ecological, or recreational importance.

### **Assumptions**

For the purposes of this analysis, Reclamation assumed the following:

- Nonmarket values are not directly quantifiable through market-based indicators; instead, they can be described qualitatively based on existing studies, stakeholder input, and related resource analyses.
- Changes in nonmarket values are assumed to be closely linked to conditions evaluated in the other technical appendixes, such as those for recreation, population and land use, cultural resources, and visual resources.

- Changing hydrology may influence how these values are perceived, particularly where access, scenic character, or ecological conditions are affected.

### Impact Indicators

- Changes in the availability or quality of recreational opportunities not captured by direct spending
- Changes in the river's existence and symbolic values due to shifts in the scenic character or ecological conditions

### TA 16.2.2 Issue 1: How would the anticipated water shortages affect the economic contributions and social conditions from agriculture?

Under all alternatives and the Continued Current Strategies (CCS) Comparative Baseline, anticipated shortages would result in increases in acres of fallowed cropland and agricultural production losses, and the modeled agricultural production loss would result in impacts on the associated jobs, income, and total economic output. However, there are regional differences as well as differences in magnitude of impacts across the alternatives and the CCS Comparative Baseline, as discussed below.

As shown in figures below (**Figure TA 16-1** through **Figure TA 16-10**), there are two sets of model results for the Representative Preferred Alternative: those for the first 2 years (2027-2028) and those for beyond the first 2 years (2029-2060). As described in **Chapter 2**, under the Representative Preferred Alternative in the first 2 years (2027 – 2028), the shortages are distributed via LB priority up to 1.5 million acre-feet (maf) and shortage volumes above 1.5 maf up to 3.6 maf are distributed using the priority system, and under the Representative Preferred (2029-2060) Alternative, all volumes of shortages are distributed via the priority system. Refer to **Appendix C**, Table C-27 and Table C-26 for shortage impacts for each irrigation and tribal entitlement holder, respectively, under the LB Priority distribution (up to 1.5 maf shortage). The 2027 and 2028 operating guidelines modeling is compared to the Representative Preferred Alternative in **Appendix T**, Preliminary Description and Analysis of Anticipated Operating Guidelines for 2027 and 2028. Expected impacts from beyond 2028 under the Preferred Alternative may be different from what is shown in the figures below for the Representative Preferred (2029-2060) Alternative, as this alternative provides a framework that allows for shortages to be distributed based on agreements among states that may arise, consistent with sideboards described in **Chapter 2**.

**Figure TA 16-1** presents the estimated number of agriculture acres fallowed for each alternative and the CCS Comparative Baseline, across a range of shortage volumes—0.6 maf to 4.0 maf—for non-tribal and tribal irrigation entitlement holders in Arizona, California, and Nevada (see **Figure TA 16-2** and the discussion below for impacts broken out by priority group, and shortages by individual entitlement holder are shown in **Appendix C**). The shading highlights the magnitude of fallowed croplands across the alternatives and the CCS Comparative Baseline and shortage levels for each state and entitlement holder group, with the darker shaded numbers representing larger magnitudes of fallowed croplands. Across the alternatives and the CCS Comparative Baseline, the greatest impacts on fallowed lands occur in Arizona on non-tribal and tribal agriculture entitlement holders as well as California non-tribal agriculture entitlement holders. On average, for non-tribal agriculture entitlement holders in Arizona and California with shortages less than or equal to 3.0 maf, the greatest impacts on fallowed lands occurs under the Enhanced Coordination or Supply Driven

(Lower Basin [LB] Pro Rata approach) Alternatives, compared with the CCS Comparative Baseline and the other alternatives, including the Representative Preferred Alternative. During shortages greater than 3.0 maf, for non-tribal agriculture entitlement holders in Arizona, the greatest impacts on fallowed lands occur under the Representative Preferred (2029-2060) and Maximum Operational Flexibility Alternatives, due to the larger maximum shortages allowed under these alternative. However, for non-tribal agriculture entitlement holders in California, the greatest impacts on fallowed lands, during shortages greater than 3.0 maf, occur under the Enhanced Coordination Alternative, due to the pro rata-based shortage distribution method. When comparing impacts due to maximum levels of shortages across all alternatives and the CCS Comparative Baseline, for Arizona non-tribal entitlement holders, the Maximum Operational Flexibility Alternative would result in the greatest level of impacts on fallowed lands (with an increase of about 103,000 acres of fallowed lands) during a maximum shortage of 4.0 maf, and for California non-tribal entitlement holders, the Enhanced Coordination Alternative would result in the highest level of impacts on fallowed lands (with an increase of about 283,000 acres of fallowed lands) during a maximum shortage of 3.0 maf. When the shortage is 0.6 maf, the smallest impacts on fallowed lands occurs under the Maximum Operational Flexibility, Supply Driven (LB Priority approach), and Representative Preferred (2027-2028) Alternatives for Arizona non-tribal entitlement holders, and there would be no impacts on fallowed lands for California non-tribal entitlement holders under the CCS Comparative Baseline and the No Action, Representative Preferred, Basic Coordination, Maximum Operational Flexibility, and Supply Driven (LB Priority approach) Alternatives. During maximum levels of shortage, the lowest impacts on fallowed lands would occur under the CCS Comparative Baseline and the No Action and Basic Coordination Alternatives, with an increase in total fallowed land across Arizona and California non-tribal entitlement holders of about 6,000 acres (with a shortage of 1.0 maf) under the CCS Comparative Baseline, 1,000 acres (with a shortage of 0.6 maf) under the No Action Alternative, and 7,000 acres (with a shortage of 1.5 maf) under the Basic Coordination Alternative.

On average, across all Arizona tribal entitlement holders combined, when the shortage is 0.6 maf, the largest impacts on fallowed lands occurs under the Supply Driven Alternative (LB Pro Rata approach) and the smallest impacts on fallowed lands occurs under the Maximum Operational Flexibility, Supply Driven (LB Priority approach), and Representative Preferred (2027-2028) Alternatives. For shortages greater than 0.6 maf but not more than 1.5 maf, impacts on fallowed lands would be largest under the Basic Coordination and Representative Preferred (2029-2060) Alternatives and smallest under the No Action Alternative, because the maximum shortage for this alternative is 0.6 maf. For shortages greater than 1.5 maf, impacts on fallowed lands would be greatest under the Representative Preferred (2029-2060) and Maximum Operational Flexibility Alternatives, with annual impacts as large as an increase in fallowed lands of about 67,000 acres (occurring during a shortage of 3.6 maf under the Representative Preferred (2029-2060) Alternative) and 68,000 acres (occurring during a shortage of 4.0 maf under the Maximum Operational Flexibility Alternative). The maximum level of impacts on fallowed lands due to shortages for Arizona tribal entitlement holders were the lowest under the No Action Alternative (with about 12,000 acres fallowed under a shortage of 0.6 maf; see **Figure TA 16-1**). However, as discussed below, these impacts vary across priority groups.

Figure TA 16-1  
Annual Acres of Fallowed Cropland in the Analysis Area by Alternative and Shortage Level, in Thousand Acre-feet (kaf)

| State, Water Entitlement Holders   |                                                               | Shortage Level (kaf) | 600    | 1,000   | 1,500   | 1,800   | 2,000   | 2,100   | 2,300   | 3,000   | 3,600   | 4,000   |
|------------------------------------|---------------------------------------------------------------|----------------------|--------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| Arizona, Non-Tribal Agriculture    | CCS Comparative Baseline <sup>1</sup>                         |                      | 1,695  | 2,747   |         |         |         |         |         |         |         |         |
|                                    | No Action Alternative                                         |                      | 1,222  |         |         |         |         |         |         |         |         |         |
|                                    | Basic Coordination Alternative <sup>2</sup>                   |                      | 1,222  | 3,882   | 7,322   |         |         |         |         |         |         |         |
|                                    | Enhanced Coordination Alternative                             |                      | 9,068  | 15,076  | 22,743  | 27,808  | 32,368  | 34,643  | 40,346  | 62,044  |         |         |
|                                    | Maximum Operational Flexibility Alternative                   |                      | 464    | 2,007   | 3,764   | 5,591   | 7,063   | 8,074   | 9,854   | 29,489  | 75,029  | 103,065 |
|                                    | Supply Driven (LB Priority Approach) Alternative              |                      | 464    | 2,007   | 3,764   | 5,591   | 7,063   | 8,074   |         |         |         |         |
|                                    | Supply Driven (LB Pro Rata Approach) Alternative              |                      | 17,875 | 26,374  | 44,351  | 52,435  | 57,825  | 60,520  |         |         |         |         |
|                                    | Representative Preferred (2027-2028) Alternative <sup>3</sup> |                      | 464    | 2,007   | 3,764   | 5,591   | 7,063   | 8,074   | 9,854   | 29,489  | 75,029  |         |
|                                    | Representative Preferred (2029-2060) Alternative <sup>4</sup> |                      | 1,222  | 3,882   | 7,322   | 10,108  | 10,275  | 12,291  | 19,115  | 51,279  | 91,032  |         |
| California, Non-Tribal Agriculture | CCS Comparative Baseline <sup>1</sup>                         |                      | 0      | 3,305   |         |         |         |         |         |         |         |         |
|                                    | No Action Alternative                                         |                      | 0      |         |         |         |         |         |         |         |         |         |
|                                    | Basic Coordination Alternative <sup>2</sup>                   |                      | 0      | 0       | 0       |         |         |         |         |         |         |         |
|                                    | Enhanced Coordination Alternative                             |                      | 71,341 | 105,664 | 148,567 | 174,309 | 191,471 | 200,052 | 217,213 | 283,363 |         |         |
|                                    | Maximum Operational Flexibility Alternative                   |                      | 0      | 0       | 12,276  | 12,276  | 12,276  | 12,276  | 12,276  | 114,402 | 170,047 | 226,560 |
|                                    | Supply Driven (LB Priority Approach) Alternative              |                      | 0      | 0       | 12,276  | 12,276  | 12,276  | 12,276  |         |         |         |         |
|                                    | Supply Driven (LB Pro Rata Approach) Alternative              |                      | 39,213 | 65,020  | 97,280  | 125,152 | 143,734 | 153,024 |         |         |         |         |
|                                    | Representative Preferred (2027-2028) Alternative <sup>3</sup> |                      | 0      | 0       | 12,276  | 12,276  | 12,276  | 12,276  | 12,276  | 114,402 | 170,047 |         |
|                                    | Representative Preferred (2029-2060) Alternative <sup>4</sup> |                      | 0      | 0       | 0       | 0       | 0       | 0       | 0       | 64,977  | 151,208 |         |
| Arizona, Tribal Agriculture        | CCS Comparative Baseline <sup>1</sup>                         |                      | 15,586 | 22,254  |         |         |         |         |         |         |         |         |
|                                    | No Action Alternative                                         |                      | 12,419 |         |         |         |         |         |         |         |         |         |
|                                    | Basic Coordination Alternative <sup>2</sup>                   |                      | 12,419 | 28,957  | 49,582  |         |         |         |         |         |         |         |
|                                    | Enhanced Coordination Alternative                             |                      | 8,067  | 13,395  | 19,975  | 24,123  | 26,855  | 28,220  | 30,707  | 39,200  |         |         |
|                                    | Maximum Operational Flexibility Alternative                   |                      | 6,535  | 16,804  | 28,237  | 40,341  | 48,486  | 53,560  | 61,787  | 64,022  | 66,506  | 68,054  |
|                                    | Supply Driven (LB Priority Approach) Alternative              |                      | 6,535  | 16,804  | 28,237  | 40,341  | 48,486  | 53,560  |         |         |         |         |
|                                    | Supply Driven (LB Pro Rata Approach) Alternative              |                      | 15,794 | 23,239  | 32,270  | 35,438  | 37,551  | 38,605  |         |         |         |         |
|                                    | Representative Preferred (2027-2028) Alternative <sup>3</sup> |                      | 6,535  | 16,804  | 28,237  | 40,341  | 48,486  | 53,560  | 61,787  | 64,022  | 66,506  |         |
|                                    | Representative Preferred (2029-2060) Alternative <sup>4</sup> |                      | 12,419 | 28,957  | 49,582  | 61,862  | 61,922  | 62,201  | 62,922  | 65,447  | 67,375  |         |
| California, Tribal Agriculture     | CCS Comparative Baseline <sup>1</sup>                         |                      | 0      | 0       |         |         |         |         |         |         |         |         |
|                                    | No Action Alternative                                         |                      | 0      |         |         |         |         |         |         |         |         |         |
|                                    | Basic Coordination Alternative <sup>2</sup>                   |                      | 0      | 0       | 0       |         |         |         |         |         |         |         |
|                                    | Enhanced Coordination Alternative                             |                      | 1,298  | 1,930   | 2,721   | 3,195   | 3,511   | 3,669   | 3,985   | 5,092   |         |         |
|                                    | Maximum Operational Flexibility Alternative                   |                      | 0      | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 0       |
|                                    | Supply Driven (LB Priority Approach) Alternative              |                      | 0      | 0       | 0       | 0       | 0       | 0       |         |         |         |         |
|                                    | Supply Driven (LB Pro Rata Approach) Alternative              |                      | 579    | 1,181   | 1,776   | 2,289   | 2,632   | 2,803   |         |         |         |         |
|                                    | Representative Preferred (2027-2028) Alternative <sup>3</sup> |                      | 0      | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 0       |         |
|                                    | Representative Preferred (2029-2060) Alternative <sup>4</sup> |                      | 0      | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 0       |         |
| Nevada, Tribal Agriculture         | CCS Comparative Baseline <sup>1</sup>                         |                      | 0      | 0       |         |         |         |         |         |         |         |         |
|                                    | No Action Alternative                                         |                      | 0      |         |         |         |         |         |         |         |         |         |
|                                    | Basic Coordination Alternative <sup>2</sup>                   |                      | 0      | 0       | 0       |         |         |         |         |         |         |         |
|                                    | Enhanced Coordination Alternative                             |                      | 131    | 219     | 328     | 393     | 437     | 459     | 503     | 656     |         |         |
|                                    | Maximum Operational Flexibility Alternative                   |                      | 0      | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 0       |
|                                    | Supply Driven (LB Priority Approach) Alternative              |                      | 0      | 0       | 0       | 0       | 0       | 0       |         |         |         |         |
|                                    | Supply Driven (LB Pro Rata Approach) Alternative              |                      | 131    | 219     | 329     | 394     | 438     | 460     |         |         |         |         |
|                                    | Representative Preferred (2027-2028) Alternative <sup>3</sup> |                      | 0      | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 0       |         |
|                                    | Representative Preferred (2029-2060) Alternative <sup>4</sup> |                      | 0      | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 0       |         |

Source: IMPLAN 2025

Note: The highlighting shows the values from the smallest (in white or no highlighting) to the largest (in yellow highlighting). The cells with hash-marks represent the values above shortages; these values are outside of the scope of this analysis. See **Appendix C**, Shortage Allocation Model and Alternative Distribution Model Documentation for more information on the shortage values for each entitlement holder type above shortages.

<sup>1</sup> Due to its fixed shortage volumes for CCS Comparative Baseline, shortages for 600K and 1,000K are actually associated with 613K and 1,013K in CCS Comparative Baseline. Greater shortages are based on an extension of priority beyond the levels of shortage provided by the pertinent documents.

<sup>2</sup> The maximum shortage for the Basic Coordination Alternative is 1.48 maf; however, the table above shows the maximum shortage as 1.5 maf for ease of comparison across the alternatives.

<sup>3</sup> The distribution of shortages up to 1.5 maf in 2027-2028 in the Representative Preferred Alternative reflects the May 1 proposal by the Lower Division States. Although not specified in their proposal, the Representative Preferred assumes shortages and their distribution above 1.5 maf in 2028 as necessary to avoid critically low elevations in Lake Mead. (See **Chapter 2** for more details on the sideboards under the Preferred Alternative and their representation in the Representative Preferred Alternative).

<sup>4</sup> Expected impacts from 2029 – 2060 under the Preferred Alternative may be different from what is shown for the Representative Preferred (2029-2060) Alternative, as this alternative provides a framework that allows for shortage distributions to be negotiated in different ways, consistent with sideboards described in **Chapter 2**.

Figure TA 16-2  
Annual Acres of Fallowed Cropland in the Analysis Area by Priority Group, Alternative, and Shortage Level, in kaf

| State, Water Entitlement Holders, Priority Group          |                                                               | Shortage Level (kaf) | 600    | 1,000  | 1,500   | 1,800   | 2,000   | 2,100   | 2,300   | 3,000   | 3,600   | 4,000   |
|-----------------------------------------------------------|---------------------------------------------------------------|----------------------|--------|--------|---------|---------|---------|---------|---------|---------|---------|---------|
| Arizona, Non-Tribal Agriculture, Priority 4(i)            | CCS Comparative Baseline <sup>1</sup>                         |                      | 1,695  | 2,747  |         |         |         |         |         |         |         |         |
|                                                           | No Action Alternative                                         |                      | 1,222  |        |         |         |         |         |         |         |         |         |
|                                                           | Basic Coordination Alternative <sup>2</sup>                   |                      | 1,222  | 3,882  | 7,322   |         |         |         |         |         |         |         |
|                                                           | Enhanced Coordination Alternative                             |                      | 552    | 881    | 1,451   | 1,801   | 1,980   | 2,064   | 2,247   | 2,907   |         |         |
|                                                           | Maximum Operational Flexibility Alternative                   |                      | 464    | 2,007  | 3,764   | 5,591   | 7,063   | 8,074   | 9,854   | 10,275  | 10,275  | 10,275  |
|                                                           | Supply Driven (LB Priority Approach) Alternative              |                      | 464    | 2,007  | 3,764   | 5,591   | 7,063   | 8,074   |         |         |         |         |
|                                                           | Supply Driven (LB Pro Rata Approach) Alternative              |                      | 1,087  | 1,723  | 2,369   | 2,615   | 2,779   | 2,861   |         |         |         |         |
|                                                           | Representative Preferred (2027-2028) Alternative <sup>3</sup> |                      | 464    | 2,007  | 3,764   | 5,591   | 7,063   | 8,074   | 9,854   | 10,275  | 10,275  |         |
|                                                           | Representative Preferred (2029-2060) Alternative <sup>4</sup> |                      | 1,222  | 3,882  | 7,322   | 10,108  | 10,275  | 10,275  | 10,275  | 10,275  | 10,275  |         |
| Arizona, Non-Tribal Agriculture, Priority 3               | CCS Comparative Baseline <sup>1</sup>                         |                      | 0      | 0      |         |         |         |         |         |         |         |         |
|                                                           | No Action Alternative                                         |                      | 0      |        |         |         |         |         |         |         |         |         |
|                                                           | Basic Coordination Alternative <sup>2</sup>                   |                      | 0      | 0      | 0       |         |         |         |         |         |         |         |
|                                                           | Enhanced Coordination Alternative                             |                      | 6,494  | 10,823 | 16,234  | 19,831  | 23,176  | 24,849  | 29,066  | 45,142  |         |         |
|                                                           | Maximum Operational Flexibility Alternative                   |                      | 0      | 0      | 0       | 0       | 0       | 0       | 0       | 19,214  | 64,754  | 92,791  |
|                                                           | Supply Driven (LB Priority Approach) Alternative              |                      | 0      | 0      | 0       | 0       | 0       | 0       |         |         |         |         |
|                                                           | Supply Driven (LB Pro Rata Approach) Alternative              |                      | 12,800 | 18,796 | 32,033  | 38,023  | 42,016  | 44,013  |         |         |         |         |
|                                                           | Representative Preferred (2027-2028) Alternative <sup>3</sup> |                      | 0      | 0      | 0       | 0       | 0       | 0       | 0       | 19,214  | 64,754  |         |
|                                                           | Representative Preferred (2029-2060) Alternative <sup>4</sup> |                      | 0      | 0      | 0       | 0       | 0       | 2,016   | 8,840   | 41,004  | 80,757  |         |
| Arizona, Non-Tribal Agriculture, PPR                      | CCS Comparative Baseline <sup>1</sup>                         |                      | 0      | 0      |         |         |         |         |         |         |         |         |
|                                                           | No Action Alternative                                         |                      | 0      |        |         |         |         |         |         |         |         |         |
|                                                           | Basic Coordination Alternative <sup>2</sup>                   |                      | 0      | 0      | 0       |         |         |         |         |         |         |         |
|                                                           | Enhanced Coordination Alternative                             |                      | 2,023  | 3,372  | 5,058   | 6,176   | 7,212   | 7,730   | 9,033   | 13,995  |         |         |
|                                                           | Maximum Operational Flexibility Alternative                   |                      | 0      | 0      | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 0       |
|                                                           | Supply Driven (LB Priority Approach) Alternative              |                      | 0      | 0      | 0       | 0       | 0       | 0       |         |         |         |         |
|                                                           | Supply Driven (LB Pro Rata Approach) Alternative              |                      | 3,988  | 5,856  | 9,949   | 11,798  | 13,030  | 13,647  |         |         |         |         |
|                                                           | Representative Preferred (2027-2028) Alternative <sup>3</sup> |                      | 0      | 0      | 0       | 0       | 0       | 0       | 0       | 0       | 0       |         |
|                                                           | Representative Preferred (2029-2060) Alternative <sup>4</sup> |                      | 0      | 0      | 0       | 0       | 0       | 0       | 0       | 0       | 0       |         |
| California, Non-Tribal Agriculture, Priorities 2 & 3      | CCS Comparative Baseline <sup>1</sup>                         |                      | 0      | 3,305  |         |         |         |         |         |         |         |         |
|                                                           | No Action Alternative                                         |                      | 0      |        |         |         |         |         |         |         |         |         |
|                                                           | Basic Coordination Alternative <sup>2</sup>                   |                      | 0      | 0      | 0       |         |         |         |         |         |         |         |
|                                                           | Enhanced Coordination Alternative                             |                      | 14,691 | 22,485 | 32,228  | 38,074  | 41,971  | 43,920  | 47,817  | 62,376  |         |         |
|                                                           | Maximum Operational Flexibility Alternative                   |                      | 0      | 0      | 12,276  | 12,276  | 12,276  | 12,276  | 12,276  | 114,402 | 170,047 | 226,560 |
|                                                           | Supply Driven (LB Priority Approach) Alternative              |                      | 0      | 0      | 12,276  | 12,276  | 12,276  | 12,276  |         |         |         |         |
|                                                           | Supply Driven (LB Pro Rata Approach) Alternative              |                      | 7,395  | 13,255 | 20,581  | 26,911  | 31,131  | 33,240  |         |         |         |         |
|                                                           | Representative Preferred (2027-2028) Alternative <sup>3</sup> |                      | 0      | 0      | 12,276  | 12,276  | 12,276  | 12,276  | 12,276  | 114,402 | 170,047 |         |
|                                                           | Representative Preferred (2029-2060) Alternative <sup>4</sup> |                      | 0      | 0      | 0       | 0       | 0       | 0       | 0       | 64,977  | 151,208 |         |
| California, Non-Tribal Agriculture, PPR                   | CCS Comparative Baseline <sup>1</sup>                         |                      | 0      | 0      |         |         |         |         |         |         |         |         |
|                                                           | No Action Alternative                                         |                      | 0      |        |         |         |         |         |         |         |         |         |
|                                                           | Basic Coordination Alternative <sup>2</sup>                   |                      | 0      | 0      | 0       |         |         |         |         |         |         |         |
|                                                           | Enhanced Coordination Alternative                             |                      | 56,650 | 83,179 | 116,339 | 136,235 | 149,500 | 156,132 | 169,396 | 220,986 |         |         |
|                                                           | Maximum Operational Flexibility Alternative                   |                      | 0      | 0      | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 0       |
|                                                           | Supply Driven (LB Priority Approach) Alternative              |                      | 0      | 0      | 0       | 0       | 0       | 0       |         |         |         |         |
|                                                           | Supply Driven (LB Pro Rata Approach) Alternative              |                      | 31,818 | 51,765 | 76,698  | 98,241  | 112,603 | 119,784 |         |         |         |         |
|                                                           | Representative Preferred (2027-2028) Alternative <sup>3</sup> |                      | 0      | 0      | 0       | 0       | 0       | 0       | 0       | 0       | 0       |         |
|                                                           | Representative Preferred (2029-2060) Alternative <sup>4</sup> |                      | 0      | 0      | 0       | 0       | 0       | 0       | 0       | 0       | 0       |         |
| Arizona, Tribal Agriculture, Priorities CAP Indian & 4(i) | CCS Comparative Baseline <sup>1</sup>                         |                      | 15,586 | 22,254 |         |         |         |         |         |         |         |         |
|                                                           | No Action Alternative                                         |                      | 12,419 |        |         |         |         |         |         |         |         |         |
|                                                           | Basic Coordination Alternative <sup>2</sup>                   |                      | 12,419 | 28,957 | 49,582  |         |         |         |         |         |         |         |
|                                                           | Enhanced Coordination Alternative                             |                      | 4,568  | 7,564  | 11,228  | 13,627  | 15,237  | 16,042  | 17,496  | 22,401  |         |         |
|                                                           | Maximum Operational Flexibility Alternative                   |                      | 6,535  | 16,804 | 28,237  | 40,341  | 48,486  | 53,560  | 61,787  | 61,922  | 61,922  | 61,922  |
|                                                           | Supply Driven (LB Priority Approach) Alternative              |                      | 6,535  | 16,804 | 28,237  | 40,341  | 48,486  | 53,560  |         |         |         |         |
|                                                           | Supply Driven (LB Pro Rata Approach) Alternative              |                      | 8,897  | 13,112 | 18,405  | 20,240  | 21,455  | 22,059  |         |         |         |         |
|                                                           | Representative Preferred (2027-2028) Alternative <sup>3</sup> |                      | 6,535  | 16,804 | 28,237  | 40,341  | 48,486  | 53,560  | 61,787  | 61,922  | 61,922  |         |
|                                                           | Representative Preferred (2029-2060) Alternative <sup>4</sup> |                      | 12,419 | 28,957 | 49,582  | 61,862  | 61,922  | 61,922  | 61,922  | 61,922  | 61,922  |         |
| Arizona, Tribal Agriculture, Priority 3                   | CCS Comparative Baseline <sup>1</sup>                         |                      | 0      | 0      |         |         |         |         |         |         |         |         |
|                                                           | No Action Alternative                                         |                      | 0      |        |         |         |         |         |         |         |         |         |
|                                                           | Basic Coordination Alternative <sup>2</sup>                   |                      | 0      | 0      | 0       |         |         |         |         |         |         |         |
|                                                           | Enhanced Coordination Alternative                             |                      | 693    | 1,154  | 1,732   | 2,078   | 2,309   | 2,424   | 2,655   | 3,463   |         |         |
|                                                           | Maximum Operational Flexibility Alternative                   |                      | 0      | 0      | 0       | 0       | 0       | 0       | 0       | 2,100   | 4,584   | 6,132   |
|                                                           | Supply Driven (LB Priority Approach) Alternative              |                      | 0      | 0      | 0       | 0       | 0       | 0       |         |         |         |         |
|                                                           | Supply Driven (LB Pro Rata Approach) Alternative              |                      | 1,365  | 2,005  | 2,804   | 3,106   | 3,306   | 3,407   |         |         |         |         |
|                                                           | Representative Preferred (2027-2028) Alternative <sup>3</sup> |                      | 0      | 0      | 0       | 0       | 0       | 0       | 0       | 2,100   | 4,584   |         |
|                                                           | Representative Preferred (2029-2060) Alternative <sup>4</sup> |                      | 0      | 0      | 0       | 0       | 0       | 279     | 1,000   | 3,525   | 5,453   |         |
| Arizona, Tribal Agriculture, PPR                          | CCS Comparative Baseline <sup>1</sup>                         |                      | 0      | 0      |         |         |         |         |         |         |         |         |
|                                                           | No Action Alternative                                         |                      | 0      |        |         |         |         |         |         |         |         |         |
|                                                           | Basic Coordination Alternative <sup>2</sup>                   |                      | 0      | 0      | 0       |         |         |         |         |         |         |         |
|                                                           | Enhanced Coordination Alternative                             |                      | 2,806  | 4,677  | 7,015   | 8,418   | 9,309   | 9,753   | 10,555  | 13,336  |         |         |
|                                                           | Maximum Operational Flexibility Alternative                   |                      | 0      | 0      | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 0       |
|                                                           | Supply Driven (LB Priority Approach) Alternative              |                      | 0      | 0      | 0       | 0       | 0       | 0       |         |         |         |         |
|                                                           | Supply Driven (LB Pro Rata Approach) Alternative              |                      | 5,531  | 8,122  | 11,060  | 12,092  | 12,790  | 13,139  |         |         |         |         |
|                                                           | Representative Preferred (2027-2028) Alternative <sup>3</sup> |                      | 0      | 0      | 0       | 0       | 0       | 0       | 0       | 0       | 0       |         |
|                                                           | Representative Preferred (2029-2060) Alternative <sup>4</sup> |                      | 0      | 0      | 0       | 0       | 0       | 0       | 0       | 0       | 0       |         |
| California, Tribal Agriculture, PPR                       | CCS Comparative Baseline <sup>1</sup>                         |                      | 0      | 0      |         |         |         |         |         |         |         |         |
|                                                           | No Action Alternative                                         |                      | 0      |        |         |         |         |         |         |         |         |         |
|                                                           | Basic Coordination Alternative <sup>2</sup>                   |                      | 0      | 0      | 0       |         |         |         |         |         |         |         |
|                                                           | Enhanced Coordination Alternative                             |                      | 1,298  | 1,930  | 2,721   | 3,195   | 3,511   | 3,669   | 3,985   | 5,092   |         |         |
|                                                           | Maximum Operational Flexibility Alternative                   |                      | 0      | 0      | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 0       |
|                                                           | Supply Driven (LB Priority Approach) Alternative              |                      | 0      | 0      | 0       | 0       | 0       | 0       |         |         |         |         |
|                                                           | Supply Driven (LB Pro Rata Approach) Alternative              |                      | 579    | 1,181  | 1,776   | 2,289   | 2,632   | 2,803   |         |         |         |         |
|                                                           | Representative Preferred (2027-2028) Alternative <sup>3</sup> |                      | 0      | 0      | 0       | 0       | 0       | 0       | 0       | 0       | 0       |         |
|                                                           | Representative Preferred (2029-2060) Alternative <sup>4</sup> |                      | 0      | 0      | 0       | 0       | 0       | 0       | 0       | 0       | 0       |         |
| Nevada, Tribal Agriculture, PPR                           | CCS Comparative Baseline <sup>1</sup>                         |                      | 0      | 0      |         |         |         |         |         |         |         |         |
|                                                           | No Action Alternative                                         |                      | 0      |        |         |         |         |         |         |         |         |         |
|                                                           | Basic Coordination Alternative <sup>2</sup>                   |                      | 0      | 0      | 0       |         |         |         |         |         |         |         |
|                                                           | Enhanced Coordination Alternative                             |                      | 131    | 219    | 328     | 393     | 437     | 459     | 503     | 656     |         |         |
|                                                           | Maximum Operational Flexibility Alternative                   |                      | 0      | 0      | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 0       |
|                                                           | Supply Driven (LB Priority Approach) Alternative              |                      | 0      | 0      | 0       | 0       | 0       | 0       |         |         |         |         |
|                                                           | Supply Driven (LB Pro Rata Approach) Alternative              |                      | 131    | 219    | 329     | 394     | 438     | 460     |         |         |         |         |
|                                                           | Representative Preferred (2027-2028) Alternative <sup>3</sup> |                      | 0      | 0      | 0       | 0       | 0       | 0       | 0       | 0       | 0       |         |
|                                                           | Representative Preferred (2029-2060) Alternative <sup>4</sup> |                      | 0      | 0      | 0       | 0       | 0       | 0       | 0       | 0       | 0       |         |

