



**US Army Corps  
of Engineers®**  
Portland District

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## **Willamette Basin Review Feasibility Study**

### **APPENDIX F**

**ResSim WVP Releases and Live Flow Diversions for  
Base Year 2020, No Action Alternative, and ARP Model Runs**

**June 2018**

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# Development of ResSim Diversions for No Action Alternative and ARP Model Runs

## 1 Introduction and Summary of Inputs

This appendix provides documentation on ResSim modeling inputs for permitted M&I live flow diversions and Willamette Valley Project (WVP) conservation pool storage releases. The flow dataset commonly referred to as “the 2010 Level Modified Flows” was used for ResSim modeling of the No Action Plan and the Agency Recommended Plan (ARP) developed in the feasibility study. The flow dataset normalizes 2008 irrigation depletions across all years of the dataset, so that flows in each year can be compared on an equal footing.

As such, a ResSim model run using the flow dataset will provide a representation of the WVP’s performance in achieving flow objectives in 2008. For the purposes of the analyses conducted for this feasibility study, additional model inputs of WVP releases and live flow diversions at a 2020 base year and 2070 future year.

Five ResSim model runs were conducted to analyze the effects of the No Action Alternative and the ARP, and are outlined below.

<b>Base Year 2020</b>	Updates the 2008 ResSim flow dataset to a base year of 2020 by: <ul style="list-style-type: none"> <li>• incorporating the expected increase in WVP releases for BOR irrigation contracts from year 2008 to year 2020</li> <li>• incorporating the expected increase in M&amp;I live flow diversions from year 2008 to year 2020</li> </ul>
<b>Peak No Action 2070</b>	Includes Base Year 2020 updates PLUS: <ul style="list-style-type: none"> <li>• the increase in WVP releases for BOR irrigation contracts from year 2020 to year 2070 under PEAK demand conditions</li> <li>• the increase in M&amp;I live flow diversions from year 2020 to year 2070 under PEAK demand conditions</li> </ul>
<b>Expected No Action 2070</b>	Includes Base Year 2020 updates PLUS: <ul style="list-style-type: none"> <li>• the increase in WVP releases for BOR irrigation contracts from year 2020 to year 2070 under EXPECTED demand conditions</li> <li>• the increase in M&amp;I live flow diversions from year 2020 to year 2070 under EXPECTED demand conditions</li> </ul>
<b>Peak ARP 2070</b>	Includes Base Year 2020 updates PLUS: <ul style="list-style-type: none"> <li>• the increase in WVP releases for BOR irrigation contracts from year 2020 to year 2070 under PEAK demand conditions;</li> <li>• the increase in WVP releases for M&amp;I supply deficits from year 2020 to year 2070 under PEAK demand conditions;</li> <li>• the increase in WVP releases for SSI from year 2020 to year 2070;</li> <li>• includes the expected increase in M&amp;I live flow diversions from year 2020 to 2070 under PEAK demand conditions</li> </ul>

**Expected ARP 2070**

Includes Base Year 2020 updates PLUS:

- the increase in WVP releases for BOR irrigation contracts from year 2020 to year 2070 under EXPECTED demand conditions;
- the increase in WVP releases for M&I supply deficits from year 2020 to year 2070 under EXPECTED demand conditions;
- the increase in WVP releases for SSI from year 2020 to year 2070;
- the increase in M&I live flow diversions from year 2020 to 2070 under EXPECTED demand conditions

Table 1 provides a summary of live flow diversions and WVP releases for the five ResSim model runs conducted for the feasibility study.

**Table 1: Summary of Diversions for the Five ResSim Model Runs (acre-feet)**

		Base Year 2020	PEAK No Action 2070	EXPECTED No Action 2070	PEAK ARP 2070	EXPECTED ARP 2070
2008 to 2020 Increases	Increase in Reclamation Contract Use	22,854	22,854	22,854	22,854	22,854
	Increase in M&I Live Flow Jun-Sep Season Use	18,780	18,780	18,780	18,780	18,780
	Increase in M&I Live Flow Apr-May Use	7,541	7,541	7,541	7,541	7,541
2020 to 2070 Increases	Increase in Reclamation Contract Use	0	184,193	100,128	184,193	100,128
	Increase in M&I Live Flow Jun-Sep Season Use	0	90,227	54,469	90,227	54,469
	Increase in M&I Live Flow Apr-May Use	0	27,246	27,246	27,246	27,246
	Increase in M&I Live Flow for Intertie Supply	0	28,901	14,075	0	0
	Increase in WVP Releases for M&I Deficits	0	0	0	103,152	38,682
	Increase in WVP Releases SSI Deficits	0	0	0	17,950	17,950

## 2 Bureau of Reclamation Contract Use Estimates

Bureau of Reclamation (Reclamation) contracts (in acre-feet) and acres under contract are provided in Table 2 below for 2007, and 2014 through 2017.

**Table 2: Reclamation Contract Data: 2007, 2014-2017, and 2020 Projected**

	2007	2014	2015	2016	2017	2020*
Acres	25,027	38,532	40,622	40,297	40,262	
Acre-feet Contracted	50,231	72,375	74,054	73,215	74,899	81,374
Contract Rate (AF/Acre)	2.00709	1.87831	1.82298	1.81688	1.86028	

\* Projected acre-feet contracted value for Year 2020 is derived in Sections 2.1 and 2.2 below

The increase in Reclamation contracts represents the PEAK value for diversions under the PEAK No Action alternative. Using the data above, Reclamation contracts increase from 2007 to 2017 by 24,688 acre-feet, (2,466.8 acre-feet per year).

### 2.1 Establish Reclamation Contracts in 2008 and 2020

1. Add 2,466.8 acre-feet under contract to 2007 value of 50,231 acre-feet under contract to arrive at a 2008 value of 52,698 acre-feet under contract.
2. Add 2,466.8 acre-feet under contract to 2017 value of 74,899 acre-feet under contract for 2018, again for 2019, and again for 2020 to arrive at a 2020 value of 82,299 acre-feet under contract. In recognition of RPA Measure 3.1, Reclamation contracts were limited to 11,574 acre-feet in Reach 3 and 1,096 acre-feet in Reach 4 through the year 2020. This limitation (necessary to impose on Reach 3 only – Reach 4 was projected to be under the limit in 2020) reduced the Reclamation contracts for the year 2020 to a total of 81,374 acre-feet.

Using the results from items 1 and 2 above, the increase in Reclamation contracts from 2008 to 2020 is established as 28,676 acre-feet (81,374 – 52,698). The 28,676 acre-feet represents the PEAK increase, as this is the change in contracted volume only.

### 2.2 Establish Reclamation Contracts Expected Use in 2008 and 2020

The underlying data upon which the summary figures from 2007, and 2014 through 2017 (presented in the table above) are based includes acres and acre-feet under contract by Reclamation reach. Review of those data reveals that the contracted use rates (i.e., acre-feet contracted divided by acres) are consistent on a reach-by-reach basis, and the overall contracted use rates (for the entire basin) have an average of 1.88 acre-feet per acre. It is known that actual use of Reclamation contracted water is less than the contracted use rate, though data are not available for all years.

Because representative data for actual USE of reclamation contracts are largely incomplete, it was assumed that the use rate of reclamation contracts would be equal to the expected use rates



(approximately 1.3 acre-feet per acre) established through work conducted to develop estimates of agricultural irrigation discussed in FR/EA Appendix B.

The method used to establish use of Reclamation contracts requires that acres under Reclamation contracts be estimated for 2008 and 2020 to 2070.

1. 2007 acres are given at 25,027, and the contracted rate for 2007 is calculated as 2.00709 acre-feet per acre (50,231 / 25,027)
2. 2008 acre-feet of 52,698 were established as the Reclamation contract total derived above.
3. Assuming that the contract rate of 2.00709 from 2007 Reclamation data would be representative of the rate in 2008, the number of acres under Reclamation contract in 2008 is calculated as 52,698 / 2.00709, or 26,526.
4. 2017 acres are given at 40,262, and the contracted rate for 2017 is calculated as 1.86028 acre-feet per acre (74,899/40,262)
5. 2020 acre-feet of 81,374 were established as the Reclamation contract total derived above.
6. Assuming that the contract rate of 1.86028 from 2017 Reclamation data would be representative of the rate in 2020, the number of acres under Reclamation contract in 2020 is calculated as 81,374 / 1.86028, or 43,743.
7. The use rates derived in Appendix B show an average of 1.3069 acre-feet per acre. Using this average use rate, EXPECTED Reclamation contract use for 2008 and 2020 are:
  - a. 2008: 26,506 Acres x 1.3069 AF/Acre      34,313 acre-feet
  - b. 2020: 43,743 Acres x 1.3069 AF/Acre      57,167 acre-feet

### 2.3 Reclamation Contract Use for ResSim Inputs

Table 1 lists the following categories of WVP releases for AI reclamation contract use:

1. Increase in Reclamation Contract Use 2008-2020:
  - a. All ResSim model runs use the same data tables
2. Increase in Reclamation Contract Use 2020-2070:
  - a. All ResSim model runs use the same data tables

Each of the Increase in Reclamation Contract Use datasets developed for the ResSim models is described below.

#### 2.3.1 Increase in Reclamation Contract Use: 2008-2020 Used by All ResSim Models

Reclamation contract use is established above as 34,313 acre-feet for 2008, and 57,167 acre-feet for 2020. Inputs to all ResSim model runs to account for changes since 2008 in Reclamation contract use is then calculated as 22,854 acre-feet (57,167 – 34,313). Table AI 1 Increase in

WVP Releases through BOR Contracts (Expected Use) 2008-2020 shows the 22,854 increase distributed by month and BOR contract reach.

### 2.3.2 Increase in Reclamation Contract Use: 2020-2070

Peak No Action 2070

Peak ARP 2070

The Peak No Action 2070 and the Peak ARP 2070 model runs use the Peak agricultural irrigation change from 2020 to 2070 of 184,200 acre-feet, as represented in FR/EA Appendix B (Agricultural Irrigation Demand Analyses) Table 7-4. Under the Estimate 1 column, the table shows an irrigation value of 680,300 acre-feet for Year 2020, and 864,500 acre-feet for Year 2070. The increase is calculated as 864,500 - 680,300. This value can be found by aggregating the data provided in the following ResSim input tables:

Table AI 2: Increase in WVP Diversions through BOR Contracts < 95 KAF  
2020-2070

Table AI 5: PEAK Agricultural Irrigation Increase in WVP Diversions > 95 KAF  
2020-2070

### 2.3.3 Increase in Reclamation Contract Use: 2020-2070

Expected No Action 2070

Expected ARP 2070

The Expected No Action 2070 and the Expected ARP 2070 model runs use the expected agricultural irrigation use change from 2020 to 2070 of 100,100 acre-feet, as represented in FR/EA Appendix B Table 7-4. Under the Estimate 7 column, the table shows an irrigation value of 526,400 acre-feet for Year 2020, and 626,500 acre-feet for Year 2070. The increase is calculated as 626,500 - 526,400. This value can be found by aggregating the data provided in the following ResSim input tables:

Table AI 2: Increase in WVP Diversions through BOR Contracts < 95 KAF  
2020-2070

Table AI 6: EXPECTED Agricultural Irrigation Increase in WVP Diversions > 95 KAF  
2020-2070

## 3 M&I Live Flow Diversions

M&I live flow diversions are defined as diversions of water from the Willamette River or its tributaries made under existing M&I diversion permits.

The analyses described in FR/EA Appendix A (M&I Demand and Supply Analyses) focused on the development of M&I supply deficits, or demand for stored water. The calculation of a supply deficit for each M&I system is equal to the difference between M&I demand and reliable supply when M&I demand exceeds reliable supply – it is important to note that supply deficit calculations are conducted for each system individually, and not in the aggregate. If M&I demand for water does not exceed its reliable live flow diversions (i.e., permitted and reliable supply), a deficit does not exist, though reliable live flow diversions are used to satisfy all

demand. If a deficit exists, reliable live flow diversions are still used to satisfy demand up to the point where reliable supply is exhausted.

These diversions are used as inputs to all five ResSim models to account for water diverted from the Willamette River or its tributaries, though the diversions are NOT included in ResSim models as releases from WVP conservation storage.