Source: IMPLAN 2025

Note: The highlighting shows the values from the smallest (in white or no highlighting) to the largest (in yellow highlighting). The cells with hash-marks represent the values above shortages; these values are outside of the scope of this analysis. See **Appendix C**, Shortage Allocation Model and Alternative Distribution Model Documentation for more information on the shortage values for each entitlement holder type above shortages.

<sup>1</sup> Due to its fixed shortage volumes for CCS Comparative Baseline, shortages for 600K and 1,000K are actually associated with 613K and 1,013K in CCS Comparative Baseline. Greater shortages are based on an extension of priority beyond the levels of shortage provided by the pertinent documents.

<sup>2</sup> The maximum shortage for the Basic Coordination Alternative is 1.48 maf; however, the table above shows the maximum shortage as 1.5 maf for ease of comparison across the alternatives.

<sup>3</sup> The distribution of shortages up to 1.5 maf in 2027-2028 in the Representative Preferred Alternative reflects the May 1 proposal by the Lower Division States. Although not specified in their proposal, the Representative Preferred assumes shortages and their distribution above 1.5 maf in 2028 as necessary to avoid critically low elevations in Lake Mead. (See **Chapter 2** for more details on the sideboards under the Preferred Alternative and their representation in the Representative Preferred Alternative).

<sup>4</sup> Expected impacts from 2029 – 2060 under the Preferred Alternative may be different from what is shown for the Representative Preferred (2029-2060) Alternative, as this alternative provides a framework that allows for shortage distributions to be negotiated in different ways, consistent with sideboards described in **Chapter 2**.

For California and Nevada tribal entitlement holders, impacts on fallowed lands would only occur under the Enhanced Coordination and Supply Driven (LB Pro Rata approach) Alternatives. The largest impacts would occur under the Enhanced Coordination Alternative, during a shortage of 3.0 maf, with an increase in fallowed lands of about 6,000 acres (about 5,000 acres and 700 acres of fallowed lands in California and Nevada, respectively). There are no expected impacts on fallowed lands under all other alternatives and the CCS Comparative Baseline for California and Nevada tribal entitlement holders, including under the Representative Preferred Alternative (see **Figure TA 16-1**).

Overall, across all entitlement groups and states, during maximum levels of shortage, there would be large impacts on the agriculture sector, including large reductions in harvested acres and crop production, under the Maximum Operational Flexibility, the Representative Preferred (2029-2060), the Enhanced Coordination, and the Supply Driven (LB Pro Rata approach) Alternatives. Under the Maximum Operational Flexibility Alternative, during a shortage of 4.0 maf, about half of all harvested acres in Yuma County, Arizona would be fallowed (including almost all harvested acres of alfalfa, cotton, other hay and haylage, and small grains) as well as over 40 percent of all harvested acres in Pima County, Arizona and over 60 percent of all harvested acres in Riverside County, California would be fallowed. During a shortage of 3.6 maf under the Representative Preferred (2029-2060) Alternative, over 40 percent of all harvested acres in Yuma County, Arizona would be fallowed (including almost all harvested acres of alfalfa, cotton, and small grains) as well as over 40 percent of all harvested acres in Pima County, Arizona and over 60 percent of all harvested acres in Riverside County, California would be fallowed. During a shortage of 3.0 maf under the Enhanced Coordination Alternative, almost half of the harvested acres in Imperial County, California would be fallowed (including all harvested acres of alfalfa, crucifers, and field grains in the county), about half of all harvested acres in Clark County, Nevada would be fallowed (including about 80 percent of harvested acres of alfalfa), all harvested acres of alfalfa and cotton in Yuma County, Arizona would be fallowed, about 90 percent of field grain and small grain crops in La Paz, Arizona would be fallowed, and over 80 percent of alfalfa would be fallowed in Riverside, California. During a shortage of 2.1 maf under the Supply Driven Alternative (LB Pro Rata approach), about one third of the harvested acres would be fallowed in Clark County in Nevada and Mohave and Yuma Counties in Arizona (including all harvested acres of alfalfa and cotton in Yuma County) as well as all harvested acres of crucifers and field grains in Imperial County, California and about 90 percent of field grain and small grain crops in La Paz, Arizona would be fallowed.

Within each state and tribal and non-tribal agricultural entitlement group, impacts on fallowed cropland from change in water shortages across the alternatives and the CCS Comparative Baseline vary across priority groups. **Figure TA 16-2** reports the estimated number of agricultural acres fallowed for each priority group across alternatives and the CCS Comparative Baseline at a range of shortage volumes (Priorities 2 and 3 for California non-tribal agricultural entitlement holders were grouped together, as were the CAP Indian and 4(i) priorities for Arizona tribal agricultural entitlement holders, due to the similarities in the distribution of shortages). See **Appendix C** for shortages by individual entitlement holder.

Impacts on fallowed cropland from changes in water availability for the present perfected right (PPR) priority entitlement holders (both tribal and non-tribal agricultural entitlement holders) in Arizona, California, and Nevada followed the same trends across alternatives and the CCS

Comparative Baseline as discussed for California and Nevada tribal entitlement holders, above. The greatest impacts would occur under the Enhanced Coordination and Supply Driven (LB Pro Rata approach) Alternatives, and there are no expected impacts on fallowed lands under all other alternatives and the CCS Comparative Baseline (see **Figure TA 16-2**).

For Arizona priority 3 tribal and non-tribal agricultural entitlement holders, during shortages less than or equal to 2.0 maf, the greatest impacts on fallowed lands would occur under the Enhanced Coordination and Supply Driven (LB Pro Rata approach) Alternatives and there are no expected impacts on fallowed lands under all other alternatives and the CCS Comparative Baseline. For shortages greater than 2.0 maf, in addition to the impacts that would occur under the Enhanced Coordination and Supply Driven (LB Pro Rata approach) Alternatives, there would also be impacts on fallowed cropland under the Representative Preferred (2029-2060) alternative, and for shortages greater than or equal to 3.0 maf, there would be impacts on fallowed lands under the Maximum Operational Flexibility Alternative and potential impacts on fallowed lands under the Representative Preferred (2027-2028) Alternative. During a maximum level of shortage, across all alternatives and the CCS Comparative Baseline, the Maximum Operational Flexibility Alternative would result in the greatest level of impacts on fallowed lands, with an increase of about 6,000 acres and 93,000 acres of fallowed lands for Arizona priority 3 tribal and non-tribal agricultural entitlement holders, respectively, during a maximum shortage of 4.0 maf.

For Arizona priority 4(i) non-tribal and Arizona CAP Indian and 4(i) priority tribal agricultural entitlement holders, during shortages of 0.6 maf, the greatest impact on fallowed lands occurs under the CCS Comparative Baseline and the No Action, Basic Coordination, and Representative Preferred (2029-2060) Alternatives; during shortages greater than 0.6 and less than or equal to 2.0 maf, the greatest impact occurs under the Basic Coordination and Representative Preferred (2029-2060) Alternatives; during shortages greater than 2.0 maf, the greatest impact on fallowed lands occurs under the Maximum Operational Flexibility and Representative Preferred (2029-2060) Alternatives, with the greatest increase in fallowed lands of about 10,000 acres and 62,000 acres for Arizona priority 4(i) non-tribal and Arizona CAP Indian and 4(i) priority tribal agricultural entitlement holders, respectively, during a shortage of 4.0 maf under the Maximum Operational Flexibility Alternative or during a shortage of 3.6 maf under the Representative Preferred (2029-2060) Alternative. During the maximum levels of shortage, the smallest impact on fallowed croplands would occur under the No Action Alternative for Arizona priority 4(i) non-tribal and Arizona CAP Indian and 4(i) priority tribal agricultural entitlement holders (with an increase in fallowed land of about 1,000 acres and 12,000 acres, with a shortage of 0.6 maf, for Arizona priority 4(i) non-tribal and Arizona CAP Indian and 4(i) priority tribal agricultural entitlement holders, respectively).

For California priorities 2 and 3 non-tribal agricultural entitlement holders, the greatest impact on fallowed lands, during shortages under 3.0 maf, occurs under the Enhanced Coordination Alternative, and the greatest impact, during shortages greater than or equal to 3.0 maf, occurs under the Maximum Operational Flexibility and Representative Preferred Alternatives, with the largest increase in fallowed land under the Maximum Operational Flexibility Alternative of about 227,000 acres, with a shortage of 4.0 maf. The No Action and Basic Coordination Alternatives would result in the lowest impacts on fallowed lands due to maximum levels of shortage, with no expected

increase in fallowed land across California priorities 2 and 3 non-tribal agricultural entitlement holders (see **Figure TA 16-2**).

For more information on impacts on changing land use and water deliveries due to potential long-term water shortages to irrigation entitlement holders, see **TA 4**, Water Deliveries, and **TA 17**, Population and Land Use.

**Figure TA 16-3** shows the estimated loss in market value of crops due to water shortages and fallowed lands for each alternative and the CCS Comparative Baseline across a range of shortage volumes (0.6 maf to 4.0 maf) for Arizona, California, and Nevada non-tribal and tribal irrigation entitlement holders, and **Figure TA 16-4** presents the estimated loss in market value of crops separated by priority group in each state in the analysis area (see **Appendix C** for shortages by individual entitlement holder). The patterns in loss of market values across regions, non-tribal and tribal entitlement holders, and shortage levels are similar to those discussed for fallowed acres, except for California non-tribal agricultural entitlement holders, as discussed below. On average, for Arizona non-tribal and tribal entitlement holders, the Maximum Operational Flexibility Alternative would result in the largest level of impacts on market value of crops during a maximum level of shortage compared with the other alternatives and CCS Comparative Baseline, with a reduction in market value of crops of about \$150.8 million and \$113.2 million, during a shortage of 4.0 maf, for Arizona non-tribal and Arizona tribal entitlement holders, respectively. Under the Representative Preferred (2029-2060) Alternative, Arizona non-tribal and tribal entitlement holders could see a reduction in market value of crops of about \$133.1 million and \$111.9 million, respectively, during a maximum level of shortage of 3.6 maf. The smallest level of impacts on market value of crops during a maximum level of shortage would occur under the No Action Alternative for Arizona non-tribal and tribal entitlement holders, on average, with a reduction in market value of crops of about \$1.8 million and \$17.4 million, during a shortage of 0.6 maf, for Arizona non-tribal and Arizona tribal entitlement holders, respectively. However, this varies for certain priority groups within Arizona non-tribal and tribal entitlement holders. For Arizona priority 4(i) non-tribal entitlement holders and Arizona CAP Indian and 4(i) priority tribal agricultural entitlement holders, the trends in impacts on market value of crops during a maximum level of shortage across alternatives would be the same as discussed above for all Arizona non-tribal and tribal entitlement holders, with the largest level of impacts on market value of crops occurring under the Maximum Operational Flexibility and Representative Preferred Alternatives (with a maximum level of reduction in market value of crops of about \$32.3 million and \$103.5 million, for Arizona priority 4(i) non-tribal entitlement holders and Arizona CAP Indian and 4(i) priority tribal entitlement holders, respectively) and the smallest level of impacts on market value of crops during a maximum level of shortage occurring under the No Action Alternative (with a reduction in market value of crops of about \$1.8 million and \$17.4 million, for Arizona priority 4(i) non-tribal entitlement holders and Arizona CAP Indian and 4(i) priority tribal entitlement holders, respectively). For Arizona priority 3 tribal and non-tribal agricultural entitlement holders, the largest level of impacts on market value of crops would occur under the Maximum Operational Flexibility Alternative (with a reduction in market value of crops of about \$118.4 million and \$9.7 million for Arizona priority 3 tribal and non-tribal agricultural entitlement holders, respectively) and there are no expected impacts on market value of crops under the CCS Comparative Baseline and the No Action, Basic Coordination, and Supply Driven (LB Priority approach) Alternatives. For Arizona PPR priority tribal and non-tribal agricultural

entitlement holders, the only impacts on market value of crops would occur under the Enhanced Coordination and Supply Driven (LB Pro Rata approach) Alternatives.

For California non-tribal entitlement holders, although the Enhanced Coordination Alternative had the highest level of impact on fallowed lands during the maximum level of shortage, the Maximum Operational Flexibility Alternative would result in the largest level of impacts on market value of crops during a maximum level of shortage (with a reduction in market value of crops of about \$1,094.3 million) due to a greater number of acres of higher-valued crops being fallowed (especially for the entitlement holders within priorities 2 and 3). Under the Representative Preferred (2029-2060) Alternative, California non-tribal entitlement holders could see a reduction in market value of crops of about \$812.7 million, during a maximum level of shortage of 3.6 maf. There are not expected to be impacts on market value of crops under the No Action and Basic Coordination Alternatives for California non-tribal entitlement holders. As discussed above for Arizona, these impacts on market value of crops for California non-tribal agriculture entitlement holders vary across priority groups. For California priority group 2 and 3 non-tribal agricultural entitlement holders, the largest level of impacts on market value of crops would occur under the Maximum Operational Flexibility Alternative (with a reduction in market value of crops of about \$1,094.3 million), whereas for California PPR priority non-tribal agricultural entitlement holders, the largest level of impacts on market value of crops would occur under the Enhanced Coordination Alternative (with a reduction in market value of crops of about \$546.8 million).

As discussed above for impacts on fallowed lands, for the tribal agricultural entitlement holders in California and Nevada (all of whom have PPR priority), impacts on the market value of crops would only occur under the Enhanced Coordination and Supply Driven (LB Pro Rata approach) Alternatives, with the largest level of impacts on market value of crops during a maximum level of shortage occurring under the Enhanced Coordination Alternative.

Figure TA 16-3  
Annual Loss of Direct Market Value of Agricultural Production in the Analysis Area  
by Alternative and Shortage Level, in kaf (2025\$ millions)

| State, Water Entitlement Holders   | Shortage Level (kaf)                                          | 600   | 1,000 | 1,500 | 1,800 | 2,000 | 2,100 | 2,300 | 3,000 | 3,600 | 4,000   |
|------------------------------------|---------------------------------------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|---------|
| Arizona, Non-Tribal Agriculture    | CCS Comparative Baseline <sup>1</sup>                         | 2.5   | 4.2   |       |       |       |       |       |       |       |         |
|                                    | No Action Alternative                                         | 1.8   |       |       |       |       |       |       |       |       |         |
|                                    | Basic Coordination Alternative <sup>2</sup>                   | 1.8   | 5.9   | 17.6  |       |       |       |       |       |       |         |
|                                    | Enhanced Coordination Alternative                             | 13.0  | 21.7  | 32.7  | 40.4  | 48.3  | 52.3  | 58.9  | 79.6  |       |         |
|                                    | Maximum Operational Flexibility Alternative                   | 0.6   | 2.9   | 5.8   | 8.8   | 16.3  | 21.0  | 30.1  | 60.0  | 111.0 | 150.8   |
|                                    | Supply Driven (LB Priority Approach) Alternative              | 0.6   | 2.9   | 5.8   | 8.8   | 16.3  | 21.0  |       |       |       |         |
|                                    | Supply Driven (LB Pro Rata Approach) Alternative              | 25.7  | 37.9  | 62.7  | 70.4  | 75.6  | 78.2  |       |       |       |         |
|                                    | Representative Preferred (2027-2028) Alternative <sup>3</sup> | 0.6   | 2.9   | 5.8   | 8.8   | 16.3  | 21.0  | 30.1  | 60.0  | 111.0 |         |
|                                    | Representative Preferred (2029-2060) Alternative <sup>4</sup> | 1.8   | 5.9   | 17.6  | 31.5  | 32.3  | 35.2  | 45.0  | 88.7  | 133.1 |         |
| California, Non-Tribal Agriculture | CCS Comparative Baseline <sup>1</sup>                         | 0.0   | 6.8   |       |       |       |       |       |       |       |         |
|                                    | No Action Alternative                                         | 0.0   |       |       |       |       |       |       |       |       |         |
|                                    | Basic Coordination Alternative <sup>2</sup>                   | 0.0   | 0.0   | 0.0   |       |       |       |       |       |       |         |
|                                    | Enhanced Coordination Alternative                             | 329.8 | 390.3 | 466.0 | 511.4 | 541.6 | 556.8 | 587.0 | 691.8 |       |         |
|                                    | Maximum Operational Flexibility Alternative                   | 0.0   | 0.0   | 25.4  | 25.4  | 25.4  | 25.4  | 25.4  | 733.7 | 843.3 | 1,094.3 |
|                                    | Supply Driven (LB Priority Approach) Alternative              | 0.0   | 0.0   | 25.4  | 25.4  | 25.4  | 25.4  |       |       |       |         |
|                                    | Supply Driven (LB Pro Rata Approach) Alternative              | 273.1 | 318.7 | 375.5 | 424.7 | 457.5 | 473.8 |       |       |       |         |
|                                    | Representative Preferred (2027-2028) Alternative <sup>3</sup> | 0.0   | 0.0   | 25.4  | 25.4  | 25.4  | 25.4  | 25.4  | 733.7 | 843.3 |         |
|                                    | Representative Preferred (2029-2060) Alternative <sup>4</sup> | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 186.9 | 812.7 |         |
| Arizona, Tribal Agriculture        | CCS Comparative Baseline <sup>1</sup>                         | 21.7  | 31.3  |       |       |       |       |       |       |       |         |
|                                    | No Action Alternative                                         | 17.4  |       |       |       |       |       |       |       |       |         |
|                                    | Basic Coordination Alternative <sup>2</sup>                   | 17.4  | 43.2  | 82.3  |       |       |       |       |       |       |         |
|                                    | Enhanced Coordination Alternative                             | 11.4  | 18.2  | 26.9  | 32.2  | 35.5  | 37.2  | 40.7  | 52.5  |       |         |
|                                    | Maximum Operational Flexibility Alternative                   | 9.7   | 23.4  | 41.9  | 64.3  | 80.4  | 88.7  | 102.3 | 106.3 | 110.2 | 113.2   |
|                                    | Supply Driven (LB Priority Approach) Alternative              | 9.7   | 23.4  | 41.9  | 64.3  | 80.4  | 88.7  |       |       |       |         |
|                                    | Supply Driven (LB Pro Rata Approach) Alternative              | 21.3  | 31.0  | 42.8  | 47.3  | 50.2  | 51.7  |       |       |       |         |
|                                    | Representative Preferred (2027-2028) Alternative <sup>3</sup> | 9.7   | 23.4  | 41.9  | 64.3  | 80.4  | 88.7  | 102.3 | 106.3 | 110.2 |         |
|                                    | Representative Preferred (2029-2060) Alternative <sup>4</sup> | 17.4  | 43.2  | 82.3  | 103.1 | 103.5 | 103.9 | 104.8 | 108.2 | 111.9 |         |
| California, Tribal Agriculture     | CCS Comparative Baseline <sup>1</sup>                         | 0.0   | 0.0   |       |       |       |       |       |       |       |         |
|                                    | No Action Alternative                                         | 0.0   |       |       |       |       |       |       |       |       |         |
|                                    | Basic Coordination Alternative <sup>2</sup>                   | 0.0   | 0.0   | 0.0   |       |       |       |       |       |       |         |
|                                    | Enhanced Coordination Alternative                             | 5.6   | 6.4   | 7.6   | 8.2   | 8.7   | 8.9   | 9.4   | 10.9  |       |         |
|                                    | Maximum Operational Flexibility Alternative                   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0     |
|                                    | Supply Driven (LB Priority Approach) Alternative              | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |       |       |       |         |
|                                    | Supply Driven (LB Pro Rata Approach) Alternative              | 2.8   | 5.4   | 6.2   | 7.0   | 7.4   | 7.7   |       |       |       |         |
|                                    | Representative Preferred (2027-2028) Alternative <sup>3</sup> | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |         |
|                                    | Representative Preferred (2029-2060) Alternative <sup>4</sup> | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |         |
| Nevada, Tribal Agriculture         | CCS Comparative Baseline <sup>1</sup>                         | 0.0   | 0.0   |       |       |       |       |       |       |       |         |
|                                    | No Action Alternative                                         | 0.0   |       |       |       |       |       |       |       |       |         |
|                                    | Basic Coordination Alternative <sup>2</sup>                   | 0.0   | 0.0   | 0.0   |       |       |       |       |       |       |         |
|                                    | Enhanced Coordination Alternative                             | 0.1   | 0.2   | 0.3   | 0.4   | 0.4   | 0.5   | 0.5   | 0.6   |       |         |
|                                    | Maximum Operational Flexibility Alternative                   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0     |
|                                    | Supply Driven (LB Priority Approach) Alternative              | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |       |       |       |         |
|                                    | Supply Driven (LB Pro Rata Approach) Alternative              | 0.1   | 0.2   | 0.3   | 0.4   | 0.4   | 0.5   |       |       |       |         |
|                                    | Representative Preferred (2027-2028) Alternative <sup>3</sup> | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |         |
|                                    | Representative Preferred (2029-2060) Alternative <sup>4</sup> | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |         |

Source: IMPLAN 2025

Note: The highlighting shows the values from the smallest (in white or no highlighting) to the largest (in yellow highlighting). The cells with hash-marks represent the values above shortages; these values are outside of the scope of this analysis. See **Appendix C**, Shortage Allocation Model and Alternative Distribution Model Documentation for more information on the shortage values for each entitlement holder type above shortages.