### 3.1 Categories of M&I Live Flow Diversion Tables

Seven categories of M&I live flow diversion tables were developed for the five ResSim models:

1. Expected M&I live flow diversion increase in June-September 2008-2020 used in:
  - a. all ResSim model runs
2. Expected M&I live flow diversion increase in April-May 2008-2020 used in:
  - a. all ResSim model runs
3. Peak M&I live flow diversion increase in June-September 2020-2070 used in:
  - a. Peak No Action Alternative 2070
  - b. Peak ARP 2070
4. Expected M&I live flow diversion increase in June-September 2020-2070 used in:
  - a. Expected No Action Alternative 2070
  - b. Expected ARP 2070
5. Expected M&I live flow diversion increase in Apr-May 2020-2070 used in:
  - a. Expected No Action Alternative 2070
  - b. Expected ARP 2070
  - c. Peak No Action Alternative 2070
  - d. Peak ARP 2070
6. Peak M&I live flow diversion increase in June-September 2020-2070 for interconnected supply used in:
  - a. Peak No Action Alternative 2070
7. Expected M&I live flow diversion increase in June-September 2020-2070 for interconnected supply used in:
  - a. Expected No Action Alternative 2070

Each of the M&I permitted live flow datasets developed is described below.

#### 3.1.1 M&I EXPECTED Increase in June-Sep Permitted Live Flow Diversions 2008-2020

Table MI 1 M&I EXPECTED Increase in June-Sep Permitted Live Flow Diversions 2008-2020 provides these data, which are used as inputs to ALL five ResSim model runs.

Values in this table represent the increase in live flow diversions, segmented by Reclamation Reach designation, from June through September under an Average Peak Season Use scenario.

**Source Data.** Table 5-1 of FR/EA Appendix A (M&I Demand and Supply Analyses) shows a peak season demand projection for the Average Peak Season Use Metric of 132,300 acre-feet in Year 2020, and Table 7-3 of FR/EA Appendix A shows a supply deficit of 9,000 acre-feet. Therefore, M&I permitted live flow diversions of 123,300 acre-feet (132,300 – 9,000) are used to satisfy demand in Year 2020.

**Development of 2008 Demand.** Additional Development of demand data for 2008 involved establishing M&I system population estimates for the year 2008. The average annual growth rate in population from 2015 to the projected 2020 estimates was calculated for each M&I system, and used to deflate population estimates to the year 2008. With population then set for 2008, an Average Peak Season Use for 2008 was calculated using the methodology described in FR/EA Appendix A, Section 4.5, and amounts to 104,500 acre-feet. All of this demand was satisfied through live permitted flow.

The increase in permitted live flow diversions from 2008 to 2020 is then 18,800 acre-feet (123,300 – 104,500), though actual numbers used in the calculation are 123,249 and 104,468, which yield a difference of 18,780 – shown as the total in Table MI 1.

### 3.1.2 M&I EXPECTED Increase in Apr-May Permitted Live Flow Diversions 2008-2020

Table MI 2 M&I EXPECTED Increase in Apr-May Permitted Live Flow Diversions 2008-2020 provides these data, which are used as inputs to ALL five ResSim model runs.

**Development of 2008 Demand.** Population estimates for 2008 established as stated in Section 3.1.1 above. Annual demand for 2008 was then established.

**Development of April-May Demand.** As described in Section 4.5 of FR/EA Appendix A, monthly water use data were aggregated by month and divided by annual water use in order to arrive at a percent value of each month's water use. The data were then analyzed to evaluate the portion of M&I demand that occurs over the 61-day period of April through May. Based on that analysis, a median value of 14.6 percent of annual demand was allocated to the 61-day period. Because the April-May timeframe is outside of the peak demand season, it was assumed that supply limitations would not exist, and that annual demand for April and May would be satisfied through permitted live flow diversions.

April-May permitted live flow diversions in the year 2008 are estimated to be 34,103 acre-feet, and for year 2020, 42,644 acre-feet. The increase in permitted live flow diversions from 2008 to 2020 is then 7,541 acre-feet – shown as the total in Table MI 2.

### 3.1.3 M&I PEAK Increase in June-Sep Permitted Live Flow Diversions 2020-2070

Table MI 3 M&I PEAK Increase in June-Sep Permitted Live Flow Diversions 2020-2070 provides these data, which are used as inputs to the PEAK No Action 2070 and PEAK ARP 2070 ResSim model runs.

Values in this table represent the increase in live flow diversions, segmented by Reclamation Reach designation, from June through September under a Peak GPCD Peak Season Use scenario.

**Source Data.** Table 5-1 of FR/EA Appendix A shows a peak season demand projection for the Peak GPCD Metric of 316,600 acre-feet in Year 2070, and Table 7-1 of FR/EA Appendix A shows a supply deficit of 103,200 acre-feet for Year 2070. Therefore, M&I permitted live flow diversions of 213,400 acre-feet ( $316,600 - 103,200$ ) are used to satisfy PEAK demand in Year 2070.

The increase from 2020 to 2070 in M&I permitted live flow demands under Peak demand conditions from June through September is then 90,100 acre-feet ( $213,400 - 123,300$  stated above as base year 2020 live flow diversions). A total of 90,227 acre-feet is shown as the total in Table MI 3 due to the absence of rounding .

### 3.1.4 M&I EXPECTED Increase in June-Sep Permitted Live Flow Diversions 2020-2070

Table MI 4 M&I EXPECTED Increase in June-Sep Permitted Live Flow Diversions 2020-2070 provides these data, which are used as inputs to the EXPECTED No Action 2070 and EXPECTED ARP 2070 ResSim model runs.

Values in this table represent the increase in live flow diversions, segmented by Reclamation Reach designation, from June through September under an Average Peak Season Use Metric.

**Source Data.** Table 5-1 of FR/EA Appendix A shows a peak season demand projection for the Average Peak Season Metric of 216,400 acre-feet in Year 2070, and Table 7-3 of FR/EA Appendix A shows a supply deficit of 38,700 acre-feet for Year 2070. Therefore, M&I permitted live flow diversions of 177,700 acre-feet ( $216,400 - 38,700$ ) are used to satisfy EXPECTED demand in Year 2070.

The increase from 2020 to 2070 in M&I permitted live flow demands under EXPECTED demand conditions from June through September is then 54,400 acre-feet ( $177,700 - 123,300$  stated above as base year 2020 live flow diversions). A total of 54,469 acre-feet is shown as the total in Table MI 4 due to the absence of rounding.

### 3.1.5 M&I EXPECTED Increase in Apr-May Permitted Live Flow Diversions 2020-2070

Table MI 5 M&I EXPECTED Increase in Apr-May Permitted Live Flow Diversions 2020-2070 provides these data, which are used as inputs to ALL five ResSim model runs.

**Development of April-May Demand.** As described above in Section 3.1.2.

April-May permitted live flow diversions in the year 2020 are estimated to be 42,644 acre-feet, and for year 2070, 69,890 acre-feet. The increase in permitted live flow diversions from 2020 to 2070 is then 27,246 acre-feet – shown as the total in Table MI 5.

### 3.1.6 M&I PEAK Increase in Permitted Live Flow Diversions for System Interconnected Supply Under the No Action Alternative: 2020-2070

Table MI 6 M&I PEAK Increase in Permitted Live Flow Diversion 2020-2070 for Interconnections provides these data, which are used as inputs to the PEAK No Action 2070 ResSim model run.

Under the No Action Alternative, it is expected that M&I systems with supply deficits will rely, in part, on interconnections with other M&I systems with excess supply to satisfy a portion of

their supply deficits (see FR/EA Section 4). Interconnection supply cited in FR/EA Section 4 relates to satisfaction of PEAK demand needs in Year 2070 of 32,900 acre-feet. Of this total, 28,901 acre-feet represents in-basin transfers of live flow water that is expected to be diverted by M&I systems with supply surpluses to serve M&I systems with supply deficits. This value is distributed among the Reclamation reaches from where the supplying M&I systems have their points of diversion, and the values are shown on Table MI 6.

### 3.1.7 M&I EXPECTED Increase in Permitted Live Flow Diversions for System Interconnected Supply Under the No Action Alternative: 2020-2070

Table MI 7 M&I EXPECTED Increase in Permitted Live Flow Diversion 2020-2070 for Interconnections provides these data, which are used as inputs to the EXPECTED No Action 2070 ResSim model run.

As described in 3.1.6 above, interconnections are expected to be utilized under the No Action Alternative. Section 3.1.6 addressed PEAK demand conditions, and under EXPECTED demand conditions, the reliance on interconnections is reduced from that level.

The analysis of expected supply interconnections was calculated for expected demand needs for additional supply at year 2070, and included in-basin transfers only. At year 2070, 14,075 acre-feet of additional live flow water is expected to be diverted by M&I systems with supply surpluses to serve M&I systems with supply deficits. This value is distributed among the Reclamation reaches from where the supplying M&I systems have their points of diversion, and the values are shown on Table MI 7.

## 4 WVP Releases for M&I Deficits

WVP releases for M&I deficits are made only under the two ARP ResSim model runs – Peak ARP 2070 and Expected ARP 2070.

### 4.1 Categories of WVP Releases for M&I Deficits

1. Increase in WVP releases for PEAK M&I Deficits used in:
  - a. PEAK ARP 2070 ResSim model runs
2. Increase in WVP releases for EXPECTED M&I Deficits used in in:
  - a. EXPECTED ARP 2070 ResSim model runs
3. Increase in WVP releases for SSI Deficits used in in:
  - a. EXPECTED ARP 2070 ResSim model runs
  - b. PEAK ARP 2070 ResSim model runs

#### 4.1.1 Increase in WVP Releases for M&I Deficits – Peak Demand

Table 1 shows a value of 103,152 acre-feet of peak season demand that would be supplied through WVP releases. Table MI 8, M&I PEAK Increase in WVP Diversions for Deficits 2020-2070 provides these data segmented by Reclamation contract reach, which are used as inputs to the PEAK ARP 2070 ResSim model run.

**Source Data.** Table 9-1 of FR/EA Appendix A shows a peak season demand for storage space (i.e., a total supply deficit) projection for the Peak GPCD Metric of 103,200 acre-feet in Year 2070.

#### 4.1.2 Increase in WVP Releases for M&I Deficits – Expected Demand

Table 1 shows a value of 38,682 acre-feet of peak season demand that would be supplied through WVP releases. Table MI 9, M&I EXPECTED Increase in WVP Diversions for Deficits 2020-2070 provides these data segmented by Reclamation contract reach, which are used as inputs to the EXPECTED ARP 2070 ResSim model run.

**Source Data.** Table 9-3 of FR/EA Appendix A shows a peak season demand for storage space (i.e., a total supply deficit) projection for the Average Peak Season GPCD Metric of 38,700 acre-feet in Year 2070.

#### 4.1.3 Increase in WVP Releases for SSI Deficits – Expected Demand

Table 1 shows a value of 17,950 acre-feet of SSI peak season demand that would be supplied through WVP releases. Table MI 10, M&I Increase in WVP Releases for SSI 2020-2070 provides these data segmented by Reclamation contract reach, which are used as inputs to the EXPECTED ARP 2070 ResSim model run and the PEAK ARP 2070 ResSim model run.

**Source Data.** Table 8-1 of FR/EA Appendix A shows a peak season demand for SSI storage space (i.e., a total supply deficit) projection of 17,950 acre-feet in Year 2070.

## 5 Monthly WVP Releases and Permitted Live Flow Diversions

The detailed tables provided in this document all show the total demands described in Sections 2, 3, and 4 distributed to specific months, as described below.

### 5.1 Monthly WVP Releases for Agricultural Irrigation

Agricultural irrigation demand estimates satisfied through WVP releases are presented for the months of May through September with the following allocation to individual months:

- May: 9.8%
- June 19.5%
- July 32.2%
- August 25.7%
- September 12.8%

FR/EA Appendix B (Agricultural Irrigation Demand) describes two methods that were used to calculate the consumptive use and diverted water demand for agricultural irrigation from May to September of each year. The percentage values shown above represent the portion of water diverted in each month relative to the sum of diverted water diverted from May through September. Source data for the percentages is not shown in FR/EA Appendix B. Rather, the data were obtained from the detailed MS Excel tables that were the source of demand estimates provided in FR/EA Appendix B.

## 5.2 Monthly WVP Releases for M&I Supply Deficits

M&I system supply deficits satisfied through WVP releases are presented for the months of June through September with the following allocation to individual months:

- June 20.1%
- July 28.5%
- August 29.1%
- September 22.3%

Section 4.5 of FR/EA Appendix A (M&I Supply and Demand Analyses) describes the Average Peak Season Use metric used to develop an estimate of M&I system demands. In that section, monthly M&I system reported water use data is described. These data were used to develop an estimate of the portion of M&I system demand that occurs during the period of June 1 through September 30 (i.e., the peak season portion of annual demand). The peak season portion of demand for each system, in conjunction with annual use data, were the basis of the Average Peak Season Use demand projections.

Allocation of the WVP releases for M&I deficits to the individual months of June through September used the underlying data from the analysis described above. The overall portion of reported water use for each month from June through September was calculated as a portion of reported water use for the June through September season.