<sup>1</sup> Due to its fixed shortage volumes for CCS Comparative Baseline, shortages for 600K and 1,000K are actually associated with 613K and 1,013K in CCS Comparative Baseline. Greater shortages are based on an extension of priority beyond the levels of shortage provided by the pertinent documents.

<sup>2</sup> The maximum shortage for the Basic Coordination Alternative is 1.48 maf; however, the table above shows the maximum shortage as 1.5 maf for ease of comparison across the alternatives.

<sup>3</sup> The distribution of shortages up to 1.5 maf in 2027-2028 in the Representative Preferred Alternative reflects the May 1 proposal by the Lower Division States. Although not specified in their proposal, the Representative Preferred assumes shortages and their distribution above 1.5 maf in 2028 as necessary to avoid critically low elevations in Lake Mead. (See **Chapter 2** for more details on the sideboards under the Preferred Alternative and their representation in the Representative Preferred Alternative).

<sup>4</sup> Expected impacts from 2029 – 2060 under the Preferred Alternative may be different from what is shown for the Representative Preferred (2029-2060) Alternative, as this alternative provides a framework that allows for shortage distributions to be negotiated in different ways, consistent with sideboards described in **Chapter 2**.

Figure TA 16-4  
Annual Loss of Direct Market Value of Agricultural Production in the Analysis Area  
by Priority Group, Alternative, and Shortage Level, in kaf (2025\$ millions)

| State, Water Entitlement Holders, Priority Group          | Shortage Level (kaf)                                          | 600   | 1,000 | 1,500 | 1,800 | 2,000 | 2,100 | 2,300 | 3,000 | 3,600 | 4,000   |
|-----------------------------------------------------------|---------------------------------------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|---------|
| Arizona, Non-Tribal Agriculture, Priority 4(i)            | CCS Comparative Baseline <sup>1</sup>                         | 2.5   | 4.2   |       |       |       |       |       |       |       |         |
|                                                           | No Action Alternative                                         | 1.8   |       |       |       |       |       |       |       |       |         |
|                                                           | Basic Coordination Alternative <sup>2</sup>                   | 1.8   | 5.9   | 17.6  |       |       |       |       |       |       |         |
|                                                           | Enhanced Coordination Alternative                             | 0.8   | 1.3   | 2.1   | 2.6   | 2.9   | 3.0   | 3.3   | 4.3   |       |         |
|                                                           | Maximum Operational Flexibility Alternative                   | 0.6   | 2.9   | 5.8   | 8.8   | 16.3  | 21.0  | 30.1  | 32.3  | 32.3  | 32.3    |
|                                                           | Supply Driven (LB Priority Approach) Alternative              | 0.6   | 2.9   | 5.8   | 8.8   | 16.3  | 21.0  |       |       |       |         |
|                                                           | Supply Driven (LB Pro Rata Approach) Alternative              | 1.6   | 2.5   | 3.5   | 3.9   | 4.1   | 4.2   |       |       |       |         |
|                                                           | Representative Preferred (2027-2028) Alternative <sup>3</sup> | 0.6   | 2.9   | 5.8   | 8.8   | 16.3  | 21.0  | 30.1  | 32.3  | 32.3  |         |
|                                                           | Representative Preferred (2029-2060) Alternative <sup>4</sup> | 1.8   | 5.9   | 17.6  | 31.5  | 32.3  | 32.3  | 32.3  | 32.3  | 32.3  |         |
| Arizona, Non-Tribal Agriculture, Priority 3               | CCS Comparative Baseline <sup>1</sup>                         | 0.0   | 0.0   |       |       |       |       |       |       |       |         |
|                                                           | No Action Alternative                                         | 0.0   |       |       |       |       |       |       |       |       |         |
|                                                           | Basic Coordination Alternative <sup>2</sup>                   | 0.0   | 0.0   | 0.0   |       |       |       |       |       |       |         |
|                                                           | Enhanced Coordination Alternative                             | 9.3   | 15.6  | 23.3  | 28.8  | 34.6  | 37.5  | 42.3  | 57.4  |       |         |
|                                                           | Maximum Operational Flexibility Alternative                   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 27.6  | 78.7  | 118.4   |
|                                                           | Supply Driven (LB Priority Approach) Alternative              | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |       |       |       |         |
|                                                           | Supply Driven (LB Pro Rata Approach) Alternative              | 18.4  | 27.0  | 45.1  | 50.7  | 54.5  | 56.4  |       |       |       |         |
|                                                           | Representative Preferred (2027-2028) Alternative <sup>3</sup> | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 27.6  | 78.7  |         |
|                                                           | Representative Preferred (2029-2060) Alternative <sup>4</sup> | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 2.9   | 12.7  | 56.4  | 100.7 |         |
| Arizona, Non-Tribal Agriculture, PPR                      | CCS Comparative Baseline <sup>1</sup>                         | 0.0   | 0.0   |       |       |       |       |       |       |       |         |
|                                                           | No Action Alternative                                         | 0.0   |       |       |       |       |       |       |       |       |         |
|                                                           | Basic Coordination Alternative <sup>2</sup>                   | 0.0   | 0.0   | 0.0   |       |       |       |       |       |       |         |
|                                                           | Enhanced Coordination Alternative                             | 2.9   | 4.9   | 7.3   | 9.0   | 10.8  | 11.7  | 13.2  | 17.9  |       |         |
|                                                           | Maximum Operational Flexibility Alternative                   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0     |
|                                                           | Supply Driven (LB Priority Approach) Alternative              | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |       |       |       |         |
|                                                           | Supply Driven (LB Pro Rata Approach) Alternative              | 5.8   | 8.5   | 14.1  | 15.8  | 17.0  | 17.6  |       |       |       |         |
|                                                           | Representative Preferred (2027-2028) Alternative <sup>3</sup> | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |         |
|                                                           | Representative Preferred (2029-2060) Alternative <sup>4</sup> | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |         |
| California, Non-Tribal Agriculture, Priorities 2 & 3      | CCS Comparative Baseline <sup>1</sup>                         | 0.0   | 6.8   |       |       |       |       |       |       |       |         |
|                                                           | No Action Alternative                                         | 0.0   |       |       |       |       |       |       |       |       |         |
|                                                           | Basic Coordination Alternative <sup>2</sup>                   | 0.0   | 0.0   | 0.0   |       |       |       |       |       |       |         |
|                                                           | Enhanced Coordination Alternative                             | 57.9  | 72.5  | 90.7  | 101.6 | 108.9 | 112.5 | 119.8 | 145.1 |       |         |
|                                                           | Maximum Operational Flexibility Alternative                   | 0.0   | 0.0   | 25.4  | 25.4  | 25.4  | 25.4  | 25.4  | 733.7 | 843.3 | 1,094.3 |
|                                                           | Supply Driven (LB Priority Approach) Alternative              | 0.0   | 0.0   | 25.4  | 25.4  | 25.4  | 25.4  |       |       |       |         |
|                                                           | Supply Driven (LB Pro Rata Approach) Alternative              | 44.3  | 55.2  | 68.9  | 80.7  | 88.6  | 92.6  |       |       |       |         |
|                                                           | Representative Preferred (2027-2028) Alternative <sup>3</sup> | 0.0   | 0.0   | 25.4  | 25.4  | 25.4  | 25.4  | 25.4  | 733.7 | 843.3 |         |
|                                                           | Representative Preferred (2029-2060) Alternative <sup>4</sup> | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 186.9 | 812.7 |         |
| California, Non-Tribal Agriculture, PPR                   | CCS Comparative Baseline <sup>1</sup>                         | 0.0   | 0.0   |       |       |       |       |       |       |       |         |
|                                                           | No Action Alternative                                         | 0.0   |       |       |       |       |       |       |       |       |         |
|                                                           | Basic Coordination Alternative <sup>2</sup>                   | 0.0   | 0.0   | 0.0   |       |       |       |       |       |       |         |
|                                                           | Enhanced Coordination Alternative                             | 271.9 | 317.9 | 375.3 | 409.8 | 432.8 | 444.3 | 467.3 | 546.8 |       |         |
|                                                           | Maximum Operational Flexibility Alternative                   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0     |
|                                                           | Supply Driven (LB Priority Approach) Alternative              | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |       |       |       |         |
|                                                           | Supply Driven (LB Pro Rata Approach) Alternative              | 228.8 | 263.4 | 306.6 | 344.0 | 368.8 | 381.3 |       |       |       |         |
|                                                           | Representative Preferred (2027-2028) Alternative <sup>3</sup> | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |         |
|                                                           | Representative Preferred (2029-2060) Alternative <sup>4</sup> | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |         |
| Arizona, Tribal Agriculture, Priorities CAP Indian & 4(i) | CCS Comparative Baseline <sup>1</sup>                         | 21.7  | 31.3  |       |       |       |       |       |       |       |         |
|                                                           | No Action Alternative                                         | 17.4  |       |       |       |       |       |       |       |       |         |
|                                                           | Basic Coordination Alternative <sup>2</sup>                   | 17.4  | 43.2  | 82.3  |       |       |       |       |       |       |         |
|                                                           | Enhanced Coordination Alternative                             | 7.0   | 10.9  | 15.9  | 19.0  | 21.0  | 22.0  | 24.0  | 30.7  |       |         |
|                                                           | Maximum Operational Flexibility Alternative                   | 9.7   | 23.4  | 41.9  | 64.3  | 80.4  | 88.7  | 102.3 | 103.5 | 103.5 | 103.5   |
|                                                           | Supply Driven (LB Priority Approach) Alternative              | 9.7   | 23.4  | 41.9  | 64.3  | 80.4  | 88.7  |       |       |       |         |
|                                                           | Supply Driven (LB Pro Rata Approach) Alternative              | 12.7  | 18.4  | 25.2  | 27.7  | 29.4  | 30.3  |       |       |       |         |
|                                                           | Representative Preferred (2027-2028) Alternative <sup>3</sup> | 9.7   | 23.4  | 41.9  | 64.3  | 80.4  | 88.7  | 102.3 | 103.5 | 103.5 |         |
|                                                           | Representative Preferred (2029-2060) Alternative <sup>4</sup> | 17.4  | 43.2  | 82.3  | 103.1 | 103.5 | 103.5 | 103.5 | 103.5 | 103.5 |         |
| Arizona, Tribal Agriculture, Priority 3                   | CCS Comparative Baseline <sup>1</sup>                         | 0.0   | 0.0   |       |       |       |       |       |       |       |         |
|                                                           | No Action Alternative                                         | 0.0   |       |       |       |       |       |       |       |       |         |
|                                                           | Basic Coordination Alternative <sup>2</sup>                   | 0.0   | 0.0   | 0.0   |       |       |       |       |       |       |         |
|                                                           | Enhanced Coordination Alternative                             | 0.9   | 1.5   | 2.3   | 2.7   | 3.0   | 3.2   | 3.5   | 4.5   |       |         |
|                                                           | Maximum Operational Flexibility Alternative                   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 2.8   | 6.7   | 9.7     |
|                                                           | Supply Driven (LB Priority Approach) Alternative              | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |       |       |       |         |
|                                                           | Supply Driven (LB Pro Rata Approach) Alternative              | 1.8   | 2.6   | 3.7   | 4.1   | 4.3   | 4.5   |       |       |       |         |
|                                                           | Representative Preferred (2027-2028) Alternative <sup>3</sup> | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 2.8   | 6.7   |         |
|                                                           | Representative Preferred (2029-2060) Alternative <sup>4</sup> | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.4   | 1.3   | 4.6   | 8.4   |         |
| Arizona, Tribal Agriculture, PPR                          | CCS Comparative Baseline <sup>1</sup>                         | 0.0   | 0.0   |       |       |       |       |       |       |       |         |
|                                                           | No Action Alternative                                         | 0.0   |       |       |       |       |       |       |       |       |         |
|                                                           | Basic Coordination Alternative <sup>2</sup>                   | 0.0   | 0.0   | 0.0   |       |       |       |       |       |       |         |
|                                                           | Enhanced Coordination Alternative                             | 3.5   | 5.8   | 8.7   | 10.4  | 11.5  | 12.0  | 13.2  | 17.2  |       |         |
|                                                           | Maximum Operational Flexibility Alternative                   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0     |
|                                                           | Supply Driven (LB Priority Approach) Alternative              | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |       |       |       |         |
|                                                           | Supply Driven (LB Pro Rata Approach) Alternative              | 6.8   | 10.0  | 13.9  | 15.5  | 16.5  | 16.9  |       |       |       |         |
|                                                           | Representative Preferred (2027-2028) Alternative <sup>3</sup> | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |         |
|                                                           | Representative Preferred (2029-2060) Alternative <sup>4</sup> | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |         |
| California, Tribal Agriculture, PPR                       | CCS Comparative Baseline <sup>1</sup>                         | 0.0   | 0.0   |       |       |       |       |       |       |       |         |
|                                                           | No Action Alternative                                         | 0.0   |       |       |       |       |       |       |       |       |         |
|                                                           | Basic Coordination Alternative <sup>2</sup>                   | 0.0   | 0.0   | 0.0   |       |       |       |       |       |       |         |
|                                                           | Enhanced Coordination Alternative                             | 5.6   | 6.4   | 7.6   | 8.2   | 8.7   | 8.9   | 9.4   | 10.9  |       |         |
|                                                           | Maximum Operational Flexibility Alternative                   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0     |
|                                                           | Supply Driven (LB Priority Approach) Alternative              | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |       |       |       |         |
|                                                           | Supply Driven (LB Pro Rata Approach) Alternative              | 2.8   | 5.4   | 6.2   | 7.0   | 7.4   | 7.7   |       |       |       |         |
|                                                           | Representative Preferred (2027-2028) Alternative <sup>3</sup> | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |         |
|                                                           | Representative Preferred (2029-2060) Alternative <sup>4</sup> | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |         |
| Nevada, Tribal Agriculture, PPR                           | CCS Comparative Baseline <sup>1</sup>                         | 0.0   | 0.0   |       |       |       |       |       |       |       |         |
|                                                           | No Action Alternative                                         | 0.0   |       |       |       |       |       |       |       |       |         |
|                                                           | Basic Coordination Alternative <sup>2</sup>                   | 0.0   | 0.0   | 0.0   |       |       |       |       |       |       |         |
|                                                           | Enhanced Coordination Alternative                             | 0.1   | 0.2   | 0.3   | 0.4   | 0.4   | 0.5   | 0.5   | 0.6   |       |         |
|                                                           | Maximum Operational Flexibility Alternative                   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0     |
|                                                           | Supply Driven (LB Priority Approach) Alternative              | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |       |       |       |         |
|                                                           | Supply Driven (LB Pro Rata Approach) Alternative              | 0.1   | 0.2   | 0.3   | 0.4   | 0.4   | 0.5   |       |       |       |         |
|                                                           | Representative Preferred (2027-2028) Alternative <sup>3</sup> | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |         |
|                                                           | Representative Preferred (2029-2060) Alternative <sup>4</sup> | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |         |

Source: IMPLAN 2025

Note: The highlighting shows the values from the smallest (in white or no highlighting) to the largest (in yellow highlighting). The cells with hash-marks represent the values above shortages; these values are outside of the scope of this analysis. See **Appendix C**, Shortage Allocation Model and Alternative Distribution Model Documentation for more information on the shortage values for each entitlement holder type above shortages.

<sup>1</sup> Due to its fixed shortage volumes for CCS Comparative Baseline, shortages for 600K and 1,000K are actually associated with 613K and 1,013K in CCS Comparative Baseline. Greater shortages are based on an extension of priority beyond the levels of shortage provided by the pertinent documents.

<sup>2</sup> The maximum shortage for the Basic Coordination Alternative is 1.48 maf; however, the table above shows the maximum shortage as 1.5 maf for ease of comparison across the alternatives.

<sup>3</sup> The distribution of shortages up to 1.5 maf in 2027-2028 in the Representative Preferred Alternative reflects the May 1 proposal by the Lower Division States. Although not specified in their proposal, the Representative Preferred assumes shortages and their distribution above 1.5 maf in 2028 as necessary to avoid critically low elevations in Lake Mead. (See **Chapter 2** for more details on the sideboards under the Preferred Alternative and their representation in the Representative Preferred Alternative).

<sup>4</sup> Expected impacts from 2029 – 2060 under the Preferred Alternative may be different from what is shown for the Representative Preferred (2029-2060) Alternative, as this alternative provides a framework that allows for shortage distributions to be negotiated in different ways, consistent with sideboards described in **Chapter 2**.

As agricultural entitlement holders fallow lands due to water shortages, the loss in market value of crops would likely lead to reductions in economic contributions in the region across agricultural-related sectors as well as sectors that supply goods and services to the farmers and their households. The impacts on economic contributions, such as jobs, labor income and total economic output, across the alternatives and the CCS Comparative Baseline would follow similar patterns as those described for impacts on fallowed lands and market values of crops.<sup>9</sup> **Figure TA 16-5, Figure TA 16-7, and Figure TA 16-9** show the results of the impact analysis on total jobs, labor income, and economic output, respectively, including direct, indirect, and induced impacts, by state and type of entitlement holder, and **Figure TA 16-6, Figure TA 16-8, and Figure TA 16-10** present the impacts on total jobs, labor income, and economic output, respectively, separated by priority group (see **Appendix C** for shortages by individual entitlement holder). On average, for non-tribal and tribal entitlement holders in Arizona, the greatest impacts on jobs, labor income, and total economic output due to a maximum level of shortage occurs under the Maximum Operational Flexibility Alternative, during a shortage of 4.0 maf, with annual reductions of about 1,000 jobs, \$56.5 million in labor income, and \$237.7 million in economic output for non-tribal agricultural entitlement holders in Arizona, and annual reductions of about 1,000 jobs, \$64.7 million in labor income, and \$222.6 million in economic output for tribal entitlement holders in Arizona. Under the Representative Preferred (2029-2060) Alternative, Arizona non-tribal entitlement holders could see a reduction of about 900 jobs, \$50.5 million in labor income, and \$210.7 million in economic output and Arizona tribal entitlement holders could see a reduction of about 1,000 jobs, \$64.0 million in labor income, and \$220.0 million in economic output, during a maximum level of shortage of 3.6 maf. The lowest impacts on jobs, labor income, and economic output for non-tribal and tribal entitlement holders in Arizona, during a maximum level of shortage, occurs under the No Action Alternative, during a shortage of 0.6 maf, with annual reductions of about 10 jobs, \$0.6 million in labor income, and \$2.8 million in economic output for non-tribal agricultural entitlement holders in Arizona, and annual reductions of about 140 jobs, \$10.7 million in labor income, and \$34.8 million in economic output for tribal entitlement holders in Arizona. However, as discussed under impacts on market values of crops, the impacts on jobs, labor income, and economic output vary across priority groups within Arizona non-tribal and tribal entitlement holders. For Arizona priority 4(i) non-tribal entitlement holders and Arizona CAP Indian and 4(i) priority tribal agricultural entitlement holders, the trends in impacts on jobs, labor income, and economic output during a maximum level of shortage across alternatives would be the same as discussed above for all Arizona non-tribal and tribal entitlement holders, with the largest level of impacts on jobs, labor income, and economic output occurring under the Maximum Operational Flexibility and Representative Preferred Alternatives and the smallest level of impacts on jobs, income, and output during a maximum level of shortage occurring under the No Action Alternative. For Arizona priority 3 tribal and non-tribal agricultural entitlement holders, the largest level of impacts on jobs, labor income, and economic output would occur under the Maximum Operational Flexibility Alternative and there are no expected impacts on jobs, income, and output under the CCS Comparative Baseline and the No Action, Basic Coordination, and Supply Driven (LB Priority approach) Alternative. For Arizona

<sup>9</sup> Some third-party studies have been conducted on the impacts on economic conditions from changes in agriculture under specific scenarios and assumptions. For example, Imperial County Workforce and Economic Development conducted an analysis that highlights the potential ranges of impacts on Imperial County's economy from changes in irrigation water. Because this study is scenario-specific and not directly comparable to the Draft EIS modeling framework, the FEIS does not adopt quantified estimates from this study.

PPR priority tribal and non-tribal agricultural entitlement holders, the only impacts on jobs, labor income, and economic output would occur under the Enhanced Coordination and Supply Driven (LB Pro Rata approach) Alternatives.

For non-tribal entitlement holders in California, the greatest impacts on jobs, labor income, and total economic output due to a maximum level of shortage occurs under the Maximum Operational Flexibility Alternative, during a shortage of 4.0 maf, with annual reductions of about 11,000 jobs, \$824.7 million in labor income, and \$1,755.2 million in economic output. Under the Representative Preferred (2029-2060) Alternative, California non-tribal entitlement holders could see a reduction of about 9,000 jobs, \$718.1 million in labor income, and \$1,343.9 million in economic output, during a maximum level of shortage of 3.6 maf. There are not expected to be impacts on jobs, labor income, and total economic output under the No Action and Basic Coordination Alternatives for California non-tribal entitlement holders. As discussed above for Arizona, these impacts on jobs, labor income, and economic output for California non-tribal agriculture entitlement holders vary across priority group. For California priority group 2 and 3 non-tribal agricultural entitlement holders, the largest level of impacts on jobs, labor income, and economic output would occur under the Maximum Operational Flexibility Alternative, whereas for California PPR priority non-tribal agricultural entitlement holders, the largest level of impacts on jobs, labor income, and economic output would occur under the Enhanced Coordination Alternative.

For California and Nevada tribal entitlement holders (all of whom have PPR priority), impacts on economic contributions such as jobs, labor income, and economic output, would be greatest under the Enhanced Coordination and Supply Driven (LB Pro Rata approach) Alternatives, with impacts as large as a reduction of over 60 jobs, about \$3.9 million in labor income, and \$15.9 million in total economic output for tribal entitlement holders in California, under the Enhanced Coordination Alternative, with a shortage of 3.0 maf; for Nevada tribal entitlement holders, under the same alternative and shortage level, there would be an estimated reduction of over 10 jobs, about \$0.1 million in labor income, and \$0.9 million in total economic output. There are no expected impacts on economic contributions under all other alternatives, including the CCS Comparative Baseline and Representative Preferred Alternative.