## 5.3 Monthly WVP Releases for SSI Supply Deficits

SSI supply deficits satisfied through WVP releases are presented for the months of June through September with the following allocation to individual months:

- June 25.2%
- July 24.9%
- August 24.9%
- September 25.0%

As indicated above, SSI allocation to individual months is roughly 25 percent per month. Though slight, the differences relate to an analysis that was conducted for the beginning and ending date associated with the set of SSI permits. In this analysis, permitted use was allocated across the calendar year. Calculated differences between months were small, but did exist. The portions for the months noted above are based on total permitted water volume in each month expressed as a portion of total permitted water volume from June through September.

## 5.4 Monthly M&I Live Flow Diversions

M&I system permitted live flow diversions are presented for the months of June through September with the following allocation to individual months:

- June 20.1%
- July 28.5%



- August 29.1%
- September 22.3%

These allocation percentages mirror those presented in Section 5.2 above.

Individual estimates for April and May are provided in the tables that accompany this document, with the following allocation to individual months:

- April 45.7%
- May 54.3%

The methodology used to develop the percentage estimates for April and May (as a percent of combined April and May demand) was nearly identical to the methodology described in Section 5.2 above. The only difference is that April and May were evaluated as opposed to June through September.

## 6 Summary Tables for the Five ResSim Model Runs

Table 3 provides a summary of the detailed individual tables used in each of the five ResSim model runs. For each value provided in the table, the table key below each value indicates with of the individual tables contain the values reported.

**Table 3: Summary of Diversions for the Five ResSim Model Runs (acre-feet) with Source Tables Identified**

		Base Year 2020	PEAK No Action 2070	EXPECTED No Action 2070	PEAK ARP 2070	EXPECTED ARP 2070
2008 to 2020 Increases	Increase in Reclamation Contract Use	22,854 <i>AI 1</i>	22,854 <i>AI 1</i>	22,854 <i>AI 1</i>	22,854 <i>AI 1</i>	22,854 <i>AI 1</i>
	Increase in M&I Live Flow Jun-Sep Season Use	18,780 <i>MI 1</i>	18,780 <i>MI 1</i>	18,780 <i>MI 1</i>	18,780 <i>MI 1</i>	18,780 <i>MI 1</i>
	Increase in M&I Live Flow Apr-May Use	7,541 <i>MI 2</i>	7,541 <i>MI 2</i>	7,541 <i>MI 2</i>	7,541 <i>MI 2</i>	7,541 <i>MI 2</i>
2020 to 2070 Increases	Increase in Reclamation Contract Use	0	184,193 <i>AI 2+AI 5</i>	100,128 <i>AI 2+AI 6</i>	184,193 <i>AI 2+AI 5</i>	100,128 <i>AI 2+AI 6</i>
	Increase in M&I Live Flow Jun-Sep Season Use	0	90,227 <i>MI 3</i>	54,469 <i>MI 4</i>	90,227 <i>MI 3</i>	54,469 <i>MI 4</i>
	Increase in M&I Live Flow Apr-May Use	0	27,246 <i>MI 5</i>	27,246 <i>MI 5</i>	27,246 <i>MI 5</i>	27,246 <i>MI 5</i>
	Increase in M&I Live Flow for Intertie Supply	0	28,901 <i>MI 6</i>	14,075 <i>MI 7</i>	0	0
	Increase in WVP Releases for M&I Deficits	0	0	0	103,152 <i>MI 8</i>	38,682 <i>MI 9</i>
	Increase in WVP Releases SSI Deficits	0	0	0	17,950 <i>MI 10</i>	17,950 <i>MI 10</i>

Sections 6.1 through 6.5 provide the individual (and in some cases combined tables) used in each of the five ResSim model runs.

**6.1 Base Year 2020 ResSim Diversion Inputs (2 data sets)**

**AI Releases from WVP up to 95,000 AF (Table AI 1)**

REACH	Apr	May	Jun	Jul	Aug	Sep
1a	0	30	59	98	78	39
1b	0	524	1,044	1,723	1,376	685
1c	0	128	255	421	336	167
2	0	7	14	24	19	9
3	0	340	677	1,117	893	444
4	0	27	54	90	72	36
5	0	466	929	1,533	1,224	609
6	0	589	1,174	1,937	1,547	770
7	0	22	45	74	59	29
8	0	53	106	174	139	69
9	0	0	0	0	0	0
10	0	27	54	89	71	36
11	0	3	5	9	7	4
12	0	0	1	1	1	0
13	0	17	35	57	46	23
14	0	2	3	5	4	2
15	0	2	3	6	4	2
<b>TOTAL</b>						<b>22,853.6</b>

**M&I Permitted Live Flow Diversions (Table MI 1 + Table MI 2)**

REACH	Apr	May	Jun	Jul	Aug	Sep
1a	664	790	630	894	915	700
1b	1,595	1,895	1,557	2,208	2,261	1,730
1c	83	98	116	165	169	129
2	5	6	0	0	0	0
3	542	645	688	976	999	765
4	37	44	46	65	66	51
5	154	183	205	291	298	228
6	0	0	0	0	0	0
7	16	19	24	34	35	26
8	99	118	130	184	188	144
9	232	275	347	492	504	386
10	0	0	0	0	0	0
11	1	1	1	2	2	1
12	3	4	4	6	6	5
13	5	6	7	9	9	7
14	10	12	15	21	22	17
15	0	0	0	0	0	0
<b>TOTAL</b>						<b>26,321.1</b>

**6.2 PEAK No Action 2070 ResSim Diversion Inputs (3 data sets)**

**AI Releases from WVP Up to 95,000 AF (Table AI 1 + Table AI 2)**

REACH	Apr	May	Jun	Jul	Aug	Sep
1a	0	48	95	157	125	62
1b	0	836	1,667	2,751	2,197	1,093
1c	0	204	407	672	537	267
2	0	12	23	38	30	15
3	0	542	1,081	1,784	1,425	709
4	0	44	87	143	114	57
5	0	744	1,483	2,447	1,954	972
6	0	940	1,874	3,091	2,469	1,229
7	0	36	71	117	94	47
8	0	84	168	278	222	110
9	0	0	0	0	0	0
10	0	43	87	143	114	57
11	0	4	9	14	12	6
12	0	1	1	2	1	1
13	0	28	55	91	73	36
14	0	2	5	8	6	3
15	0	3	5	9	7	4
<b>TOTAL</b>						<b>36,479.9</b>

**AI Releases from WVP Above 95,000 AF (Table AI 5)**

REACH	Apr	May	Jun	Jul	Aug	Sep
1a	0	478	953	1,573	1,256	625
1b	0	8,396	16,741	27,623	22,063	10,978
1c	0	2,051	4,089	6,747	5,389	2,681
2	0	594	1,184	1,953	1,560	776
3	0	633	1,262	2,083	1,664	828
4	0	956	1,907	3,146	2,513	1,250
5	0	771	1,537	2,537	2,026	1,008
6	0	691	1,378	2,274	1,816	904
7	0	618	1,232	2,033	1,624	808
8	0	415	828	1,367	1,092	543
9	0	5	9	15	12	6
10	0	167	334	550	440	219
11	0	784	1,564	2,580	2,061	1,025
12	0	13	27	44	35	18
13	0	109	218	360	288	143
14	0	8	16	26	21	10
15	0	0	0	0	0	0
<b>TOTAL</b>						<b>170,565.7</b>

**M&I Permitted Live Flow Diversions (Sum of Tables MI 1, MI 2, MI 3, MI 5, MI 6)**

REACH	Apr	May	Jun	Jul	Aug	Sep
1a	2,618	3,111	3,576	5,071	5,191	3,974
1b	7,086	8,421	10,809	15,329	15,693	12,012
1c	463	551	956	1,355	1,388	1,062
2	26	31	0	0	0	0
3	3,005	3,571	4,633	6,570	6,726	5,148
4	180	214	297	421	431	330
5	779	926	1,729	2,452	2,511	1,922
6	2	2	14	20	21	16
7	75	89	186	264	270	207
8	470	559	775	1,099	1,125	861
9	1,100	1,307	4,523	6,415	6,567	5,026
10	0	0	0	0	0	0
11	5	5	20	29	30	23
12	15	18	66	94	96	74
13	24	29	40	57	58	44
14	48	57	61	87	89	68
15	0	0	0	0	0	0
<b>TOTAL</b>					<b>172,695.2</b>	

**6.3 EXPECTED No Action 2070 ResSim Diversion Inputs (3 data sets)**

**AI Releases from WVP Up to 95,000 AF (Table AI 1 + Table AI 2)**

REACH	Apr	May	Jun	Jul	Aug	Sep
1a	0	48	95	157	125	62
1b	0	836	1,667	2,751	2,197	1,093
1c	0	204	407	672	537	267
2	0	12	23	38	30	15
3	0	542	1,081	1,784	1,425	709
4	0	44	87	143	114	57
5	0	744	1,483	2,447	1,954	972
6	0	940	1,874	3,091	2,469	1,229
7	0	36	71	117	94	47
8	0	84	168	278	222	110
9	0	0	0	0	0	0
10	0	43	87	143	114	57
11	0	4	9	14	12	6
12	0	1	1	2	1	1
13	0	28	55	91	73	36
14	0	2	5	8	6	3
15	0	3	5	9	7	4
<b>TOTAL</b>						<b>36,479.9</b>

**AI Releases from WVP Above 95,000 AF (Table AI 6)**

REACH	Apr	May	Jun	Jul	Aug	Sep
1a	0	236	470	775	619	308
1b	0	4,138	8,250	13,612	10,872	5,410
1c	0	1,011	2,015	3,325	2,656	1,321
2	0	339	675	1,114	890	443
3	0	284	567	935	747	372
4	0	608	1,212	2,000	1,597	795
5	0	139	278	459	366	182
6	0	227	452	746	596	297
7	0	384	765	1,262	1,008	502
8	0	287	573	946	755	376
9	0	3	6	9	8	4
10	0	95	189	311	249	124
11	0	636	1,269	2,094	1,672	832
12	0	11	21	35	28	14
13	0	64	128	211	168	84
14	0	5	9	15	12	6
15	0	0	0	0	0	0
<b>TOTAL</b>						<b>86,502.1</b>

**M&I Permitted Live Flow Diversions (Sum of Tables MI 1, MI 2, MI 4, MI 5, MI 7)**

REACH	Apr	May	Jun	Jul	Aug	Sep
1a	2,618	3,111	2,307	3,272	3,350	2,564
1b	7,086	8,421	6,995	9,921	10,156	7,774
1c	463	551	692	982	1,005	769
2	26	31	0	0	0	0
3	3,005	3,571	3,812	5,406	5,534	4,236
4	180	214	222	315	322	246
5	779	926	996	1,412	1,446	1,107
6	2	2	2	2	2	2
7	75	89	114	161	165	126
8	470	559	616	874	894	685
9	1,100	1,307	1,647	2,336	2,391	1,830
10	0	0	0	0	0	0
11	5	5	6	9	9	7
12	15	18	20	28	29	22
13	24	29	31	44	45	34
14	48	57	71	101	103	79
15	0	0	0	0	0	0
Totals	<b>TOTAL</b>					<b>122,111.3</b>

**6.4 PEAK ARP 2070 ResSim Diversion Inputs (4 data sets)**

**AI Releases from WVP Up to 95,000 AF (Table AI 1 + Table AI 2)**

REACH	Apr	May	Jun	Jul	Aug	Sep
1a	0	48	95	157	125	62
1b	0	836	1,667	2,751	2,197	1,093
1c	0	204	407	672	537	267
2	0	12	23	38	30	15
3	0	542	1,081	1,784	1,425	709
4	0	44	87	143	114	57
5	0	744	1,483	2,447	1,954	972
6	0	940	1,874	3,091	2,469	1,229
7	0	36	71	117	94	47
8	0	84	168	278	222	110
9	0	0	0	0	0	0
10	0	43	87	143	114	57
11	0	4	9	14	12	6
12	0	1	1	2	1	1
13	0	28	55	91	73	36
14	0	2	5	8	6	3
15	0	3	5	9	7	4
<b>TOTAL</b>						<b>36,479.9</b>