Figure TA 16-5  
Annual Loss of Total Jobs from Agricultural Production in the Analysis Area by Alternative and Shortage Level, in kaf

| State, Water Entitlement Holders   |                                                               | Shortage Level (kaf) | 600   | 1,000 | 1,500 | 1,800 | 2,000 | 2,100 | 2,300 | 3,000 | 3,600  | 4,000 |
|------------------------------------|---------------------------------------------------------------|----------------------|-------|-------|-------|-------|-------|-------|-------|-------|--------|-------|
| Arizona, Non-Tribal Agriculture    | CCS Comparative Baseline <sup>1</sup>                         | 18                   | 31    |       |       |       |       |       |       |       |        |       |
|                                    | No Action Alternative                                         | 13                   |       |       |       |       |       |       |       |       |        |       |
|                                    | Basic Coordination Alternative <sup>2</sup>                   | 13                   | 43    | 135   |       |       |       |       |       |       |        |       |
|                                    | Enhanced Coordination Alternative                             | 100                  | 166   | 251   | 305   | 347   | 368   | 405   | 525   |       |        |       |
|                                    | Maximum Operational Flexibility Alternative                   | 5                    | 22    | 42    | 65    | 126   | 159   | 221   | 448   | 742   | 1,043  |       |
|                                    | Supply Driven (LB Priority Approach) Alternative              | 5                    | 22    | 42    | 65    | 126   | 159   |       |       |       |        |       |
|                                    | Supply Driven (LB Pro Rata Approach) Alternative              | 197                  | 292   | 427   | 472   | 502   | 517   |       |       |       |        |       |
|                                    | Representative Preferred (2027-2028) Alternative <sup>3</sup> | 5                    | 22    | 42    | 65    | 126   | 159   | 221   | 448   | 742   |        |       |
|                                    | Representative Preferred (2029-2060) Alternative <sup>4</sup> | 13                   | 43    | 135   | 230   | 235   | 258   | 333   | 615   | 906   |        |       |
| California, Non-Tribal Agriculture | CCS Comparative Baseline <sup>1</sup>                         | 0                    | 38    |       |       |       |       |       |       |       |        |       |
|                                    | No Action Alternative                                         | 0                    |       |       |       |       |       |       |       |       |        |       |
|                                    | Basic Coordination Alternative <sup>2</sup>                   | 0                    | 0     | 0     |       |       |       |       |       |       |        |       |
|                                    | Enhanced Coordination Alternative                             | 1,975                | 2,310 | 2,729 | 2,981 | 3,149 | 3,233 | 3,400 | 3,981 |       |        |       |
|                                    | Maximum Operational Flexibility Alternative                   | 0                    | 0     | 141   | 141   | 141   | 141   | 141   | 8,459 | 9,080 | 10,560 |       |
|                                    | Supply Driven (LB Priority Approach) Alternative              | 0                    | 0     | 141   | 141   | 141   | 141   |       |       |       |        |       |
|                                    | Supply Driven (LB Pro Rata Approach) Alternative              | 1,661                | 1,913 | 2,228 | 2,500 | 2,682 | 2,773 |       |       |       |        |       |
|                                    | Representative Preferred (2027-2028) Alternative <sup>3</sup> | 0                    | 0     | 141   | 141   | 141   | 141   | 141   | 8,459 | 9,080 |        |       |
|                                    | Representative Preferred (2029-2060) Alternative <sup>4</sup> | 0                    | 0     | 0     | 0     | 0     | 0     | 0     | 2,122 | 8,908 |        |       |
| Arizona, Tribal Agriculture        | CCS Comparative Baseline <sup>1</sup>                         | 173                  | 260   |       |       |       |       |       |       |       |        |       |
|                                    | No Action Alternative                                         | 136                  |       |       |       |       |       |       |       |       |        |       |
|                                    | Basic Coordination Alternative <sup>2</sup>                   | 136                  | 404   | 860   |       |       |       |       |       |       |        |       |
|                                    | Enhanced Coordination Alternative                             | 99                   | 156   | 231   | 275   | 304   | 318   | 349   | 456   |       |        |       |
|                                    | Maximum Operational Flexibility Alternative                   | 77                   | 188   | 388   | 666   | 843   | 915   | 1,035 | 1,067 | 1,107 | 1,146  |       |
|                                    | Supply Driven (LB Priority Approach) Alternative              | 77                   | 188   | 388   | 666   | 843   | 915   |       |       |       |        |       |
|                                    | Supply Driven (LB Pro Rata Approach) Alternative              | 184                  | 266   | 368   | 408   | 435   | 449   |       |       |       |        |       |
|                                    | Representative Preferred (2027-2028) Alternative <sup>3</sup> | 77                   | 188   | 388   | 666   | 843   | 915   | 1,035 | 1,067 | 1,107 |        |       |
|                                    | Representative Preferred (2029-2060) Alternative <sup>4</sup> | 136                  | 404   | 860   | 1,042 | 1,046 | 1,049 | 1,056 | 1,081 | 1,129 |        |       |
| California, Tribal Agriculture     | CCS Comparative Baseline <sup>1</sup>                         | 0                    | 0     |       |       |       |       |       |       |       |        |       |
|                                    | No Action Alternative                                         | 0                    |       |       |       |       |       |       |       |       |        |       |
|                                    | Basic Coordination Alternative <sup>2</sup>                   | 0                    | 0     | 0     |       |       |       |       |       |       |        |       |
|                                    | Enhanced Coordination Alternative                             | 33                   | 38    | 45    | 48    | 51    | 52    | 55    | 63    |       |        |       |
|                                    | Maximum Operational Flexibility Alternative                   | 0                    | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0      | 0     |
|                                    | Supply Driven (LB Priority Approach) Alternative              | 0                    | 0     | 0     | 0     | 0     | 0     |       |       |       |        |       |
|                                    | Supply Driven (LB Pro Rata Approach) Alternative              | 17                   | 32    | 37    | 41    | 44    | 45    |       |       |       |        |       |
|                                    | Representative Preferred (2027-2028) Alternative <sup>3</sup> | 0                    | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0      |       |
|                                    | Representative Preferred (2029-2060) Alternative <sup>4</sup> | 0                    | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0      |       |
| Nevada, Tribal Agriculture         | CCS Comparative Baseline <sup>1</sup>                         | 0                    | 0     |       |       |       |       |       |       |       |        |       |
|                                    | No Action Alternative                                         | 0                    |       |       |       |       |       |       |       |       |        |       |
|                                    | Basic Coordination Alternative <sup>2</sup>                   | 0                    | 0     | 0     |       |       |       |       |       |       |        |       |
|                                    | Enhanced Coordination Alternative                             | 3                    | 4     | 6     | 8     | 9     | 9     | 10    | 13    |       |        |       |
|                                    | Maximum Operational Flexibility Alternative                   | 0                    | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0      | 0     |
|                                    | Supply Driven (LB Priority Approach) Alternative              | 0                    | 0     | 0     | 0     | 0     | 0     |       |       |       |        |       |
|                                    | Supply Driven (LB Pro Rata Approach) Alternative              | 3                    | 4     | 6     | 8     | 9     | 9     |       |       |       |        |       |
|                                    | Representative Preferred (2027-2028) Alternative <sup>3</sup> | 0                    | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     |        |       |
|                                    | Representative Preferred (2029-2060) Alternative <sup>4</sup> | 0                    | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0      |       |

Source: IMPLAN 2025

Note: The highlighting shows the values from the smallest (in white or no highlighting) to the largest (in yellow highlighting). The cells with hash-marks represent the values above shortages; these values are outside of the scope of this analysis. See **Appendix C**, Shortage Allocation Model and Alternative Distribution Model Documentation for more information on the shortage values for each entitlement holder type above shortages.

<sup>1</sup> Due to its fixed shortage volumes for CCS Comparative Baseline, shortages for 600K and 1,000K are actually associated with 613K and 1,013K in CCS Comparative Baseline. Greater shortages are based on an extension of priority beyond the levels of shortage provided by the pertinent documents.

<sup>2</sup> The maximum shortage for the Basic Coordination Alternative is 1.48 maf; however, the table above shows the maximum shortage as 1.5 maf for ease of comparison across the alternatives.

<sup>3</sup> The distribution of shortages up to 1.5 maf in 2027-2028 in the Representative Preferred Alternative reflects the May 1 proposal by the Lower Division States. Although not specified in their proposal, the Representative Preferred assumes shortages and their distribution above 1.5 maf in 2028 as necessary to avoid critically low elevations in Lake Mead. (See **Chapter 2** for more details on the sideboards under the Preferred Alternative and their representation in the Representative Preferred Alternative).

<sup>4</sup> Expected impacts from 2029 – 2060 under the Preferred Alternative may be different from what is shown for the Representative Preferred (2029-2060) Alternative, as this alternative provides a framework that allows for shortage distributions to be negotiated in different ways, consistent with sideboards described in **Chapter 2**.

Figure TA 16-6  
Annual Loss of Total Jobs from Agricultural Production in the Analysis Area  
by Priority Group, Alternative, and Shortage Level, in kaf

| State, Water Entitlement Holders, Priority Group          |                                                               | Shortage Level (kaf) |       |       |       |       |       |       |       |       |        |
|-----------------------------------------------------------|---------------------------------------------------------------|----------------------|-------|-------|-------|-------|-------|-------|-------|-------|--------|
|                                                           |                                                               | 600                  | 1,000 | 1,500 | 1,800 | 2,000 | 2,100 | 2,300 | 3,000 | 3,600 | 4,000  |
| Arizona, Non-Tribal Agriculture, Priority 4(i)            | CCS Comparative Baseline <sup>1</sup>                         | 18                   | 31    |       |       |       |       |       |       |       |        |
|                                                           | No Action Alternative                                         | 13                   |       |       |       |       |       |       |       |       |        |
|                                                           | Basic Coordination Alternative <sup>2</sup>                   | 13                   | 43    | 135   |       |       |       |       |       |       |        |
|                                                           | Enhanced Coordination Alternative                             | 5                    | 9     | 15    | 19    | 21    | 22    | 24    | 31    |       |        |
|                                                           | Maximum Operational Flexibility Alternative                   | 5                    | 22    | 42    | 65    | 126   | 159   | 221   | 235   | 235   | 235    |
|                                                           | Supply Driven (LB Priority Approach) Alternative              | 5                    | 22    | 42    | 65    | 126   | 159   |       |       |       |        |
|                                                           | Supply Driven (LB Pro Rata Approach) Alternative              | 11                   | 18    | 26    | 28    | 30    | 31    |       |       |       |        |
|                                                           | Representative Preferred (2027-2028) Alternative <sup>3</sup> | 5                    | 22    | 42    | 65    | 126   | 159   | 221   | 235   | 235   |        |
|                                                           | Representative Preferred (2029-2060) Alternative <sup>4</sup> | 13                   | 43    | 135   | 230   | 235   | 235   | 235   | 235   | 235   |        |
| Arizona, Non-Tribal Agriculture, Priority 3               | CCS Comparative Baseline <sup>1</sup>                         | 0                    | 0     |       |       |       |       |       |       |       |        |
|                                                           | No Action Alternative                                         | 0                    |       |       |       |       |       |       |       |       |        |
|                                                           | Basic Coordination Alternative <sup>2</sup>                   | 0                    | 0     | 0     |       |       |       |       |       |       |        |
|                                                           | Enhanced Coordination Alternative                             | 72                   | 120   | 180   | 218   | 248   | 264   | 290   | 376   |       |        |
|                                                           | Maximum Operational Flexibility Alternative                   | 0                    | 0     | 0     | 0     | 0     | 0     | 0     | 213   | 507   | 808    |
|                                                           | Supply Driven (LB Priority Approach) Alternative              | 0                    | 0     | 0     | 0     | 0     | 0     |       |       |       |        |
|                                                           | Supply Driven (LB Pro Rata Approach) Alternative              | 142                  | 208   | 306   | 338   | 359   | 370   |       |       |       |        |
|                                                           | Representative Preferred (2027-2028) Alternative <sup>3</sup> | 0                    | 0     | 0     | 0     | 0     | 0     | 0     | 213   | 507   |        |
|                                                           | Representative Preferred (2029-2060) Alternative <sup>4</sup> | 0                    | 0     | 0     | 0     | 0     | 22    | 98    | 380   | 671   |        |
| Arizona, Non-Tribal Agriculture, PPR                      | CCS Comparative Baseline <sup>1</sup>                         | 0                    | 0     |       |       |       |       |       |       |       |        |
|                                                           | No Action Alternative                                         | 0                    |       |       |       |       |       |       |       |       |        |
|                                                           | Basic Coordination Alternative <sup>2</sup>                   | 0                    | 0     | 0     |       |       |       |       |       |       |        |
|                                                           | Enhanced Coordination Alternative                             | 23                   | 38    | 56    | 68    | 78    | 82    | 91    | 118   |       |        |
|                                                           | Maximum Operational Flexibility Alternative                   | 0                    | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0      |
|                                                           | Supply Driven (LB Priority Approach) Alternative              | 0                    | 0     | 0     | 0     | 0     | 0     |       |       |       |        |
|                                                           | Supply Driven (LB Pro Rata Approach) Alternative              | 44                   | 65    | 96    | 106   | 112   | 116   |       |       |       |        |
|                                                           | Representative Preferred (2027-2028) Alternative <sup>3</sup> | 0                    | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     |        |
|                                                           | Representative Preferred (2029-2060) Alternative <sup>4</sup> | 0                    | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     |        |
| California, Non-Tribal Agriculture, Priorities 2 & 3      | CCS Comparative Baseline <sup>1</sup>                         | 0                    | 38    |       |       |       |       |       |       |       |        |
|                                                           | No Action Alternative                                         | 0                    |       |       |       |       |       |       |       |       |        |
|                                                           | Basic Coordination Alternative <sup>2</sup>                   | 0                    | 0     | 0     |       |       |       |       |       |       |        |
|                                                           | Enhanced Coordination Alternative                             | 343                  | 424   | 525   | 585   | 625   | 646   | 686   | 826   |       |        |
|                                                           | Maximum Operational Flexibility Alternative                   | 0                    | 0     | 141   | 141   | 141   | 141   | 141   | 8,459 | 9,080 | 10,560 |
|                                                           | Supply Driven (LB Priority Approach) Alternative              | 0                    | 0     | 141   | 141   | 141   | 141   |       |       |       |        |
|                                                           | Supply Driven (LB Pro Rata Approach) Alternative              | 268                  | 328   | 404   | 470   | 513   | 535   |       |       |       |        |
|                                                           | Representative Preferred (2027-2028) Alternative <sup>3</sup> | 0                    | 0     | 141   | 141   | 141   | 141   | 141   | 8,459 | 9,080 |        |
|                                                           | Representative Preferred (2029-2060) Alternative <sup>4</sup> | 0                    | 0     | 0     | 0     | 0     | 0     | 0     | 2,122 | 8,908 |        |
| California, Non-Tribal Agriculture, PPR                   | CCS Comparative Baseline <sup>1</sup>                         | 0                    | 0     |       |       |       |       |       |       |       |        |
|                                                           | No Action Alternative                                         | 0                    |       |       |       |       |       |       |       |       |        |
|                                                           | Basic Coordination Alternative <sup>2</sup>                   | 0                    | 0     | 0     |       |       |       |       |       |       |        |
|                                                           | Enhanced Coordination Alternative                             | 1,631                | 1,886 | 2,205 | 2,396 | 2,523 | 2,587 | 2,714 | 3,155 |       |        |
|                                                           | Maximum Operational Flexibility Alternative                   | 0                    | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0      |
|                                                           | Supply Driven (LB Priority Approach) Alternative              | 0                    | 0     | 0     | 0     | 0     | 0     |       |       |       |        |
|                                                           | Supply Driven (LB Pro Rata Approach) Alternative              | 1,393                | 1,584 | 1,824 | 2,031 | 2,169 | 2,238 |       |       |       |        |
|                                                           | Representative Preferred (2027-2028) Alternative <sup>3</sup> | 0                    | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     |        |
|                                                           | Representative Preferred (2029-2060) Alternative <sup>4</sup> | 0                    | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     |        |
| Arizona, Tribal Agriculture, Priorities CAP Indian & 4(i) | CCS Comparative Baseline <sup>1</sup>                         | 173                  | 260   |       |       |       |       |       |       |       |        |
|                                                           | No Action Alternative                                         | 136                  |       |       |       |       |       |       |       |       |        |
|                                                           | Basic Coordination Alternative <sup>2</sup>                   | 136                  | 404   | 860   |       |       |       |       |       |       |        |
|                                                           | Enhanced Coordination Alternative                             | 57                   | 86    | 126   | 149   | 165   | 172   | 189   | 248   |       |        |
|                                                           | Maximum Operational Flexibility Alternative                   | 77                   | 188   | 388   | 666   | 843   | 915   | 1,035 | 1,046 | 1,046 | 1,046  |
|                                                           | Supply Driven (LB Priority Approach) Alternative              | 77                   | 188   | 388   | 666   | 843   | 915   |       |       |       |        |
|                                                           | Supply Driven (LB Pro Rata Approach) Alternative              | 101                  | 145   | 199   | 221   | 236   | 244   |       |       |       |        |
|                                                           | Representative Preferred (2027-2028) Alternative <sup>3</sup> | 77                   | 188   | 388   | 666   | 843   | 915   | 1,035 | 1,046 | 1,046 |        |
|                                                           | Representative Preferred (2029-2060) Alternative <sup>4</sup> | 136                  | 404   | 860   | 1,042 | 1,046 | 1,046 | 1,046 | 1,046 | 1,046 |        |
| Arizona, Tribal Agriculture, Priority 3                   | CCS Comparative Baseline <sup>1</sup>                         | 0                    | 0     |       |       |       |       |       |       |       |        |
|                                                           | No Action Alternative                                         | 0                    |       |       |       |       |       |       |       |       |        |
|                                                           | Basic Coordination Alternative <sup>2</sup>                   | 0                    | 0     | 0     |       |       |       |       |       |       |        |
|                                                           | Enhanced Coordination Alternative                             | 7                    | 11    | 17    | 21    | 23    | 24    | 26    | 34    |       |        |
|                                                           | Maximum Operational Flexibility Alternative                   | 0                    | 0     | 0     | 0     | 0     | 0     | 0     | 21    | 61    | 100    |
|                                                           | Supply Driven (LB Priority Approach) Alternative              | 0                    | 0     | 0     | 0     | 0     | 0     |       |       |       |        |
|                                                           | Supply Driven (LB Pro Rata Approach) Alternative              | 14                   | 20    | 28    | 31    | 33    | 34    |       |       |       |        |
|                                                           | Representative Preferred (2027-2028) Alternative <sup>3</sup> | 0                    | 0     | 0     | 0     | 0     | 0     | 0     | 21    | 61    |        |
|                                                           | Representative Preferred (2029-2060) Alternative <sup>4</sup> | 0                    | 0     | 0     | 0     | 0     | 3     | 10    | 35    | 83    |        |
| Arizona, Tribal Agriculture, PPR                          | CCS Comparative Baseline <sup>1</sup>                         | 0                    | 0     |       |       |       |       |       |       |       |        |
|                                                           | No Action Alternative                                         | 0                    |       |       |       |       |       |       |       |       |        |
|                                                           | Basic Coordination Alternative <sup>2</sup>                   | 0                    | 0     | 0     |       |       |       |       |       |       |        |
|                                                           | Enhanced Coordination Alternative                             | 35                   | 58    | 88    | 105   | 116   | 122   | 134   | 174   |       |        |
|                                                           | Maximum Operational Flexibility Alternative                   | 0                    | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0      |
|                                                           | Supply Driven (LB Priority Approach) Alternative              | 0                    | 0     | 0     | 0     | 0     | 0     |       |       |       |        |
|                                                           | Supply Driven (LB Pro Rata Approach) Alternative              | 69                   | 102   | 141   | 156   | 166   | 171   |       |       |       |        |
|                                                           | Representative Preferred (2027-2028) Alternative <sup>3</sup> | 0                    | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     |        |
|                                                           | Representative Preferred (2029-2060) Alternative <sup>4</sup> | 0                    | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     |        |
| California, Tribal Agriculture, PPR                       | CCS Comparative Baseline <sup>1</sup>                         | 0                    | 0     |       |       |       |       |       |       |       |        |
|                                                           | No Action Alternative                                         | 0                    |       |       |       |       |       |       |       |       |        |
|                                                           | Basic Coordination Alternative <sup>2</sup>                   | 0                    | 0     | 0     |       |       |       |       |       |       |        |
|                                                           | Enhanced Coordination Alternative                             | 33                   | 38    | 45    | 48    | 51    | 52    | 55    | 63    |       |        |
|                                                           | Maximum Operational Flexibility Alternative                   | 0                    | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0      |
|                                                           | Supply Driven (LB Priority Approach) Alternative              | 0                    | 0     | 0     | 0     | 0     | 0     |       |       |       |        |
|                                                           | Supply Driven (LB Pro Rata Approach) Alternative              | 17                   | 32    | 37    | 41    | 44    | 45    |       |       |       |        |
|                                                           | Representative Preferred (2027-2028) Alternative <sup>3</sup> | 0                    | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     |        |
|                                                           | Representative Preferred (2029-2060) Alternative <sup>4</sup> | 0                    | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     |        |
| Nevada, Tribal Agriculture, PPR                           | CCS Comparative Baseline <sup>1</sup>                         | 0                    | 0     |       |       |       |       |       |       |       |        |
|                                                           | No Action Alternative                                         | 0                    |       |       |       |       |       |       |       |       |        |
|                                                           | Basic Coordination Alternative <sup>2</sup>                   | 0                    | 0     | 0     |       |       |       |       |       |       |        |
|                                                           | Enhanced Coordination Alternative                             | 3                    | 4     | 6     | 8     | 9     | 9     | 10    | 13    |       |        |
|                                                           | Maximum Operational Flexibility Alternative                   | 0                    | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0      |
|                                                           | Supply Driven (LB Priority Approach) Alternative              | 0                    | 0     | 0     | 0     | 0     | 0     |       |       |       |        |
|                                                           | Supply Driven (LB Pro Rata Approach) Alternative              | 3                    | 4     | 6     | 8     | 9     | 9     |       |       |       |        |
|                                                           | Representative Preferred (2027-2028) Alternative <sup>3</sup> | 0                    | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     |        |
|                                                           | Representative Preferred (2029-2060) Alternative <sup>4</sup> | 0                    | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     |        |

Source: IMPLAN 2025

Note: The highlighting shows the values from the smallest (in white or no highlighting) to the largest (in yellow highlighting). The cells with hash-marks represent the values above shortages; these values are outside of the scope of this analysis. See **Appendix C**, Shortage Allocation Model and Alternative Distribution Model Documentation for more information on the shortage values for each entitlement holder type above shortages.

<sup>1</sup> Due to its fixed shortage volumes for CCS Comparative Baseline, shortages for 600K and 1,000K are actually associated with 613K and 1,013K in CCS Comparative Baseline. Greater shortages are based on an extension of priority beyond the levels of shortage provided by the pertinent documents.

<sup>2</sup> The maximum shortage for the Basic Coordination Alternative is 1.48 maf; however, the table above shows the maximum shortage as 1.5 maf for ease of comparison across the alternatives.

<sup>3</sup> The distribution of shortages up to 1.5 maf in 2027-2028 in the Representative Preferred Alternative reflects the May 1 proposal by the Lower Division States. Although not specified in their proposal, the Representative Preferred assumes shortages and their distribution above 1.5 maf in 2028 as necessary to avoid critically low elevations in Lake Mead. (See **Chapter 2** for more details on the sideboards under the Preferred Alternative and their representation in the Representative Preferred Alternative).

<sup>4</sup> Expected impacts from 2029 – 2060 under the Preferred Alternative may be different from what is shown for the Representative Preferred (2029-2060) Alternative, as this alternative provides a framework that allows for shortage distributions to be negotiated in different ways, consistent with sideboards described in **Chapter 2**.

Figure TA 16-7  
Annual Loss of Labor Income from Agricultural Production in the Analysis Area  
by Alternative and Shortage Level, in kaf (2025\$ millions)

| State, Water Entitlement Holders   | Shortage Level (kaf)                                          | 600   | 1,000 | 1,500 | 1,800 | 2,000 | 2,100 | 2,300 | 3,000 | 3,600 | 4,000 |
|------------------------------------|---------------------------------------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Arizona, Non-Tribal Agriculture    | CCS Comparative Baseline <sup>1</sup>                         | 0.9   | 1.5   |       |       |       |       |       |       |       |       |
|                                    | No Action Alternative                                         | 0.6   |       |       |       |       |       |       |       |       |       |
|                                    | Basic Coordination Alternative <sup>2</sup>                   | 0.6   | 2.1   | 8.1   |       |       |       |       |       |       |       |
|                                    | Enhanced Coordination Alternative                             | 4.4   | 7.4   | 11.1  | 13.9  | 17.2  | 18.8  | 21.3  | 29.0  |       |       |
|                                    | Maximum Operational Flexibility Alternative                   | 0.2   | 1.0   | 2.0   | 3.0   | 7.6   | 9.5   | 13.3  | 23.6  | 42.9  | 56.5  |
|                                    | Supply Driven (LB Priority Approach) Alternative              | 0.2   | 1.0   | 2.0   | 3.0   | 7.6   | 9.5   |       |       |       |       |
|                                    | Supply Driven (LB Pro Rata Approach) Alternative              | 8.8   | 12.9  | 22.7  | 25.6  | 27.5  | 28.4  |       |       |       |       |
|                                    | Representative Preferred (2027-2028) Alternative <sup>3</sup> | 0.2   | 1.0   | 2.0   | 3.0   | 7.6   | 9.5   | 13.3  | 23.6  | 42.9  |       |
|                                    | Representative Preferred (2029-2060) Alternative <sup>4</sup> | 0.6   | 2.1   | 8.1   | 13.8  | 14.2  | 15.1  | 18.5  | 34.7  | 50.5  |       |
| California, Non-Tribal Agriculture | CCS Comparative Baseline <sup>1</sup>                         | 0.0   | 2.3   |       |       |       |       |       |       |       |       |
|                                    | No Action Alternative                                         | 0.0   |       |       |       |       |       |       |       |       |       |
|                                    | Basic Coordination Alternative <sup>2</sup>                   | 0.0   | 0.0   | 0.0   |       |       |       |       |       |       |       |
|                                    | Enhanced Coordination Alternative                             | 125.2 | 145.4 | 170.8 | 186.0 | 196.2 | 201.2 | 211.4 | 246.5 |       |       |
|                                    | Maximum Operational Flexibility Alternative                   | 0.0   | 0.0   | 8.5   | 8.5   | 8.5   | 8.5   | 8.5   | 690.5 | 728.6 | 824.7 |
|                                    | Supply Driven (LB Priority Approach) Alternative              | 0.0   | 0.0   | 8.5   | 8.5   | 8.5   | 8.5   |       |       |       |       |
|                                    | Supply Driven (LB Pro Rata Approach) Alternative              | 106.2 | 121.4 | 140.5 | 157.0 | 168.0 | 173.4 |       |       |       |       |
|                                    | Representative Preferred (2027-2028) Alternative <sup>3</sup> | 0.0   | 0.0   | 8.5   | 8.5   | 8.5   | 8.5   | 8.5   | 690.5 | 728.6 |       |
|                                    | Representative Preferred (2029-2060) Alternative <sup>4</sup> | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 174.0 | 718.1 |       |
| Arizona, Tribal Agriculture        | CCS Comparative Baseline <sup>1</sup>                         | 13.4  | 19.3  |       |       |       |       |       |       |       |       |
|                                    | No Action Alternative                                         | 10.7  |       |       |       |       |       |       |       |       |       |
|                                    | Basic Coordination Alternative <sup>2</sup>                   | 10.7  | 25.9  | 48.1  |       |       |       |       |       |       |       |
|                                    | Enhanced Coordination Alternative                             | 6.6   | 10.6  | 15.8  | 18.9  | 20.9  | 21.8  | 23.9  | 31.2  |       |       |
|                                    | Maximum Operational Flexibility Alternative                   | 5.9   | 14.4  | 25.2  | 37.6  | 47.1  | 51.3  | 58.2  | 60.7  | 63.0  | 64.7  |
|                                    | Supply Driven (LB Priority Approach) Alternative              | 5.9   | 14.4  | 25.2  | 37.6  | 47.1  | 51.3  |       |       |       |       |
|                                    | Supply Driven (LB Pro Rata Approach) Alternative              | 12.5  | 18.3  | 25.3  | 28.0  | 29.8  | 30.7  |       |       |       |       |
|                                    | Representative Preferred (2027-2028) Alternative <sup>3</sup> | 5.9   | 14.4  | 25.2  | 37.6  | 47.1  | 51.3  | 58.2  | 60.7  | 63.0  |       |
|                                    | Representative Preferred (2029-2060) Alternative <sup>4</sup> | 10.7  | 25.9  | 48.1  | 58.7  | 58.9  | 59.1  | 59.8  | 61.9  | 64.0  |       |
| California, Tribal Agriculture     | CCS Comparative Baseline <sup>1</sup>                         | 0.0   | 0.0   |       |       |       |       |       |       |       |       |
|                                    | No Action Alternative                                         | 0.0   |       |       |       |       |       |       |       |       |       |
|                                    | Basic Coordination Alternative <sup>2</sup>                   | 0.0   | 0.0   | 0.0   |       |       |       |       |       |       |       |
|                                    | Enhanced Coordination Alternative                             | 2.1   | 2.4   | 2.8   | 3.0   | 3.2   | 3.2   | 3.4   | 3.9   |       |       |
|                                    | Maximum Operational Flexibility Alternative                   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
|                                    | Supply Driven (LB Priority Approach) Alternative              | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |       |       |       |       |
|                                    | Supply Driven (LB Pro Rata Approach) Alternative              | 1.1   | 2.1   | 2.3   | 2.6   | 2.8   | 2.8   |       |       |       |       |
|                                    | Representative Preferred (2027-2028) Alternative <sup>3</sup> | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |       |
|                                    | Representative Preferred (2029-2060) Alternative <sup>4</sup> | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |       |
| Nevada, Tribal Agriculture         | CCS Comparative Baseline <sup>1</sup>                         | 0.0   | 0.0   |       |       |       |       |       |       |       |       |
|                                    | No Action Alternative                                         | 0.0   |       |       |       |       |       |       |       |       |       |
|                                    | Basic Coordination Alternative <sup>2</sup>                   | 0.0   | 0.0   | 0.0   |       |       |       |       |       |       |       |
|                                    | Enhanced Coordination Alternative                             | 0.0   | 0.0   | 0.1   | 0.1   | 0.1   | 0.1   | 0.1   | 0.1   |       |       |
|                                    | Maximum Operational Flexibility Alternative                   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
|                                    | Supply Driven (LB Priority Approach) Alternative              | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |       |       |       |       |
|                                    | Supply Driven (LB Pro Rata Approach) Alternative              | 0.0   | 0.0   | 0.1   | 0.1   | 0.1   | 0.1   |       |       |       |       |
|                                    | Representative Preferred (2027-2028) Alternative <sup>3</sup> | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |       |
|                                    | Representative Preferred (2029-2060) Alternative <sup>4</sup> | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |       |

Source: IMPLAN 2025

Note: The highlighting shows the values from the smallest (in white or no highlighting) to the largest (in yellow highlighting). The cells with hash-marks represent the values above shortages; these values are outside of the scope of this analysis. See **Appendix C**, Shortage Allocation Model and Alternative Distribution Model Documentation for more information on the shortage values for each entitlement holder type above shortages.

<sup>1</sup> Due to its fixed shortage volumes for CCS Comparative Baseline, shortages for 600K and 1,000K are actually associated with 613K and 1,013K in CCS Comparative Baseline. Greater shortages are based on an extension of priority beyond the levels of shortage provided by the pertinent documents.

<sup>2</sup> The maximum shortage for the Basic Coordination Alternative is 1.48 maf; however, the table above shows the maximum shortage as 1.5 maf for ease of comparison across the alternatives.

<sup>3</sup> The distribution of shortages up to 1.5 maf in 2027-2028 in the Representative Preferred Alternative reflects the May 1 proposal by the Lower Division States. Although not specified in their proposal, the Representative Preferred assumes shortages and their distribution above 1.5 maf in 2028 as necessary to avoid critically low elevations in Lake Mead. (See **Chapter 2** for more details on the sideboards under the Preferred Alternative and their representation in the Representative Preferred Alternative).

<sup>4</sup> Expected impacts from 2029 – 2060 under the Preferred Alternative may be different from what is shown for the Representative Preferred (2029-2060) Alternative, as this alternative provides a framework that allows for shortage distributions to be negotiated in different ways, consistent with sideboards described in **Chapter 2**.

Figure TA 16-8  
Annual Loss of Labor Income from Agricultural Production in the Analysis Area  
by Priority Group, Alternative, and Shortage Level, in kaf (2025\$ millions)

| State, Water Entitlement Holders,<br>Priority Group          |                                                               | Shortage Level (kaf) | 600   | 1,000 | 1,500 | 1,800 | 2,000 | 2,100 | 2,300 | 3,000 | 3,600 | 4,000 |
|--------------------------------------------------------------|---------------------------------------------------------------|----------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Arizona, Non-Tribal Agriculture,<br>Priority 4(i)            | CCS Comparative Baseline <sup>1</sup>                         |                      | 0.9   | 1.5   |       |       |       |       |       |       |       |       |
|                                                              | No Action Alternative                                         |                      | 0.6   |       |       |       |       |       |       |       |       |       |
|                                                              | Basic Coordination Alternative <sup>2</sup>                   |                      | 0.6   | 2.1   | 8.1   |       |       |       |       |       |       |       |
|                                                              | Enhanced Coordination Alternative                             |                      | 0.3   | 0.4   | 0.7   | 0.9   | 1.0   | 1.1   | 1.2   | 1.5   |       |       |
|                                                              | Maximum Operational Flexibility Alternative                   |                      | 0.2   | 1.0   | 2.0   | 3.0   | 7.6   | 9.5   | 13.3  | 14.2  | 14.2  | 14.2  |
|                                                              | Supply Driven (LB Priority Approach) Alternative              |                      | 0.2   | 1.0   | 2.0   | 3.0   | 7.6   | 9.5   |       |       |       |       |
|                                                              | Supply Driven (LB Pro Rata Approach) Alternative              |                      | 0.5   | 0.9   | 1.2   | 1.4   | 1.4   | 1.5   |       |       |       |       |
|                                                              | Representative Preferred (2027-2028) Alternative <sup>3</sup> |                      | 0.2   | 1.0   | 2.0   | 3.0   | 7.6   | 9.5   | 13.3  | 14.2  | 14.2  |       |
|                                                              | Representative Preferred (2029-2060) Alternative <sup>4</sup> |                      | 0.6   | 2.1   | 8.1   | 13.8  | 14.2  | 14.2  | 14.2  | 14.2  | 14.2  |       |
| Arizona, Non-Tribal Agriculture,<br>Priority 3               | CCS Comparative Baseline <sup>1</sup>                         |                      | 0.0   | 0.0   |       |       |       |       |       |       |       |       |
|                                                              | No Action Alternative                                         |                      | 0.0   |       |       |       |       |       |       |       |       |       |
|                                                              | Basic Coordination Alternative <sup>2</sup>                   |                      | 0.0   | 0.0   | 0.0   |       |       |       |       |       |       |       |
|                                                              | Enhanced Coordination Alternative                             |                      | 3.2   | 5.3   | 7.9   | 9.9   | 12.3  | 13.5  | 15.3  | 20.9  |       |       |
|                                                              | Maximum Operational Flexibility Alternative                   |                      | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 9.4   | 28.8  | 42.3  |
|                                                              | Supply Driven (LB Priority Approach) Alternative              |                      | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |       |       |       |       |
|                                                              | Supply Driven (LB Pro Rata Approach) Alternative              |                      | 6.3   | 9.2   | 16.4  | 18.5  | 19.8  | 20.5  |       |       |       |       |
|                                                              | Representative Preferred (2027-2028) Alternative <sup>3</sup> |                      | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 9.4   | 28.8  |       |
|                                                              | Representative Preferred (2029-2060) Alternative <sup>4</sup> |                      | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 1.0   | 4.3   | 20.5  | 36.3  |       |
| Arizona, Non-Tribal Agriculture, PPR                         | CCS Comparative Baseline <sup>1</sup>                         |                      | 0.0   | 0.0   |       |       |       |       |       |       |       |       |
|                                                              | No Action Alternative                                         |                      | 0.0   |       |       |       |       |       |       |       |       |       |
|                                                              | Basic Coordination Alternative <sup>2</sup>                   |                      | 0.0   | 0.0   | 0.0   |       |       |       |       |       |       |       |
|                                                              | Enhanced Coordination Alternative                             |                      | 1.0   | 1.7   | 2.5   | 3.1   | 3.8   | 4.2   | 4.8   | 6.5   |       |       |
|                                                              | Maximum Operational Flexibility Alternative                   |                      | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
|                                                              | Supply Driven (LB Priority Approach) Alternative              |                      | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |       |       |       |       |
|                                                              | Supply Driven (LB Pro Rata Approach) Alternative              |                      | 2.0   | 2.9   | 5.1   | 5.7   | 6.2   | 6.4   |       |       |       |       |
|                                                              | Representative Preferred (2027-2028) Alternative <sup>3</sup> |                      | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |       |
|                                                              | Representative Preferred (2029-2060) Alternative <sup>4</sup> |                      | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |       |
| California, Non-Tribal Agriculture,<br>Priorities 2 & 3      | CCS Comparative Baseline <sup>1</sup>                         |                      | 0.0   | 2.3   |       |       |       |       |       |       |       |       |
|                                                              | No Action Alternative                                         |                      | 0.0   |       |       |       |       |       |       |       |       |       |
|                                                              | Basic Coordination Alternative <sup>2</sup>                   |                      | 0.0   | 0.0   | 0.0   |       |       |       |       |       |       |       |
|                                                              | Enhanced Coordination Alternative                             |                      | 21.6  | 26.5  | 32.6  | 36.3  | 38.7  | 39.9  | 42.4  | 50.8  |       |       |
|                                                              | Maximum Operational Flexibility Alternative                   |                      | 0.0   | 0.0   | 8.5   | 8.5   | 8.5   | 8.5   | 8.5   | 690.5 | 728.6 | 824.7 |
|                                                              | Supply Driven (LB Priority Approach) Alternative              |                      | 0.0   | 0.0   | 8.5   | 8.5   | 8.5   | 8.5   |       |       |       |       |
|                                                              | Supply Driven (LB Pro Rata Approach) Alternative              |                      | 17.1  | 20.7  | 25.3  | 29.3  | 31.9  | 33.2  |       |       |       |       |
|                                                              | Representative Preferred (2027-2028) Alternative <sup>3</sup> |                      | 0.0   | 0.0   | 8.5   | 8.5   | 8.5   | 8.5   | 8.5   | 690.5 | 728.6 |       |
|                                                              | Representative Preferred (2029-2060) Alternative <sup>4</sup> |                      | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 174.0 | 718.1 |       |
| California, Non-Tribal Agriculture,<br>PPR                   | CCS Comparative Baseline <sup>1</sup>                         |                      | 0.0   | 0.0   |       |       |       |       |       |       |       |       |
|                                                              | No Action Alternative                                         |                      | 0.0   |       |       |       |       |       |       |       |       |       |
|                                                              | Basic Coordination Alternative <sup>2</sup>                   |                      | 0.0   | 0.0   | 0.0   |       |       |       |       |       |       |       |
|                                                              | Enhanced Coordination Alternative                             |                      | 103.5 | 118.9 | 138.2 | 149.8 | 157.5 | 161.3 | 169.0 | 195.7 |       |       |
|                                                              | Maximum Operational Flexibility Alternative                   |                      | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
|                                                              | Supply Driven (LB Priority Approach) Alternative              |                      | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |       |       |       |       |
|                                                              | Supply Driven (LB Pro Rata Approach) Alternative              |                      | 89.1  | 100.7 | 115.2 | 127.7 | 136.0 | 140.2 |       |       |       |       |
|                                                              | Representative Preferred (2027-2028) Alternative <sup>3</sup> |                      | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |       |
|                                                              | Representative Preferred (2029-2060) Alternative <sup>4</sup> |                      | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |       |
| Arizona, Tribal Agriculture, Priorities<br>CAP Indian & 4(i) | CCS Comparative Baseline <sup>1</sup>                         |                      | 13.4  | 19.3  |       |       |       |       |       |       |       |       |
|                                                              | No Action Alternative                                         |                      | 10.7  |       |       |       |       |       |       |       |       |       |
|                                                              | Basic Coordination Alternative <sup>2</sup>                   |                      | 10.7  | 25.9  | 48.1  |       |       |       |       |       |       |       |
|                                                              | Enhanced Coordination Alternative                             |                      | 4.2   | 6.6   | 9.9   | 11.8  | 13.0  | 13.6  | 14.8  | 19.0  |       |       |
|                                                              | Maximum Operational Flexibility Alternative                   |                      | 5.9   | 14.4  | 25.2  | 37.6  | 47.1  | 51.3  | 58.2  | 58.9  | 58.9  | 58.9  |
|                                                              | Supply Driven (LB Priority Approach) Alternative              |                      | 5.9   | 14.4  | 25.2  | 37.6  | 47.1  | 51.3  |       |       |       |       |
|                                                              | Supply Driven (LB Pro Rata Approach) Alternative              |                      | 7.8   | 11.4  | 15.6  | 17.2  | 18.2  | 18.7  |       |       |       |       |
|                                                              | Representative Preferred (2027-2028) Alternative <sup>3</sup> |                      | 5.9   | 14.4  | 25.2  | 37.6  | 47.1  | 51.3  | 58.2  | 58.9  | 58.9  |       |
|                                                              | Representative Preferred (2029-2060) Alternative <sup>4</sup> |                      | 10.7  | 25.9  | 48.1  | 58.7  | 58.9  | 58.9  | 58.9  | 58.9  | 58.9  |       |
| Arizona, Tribal Agriculture, Priority 3                      | CCS Comparative Baseline <sup>1</sup>                         |                      | 0.0   | 0.0   |       |       |       |       |       |       |       |       |
|                                                              | No Action Alternative                                         |                      | 0.0   |       |       |       |       |       |       |       |       |       |
|                                                              | Basic Coordination Alternative <sup>2</sup>                   |                      | 0.0   | 0.0   | 0.0   |       |       |       |       |       |       |       |
|                                                              | Enhanced Coordination Alternative                             |                      | 0.6   | 1.0   | 1.5   | 1.8   | 2.0   | 2.1   | 2.3   | 2.9   |       |       |
|                                                              | Maximum Operational Flexibility Alternative                   |                      | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 1.8   | 4.1   | 5.8   |
|                                                              | Supply Driven (LB Priority Approach) Alternative              |                      | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |       |       |       |       |
|                                                              | Supply Driven (LB Pro Rata Approach) Alternative              |                      | 1.2   | 1.7   | 2.4   | 2.6   | 2.8   | 2.9   |       |       |       |       |
|                                                              | Representative Preferred (2027-2028) Alternative <sup>3</sup> |                      | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 1.8   | 4.1   |       |
|                                                              | Representative Preferred (2029-2060) Alternative <sup>4</sup> |                      | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.2   | 0.9   | 3.0   | 5.1   |       |
| Arizona, Tribal Agriculture, PPR                             | CCS Comparative Baseline <sup>1</sup>                         |                      | 0.0   | 0.0   |       |       |       |       |       |       |       |       |
|                                                              | No Action Alternative                                         |                      | 0.0   |       |       |       |       |       |       |       |       |       |
|                                                              | Basic Coordination Alternative <sup>2</sup>                   |                      | 0.0   | 0.0   | 0.0   |       |       |       |       |       |       |       |
|                                                              | Enhanced Coordination Alternative                             |                      | 1.8   | 3.0   | 4.4   | 5.3   | 5.9   | 6.2   | 6.8   | 9.2   |       |       |
|                                                              | Maximum Operational Flexibility Alternative                   |                      | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
|                                                              | Supply Driven (LB Priority Approach) Alternative              |                      | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |       |       |       |       |
|                                                              | Supply Driven (LB Pro Rata Approach) Alternative              |                      | 3.5   | 5.1   | 7.3   | 8.2   | 8.8   | 9.1   |       |       |       |       |
|                                                              | Representative Preferred (2027-2028) Alternative <sup>3</sup> |                      | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |       |
|                                                              | Representative Preferred (2029-2060) Alternative <sup>4</sup> |                      | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |       |
| California, Tribal Agriculture, PPR                          | CCS Comparative Baseline <sup>1</sup>                         |                      | 0.0   | 0.0   |       |       |       |       |       |       |       |       |
|                                                              | No Action Alternative                                         |                      | 0.0   |       |       |       |       |       |       |       |       |       |
|                                                              | Basic Coordination Alternative <sup>2</sup>                   |                      | 0.0   | 0.0   | 0.0   |       |       |       |       |       |       |       |
|                                                              | Enhanced Coordination Alternative                             |                      | 2.1   | 2.4   | 2.8   | 3.0   | 3.2   | 3.2   | 3.4   | 3.9   |       |       |
|                                                              | Maximum Operational Flexibility Alternative                   |                      | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
|                                                              | Supply Driven (LB Priority Approach) Alternative              |                      | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |       |       |       |       |
|                                                              | Supply Driven (LB Pro Rata Approach) Alternative              |                      | 1.1   | 2.1   | 2.3   | 2.6   | 2.8   | 2.8   |       |       |       |       |
|                                                              | Representative Preferred (2027-2028) Alternative <sup>3</sup> |                      | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |       |
|                                                              | Representative Preferred (2029-2060) Alternative <sup>4</sup> |                      | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |       |
| Nevada, Tribal Agriculture, PPR                              | CCS Comparative Baseline <sup>1</sup>                         |                      | 0.0   | 0.0   |       |       |       |       |       |       |       |       |
|                                                              | No Action Alternative                                         |                      | 0.0   |       |       |       |       |       |       |       |       |       |
|                                                              | Basic Coordination Alternative <sup>2</sup>                   |                      | 0.0   | 0.0   | 0.0   |       |       |       |       |       |       |       |
|                                                              | Enhanced Coordination Alternative                             |                      | 0.0   | 0.0   | 0.1   | 0.1   | 0.1   | 0.1   | 0.1   | 0.1   |       |       |
|                                                              | Maximum Operational Flexibility Alternative                   |                      | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
|                                                              | Supply Driven (LB Priority Approach) Alternative              |                      | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |       |       |       |       |
|                                                              | Supply Driven (LB Pro Rata Approach) Alternative              |                      | 0.0   | 0.0   | 0.1   | 0.1   | 0.1   | 0.1   |       |       |       |       |
|                                                              | Representative Preferred (2027-2028) Alternative <sup>3</sup> |                      | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |       |
|                                                              | Representative Preferred (2029-2060) Alternative <sup>4</sup> |                      | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |       |

Source: IMPLAN 2025

Note: The highlighting shows the values from the smallest (in white or no highlighting) to the largest (in yellow highlighting). The cells with hash-marks represent the values above shortages; these values are outside of the scope of this analysis. See **Appendix C**, Shortage Allocation Model and Alternative Distribution Model Documentation for more information on the shortage values for each entitlement holder type above shortages.

<sup>1</sup> Due to its fixed shortage volumes for CCS Comparative Baseline, shortages for 600K and 1,000K are actually associated with 613K and 1,013K in CCS Comparative Baseline. Greater shortages are based on an extension of priority beyond the levels of shortage provided by the pertinent documents.

<sup>2</sup> The maximum shortage for the Basic Coordination Alternative is 1.48 maf; however, the table above shows the maximum shortage as 1.5 maf for ease of comparison across the alternatives.

<sup>3</sup> The distribution of shortages up to 1.5 maf in 2027-2028 in the Representative Preferred Alternative reflects the May 1 proposal by the Lower Division States. Although not specified in their proposal, the Representative Preferred assumes shortages and their distribution above 1.5 maf in 2028 as necessary to avoid critically low elevations in Lake Mead. (See **Chapter 2** for more details on the sideboards under the Preferred Alternative and their representation in the Representative Preferred Alternative).

<sup>4</sup> Expected impacts from 2029 – 2060 under the Preferred Alternative may be different from what is shown for the Representative Preferred (2029-2060) Alternative, as this alternative provides a framework that allows for shortage distributions to be negotiated in different ways, consistent with sideboards described in **Chapter 2**.

Figure TA 16-9  
Annual Loss of Total Economic Output from Agricultural Production in the  
Analysis Area by Alternative and Shortage Level, in kaf (2025\$ millions)

| State, Water Entitlement Holders   | Shortage Level (kaf)                                          | 600   | 1,000 | 1,500 | 1,800 | 2,000 | 2,100 | 2,300 | 3,000   | 3,600   | 4,000   |
|------------------------------------|---------------------------------------------------------------|-------|-------|-------|-------|-------|-------|-------|---------|---------|---------|
| Arizona, Non-Tribal Agriculture    | CCS Comparative Baseline <sup>1</sup>                         | 3.8   | 6.5   |       |       |       |       |       |         |         |         |
|                                    | No Action Alternative                                         | 2.8   |       |       |       |       |       |       |         |         |         |
|                                    | Basic Coordination Alternative <sup>2</sup>                   | 2.8   | 9.2   | 27.4  |       |       |       |       |         |         |         |
|                                    | Enhanced Coordination Alternative                             | 19.9  | 33.1  | 50.0  | 61.8  | 74.2  | 80.3  | 91.2  | 126.8   |         |         |
|                                    | Maximum Operational Flexibility Alternative                   | 1.0   | 4.5   | 8.9   | 13.6  | 25.4  | 32.6  | 46.5  | 91.9    | 176.6   | 237.7   |
|                                    | Supply Driven (LB Priority Approach) Alternative              | 1.0   | 4.5   | 8.9   | 13.6  | 25.4  | 32.6  |       |         |         |         |
|                                    | Supply Driven (LB Pro Rata Approach) Alternative              | 39.3  | 57.9  | 97.7  | 111.0 | 119.8 | 124.3 |       |         |         |         |
|                                    | Representative Preferred (2027-2028) Alternative <sup>3</sup> | 1.0   | 4.5   | 8.9   | 13.6  | 25.4  | 32.6  | 46.5  | 91.9    | 176.6   |         |
|                                    | Representative Preferred (2029-2060) Alternative <sup>4</sup> | 2.8   | 9.2   | 27.4  | 48.6  | 49.8  | 54.2  | 69.2  | 138.2   | 210.7   |         |
| California, Non-Tribal Agriculture | CCS Comparative Baseline <sup>1</sup>                         | 0.0   | 9.9   |       |       |       |       |       |         |         |         |
|                                    | No Action Alternative                                         | 0.0   |       |       |       |       |       |       |         |         |         |
|                                    | Basic Coordination Alternative <sup>2</sup>                   | 0.0   | 0.0   | 0.0   |       |       |       |       |         |         |         |
|                                    | Enhanced Coordination Alternative                             | 479.9 | 567.9 | 677.8 | 743.7 | 787.6 | 809.6 | 853.6 | 1,005.8 |         |         |
|                                    | Maximum Operational Flexibility Alternative                   | 0.0   | 0.0   | 36.9  | 36.9  | 36.9  | 36.9  | 36.9  | 1,229.1 | 1,388.4 | 1,755.2 |
|                                    | Supply Driven (LB Priority Approach) Alternative              | 0.0   | 0.0   | 36.9  | 36.9  | 36.9  | 36.9  |       |         |         |         |
|                                    | Supply Driven (LB Pro Rata Approach) Alternative              | 397.6 | 463.7 | 546.4 | 617.8 | 665.4 | 689.2 |       |         |         |         |
|                                    | Representative Preferred (2027-2028) Alternative <sup>3</sup> | 0.0   | 0.0   | 36.9  | 36.9  | 36.9  | 36.9  | 36.9  | 1,229.1 | 1,388.4 |         |
|                                    | Representative Preferred (2029-2060) Alternative <sup>4</sup> | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 314.3   | 1,343.9 |         |
| Arizona, Tribal Agriculture        | CCS Comparative Baseline <sup>1</sup>                         | 43.5  | 62.5  |       |       |       |       |       |         |         |         |
|                                    | No Action Alternative                                         | 34.8  |       |       |       |       |       |       |         |         |         |
|                                    | Basic Coordination Alternative <sup>2</sup>                   | 34.8  | 85.8  | 162.2 |       |       |       |       |         |         |         |
|                                    | Enhanced Coordination Alternative                             | 22.5  | 36.0  | 53.5  | 64.0  | 70.8  | 74.2  | 81.0  | 104.7   |         |         |
|                                    | Maximum Operational Flexibility Alternative                   | 19.4  | 46.8  | 83.3  | 126.8 | 158.5 | 174.6 | 201.0 | 209.0   | 216.7   | 222.6   |
|                                    | Supply Driven (LB Priority Approach) Alternative              | 19.4  | 46.8  | 83.3  | 126.8 | 158.5 | 174.6 |       |         |         |         |
|                                    | Supply Driven (LB Pro Rata Approach) Alternative              | 42.4  | 61.8  | 85.4  | 94.2  | 100.1 | 103.0 |       |         |         |         |
|                                    | Representative Preferred (2027-2028) Alternative <sup>3</sup> | 19.4  | 46.8  | 83.3  | 126.8 | 158.5 | 174.6 | 201.0 | 209.0   | 216.7   |         |
|                                    | Representative Preferred (2029-2060) Alternative <sup>4</sup> | 34.8  | 85.8  | 162.2 | 202.6 | 203.4 | 204.1 | 206.0 | 212.7   | 220.0   |         |
| California, Tribal Agriculture     | CCS Comparative Baseline <sup>1</sup>                         | 0.0   | 0.0   |       |       |       |       |       |         |         |         |
|                                    | No Action Alternative                                         | 0.0   |       |       |       |       |       |       |         |         |         |
|                                    | Basic Coordination Alternative <sup>2</sup>                   | 0.0   | 0.0   | 0.0   |       |       |       |       |         |         |         |
|                                    | Enhanced Coordination Alternative                             | 8.1   | 9.4   | 11.0  | 12.0  | 12.6  | 13.0  | 13.6  | 15.9    |         |         |
|                                    | Maximum Operational Flexibility Alternative                   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0     | 0.0     | 0.0     |
|                                    | Supply Driven (LB Priority Approach) Alternative              | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |       |         |         |         |
|                                    | Supply Driven (LB Pro Rata Approach) Alternative              | 4.2   | 7.8   | 9.1   | 10.1  | 10.8  | 11.2  |       |         |         |         |
|                                    | Representative Preferred (2027-2028) Alternative <sup>3</sup> | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0     | 0.0     |         |
|                                    | Representative Preferred (2029-2060) Alternative <sup>4</sup> | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0     | 0.0     |         |
| Nevada, Tribal Agriculture         | CCS Comparative Baseline <sup>1</sup>                         | 0.0   | 0.0   |       |       |       |       |       |         |         |         |
|                                    | No Action Alternative                                         | 0.0   |       |       |       |       |       |       |         |         |         |
|                                    | Basic Coordination Alternative <sup>2</sup>                   | 0.0   | 0.0   | 0.0   |       |       |       |       |         |         |         |
|                                    | Enhanced Coordination Alternative                             | 0.2   | 0.3   | 0.4   | 0.5   | 0.6   | 0.6   | 0.7   | 0.9     |         |         |
|                                    | Maximum Operational Flexibility Alternative                   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0     | 0.0     | 0.0     |
|                                    | Supply Driven (LB Priority Approach) Alternative              | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |       |         |         |         |
|                                    | Supply Driven (LB Pro Rata Approach) Alternative              | 0.2   | 0.3   | 0.4   | 0.5   | 0.6   | 0.6   |       |         |         |         |
|                                    | Representative Preferred (2027-2028) Alternative <sup>3</sup> | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0     | 0.0     |         |
|                                    | Representative Preferred (2029-2060) Alternative <sup>4</sup> | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0     | 0.0     |         |

Source: IMPLAN 2025

Note: The highlighting shows the values from the smallest (in white or no highlighting) to the largest (in yellow highlighting). The cells with hash-marks represent the values above shortages; these values are outside of the scope of this analysis. See **Appendix C**, Shortage Allocation Model and Alternative Distribution Model Documentation for more information on the shortage values for each entitlement holder type above shortages.