**AI Releases from WVP Above 95,000 AF (Table AI 5)**

REACH	Apr	May	Jun	Jul	Aug	Sep
1a	0	478	953	1,573	1,256	625
1b	0	8,396	16,741	27,623	22,063	10,978
1c	0	2,051	4,089	6,747	5,389	2,681
2	0	594	1,184	1,953	1,560	776
3	0	633	1,262	2,083	1,664	828
4	0	956	1,907	3,146	2,513	1,250
5	0	771	1,537	2,537	2,026	1,008
6	0	691	1,378	2,274	1,816	904
7	0	618	1,232	2,033	1,624	808
8	0	415	828	1,367	1,092	543
9	0	5	9	15	12	6
10	0	167	334	550	440	219
11	0	784	1,564	2,580	2,061	1,025
12	0	13	27	44	35	18
13	0	109	218	360	288	143
14	0	8	16	26	21	10
15	0	0	0	0	0	0
<b>TOTAL</b>						<b>170,565.7</b>



**M&I Permitted Live Flow Diversions (Sum of Tables MI 1, MI 2, MI 3, MI 5)**

REACH	Apr	May	Jun	Jul	Aug	Sep
1a	2,618	3,111	3,576	5,071	5,191	3,974
1b	7,086	8,421	5,944	8,429	8,629	6,605
1c	463	551	675	957	980	750
2	26	31	0	0	0	0
3	3,005	3,571	4,633	6,570	6,726	5,148
4	180	214	297	421	431	330
5	779	926	1,729	2,452	2,511	1,922
6	2	2	14	20	21	16
7	75	89	186	264	270	207
8	470	559	775	1,099	1,125	861
9	1,100	1,307	3,867	5,485	5,615	4,298
10	0	0	0	0	0	0
11	5	5	20	29	30	23
12	15	18	66	94	96	74
13	24	29	40	57	58	44
14	48	57	61	87	89	68
15	0	0	0	0	0	0
<b>TOTAL</b>						<b>143,793.8</b>

**M&I PEAK WVP Stored Water Diversions (Table MI 8 + Table MI 10)**

REACH	Apr	May	Jun	Jul	Aug	Sep
1a	0	0	5,898	7,690	7,835	6,366
1b	0	0	14,689	20,068	20,502	16,111
1c	0	0	320	433	442	350
2	0	0	96	136	139	107
3	0	0	1,891	2,657	2,719	2,095
4	0	0	229	226	226	227
5	0	0	755	982	1,001	814
6	0	0	0	0	0	0
7	0	0	348	366	368	351
8	0	0	669	949	971	744
9	0	0	329	326	326	327
10	0	0	3	3	3	3
11	0	0	0	0	0	0
12	0	0	0	0	0	0
13	0	0	0	0	0	0
14	0	0	2	2	2	2
15	0	0	0	0	0	0
<b>Totals</b>						<b>121,101.6</b>

**6.5 EXPECTED ARP 2070 ResSim Diversion Inputs (4 data sets)**

**AI Releases from WVP Up to 95,000 AF (Table AI 1 + Table AI 2)**

REACH	Apr	May	Jun	Jul	Aug	Sep
1a	0	48	95	157	125	62
1b	0	836	1,667	2,751	2,197	1,093
1c	0	204	407	672	537	267
2	0	12	23	38	30	15
3	0	542	1,081	1,784	1,425	709
4	0	44	87	143	114	57
5	0	744	1,483	2,447	1,954	972
6	0	940	1,874	3,091	2,469	1,229
7	0	36	71	117	94	47
8	0	84	168	278	222	110
9	0	0	0	0	0	0
10	0	43	87	143	114	57
11	0	4	9	14	12	6
12	0	1	1	2	1	1
13	0	28	55	91	73	36
14	0	2	5	8	6	3
15	0	3	5	9	7	4

**TOTAL**

**36,479.9**

**AI Releases from WVP Above 95,000 AF (Table AI 6)**

REACH	Apr	May	Jun	Jul	Aug	Sep
1a	0	236	470	775	619	308
1b	0	4,138	8,250	13,612	10,872	5,410
1c	0	1,011	2,015	3,325	2,656	1,321
2	0	339	675	1,114	890	443
3	0	284	567	935	747	372
4	0	608	1,212	2,000	1,597	795
5	0	139	278	459	366	182
6	0	227	452	746	596	297
7	0	384	765	1,262	1,008	502
8	0	287	573	946	755	376
9	0	3	6	9	8	4
10	0	95	189	311	249	124
11	0	636	1,269	2,094	1,672	832
12	0	11	21	35	28	14
13	0	64	128	211	168	84
14	0	5	9	15	12	6
15	0	0	0	0	0	0

**TOTAL**

**86,502.1**

**M&I Permitted Live Flow Diversions (Sum of Tables MI 1, MI 2, MI 4, MI 5)**

REACH	Apr	May	Jun	Jul	Aug	Sep
1a	2,618	3,111	2,307	3,272	3,350	2,564
1b	7,086	8,421	4,246	6,021	6,164	4,718
1c	463	551	616	874	895	685
2	26	31	0	0	0	0
3	3,005	3,571	3,812	5,406	5,534	4,236
4	180	214	222	315	322	246
5	779	926	996	1,412	1,446	1,107
6	2	2	2	2	2	2
7	75	89	114	161	165	126
8	470	559	616	874	894	685
9	1,100	1,307	1,647	2,336	2,391	1,830
10	0	0	0	0	0	0
11	5	5	6	9	9	7
12	15	18	20	28	29	22
13	24	29	31	44	45	34
14	48	57	71	101	103	79
15	0	0	0	0	0	0
<b>TOTAL</b>						<b>108,035.9</b>

**M&I PEAK WVP Stored Water Diversions (Table MI 9 + Table MI 10)**

REACH	Apr	May	Jun	Jul	Aug	Sep
1a	0	0	3,278	3,974	4,032	3,455
1b	0	0	7,703	10,160	10,359	8,347
1c	0	0	86	100	102	89
2	0	0	52	74	76	58
3	0	0	59	58	58	59
4	0	0	229	226	226	227
5	0	0	246	260	261	249
6	0	0	0	0	0	0
7	0	0	296	293	293	294
8	0	0	6	8	9	7
9	0	0	329	326	326	327
10	0	0	3	3	3	3
11	0	0	0	0	0	0
12	0	0	0	0	0	0
13	0	0	0	0	0	0
14	0	0	0	0	0	0
15	0	0	0	0	0	0
<b>TOTAL</b>						<b>56,632.3</b>