<sup>1</sup> Due to its fixed shortage volumes for CCS Comparative Baseline, shortages for 600K and 1,000K are actually associated with 613K and 1,013K in CCS Comparative Baseline. Greater shortages are based on an extension of priority beyond the levels of shortage provided by the pertinent documents.

<sup>2</sup> The maximum shortage for the Basic Coordination Alternative is 1.48 maf; however, the table above shows the maximum shortage as 1.5 maf for ease of comparison across the alternatives.

<sup>3</sup> The distribution of shortages up to 1.5 maf in 2027-2028 in the Representative Preferred Alternative reflects the May 1 proposal by the Lower Division States. Although not specified in their proposal, the Representative Preferred assumes shortages and their distribution above 1.5 maf in 2028 as necessary to avoid critically low elevations in Lake Mead. (See **Chapter 2** for more details on the sideboards under the Preferred Alternative and their representation in the Representative Preferred Alternative).

<sup>4</sup> Expected impacts from 2029 – 2060 under the Preferred Alternative may be different from what is shown for the Representative Preferred (2029-2060) Alternative, as this alternative provides a framework that allows for shortage distributions to be negotiated in different ways, consistent with sideboards described in **Chapter 2**.

Figure TA 16-10  
Annual Loss of Total Economic Output from Agricultural Production in the Analysis Area by Priority Group, Alternative, and Shortage Level, in kaf (2025\$ millions)

| State, Water Entitlement Holders, Priority Group          | Shortage Level (kaf)                                          | 600   | 1,000 | 1,500 | 1,800 | 2,000 | 2,100 | 2,300 | 3,000   | 3,600   | 4,000   |
|-----------------------------------------------------------|---------------------------------------------------------------|-------|-------|-------|-------|-------|-------|-------|---------|---------|---------|
| Arizona, Non-Tribal Agriculture, Priority 4(i)            | CCS Comparative Baseline <sup>1</sup>                         | 3.8   | 6.5   |       |       |       |       |       |         |         |         |
|                                                           | No Action Alternative                                         | 2.8   |       |       |       |       |       |       |         |         |         |
|                                                           | Basic Coordination Alternative <sup>2</sup>                   | 2.8   | 9.2   | 27.4  |       |       |       |       |         |         |         |
|                                                           | Enhanced Coordination Alternative                             | 1.2   | 2.0   | 3.2   | 4.0   | 4.5   | 4.7   | 5.1   | 6.7     |         |         |
|                                                           | Maximum Operational Flexibility Alternative                   | 1.0   | 4.5   | 8.9   | 13.6  | 25.4  | 32.6  | 46.5  | 49.8    | 49.8    | 49.8    |
|                                                           | Supply Driven (LB Priority Approach) Alternative              | 1.0   | 4.5   | 8.9   | 13.6  | 25.4  | 32.6  |       |         |         |         |
|                                                           | Supply Driven (LB Pro Rata Approach) Alternative              | 2.4   | 3.8   | 5.4   | 6.0   | 6.4   | 6.6   |       |         |         |         |
|                                                           | Representative Preferred (2027-2028) Alternative <sup>3</sup> | 1.0   | 4.5   | 8.9   | 13.6  | 25.4  | 32.6  | 46.5  | 49.8    | 49.8    |         |
|                                                           | Representative Preferred (2029-2060) Alternative <sup>4</sup> | 2.8   | 9.2   | 27.4  | 48.6  | 49.8  | 49.8  | 49.8  | 49.8    | 49.8    |         |
| Arizona, Non-Tribal Agriculture, Priority 3               | CCS Comparative Baseline <sup>1</sup>                         | 0.0   | 0.0   |       |       |       |       |       |         |         |         |
|                                                           | No Action Alternative                                         | 0.0   |       |       |       |       |       |       |         |         |         |
|                                                           | Basic Coordination Alternative <sup>2</sup>                   | 0.0   | 0.0   | 0.0   |       |       |       |       |         |         |         |
|                                                           | Enhanced Coordination Alternative                             | 14.2  | 23.7  | 35.6  | 44.0  | 53.1  | 57.7  | 65.6  | 91.5    |         |         |
|                                                           | Maximum Operational Flexibility Alternative                   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 42.1    | 126.8   | 187.9   |
|                                                           | Supply Driven (LB Priority Approach) Alternative              | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |       |         |         |         |
|                                                           | Supply Driven (LB Pro Rata Approach) Alternative              | 28.1  | 41.2  | 70.4  | 80.0  | 86.5  | 89.7  |       |         |         |         |
|                                                           | Representative Preferred (2027-2028) Alternative <sup>3</sup> | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 42.1    | 126.8   |         |
|                                                           | Representative Preferred (2029-2060) Alternative <sup>4</sup> | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 4.4   | 19.4  | 88.4    | 160.9   |         |
| Arizona, Non-Tribal Agriculture, PPR                      | CCS Comparative Baseline <sup>1</sup>                         | 0.0   | 0.0   |       |       |       |       |       |         |         |         |
|                                                           | No Action Alternative                                         | 0.0   |       |       |       |       |       |       |         |         |         |
|                                                           | Basic Coordination Alternative <sup>2</sup>                   | 0.0   | 0.0   | 0.0   |       |       |       |       |         |         |         |
|                                                           | Enhanced Coordination Alternative                             | 4.5   | 7.4   | 11.1  | 13.8  | 16.6  | 18.0  | 20.4  | 28.5    |         |         |
|                                                           | Maximum Operational Flexibility Alternative                   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0     | 0.0     | 0.0     |
|                                                           | Supply Driven (LB Priority Approach) Alternative              | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |       |         |         |         |
|                                                           | Supply Driven (LB Pro Rata Approach) Alternative              | 8.8   | 12.9  | 21.9  | 24.9  | 26.9  | 27.9  |       |         |         |         |
|                                                           | Representative Preferred (2027-2028) Alternative <sup>3</sup> | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0     | 0.0     |         |
|                                                           | Representative Preferred (2029-2060) Alternative <sup>4</sup> | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0     | 0.0     |         |
| California, Non-Tribal Agriculture, Priorities 2 & 3      | CCS Comparative Baseline <sup>1</sup>                         | 0.0   | 9.9   |       |       |       |       |       |         |         |         |
|                                                           | No Action Alternative                                         | 0.0   |       |       |       |       |       |       |         |         |         |
|                                                           | Basic Coordination Alternative <sup>2</sup>                   | 0.0   | 0.0   | 0.0   |       |       |       |       |         |         |         |
|                                                           | Enhanced Coordination Alternative                             | 84.3  | 105.4 | 131.8 | 147.7 | 158.2 | 163.5 | 174.1 | 210.8   |         |         |
|                                                           | Maximum Operational Flexibility Alternative                   | 0.0   | 0.0   | 36.9  | 36.9  | 36.9  | 36.9  | 36.9  | 1,229.1 | 1,388.4 | 1,755.2 |
|                                                           | Supply Driven (LB Priority Approach) Alternative              | 0.0   | 0.0   | 36.9  | 36.9  | 36.9  | 36.9  |       |         |         |         |
|                                                           | Supply Driven (LB Pro Rata Approach) Alternative              | 64.5  | 80.4  | 100.2 | 117.4 | 128.9 | 134.6 |       |         |         |         |
|                                                           | Representative Preferred (2027-2028) Alternative <sup>3</sup> | 0.0   | 0.0   | 36.9  | 36.9  | 36.9  | 36.9  | 36.9  | 1,229.1 | 1,388.4 |         |
|                                                           | Representative Preferred (2029-2060) Alternative <sup>4</sup> | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 314.3   | 1,343.9 |         |
| California, Non-Tribal Agriculture, PPR                   | CCS Comparative Baseline <sup>1</sup>                         | 0.0   | 0.0   |       |       |       |       |       |         |         |         |
|                                                           | No Action Alternative                                         | 0.0   |       |       |       |       |       |       |         |         |         |
|                                                           | Basic Coordination Alternative <sup>2</sup>                   | 0.0   | 0.0   | 0.0   |       |       |       |       |         |         |         |
|                                                           | Enhanced Coordination Alternative                             | 395.7 | 462.4 | 545.9 | 596.0 | 629.4 | 646.1 | 679.5 | 795.0   |         |         |
|                                                           | Maximum Operational Flexibility Alternative                   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0     | 0.0     | 0.0     |
|                                                           | Supply Driven (LB Priority Approach) Alternative              | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |       |         |         |         |
|                                                           | Supply Driven (LB Pro Rata Approach) Alternative              | 333.1 | 383.4 | 446.1 | 500.4 | 536.5 | 554.6 |       |         |         |         |
|                                                           | Representative Preferred (2027-2028) Alternative <sup>3</sup> | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0     | 0.0     |         |
|                                                           | Representative Preferred (2029-2060) Alternative <sup>4</sup> | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0     | 0.0     |         |
| Arizona, Tribal Agriculture, Priorities CAP Indian & 4(i) | CCS Comparative Baseline <sup>1</sup>                         | 43.5  | 62.5  |       |       |       |       |       |         |         |         |
|                                                           | No Action Alternative                                         | 34.8  |       |       |       |       |       |       |         |         |         |
|                                                           | Basic Coordination Alternative <sup>2</sup>                   | 34.8  | 85.8  | 162.2 |       |       |       |       |         |         |         |
|                                                           | Enhanced Coordination Alternative                             | 13.9  | 21.6  | 31.9  | 38.1  | 42.1  | 44.1  | 48.0  | 61.5    |         |         |
|                                                           | Maximum Operational Flexibility Alternative                   | 19.4  | 46.8  | 83.3  | 126.8 | 158.5 | 174.6 | 201.0 | 203.4   | 203.4   | 203.4   |
|                                                           | Supply Driven (LB Priority Approach) Alternative              | 19.4  | 46.8  | 83.3  | 126.8 | 158.5 | 174.6 |       |         |         |         |
|                                                           | Supply Driven (LB Pro Rata Approach) Alternative              | 25.3  | 36.8  | 50.5  | 55.5  | 58.9  | 60.6  |       |         |         |         |
|                                                           | Representative Preferred (2027-2028) Alternative <sup>3</sup> | 19.4  | 46.8  | 83.3  | 126.8 | 158.5 | 174.6 | 201.0 | 203.4   | 203.4   |         |
|                                                           | Representative Preferred (2029-2060) Alternative <sup>4</sup> | 34.8  | 85.8  | 162.2 | 202.6 | 203.4 | 203.4 | 203.4 | 203.4   | 203.4   |         |
| Arizona, Tribal Agriculture, Priority 3                   | CCS Comparative Baseline <sup>1</sup>                         | 0.0   | 0.0   |       |       |       |       |       |         |         |         |
|                                                           | No Action Alternative                                         | 0.0   |       |       |       |       |       |       |         |         |         |
|                                                           | Basic Coordination Alternative <sup>2</sup>                   | 0.0   | 0.0   | 0.0   |       |       |       |       |         |         |         |
|                                                           | Enhanced Coordination Alternative                             | 1.8   | 3.1   | 4.6   | 5.5   | 6.1   | 6.4   | 7.0   | 9.2     |         |         |
|                                                           | Maximum Operational Flexibility Alternative                   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 5.6     | 13.3    | 19.2    |
|                                                           | Supply Driven (LB Priority Approach) Alternative              | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |       |         |         |         |
|                                                           | Supply Driven (LB Pro Rata Approach) Alternative              | 3.6   | 5.3   | 7.4   | 8.2   | 8.8   | 9.0   |       |         |         |         |
|                                                           | Representative Preferred (2027-2028) Alternative <sup>3</sup> | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 5.6     | 13.3    |         |
|                                                           | Representative Preferred (2029-2060) Alternative <sup>4</sup> | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.7   | 2.6   | 9.3     | 16.6    |         |
| Arizona, Tribal Agriculture, PPR                          | CCS Comparative Baseline <sup>1</sup>                         | 0.0   | 0.0   |       |       |       |       |       |         |         |         |
|                                                           | No Action Alternative                                         | 0.0   |       |       |       |       |       |       |         |         |         |
|                                                           | Basic Coordination Alternative <sup>2</sup>                   | 0.0   | 0.0   | 0.0   |       |       |       |       |         |         |         |
|                                                           | Enhanced Coordination Alternative                             | 6.8   | 11.4  | 17.1  | 20.5  | 22.6  | 23.6  | 25.9  | 34.0    |         |         |
|                                                           | Maximum Operational Flexibility Alternative                   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0     | 0.0     | 0.0     |
|                                                           | Supply Driven (LB Priority Approach) Alternative              | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |       |         |         |         |
|                                                           | Supply Driven (LB Pro Rata Approach) Alternative              | 13.4  | 19.7  | 27.4  | 30.4  | 32.4  | 33.4  |       |         |         |         |
|                                                           | Representative Preferred (2027-2028) Alternative <sup>3</sup> | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0     | 0.0     |         |
|                                                           | Representative Preferred (2029-2060) Alternative <sup>4</sup> | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0     | 0.0     |         |
| California, Tribal Agriculture, PPR                       | CCS Comparative Baseline <sup>1</sup>                         | 0.0   | 0.0   |       |       |       |       |       |         |         |         |
|                                                           | No Action Alternative                                         | 0.0   |       |       |       |       |       |       |         |         |         |
|                                                           | Basic Coordination Alternative <sup>2</sup>                   | 0.0   | 0.0   | 0.0   |       |       |       |       |         |         |         |
|                                                           | Enhanced Coordination Alternative                             | 8.1   | 9.4   | 11.0  | 12.0  | 12.6  | 13.0  | 13.6  | 15.9    |         |         |
|                                                           | Maximum Operational Flexibility Alternative                   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0     | 0.0     | 0.0     |
|                                                           | Supply Driven (LB Priority Approach) Alternative              | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |       |         |         |         |
|                                                           | Supply Driven (LB Pro Rata Approach) Alternative              | 4.2   | 7.8   | 9.1   | 10.1  | 10.8  | 11.2  |       |         |         |         |
|                                                           | Representative Preferred (2027-2028) Alternative <sup>3</sup> | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0     | 0.0     |         |
|                                                           | Representative Preferred (2029-2060) Alternative <sup>4</sup> | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0     | 0.0     |         |
| Nevada, Tribal Agriculture, PPR                           | CCS Comparative Baseline <sup>1</sup>                         | 0.0   | 0.0   |       |       |       |       |       |         |         |         |
|                                                           | No Action Alternative                                         | 0.0   |       |       |       |       |       |       |         |         |         |
|                                                           | Basic Coordination Alternative <sup>2</sup>                   | 0.0   | 0.0   | 0.0   |       |       |       |       |         |         |         |
|                                                           | Enhanced Coordination Alternative                             | 0.2   | 0.3   | 0.4   | 0.5   | 0.6   | 0.6   | 0.7   | 0.9     |         |         |
|                                                           | Maximum Operational Flexibility Alternative                   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0     | 0.0     | 0.0     |
|                                                           | Supply Driven (LB Priority Approach) Alternative              | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |       |         |         |         |
|                                                           | Supply Driven (LB Pro Rata Approach) Alternative              | 0.2   | 0.3   | 0.4   | 0.5   | 0.6   | 0.6   |       |         |         |         |
|                                                           | Representative Preferred (2027-2028) Alternative <sup>3</sup> | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0     | 0.0     |         |
|                                                           | Representative Preferred (2029-2060) Alternative <sup>4</sup> | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0     | 0.0     |         |

Source: IMPLAN 2025

Note: The highlighting shows the values from the smallest (in white or no highlighting) to the largest (in yellow highlighting). The cells with hash-marks represent the values above shortages; these values are outside of the scope of this analysis. See **Appendix C**, Shortage Allocation Model and Alternative Distribution Model Documentation for more information on the shortage values for each entitlement holder type above shortages.

<sup>1</sup> Due to its fixed shortage volumes for CCS Comparative Baseline, shortages for 600K and 1,000K are actually associated with 613K and 1,013K in CCS Comparative Baseline. Greater shortages are based on an extension of priority beyond the levels of shortage provided by the pertinent documents.

<sup>2</sup> The maximum shortage for the Basic Coordination Alternative is 1.48 maf; however, the table above shows the maximum shortage as 1.5 maf for ease of comparison across the alternatives.

<sup>3</sup> The distribution of shortages up to 1.5 maf in 2027-2028 in the Representative Preferred Alternative reflects the May 1 proposal by the Lower Division States. Although not specified in their proposal, the Representative Preferred assumes shortages and their distribution above 1.5 maf in 2028 as necessary to avoid critically low elevations in Lake Mead. (See **Chapter 2** for more details on the sideboards under the Preferred Alternative and their representation in the Representative Preferred Alternative).

<sup>4</sup> Expected impacts from 2029 – 2060 under the Preferred Alternative may be different from what is shown for the Representative Preferred (2029-2060) Alternative, as this alternative provides a framework that allows for shortage distributions to be negotiated in different ways, consistent with sideboards described in **Chapter 2**.

In addition to the impacts on jobs, labor income, and economic output presented above, reductions in irrigation water would also lead to impacts on economic conditions through increased costs incurred when fallowing lands, increased strain on farmers' ability to pay fixed costs, and reduced national supply of agricultural crops produced in the analysis area. An increase in fallowing lands would lead to an increase in costs associated with maintaining the fallowed lands, such as costs for controlling and mitigating weeds, pests, and wind erosion. After fallowing lands, there would be additional costs to prepare and return the land to farming crops, such as costs to repair and reestablish irrigation ditches and infrastructure, especially after multiple years of continued fallowing. Farmers could also face financial strains from the reduced revenue associated with increased fallowing lands, if the revenue farmers receive for crop production no longer covers the fixed costs needed to continue and maintain operations. Additionally, increases in fallowed lands could impact the national supply of crops that are largely produced in the analysis area. For example, Arizona is the largest supplier of leafy greens in the U.S. during winter months, and in 2024, Arizona produced over 20 percent of the U.S. lettuce supply throughout the year (Arizona Farm Bureau 2026, USDA NASS 2025, Duval et al. 2024). An increase in fallowed lands due to a reduction in water for irrigation would lead to a reduction in supply of these crops throughout the U.S., which could lead to reduced availability and a potential increase in prices that consumers face for the produce. The magnitude of these impacts depends on several economic and market factors that are outside of the scope of this EIS. The alternatives with the greatest and smallest impacts on the economic conditions discussed above are the same as those discussed for impacts on fallowed lands.

The analysis on economic contributions provides estimated impacts per year of shortage. If shortages continue over multiple years, there will continue to be impacts on economic conditions, including reductions in jobs, labor income, and economic output. Depending on the magnitude of the water delivery shortages each year and the number of years of shortage, impacts on economic contributions could lead to farms ceasing operations permanently, especially for small farmers with limited resources for withstanding multiple years of fallowed lands. If farms cease operating, there could be large, cascading impacts throughout the local and regional economies, especially in regions that heavily rely on agriculture to support livelihoods and well-being throughout the communities. For more information on long-term impacts on changing land use and water deliveries due to water shortages to irrigation entitlement holders, see **TA 4**, Water Deliveries, and **TA 17**, Population and Land Use.

Long-term and deep Colorado River water shortages could result in further impacts on the economic contributions to entitlement holders that have unused water entitlement above their current consumptive use. As discussed in the *Methodology* section above, as well as in **Appendix C**, Shortage Allocation Model and Alternative Distribution Model Documentation, the analysis of impacts on economic conditions due to changes in agriculture in this EIS is based on modeled shortage volumes to irrigation entitlement holders in terms of consumptive use shortage relative to the consumptive use (or modeled equivalent) entitlement, in order to allow for comparison across the alternatives and shortage distribution methods. On average, from 2019 to 2023, consumptive use was estimated at 87 percent and 85 percent of the consumptive use (or equivalent) entitlements of non-tribal irrigation entitlement holders in Arizona and California, respectively. Consumptive use as a percentage of the consumptive use (or equivalent) entitlements was considerably less for tribal irrigation entitlement holders across the analysis area, with consumptive use making up

approximately 66 percent of the consumptive use (or equivalent) entitlements for tribal irrigation entitlement holders, on average, across Arizona, California, and Nevada (Reclamation 2019, 2020, 2021, 2022, 2023). Irrigation entitlement holders who currently use less than their entitlement (measured in terms of diversion, consumptive use, or both) might not immediately experience impacts on economic contributions from water shortages; however, long-term, continued shortages would limit future opportunities to expand the irrigation entitlement holders' water use, which would result in impacts on economic contributions through reduced opportunities for future development, expansion of crop production, or additional opportunities to lease water.

The analysis of impacts on economic conditions discussed above examines the impacts of shortages on agriculture entitlement holders. If there is not enough water in Lake Mead to fully meet downstream demands and/or if Hoover Dam infrastructure constraints result in releases below the demand volume, other measures would be taken in the Lower Basin, such as water conservation or dead pool–related reductions. During some instances of dead pool–related reductions, these unplanned reductions occur because Lake Mead is approaching dead pool (elevation 895 feet) and in some cases it occurs earlier (up to elevation 950 feet). If there are dead pool–related reductions, the impacts on acreages fallowed would likely extend to more high-valued crops as well as result in entire crops or all croplands in certain counties being fallowed. Increases in fallowed lands of these high-valued types of crops would likely lead to greater and longer-term effects on the production value as well as the jobs, labor income and economic output associated with the loss of crop production. The magnitude of these impacts depends on many factors, including the water distribution methods and conservation measures that are implemented; the approach to distributing reductions associated with dead pool is not addressed in this analysis. See the subsection *Shortage vs. Dead Pool–Related Reductions: Comparison for Full Lower Basin*, under **TA 4**, Water Deliveries, for a discussion on the relationship between shortages and dead pool–related reductions for water deliveries across all entitlement holders.

In addition to impacts on economic conditions, increases in water shortages would likely lead to changes in quality and access to nonmarket values and social conditions associated with changes in agriculture. As more land is fallowed due to shortages in water delivered from the Colorado River, the livelihoods, the way of life, and the health of individuals throughout the surrounding communities could change, which can impact how the individuals perceive their sense of place and interact with the local communities, land, and individuals around them. Many communities, especially tribes in the surrounding regions, value the use of Colorado River water for irrigation for the food that it supports as well as for access to cultural, traditional, and spiritual purposes, and impacts on agriculture can greatly reduce access to and quality of these values (Curtis et al. 2023). Additionally, impacts on agriculture due to water shortages can affect the well-being of communities through effects on access to affordable health and dental care and funding to support public services such as education, especially for tribes and farmers who rely on agricultural revenues to pay for healthcare and for communities that rely on agriculture to support the economy and public services. Increases in fallowed agricultural lands could be a source of fugitive dust, particularly under dry and unvegetated conditions, which could also impact the well-being and quality of life for communities in the analysis area (for more detail on impacts on fugitive dust emission, see **TA 7**, Air Quality). Fallowing of land with fruit or nut trees would lead to reduced sources of shade, which could result in impacts on quality of life of neighboring communities through urban heat impacts (such as heat

related illness; see **TA 17**, Population and Land Use, for more information on impacts to communities related to loss of urban and suburban trees due to reductions in domestic water). The alternatives with the greatest and smallest impacts on social conditions and access and quality of nonmarket values are the same as those discussed for impacts on fallowed lands. On average, for non-tribal entitlement holders in Arizona and California, when the total shortages are less than or equal to 3.0 maf, the greatest impacts on social conditions and access and quality of nonmarket values associated with agriculture are likely to occur under the Enhanced Coordination and Supply Driven (LB Pro Rata approach) Alternatives; with shortages greater than 3.0 maf, the greatest impacts on social conditions and nonmarket values due to changes in agriculture are likely to occur under the Maximum Operational Flexibility, Enhanced Coordination, and Representative Preferred (2029-2060) Alternatives, for non-tribal agriculture entitlement holders in Arizona and California. On average, for Arizona tribal entitlement holders, during shortages of 0.6 maf, impacts on social conditions and access to and quality of nonmarket values associated with agriculture would be the greatest under the Supply Driven Alternative (LB Pro Rata approach); with shortages greater than 0.6 maf but not more than 2.0 maf, impacts on social conditions and access to and quality of nonmarket values would be greatest under the Basic Coordination and Representative Preferred (2029-2060) Alternatives; with shortages greater than 2.0 maf, impacts on social conditions and access and quality of nonmarket values would be the biggest under the Maximum Operational Flexibility and Representative Preferred (2029-2060) Alternatives. For California and Nevada tribal entitlement holders, impacts on social conditions and access and quality of nonmarket values would be greatest under the Enhanced Coordination and Supply Driven (LB Pro Rata approach) Alternatives, and there would be little to no impacts on social conditions and access and quality of nonmarket values under all other alternatives and the CCS Comparative Baseline. For more information on the impacts on tribal interests and tribal entitlement holders, see **TA 13**, Tribal Resources, and **TA 18**, Indian Trust Assets.

As discussed above in the *Assumptions* subsection, under *Agriculture*, the analysis of impacts on economic and social conditions due to changes in agriculture assumes that water shortages would lead to an increase in fallowed lands rather than a change in water sources—for example, a switch to use groundwater or other surface water sources for irrigation. If other surface water or groundwater sources are used instead of fallowing agriculture acreages, the impacts on economic and social conditions due to lost agriculture production are likely to be lessened, at least in the short term. However, the reliance on more pumped groundwater to offset delivery shortages can lead to substantial additional pumping costs, particularly for electricity (for an analysis of impacts on hydropower, including impacts on energy generation, refer to **TA 15**, Dams and Electrical Power Resources). The magnitude of the increase in costs due to pumping groundwater depends on several factors including the proximity of the agriculture land to the Colorado River. If there are large increases in cost for agriculture production—for example, on land near the Colorado River and for farmers who previously had low costs for Colorado River water delivery—the increase in cost would lead to reduced profitability of crops and could lead to an increase in fallowed lands and reduced agriculture production, especially for small farmers who are not able to absorb higher operating costs or who produce low-profitable or water-intensive crops. Additionally, in the long term, if water delivery shortages continue over multiple years and there is more sustained reliance on groundwater for irrigation, resulting in the depletion of aquifers, the water supply of both groundwater as well as the surface water from the Colorado River could reduce, which would likely lead to greater levels of

fallowed lands, a decrease in market value of crops produced, and a reduction in jobs, labor income, and economic output. A greater demand for groundwater could also lead to impacts on users and tribes who rely on groundwater for irrigation and domestic needs, similar to those impacts on economic and social conditions discussed above.

### **TA 16.2.3 Issue 2: How would operational changes affect economic contributions and the value associated with lake-based and river-based recreation?**

The economic contribution analysis is presented below in **Table TA 16-25** for lake-based recreation and **Table TA 16-26** for river-based recreation for the CCS Comparative Baseline. A qualitative analysis is provided by action alternative based on potential changes to recreational visitation data.

**Table TA 16-25**  
**Economic Contributions- Lake-Based Recreation —**  
**CCS Comparative Baseline, 2025\$**

|                           | Employment<br>(jobs) | Output<br>(\$)     | Labor Income<br>(\$) |
|---------------------------|----------------------|--------------------|----------------------|
| <b>Glen Canyon Totals</b> | <b>3,697</b>         | <b>484,052,913</b> | <b>164,064,861</b>   |
| Direct                    | 2,878                | 343,102,820        | 119,990,451          |
| Indirect                  | 412                  | 68,662,216         | 22,184,610           |
| Induced                   | 407                  | 72,287,877         | 21,889,800           |
| <b>Lake Mead Totals</b>   | <b>1,768</b>         | <b>266,778,297</b> | <b>93,043,949</b>    |
| Direct                    | 1,223                | 159,360,100        | 59,751,812           |
| Indirect                  | 243                  | 50,135,433         | 15,668,510           |
| Induced                   | 302                  | 57,282,764         | 17,623,628           |

Source: IMPLAN 2025

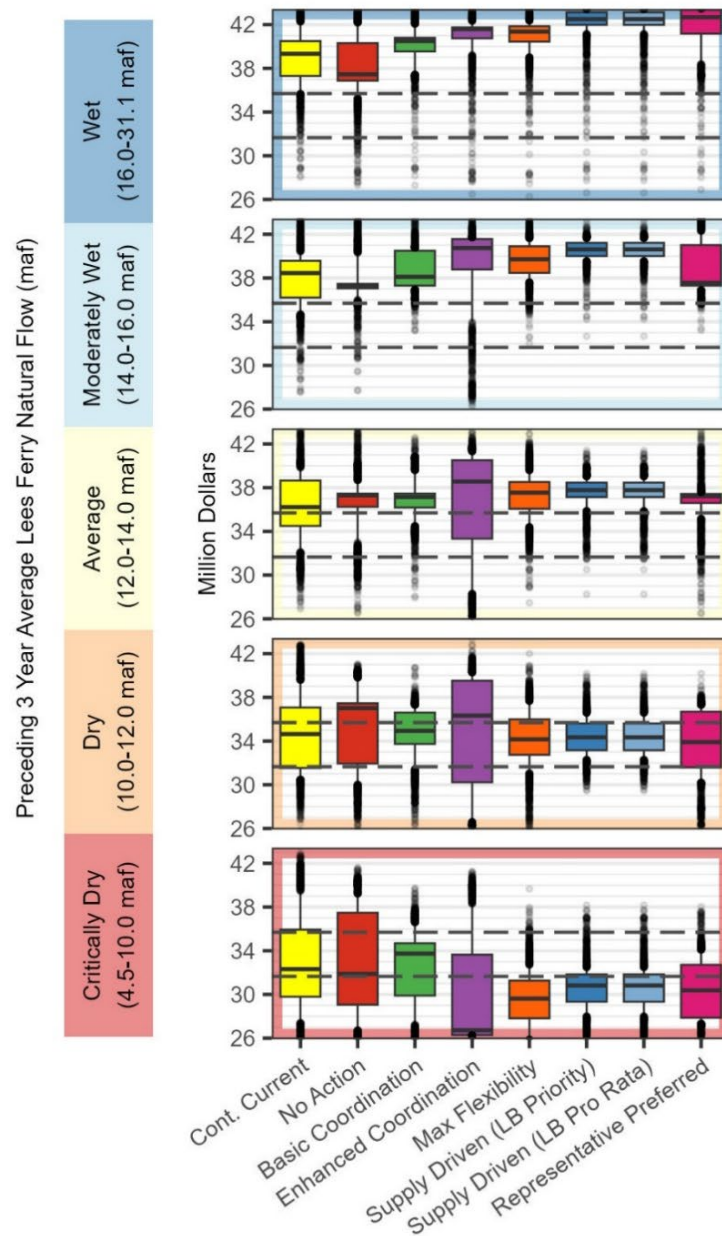
**Table TA 16-26**  
**Economic Contributions- River-Based Recreation —**  
**CCS Comparative Baseline, 2025\$**

|                            | Employment<br>(jobs) | Output<br>(\$)     | Labor Income<br>(\$) |
|----------------------------|----------------------|--------------------|----------------------|
| <b>Grand Canyon Totals</b> | <b>6,805</b>         | <b>846,100,020</b> | <b>163,163,321</b>   |
| Direct                     | 5,301                | 584,485,312        | 119,097,734          |
| Indirect                   | 765                  | 129,646,343        | 22,299,651           |
| Induced                    | 740                  | 131,968,365        | 21,765,936           |

Source: IMPLAN 2025

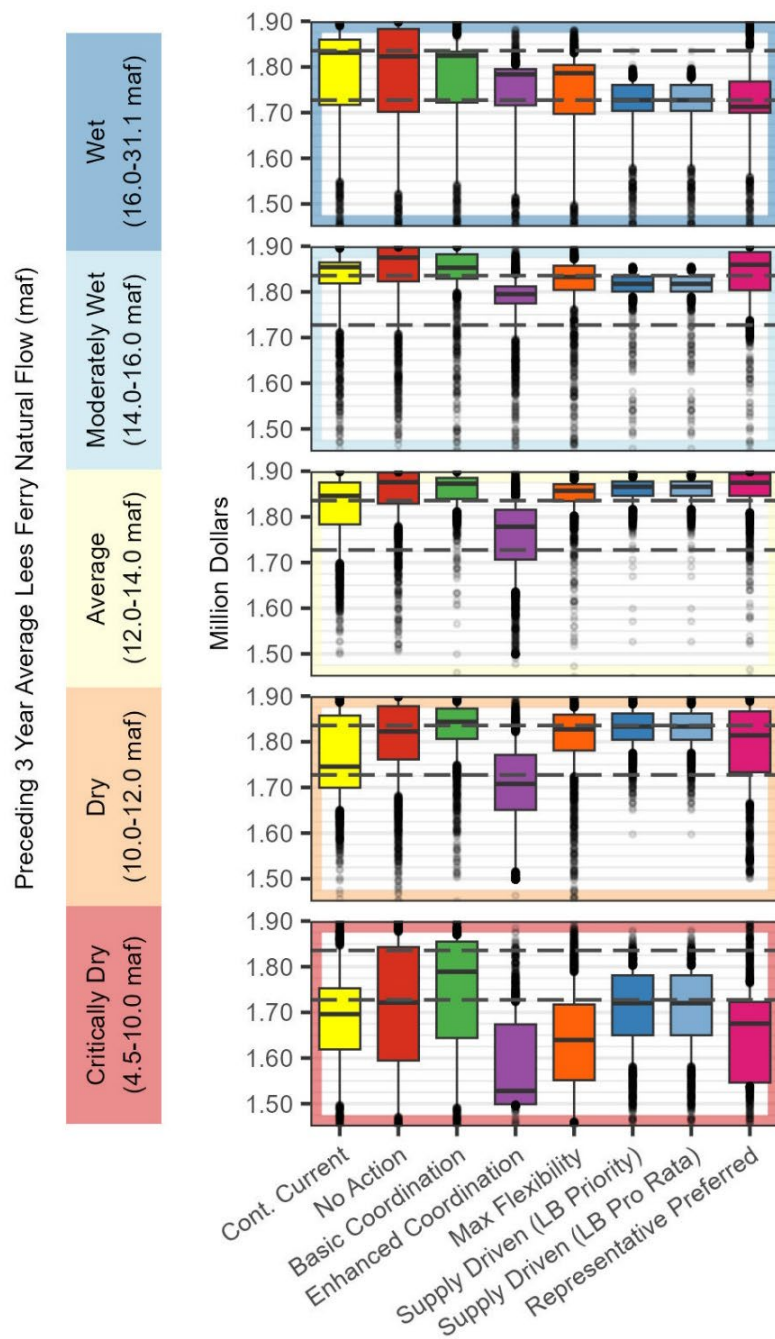
**Figure TA 16-11** and **Figure TA 16-12** illustrate how the different Post-2026 operational alternatives perform in maintaining angling and boating recreational value across a wide range of plausible future hydrologic conditions. For whitewater boating, the lower reference line (\$31.65 million of annual value) represents a “bad year” for economic value of whitewater rafting. It is calculated by modeling CCS Comparative Baseline in 2000–2023 hydrology and taking the

**Figure TA 16-11**  
**Annual Value of Whitewater Rafting Conditional Box Plot (2025 dollars)**



Source: Bair 2026

**Figure TA 16-12**  
**Annual Value of Angling Conditional Box Plot (2025 dollars)**

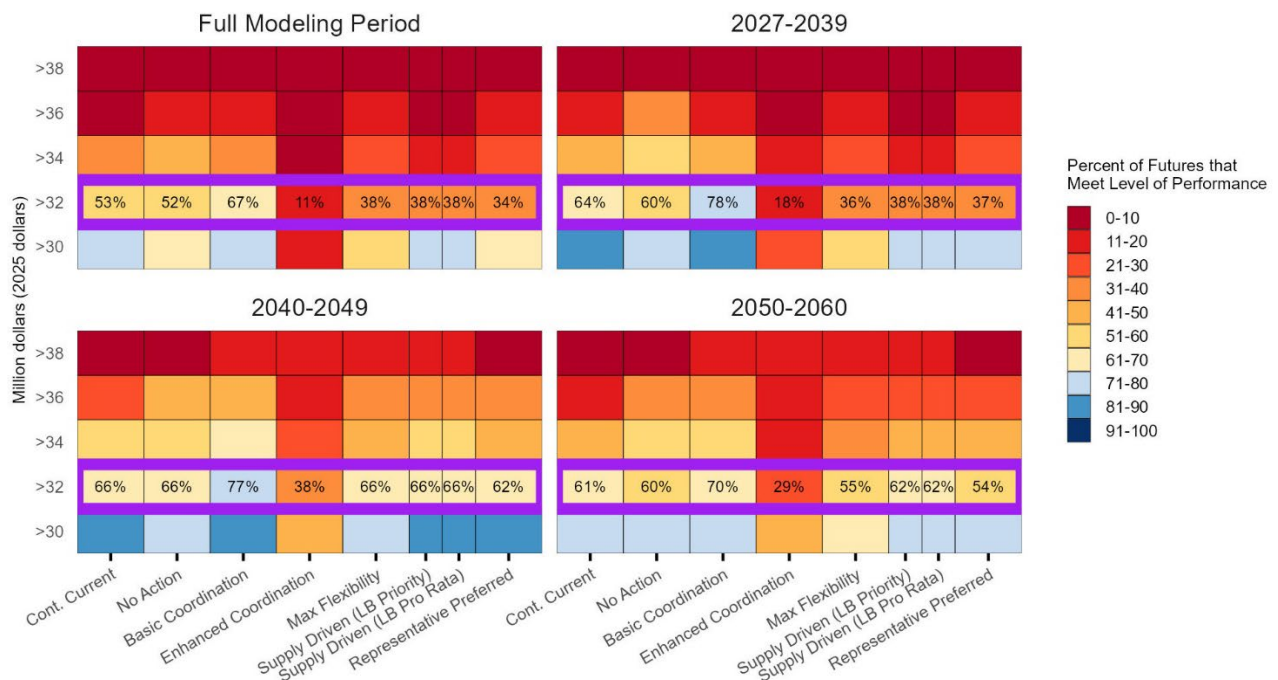


Source: Bair 2026

10th percentile (that is, only 10 percent of years resulted in less than or equal to a value of \$31.65 million). The upper reference line (\$35.69 million) represents a “normal year” and is calculated as the 50th percentile of CCS Comparative Baseline tested in the 2000–2023 hydrology. The same approach is taken for angling values, with the lower reference line (lowest 10th percentile) of \$1.73 million representing poor past performance and \$1.84 million (50th percentile) for the upper reference line of a “normal” year (Bair 2026). Below these levels, impacts on overall recreational values from these uses would be anticipated. It should be noted that the conditional box plots for all alternative exhibit a high range of variability of data, particularly in the case of angling value, with outliers at the high and low ends of the economic value output. As a result, the alternative comparison below focuses primarily on median and the interquartile range.

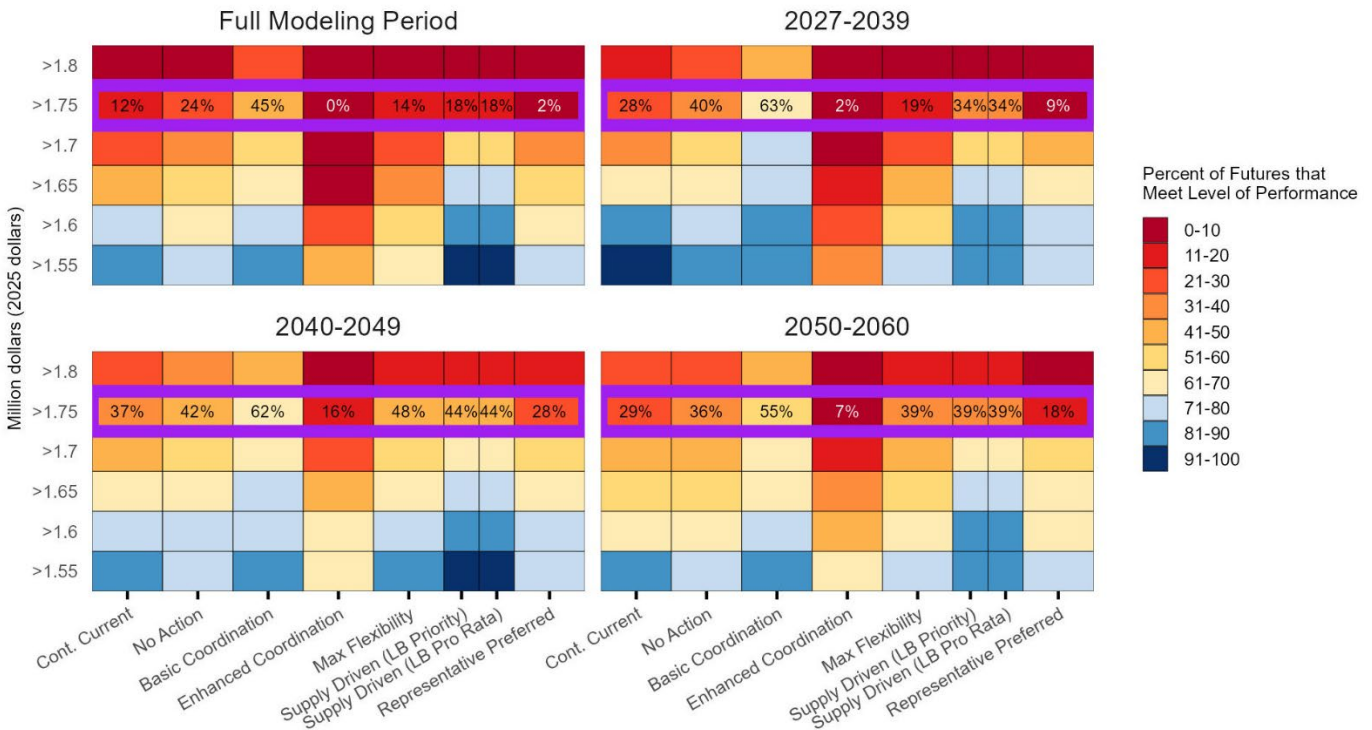
**Figure TA 16-13** and **Figure TA 16-14** carry forward the minimum performance threshold representing the worst 10 percent of recreational value outcomes (that is, \$32 million for whitewater boating and \$1.8 million for angling), as indicated in the purple highlighted row. These figures show a heatmap for the complete modeling period, with a summary in the graph in the upper left of the figure, with the percentage of futures indicated which meet the specified level of performance for at least 90 percent of years.

**Figure TA 16-13**  
**Whitewater Boating Economic Value: Robustness.**  
**Percent of futures in which the annual value of whitewater boating exceeds the value specified in each row in at least 90 percent of years**



Source: Bair 2026

**Figure TA 16-14**  
**Angling Economic Value: Robustness.**  
 Percent of futures in which the annual value of angling exceeds the value specified in each row in at least 90 percent of years



Source: Bair 2026

Operational changes influence recreation primarily through their effects on reservoir elevations and river flows, which in turn shape visitor access, trip quality, and spending patterns. The following discussion examines how these dynamics affect economic contributions and recreational value across lake-based and river-based settings. Summary information is included below for summer recreation site access in both Lake Mead and Lake Powell, as well as thresholds for navigation for both reservoirs. In addition, ability to maintain flow levels to support commercial whitewater rafting is examined. More details, including additional recreation thresholds, are examined in **TA 14, Recreation**.

For lake-based recreation, under the CCS Comparative Baseline, recreation-related economic contributions are shaped by projected reservoir conditions that affect access and participation. Across the full modeling period, and the 2027–2039 subperiod none of the alternatives or the CCS Comparative Baseline would maintain at least 60 percent of Lake Powell recreational sites open during the summer months at Lake Powell. These results translate to widespread closures of Lake Powell recreation sites and boat launch ramps over the next decade and potential for reduced economic contributions (see **Figure TA 14-1** in **TA 14, Recreation**). In terms of navigation, the CCS Comparative Baseline would be slightly less robust than the No Action Alternative, with 49 percent and 58 percent of futures, respectively, over the full analysis period and 42 and 47 percent

respectively over the first decadal period meeting the threshold of 3,620 feet, which corresponds to the critical threshold navigation in Lake Powell (see **Figure 14-3** in **TA 14**, Recreation).

Similarly, for Lake Mead all alternatives exhibit poor performance at maintaining at least 80 percent of Lake Mead recreational sites open during the summer months, indicating that widespread reductions in recreation site availability are likely under a broad range of future conditions, with potential for reduced economic contributions as a result. (**TA 14**, Recreation). The No Action Alternative would support recreation access in 2 percent of futures while the CCS Comparative Baseline was successful in 7 percent of futures over the full modeling period (3 and 12 percent over the first decadal period respectively). In terms of critical thresholds for navigation, the CCS Comparative Baseline would be similar to the No Action Alternative, with 27 percent and 28 percent of futures, respectively, over the full analysis period and only 13 and 12 percent over the first decadal period meeting the critical threshold for navigation (see **TA 14**, Recreation).

IMPLAN results for the CCS Comparative Baseline (**Table TA 16-25**) show current recreational activity supports approximately 3,697 jobs and \$484.1 million in output related to recreation at Glen Canyon NRA, and 1,768 jobs and \$266.8 million related to recreation at Lake Mead NRA. These totals reflect direct visitor spending and the indirect and induced effects that ripple through gateway economies. The CCS Comparative Baseline serves as the benchmark for comparing the action alternatives' potential impacts on recreation-related employment and economic activity.

As described in **TA 14**, Recreation (**Figures TA 14-1** and **14-2**), Lake Powell elevations for much of the analysis period are expected to remain below critical thresholds for some launch facilities and navigational routes across all alternatives, resulting in reduced reservoir boating opportunities. Lake Mead faces similar challenges across all alternatives in maintaining elevations above navigational hazard thresholds (**Figures TA 14-3** and **14-4**). These access limitations are expected to suppress lake-based recreational spending. Research supports the link between lake levels and recreational spending and employment. Water-based recreation represents a large share of visitor activity at Lake Powell, with 46 percent of visitors participating in motorized boating (NPS 2018). Studies have found lake volume to be a predictor of visitation and spending: a 100 thousand acre feet (kaf) increase in Lake Powell volume was associated with 5,280 additional visits and \$374,000 in spending in Coconino County (Nehr et al. 2013). Duvel et al. (2022), found that reservoir elevation for Lake Powell had a positive, statistically significant effect on total monthly recreational visits, and a negative correlation with unemployment. Conversely, reductions in elevation from 3,675 to 3,625 feet were estimated to result in more than a 25 percent decline in visitation (Johnson et al. 2016). Similar patterns are expected at Lake Mead, where low water levels would render most boat launches inaccessible and increase navigational hazards, reducing visitor experience and spending (Reclamation 2024), although some studies suggest this relationship may be less robust than that in Lake Powell. Reservoir elevation was estimated to have a positive, but not statistically significant effect on total monthly recreational visitors in a study by Duval et al. (2022). These changes could affect concessionaire viability and reduce revenue streams for gateway businesses reliant on extended recreational seasons (Reclamation 2024). These impacts include potential impacts on tribal concessionaries as discussed in **Section TA 16.1.3** and **TA 18**, Indian Trust Assets.

River-based recreation, including angling in Glen Canyon and whitewater rafting in Grand Canyon, is sensitive to flow conditions below Glen Canyon Dam. As noted in **TA 14, Recreation**, flows below 10,000 cubic feet per second (cfs) and above 45,000 cfs are considered less than optimal for rafting, while flows between 20,000 and 26,000 cfs are optimal. Commercial guides identify 8,000–9,000 cfs as the minimum level necessary for safe trips. Analysis for impacts of proposed management on flow indicates that the No Action Alternative is slightly less robust than the CCS Comparative Baseline at maintaining daytime flows of at least 8,000 cfs, with 67 percent of futures across the full modeling period meeting defined thresholds under the No Action Alternative compared to 58 percent under the CCS Comparative Baseline (75 percent and 55 percent when the first decadal period is examined). This suggests the No Action Alternative may provide less consistent support for preferred rafting conditions than current conditions (see **Table TA 14-5 in TA 14, Recreation**). Variability in flows could influence trip quality and safety, which in turn affects both the value associated with the recreational experience and economic contributions from commercial river trips and related services in gateway communities.

IMPLAN output for CCS Comparative Baseline for GCNP estimates support for 6,805 jobs and \$846.1 million. As for lake-based recreation, these totals reflect direct visitor spending and the indirect and induced effects that ripple through gateway economies.

The CCS Comparative Baseline and the No Action Alternative are successful at keeping both whitewater boating values above determined thresholds 90 percent of the time in 53 percent and 52 percent of futures, respectively. When just the first decadal modeling period is examined, these values are slightly improved at 64 percent of futures for CCS and 60 percent for the No Action Alternative. For angling, the CCS Comparative Baseline and the No Action Alternative are successful at keeping values above determined thresholds in 12 percent and 24 percent of traces respectively. When just the first decadal modeling period is examined, performance is slightly improved, with the CCS has values above determined thresholds in 28 percent of traces and the No Action Alternative has values above thresholds 40 percent. When examining conditional box plots, under wet and moderate hydrologic conditions, all alternatives and the CCS Comparative Baseline maintain recreational value associated with boating and angling above the established critical threshold ranges. Under dry hydrologic conditions, the CCS Comparative Baseline and the No Action Alternative maintain median values within the minimum threshold levels for whitewater boating and angling. Under critically dry conditions, the CCS Comparative Baseline median is below the defined thresholds for angling recreational value; under the No Action Alternative, the median is just above the minimum range. For whitewater boating recreational value, the median is just above the minimum range for both the No Action Alternative and the CCS Comparative Baseline. This data indicates that under the No Action Alternative and the CCS Comparative Baseline, under dry hydrological conditions future recreational values are likely to be maintained but under critically dry conditions impacts may occur.

Under the Basic Coordination Alternative, greater flexibility in releases begins to shift the frequency and duration of low-elevation periods, with implications for both lake access and river flow stability. The Basic Coordination Alternative introduces shortages up to 1.48 maf and allows Lake Powell releases to fall to 7.0 maf in low-storage years. These operational changes increase the frequency and duration of low-elevation conditions at Lake Mead and Lake Powell, reducing marina operability and

shortening boating seasons. As noted previously, summer recreation site access is limited under all alternatives. For Lake Powell, in terms of navigation, the Basic Coordination Alternative is slightly less robust than the CCS Comparative Baseline and slightly more robust than No Action Alternative, with a 55 percent success rate over the full analysis period (50 percent over the first decadal period) (see **TA 14**, Recreation). For Lake Mead, the Basic Coordination Alternative succeeded in only 6 percent of futures for summer recreational site access over the full modeling period and the first decadal period, similar performance to the CCS Comparative Baseline (7 percent) and slightly more robust than the No Action Alternative (2 percent) (see **TA 14**, Recreation). Navigation thresholds were achieved in 35 percent of futures over the full modeling period (19 percent over the first decadal period), more robust than the CCS Comparative Baseline and No Action Alternative. These data indicate that overall economic contributions from reservoir recreational activities may be similar under the Basic Coordination Alternative to the CCS Comparative Baseline and No Action Alternative.

For river-based recreation, the Basic Coordination Alternative has a higher level of robustness for whitewater boating value as compared to the No Action Alternative (67 percent of futures having a value above the defined threshold, with 78 percent above the threshold for the first decadal period). This is the most robust of any alternative. Similarly, for angling recreational value, the Basic Coordination Alternative is more robust than any other alternative, with 45 percent of futures maintaining values above the defined threshold for 90 percent of modeled years compared to 24 percent in the No Action Alternative (for the first decadal period performance under the Basic Coordination Alternative is further improved at 63 percent of traces). When examining conditional box plots, under dry hydrologic conditions, for whitewater boating the Basic Coordination Alternative performs slightly worse than the No Action Alternative, with the median just below the identified upper critical threshold; however, there is less variability in the range of outcomes under this alternative. For angling, the Basic Coordination Alternative performs the best of all Alternatives under dry hydrologic conditions, with the median just above the identified threshold range. DMDU analysis performed in **TA 14**, Recreation (**Figure TA 14-5**) also indicates that the Basic Coordination Alternative performs more robustly than the No Action Alternative in maintaining daytime flows of at least 8,000 cfs, which are considered minimally adequate for rafting (80 percent of futures over the full modeling period and 90 percent of futures over the first decadal period), supporting continued or increased economic contributions from commercial river trips over the full modeling period.

For reservoir-based recreation, the Enhanced Coordination Alternative introduces proactive storage balancing and shortages up to 3.0 maf. This alternative is among the most robust in terms of meeting thresholds navigation in Lake Powell (82 percent of futures over the full modeling period and 64 percent over the first decadal period) (see **TA 14**, Recreation). Consequently, economic contributions from lake-based recreation would likely be higher than the CCS Comparative Baseline and No Action Alternative. For Lake Mead, analysis indicates that summer recreational site access thresholds would be achieved in only 4 percent of futures over the full modeling period (5 percent over the first decadal period), and navigation thresholds achieved in 55 percent of futures over the full modeling period (32 percent over the first decadal period). This performance is more robust than both the CCS Comparative Baseline and No Action Alternative for navigation but less robust than CCS Comparative Baseline for recreation site access. As noted above, as under all alternatives,

however, access to launch facilities and safe navigation routes for Lake Powell and navigational challenges in Lake Mead would continue to impact lake-based recreational opportunities and the associated spending, though storage balancing may help limit the duration of extreme low-elevation periods compared to the other action alternatives.

For river-based recreation, the Enhanced Coordination Alternative would be the least robust in maintaining or exceeding minimum desired daytime flows to support boating in Grand Canyon (only 8 percent of futures would meet the defined threshold over the full modeling period and one percent of the first decadal period; **Figure TA 14-5** in **TA 14**, Recreation). DMDU modeling output for angling and boating value aligns with these findings, with whitewater boating and angling values having the least robust performance of all alternatives, with only 11 percent and 0 percent of futures meeting or exceeding defined thresholds for recreational value for boating and angling respectively (18 percent and 2 percent for the first decadal period for boating and angling respectively). When examining conditional box plots, under dry hydrologic conditions, this is the worst performing alternative for angling, with the median falling below the identified minimum threshold. For the recreational value associated with whitewater boating, the median value is slightly below the median seen in the No Action Alternative, but still above the critical thresholds, and higher than other action alternatives. However, this alternative has the widest range for potential outcomes under dry conditions. As a result, this alternative would result in the greatest potential for a reduction in recreational value for angling as well as the associated regional economic contributions associated with this use, and would have an unpredictable level of reduction in economic contributions from whitewater boating.

The Maximum Operational Flexibility Alternative allows shortages up to 4.0 maf and Lake Powell releases as low as 5.0 maf. For river-based recreation, in terms of flow conditions, daytime flows below Glen Canyon Dam under this alternative are more volatile than under the CCS Comparative Baseline and No Action Alternative, increasing the likelihood of extended periods below 8,000 cfs and even near 5,000 cfs, which are considered adverse for rafting (31 percent of futures would meet threshold conditions over the full modeling period and 22 percent over the first decadal period) (see **Figure TA 14-2** in **TA 14**, Recreation). These conditions would diminish trip quality and safety, reducing long-run economic contributions from river-based recreation and nonmarket values tied to scenic quality and experience as compared to the CCS Comparative Baseline and No Action Alternative. DMDU modeling output for angling indicates that the Maximum Operational Flexibility Alternative is slightly more robust than the CCS Comparative baseline but less robust than the No Action Alternative for angling, with 14 percent of futures meeting the minimum defined thresholds over the full modeling period. When only the first decadal period is examined, however, the Maximum Operational Flexibility Alternative is less robust than both the CCS Comparative Baseline and the No Action Alternative for angling (19 percent of futures meeting defined thresholds compared with 28 percent under the No Action Alternative). For whitewater boating, the Maximum Operational Flexibility Alternative is consistently less robust than the No Action Alternative and CCS Comparative Baseline, with 38 percent of futures over the full modeling period meeting or exceeding the defined threshold for recreational value (36 percent in the first decadal period). When examining conditional box plots, under dry hydrologic conditions, for angling value the Maximum Operational Flexibility Alternative performs similar to the No Action Alternative and better than the CCS Comparative Baseline. For whitewater boating the Maximum Operational Flexibility

Alternative performs worse than the No Action Alternative and similar to the CCS Comparative Baseline.

In terms of reservoir elevations, **TA 14**, Recreation, indicates that under the Maximum Operational Flexibility Alternative, maintenance of critical thresholds for navigation in Lake Powell is among the most robust alternatives, with access maintained in 80 percent of futures over the full modeling period (69 percent over the first decadal period). For Lake Mead, recreation access and navigation are similarly more robust than the No Action Alternative and the CCS Comparative Baseline (64 percent over the full modeling period and 36 percent over the first decadal period). As discussed under for the Maximum Operational Flexibility Alternative, consequently, economic contributions from lake-based recreation would likely be higher than the CCS Comparative Baseline and No Action Alternative. Under all alternatives, however, access to launch facilities and safe navigation routes for Lake Powell and navigational challenges in Lake Mead would continue to impact lake-based recreational opportunities and the associated spending.

The Supply Driven Alternative ties Powell releases to a percentage of 3-year average natural flow and applies Mead shortage tiers up to 2.1 maf. Within this framework, two approaches for the Supply Driven Alternative were considered: a Pro Rata approach, which distributes available Colorado River water supplies proportionally across entitlement holders, and a Priority approach, which distributes available Colorado River water supplies in accordance with statutes, case law, and contracts. For reservoir-based recreation, for Lake Powell both the Priority and Pro Rata approaches would be less robust in terms of maintenance of critical thresholds for navigation than the No Action Alternative and the CCS Comparative Baseline which could further impact recreational spending and gateway businesses and concessionaire associated with Lake Powell. In contrast, for Lake Mead, the Supply Driven Alternative modeling represents the most robust outcomes for recreational site access and navigation, supporting continued or increased spending associated with recreational activities for this reservoir.

For river-based recreation, the Supply Driven Alternative (both LB Priority and LB Pro Rata approaches) is the most robust at maintaining or exceeding daytime flows of 8,000 cfs below Glen Canyon Dam over the full modeling period and among the most robust over the first decadal period, providing the strongest support for maintained or improved recreational value for boating and angling, and economic contributions associated with river-based recreation. DMDU modeling output for angling indicates that the Supply Driven Alternative (both the LB Priority and Pro Rata approaches) are slightly more robust than the CCS Comparative Baseline and less robust than the No Action Alternative, with 18 percent of futures meeting the minimum defined thresholds for 90 percent of future years over the full modeling period (34 percent when just the first decadal period is examined). For whitewater boating the Supply Driven Alternative is less robust than both the CCS Comparative Baseline and the No Action Alternative, with 38 percent of futures meeting or exceeding the defined threshold for recreational value (under both the LB Priority and Pro Rata approaches). When examining conditional box plots, under dry hydrologic conditions, for angling value both the LB Priority and Pro Rata perform similarly to the No Action Alternative and better than the CCS Comparative Baseline, with the median values slightly below that of the No Action Alternative, although there is a smaller range of variability in the Supply Driven Alternative. For whitewater boating value both the LB Priority and Pro Rata perform similarly to the CCS

Comparative Baseline and slightly worse than the No Action Alternative. As for angling recreational value, modeling indicates a smaller range of variability in the Supply Driven Alternative.

As discussed in **Chapter 2**, the Preferred Alternative is a multi-year decision framework that establishes the process and criteria that would govern development and adoption of operating guidelines through 2036. The decision framework is anticipated to be implemented in two-year operating intervals. Unlike other alternatives, the operating guidelines for each interval are not specified in this Final EIS. The sideboards provide a basis for assumptions included in the Representative Preferred Alternative which captures the range of operating guidelines that may be adopted during each interval, but exact operations would be subject to the guidelines in place during each interval. While some impacts are influenced by how the Representative Preferred Alternative distributes Lower Basin shortages in 2027-2028 vs. 2029-2060, issue is either minimally sensitive or not sensitive to this distinction, so the different time periods are not discussed.

For reservoir-based recreation on Lake Powell, the Representative Preferred Alternative would be slightly more robust in terms of maintenance of critical thresholds for navigation than the No Action Alternative and CCS Comparative Baseline over both the full modeling period (61 percent of futures above defined thresholds) and the first decadal period (55 percent above defined thresholds). Compared to other action alternatives, this is better than the Supply Driven Alternative (both LB Priority and LB Pro Rata approaches), but less robust than the Enhanced Coordination and Maximum Operational Flexibility Alternatives. For reservoir-based recreation on Lake Mead, the Representative Preferred modeling represents less robust outcomes for recreational site access as compared to the CCS Comparative Baseline but slightly more robust outcomes than the No Action Alternative (6 percent for the full modeling period and 7 percent over the first decadal period above defined thresholds). This is a similar level of performance to the other action alternatives, with only the Supply Driven Alternative (both LB Priority and LB Pro Rata approaches) showing a more than 2 percent difference in success rate of meeting defined thresholds. For navigation, the Representative Preferred Alternative is more robust at meeting defined thresholds than both the No Action Alternative and CCS Comparative Baseline (48 percent over the first decadal period and 31 percent over the first decadal period). Compared to other action alternatives, the Representative Preferred is less robust than all but the Basic Coordination Alternative in meeting navigational thresholds for Lake Mead, but the performance is more similar to other alternatives when only the first decadal period is examined. Similar to all alternatives, however, access to launch facilities and safe navigation routes for Lake Powell and navigational challenges in Lake Mead would continue to impact lake-based recreational opportunities and the associated spending.

For river-based recreation, the Representative Preferred Alternative is less robust in terms of maintaining or exceeding daytime flows of 8,000 cfs below Glen Canyon Dam than the No Action Alternative and CCS Comparative Baseline over both the full modeling period (51 percent of futures above defined thresholds) and the first decadal period (60 percent above defined thresholds). Compared to other action alternatives, this is less robust performance than the Basic Coordination and Supply Driven (both LB Priority and LB Pro Rata approaches) Alternatives, but more robust than the Maximum Flexibility and Enhanced Coordination Alternatives. DMDU modeling output for angling indicates that the Representative Preferred Alternative is less robust than all alternatives other than the Enhanced Coordination Alternative with only 2 percent of modeling futures

exceeding defined thresholds (9 percent over first decadal period). For whitewater boating recreational value performance is also less robust than all alternatives other than the Enhanced Coordination Alternative, although the percent of futures is similar to that in the Supply Driven and Maximum Flexibility Alternatives. When examining conditional box plots, under dry hydrologic conditions, for angling value the Representative Preferred Alternative performs similarly to the No Action Alternative and better than the CCS Comparative Baseline, with the median values slightly below that of the No Action Alternative, although there is a smaller range of variability. For whitewater boating value the Representative Preferred Alternative performs similarly to the CCS Comparative Baseline and slightly worse than the No Action Alternative. As for angling recreational value, modeling indicates a larger range of variability under the Representative Preferred. For both angling and boating, performance is also similar to the Maximum Flexibility Alternative and the Supply Driven Alternative (both LB Priority and LB Pro Rata approaches), although the Representative Preferred Alternative has a higher range of variability compared to these alternatives. This data suggests overall river-based recreational outcomes and the associated recreational value and economic contributions are likely to experience a high range of variability, which may impact the ability of local communities and concessionaries to depend on this economic activity.

#### **TA 16.2.4 Issue 3: How would anticipated water shortages and changes in water levels in reservoirs and river segments affect access and quality of nonmarket values?**

Nonmarket values with potential to be affected by operations generally encompass cultural identity, recreational quality, aesthetics, and existence values, and may vary based on site-specific conditions, user preferences, and other factors. Values specific to tribes are further explored in **TA 18**, Indian Trust Assets, and **TA 13**, Tribal Resources.

In general, the alternatives that facilitate higher reservoir elevations, and maintain more consistent flows along the Colorado River including through Grand Canyon would result in the reduced impacts on identified nonmarket values. There may be exceptions to this generalization; for example, alternatives which provide better support for river-based recreation and associated values may result in less preferable outcomes for reservoir-based recreation and vice versa.

During wet hydrologic conditions, the range of alternatives would generally produce conditions where lake levels and flows along the Colorado River would result in minimal impacts on nonmarket values. However, this varies by resource. For example, nonmarket values such as scenic integrity, solitude, and cultural connections to the river corridor would be maintained at a level similar to current conditions (**TA 19** Visual Resources). Ecological services, including riparian habitat and wildlife viewing opportunities, remain similar to current conditions (see **TA 8**, Biological Resources – Fish and Other Aquatic Species), and cultural landscapes retain the factors which are associated with nonmarket values (see **TA 11**, Cultural Resources). Recreational experiences for boating, angling, and rafting however, may be impacted under all alternatives in their quality and support for sense of place for gateway communities and visitor, as modeling indicates that periods of reservoir elevations below thresholds for recreation facility access and navigation would be more likely than that under historic conditions.

As conditions become drier, the No Action Alternative and CCS Comparative Baseline would result in the most modeled futures where impacts could occur to resources with nonmarket values. For example, nonmarket values for recreation and ecosystem services could be reduced in instances of prolonged drought, which could reduce shoreline aesthetics and diminish the opportunities for solitude at Lake Powell and Lake Mead over time (see **TA 14**, Recreation). Extended low-flow periods could also impact river-based experiences in Grand Canyon due to changes in setting which could impact perceived naturalness (see **TA 3**, Hydrologic Resources). Cultural and spiritual values tied to iconic landscapes and cultural artifacts could also be affected in low-hydrologic flow periods (see **TA 11**, Cultural Resources). Ecological services such as riparian habitat stability may decline, influencing nonuse values related to wildlife and vegetation communities (see **TA 8**, Biological Resources – Fish and Other Aquatic Species).

Under drier conditions, the Enhanced Coordination and Maximum Operational Flexibility Alternatives would be more robust in terms of the support for some nonmarket values, particularly for values associated with Lake Powell. Reservoir levels which are maintained at thresholds that support access for boating and camping in more modeled futures, support experiential benefits and cultural connections (see **TA 11**, Cultural Resources). The quality of river-based recreation is expected to remain high, due to increased stability with flow-dependent activities (see **TA 14**, Recreation); however, a lower average flow may impact some values. Nonuse values tied to ecosystem services, such as wildlife habitat and riparian vegetation, would also be supported (see **TA 8**, Biological Resources – Fish and Other Aquatic Species). As conditions become drier, Lake Powell and Lake Mead landscape character would be better supported under the Enhanced Coordination, Maximum Operational Flexibility, and Representative Preferred Alternatives as compared to the No action Alternative and CCS Comparative Baseline (**TA 19**, Visual Resources).

More frequent reservoir low-elevation conditions could occur in the Basic Coordination Alternative, which could noticeably affect nonmarket values tied to lake-based recreation and scenic quality (see **TA 14**, Recreation) although at a reduced level compared with the No Action Alternative and the CCS Comparative Baseline. Reduced reservoir levels may expose previously submerged areas, altering visual character and diminishing the opportunities for solitude. River-based recreation could experience flow variability that affects trip quality and angling success (see **TA 3**, Hydrologic Resources); however, higher average flows may support some river-based values.

Outcomes produced by the Supply Driven Alternative vary depending on the hydrology and location. In wet years, the nonmarket values remain similar to those under the CCS Comparative Baseline; however, in dry sequences, reduced reservoir elevations and altered flow regimes would diminish the scenic quality and access for boating and angling (see **TA 14**, Recreation), for Lake Powell. For Lake Mead, the Supply Driven Alternative is the most robust for supporting reservoir levels at Lake Mead, which support the nonmarket values. River-based recreation would experience moderate variability in trip quality, while ecosystem services and the associated nonuse values would fluctuate with water availability (see **TA 8**, Biological Resources – Fish and Other Aquatic Species). Cultural and spiritual values tied to river corridors may also be affected during extended drought periods (see **TA 11**, Cultural Resources). Similar to the Basic Coordination Alternative, however, higher average flows may support some river-based values.

As discussed in **Chapter 2**, the Preferred Alternative is a multi-year decision framework that establishes the process and criteria that would govern development and adoption of operating guidelines through 2036. The decision framework is anticipated to be implemented in two-year operating intervals. Unlike other alternatives, the operating guidelines for each interval are not specified in this Final EIS. The sideboards provide a basis for assumptions included in the Representative Preferred Alternative which captures the range of operating guidelines that may be adopted during each interval, but exact operations would be subject to the guidelines in place during each interval. While some impacts are influenced by how the Representative Preferred Alternative distributes Lower Basin shortages in 2027-2028 vs. 2029-2060, this issue is either minimally sensitive or not sensitive to this distinction, so the different time periods are not discussed.

The Representative Preferred Alternative generally performs in the middle of the range of alternatives for both Lake Powell and Lake Mead elevations as well as river flow, showing moderate robustness in terms of overall support for recreation associated benefits (**TA 14**, Recreation). Overall, this alternative would provide moderate protection for riverine habitat to support cultural values (see **TA 13**, Tribal).

### **TA 16.2.5 Summary Comparison of Alternatives**

#### ***Issue 1: How would anticipated water shortages affect economic contributions and social conditions from agriculture?***

The lowest impacts on economic and social conditions from reductions in agricultural production and increases in fallowed lands due to shortages in irrigation water, across all alternatives, states, priority groups, and tribal and non-tribal irrigation entitlement holders, would occur under the No Action Alternative due to the low maximum shortage of 0.6 maf; however, across the action alternatives, impacts on economic and social conditions from changes in agriculture would vary across irrigation priority groups and tribal and non-tribal entitlement holders, based on the maximum shortage levels and water shortage distribution methods.

Under low shortage levels, on average across all priority groups, for all irrigation entitlement holders except Arizona tribal (Arizona non-tribal, California non-tribal, California tribal, and Nevada tribal irrigation entitlement holders), impacts on the economic and social conditions due to reductions in agricultural production would tend to be lower under the alternatives with priority shortage distribution methods (such as under the Basic Coordination, Maximum Operational Flexibility, and Supply Driven [LB Priority approach] Alternatives), and impacts would tend to be higher under the alternatives with pro rata shortage distribution methods (under the Enhanced Coordination and Supply Driven [LB Pro Rata approach] Alternatives). In contrast, under low shortage levels, for Arizona tribal irrigation entitlement holders, impacts on the economic and social conditions due to reductions in agricultural production would be similar across all action alternatives. During times of extensive drought, when maximum shortage levels are implemented, on average across all priority groups, for all irrigation entitlement holders except Arizona tribal, impacts on the economic and social conditions from agricultural activity would tend to be lower under the alternatives with a low maximum shortage level and priority shortage distribution methods (such as under the Basic Coordination Alternative), and impacts would tend to be higher under the alternatives with a high maximum shortage level or pro rata shortage distribution methods (such as the Enhanced

Coordination, Maximum Operational Flexibility, or Supply Driven [LB Pro Rata approach] Alternatives), compared with the other action alternatives. However, for Arizona tribal entitlement holders, during times of maximum shortage levels, lower impacts on the economic and social conditions due to reductions in agricultural production would occur under the alternatives with pro rata shortage distribution methods (such as under the Enhanced Coordination and Supply Driven [LB Pro Rata approach] Alternatives) and higher impacts would occur under the alternatives with priority shortage distribution methods (such as under the Basic Coordination, Maximum Operational Flexibility, and Supply Driven [LB Priority approach] Alternatives), compared with the other action alternatives. These impacts vary across priority groups. The largest impacts on economic and social conditions during a maximum shortage level, for tribal and non-tribal PPR priority holders, would tend to occur under the action alternatives with a pro rata shortage distribution methods, while the largest impacts for the more junior priority holders (Arizona non-tribal priorities 4(i), and Arizona tribal priorities CAP Indian, 4(i), and 3) would tend to occur under the action alternatives with a priority shortage distribution method and higher maximum shortage level (such as the Maximum Operational Flexibility Alternative). In contrast, the largest impacts for non-tribal and tribal priority group 3 in Arizona and non-tribal priority groups 2 and 3 in California would tend to occur under alternatives with pro rata shortage distribution methods, during periods of low shortages, and would tend to occur under alternatives with a priority shortage distribution method and higher maximum shortage level (such as the Maximum Operational Flexibility Alternative) during period of severe droughts and maximum shortages levels. Overall, the alternatives demonstrate a trade-off between shortage distributions across irrigation entitlement holders, flexibility in the maximum allowable shortage implementation, and the ability to support stable agricultural production and social well-being.

***Issue 2: How would operational changes affect economic contributions and value associated with lake-based and river-based recreation?***

Recreation-based economies are highly sensitive to changes in reservoir elevations and river flow conditions. Under the alternatives that sustain more stable water levels, boating and shoreline access would remain consistent, supporting steady visitation and related spending that currently contributes about 12,000 jobs and \$1.6 billion in output across the Basin.

Operational changes under the proposed alternatives would influence these conditions in different ways. The alternatives that maintain higher and more consistent water levels would preserve boating access, marina operations, and shoreline recreational opportunities. This stability would support continued visitation and minimize disruptions to businesses dependent on tourism. Conversely, the alternatives that result in greater variability in lake elevations and river flows would affect the recreational quality and access and the related levels of contributions.

Under all alternatives, restrictions on summer recreation access and safe navigation routes for Lake Powell and navigational challenges in Lake Mead would continue to impact lake-based recreational opportunities and the associated spending. As a result, outfitters and concessionaires operating in these areas would face increased uncertainty, affecting employment and revenue streams under all alternatives. Research indicates that declines in lake elevation can reduce visitation by more than 25 percent, amplifying economic losses for local communities (Johnson et al. 2016). Lake Mead would experience similar constraints, with boating access severely limited during extended drought periods.

The Supply Driven Alternative (both LB Priority and LB Pro Rata approaches) poses the greatest risk to recreation-based economies relying on economic contributions from reservoir-based recreation in Lake Powell, while the CCS Comparative Baseline and the No Action Alternative have the least robust modeled performance for supporting recreational opportunities and spending associated with Lake Mead recreation. In contrast, the Enhanced Coordination and Maximum Operational Flexibility Alternatives would result in more consistent reservoir levels at Lake Powell to support recreation, and the Supply Driven Alternative would support the greatest level of contributions from recreation in Lake Mead. Under the Representative Preferred Alternative, support for navigation in Lake Powell would be slightly more robust in terms of maintenance of critical thresholds for navigation than the No Action Alternative and CCS Comparative Baseline. For Lake Mead, the Representative Preferred would be less robust outcomes for recreational site access as compared to the CCS Comparative Baseline but slightly more robust outcomes than the No Action Alternative. For navigation, the Representative Preferred Alternative is more robust at meeting defined thresholds than both the No Action Alternative and CCS Comparative Baseline. Compared to other action alternatives, the Representative Preferred is less robust than all but the Basic Coordination Alternative in meeting navigational thresholds, but the performance is more similar to other alternatives when only the first decadal period is examined.

River-based recreation is also vulnerable to operational changes. Activities such as angling in Glen Canyon and whitewater rafting in Grand Canyon depend on stable flows to ensure safety and trip quality. Reduced flows shorten rafting seasons and diminish the overall experience, leading to lower recreational value and reduced demand for outfitter services and the associated hospitality sectors. The Basic Coordination Alternative would provide the most support for continued or increased economic value associated with boating and angling and related economic contributions. The Enhanced Coordination Alternative would be the least robust at maintaining or exceeding the minimum desired daytime flows to support boating in Grand Canyon; it also would result in the greatest potential for a reduction in recreational value for whitewater rafting and angling as well as the associated regional economic contributions associated with these uses. Impacts would be most pronounced under dry hydrologic conditions.

The Representative Preferred Alternative would provide reduced support for economic contributions from river-based angling and boating compared to most other action alternatives; DMDU modeling output for angling and boating indicates that the Representative Preferred Alternative is less robust than all alternatives other than the Enhanced Coordination Alternative.

Economic impacts extend beyond direct visitor spending. Gateway communities, often small and rural, rely heavily on tourism-related income to sustain local businesses and municipal services. When lake levels drop or river flows decline, these communities experience cascading effects, including reduced tax revenues and job losses in sectors such as lodging, food service, and transportation. The magnitude of these impacts would depend on the frequency and duration of low-elevation conditions, which would vary significantly across the alternatives.

***Issue 3: How would anticipated water shortages and changes in water levels in reservoirs and river segments affect access and quality of nonmarket values?***

Changes in reservoir elevations and river hydrology also influence nonmarket values such as scenic quality, solitude, and cultural and spiritual connections to the river corridor. More stable operating conditions preserve visual continuity and access to culturally important sites, supporting a sense of place and maintaining the experiential qualities associated with national parks, recreation areas, and other designated lands (see **TA 11**, Cultural Resources). In wet hydrologic conditions, all alternatives support the preservation of conditions which support nonmarket values, although the level of support varies by resource. Under dry hydrologic conditions, however, the No Action Alternative and CCS Comparative Baseline would result in reductions in reservoir levels and greater variability in river flow especially as compared to the Enhanced Coordination and Maximum Operational Flexibility Alternatives. This would result in more frequent exposure of drawdown zones and shifts in shoreline character, diminishing the aesthetic and spiritual values tied to the river's natural appearance. Variability in flows and elevations could also affect the timing and accessibility of traditional practices for tribes and local communities. In general, the alternatives that moderate elevation changes better sustain these nonmarket benefits, while those allowing greater fluctuation introduce tradeoffs between resource protection and system adaptability.

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