## **7 Detailed Individual Demand Tables**

**Table AI 1**  
**Increase in WVP Releases through BOR Contracts 2008-2020**  
**(BASE 2020, PEAK USE & EXPECTED USE)**

REACH	Apr	May	Jun	Jul	Aug	Sep
1a	0	30	59	98	78	39
1b	0	524	1,044	1,723	1,376	685
1c	0	128	255	421	336	167
2	0	7	14	24	19	9
3	0	340	677	1,117	893	444
4	0	27	54	90	72	36
5	0	466	929	1,533	1,224	609
6	0	589	1,174	1,937	1,547	770
7	0	22	45	74	59	29
8	0	53	106	174	139	69
9	0	0	0	0	0	0
10	0	27	54	89	71	36
11	0	3	5	9	7	4
12	0	0	1	1	1	0
13	0	17	35	57	46	23
14	0	2	3	5	4	2
15	0	2	3	6	4	2
<b>TOTAL</b>						<b>22,853.6</b>

**Table AI 2**  
**Increase in WVP Releases through BOR Contracts < 95 KAF 2020-2070**  
**(No Action & ARP: PEAK USE AND EXPECTED USE)**

REACH	Apr	May	Jun	Jul	Aug	Sep
1a	0	18	35	58	47	23
1b	0	312	623	1,027	821	408
1c	0	76	152	251	200	100
2	0	4	9	14	11	6
3	0	203	404	666	532	265
4	0	16	32	54	43	21
5	0	278	554	914	730	363
6	0	351	700	1,155	922	459
7	0	13	27	44	35	17
8	0	32	63	104	83	41
9	0	0	0	0	0	0
10	0	16	32	53	43	21
11	0	2	3	5	4	2
12	0	0	0	1	1	0
13	0	10	21	34	27	14
14	0	1	2	3	2	1
15	0	1	2	3	3	1
<b>TOTAL</b>						<b>13,626.3</b>

**Note: Tables AI-3 and AI-4 are no longer used in analysis, though the table numbering convention has remained as stated in the draft report in order to maintain table numbering consistency.**

**Table AI 5**  
**Agricultural Irrigation Increase in WVP Releases > 95 KAF 2020-2070**  
**(No Action & ARP: PEAK USE)**

REACH	Apr	May	Jun	Jul	Aug	Sep
1a	0	478	953	1,573	1,256	625
1b	0	8,396	16,741	27,623	22,063	10,978
1c	0	2,051	4,089	6,747	5,389	2,681
2	0	594	1,184	1,953	1,560	776
3	0	633	1,262	2,083	1,664	828
4	0	956	1,907	3,146	2,513	1,250
5	0	771	1,537	2,537	2,026	1,008
6	0	691	1,378	2,274	1,816	904
7	0	618	1,232	2,033	1,624	808
8	0	415	828	1,367	1,092	543
9	0	5	9	15	12	6
10	0	167	334	550	440	219
11	0	784	1,564	2,580	2,061	1,025
12	0	13	27	44	35	18
13	0	109	218	360	288	143
14	0	8	16	26	21	10
15	0	0	0	0	0	0
<b>TOTAL</b>						<b>170,565.7</b>

**Table AI 6**  
**EXPECTED Agricultural Irrigation Increase in WVP Releases > 95 KAF 2020-2070**  
**(No Action & ARP: PEAK USE)**

REACH	Apr	May	Jun	Jul	Aug	Sep
1a	0	236	470	775	619	308
1b	0	4,138	8,250	13,612	10,872	5,410
1c	0	1,011	2,015	3,325	2,656	1,321
2	0	339	675	1,114	890	443
3	0	284	567	935	747	372
4	0	608	1,212	2,000	1,597	795
5	0	139	278	459	366	182
6	0	227	452	746	596	297
7	0	384	765	1,262	1,008	502
8	0	287	573	946	755	376
9	0	3	6	9	8	4
10	0	95	189	311	249	124
11	0	636	1,269	2,094	1,672	832
12	0	11	21	35	28	14
13	0	64	128	211	168	84
14	0	5	9	15	12	6
15	0	0	0	0	0	0
<b>TOTAL</b>						<b>86,502.1</b>

**Table MI 1**  
**M&I Increase in June-Sep Permitted Live Flow Diversions 2008-2020**  
**(BASE 2020, No Action & ARP: PEAK USE & EXPECTED USE)**

REACH	Apr	May	Jun	Jul	Aug	Sep
1a	0	0	630	894	915	700
1b	0	0	1,557	2,208	2,261	1,730
1c	0	0	116	165	169	129
2	0	0	0	0	0	0
3	0	0	688	976	999	765
4	0	0	46	65	66	51
5	0	0	205	291	298	228
6	0	0	0	0	0	0
7	0	0	24	34	35	26
8	0	0	130	184	188	144
9	0	0	347	492	504	386
10	0	0	0	0	0	0
11	0	0	1	2	2	1
12	0	0	4	6	6	5
13	0	0	7	9	9	7
14	0	0	15	21	22	17
15	0	0	0	0	0	0
<b>TOTAL</b>						<b>18,780.3</b>

**Table MI 2**  
**M&I Increase in Apr-May Permitted Live Flow Diversions 2008-2020**  
**(BASE 2020, No Action and ARP: PEAK USE & EXPECTED USE)**

REACH	Apr	May	Jun	Jul	Aug	Sep
1a	664	790	0	0	0	0
1b	1,595	1,895	0	0	0	0
1c	83	98	0	0	0	0
2	5	6	0	0	0	0
3	542	645	0	0	0	0
4	37	44	0	0	0	0
5	154	183	0	0	0	0
6	0	0	0	0	0	0
7	16	19	0	0	0	0
8	99	118	0	0	0	0
9	232	275	0	0	0	0
10	0	0	0	0	0	0
11	1	1	0	0	0	0
12	3	4	0	0	0	0
13	5	6	0	0	0	0
14	10	12	0	0	0	0
15	0	0	0	0	0	0
<b>TOTAL</b>						<b>7,540.8</b>



**Table MI 3**  
**M&I Increase in June-Sep Permitted Live Flow Diversions 2020-2070**  
**(No Action 2070 & ARP: PEAK USE)**

REACH	Apr	May	Jun	Jul	Aug	Sep
1a	0	0	2,946	4,177	4,276	3,273
1b	0	0	4,386	6,221	6,368	4,874
1c	0	0	559	792	811	621
2	0	0	0	0	0	0
3	0	0	3,945	5,594	5,727	4,384
4	0	0	251	357	365	279
5	0	0	1,524	2,162	2,213	1,694
6	0	0	14	20	20	15
7	0	0	162	230	235	180
8	0	0	645	915	936	717
9	0	0	3,520	4,992	5,111	3,912
10	0	0	0	0	0	0
11	0	0	19	27	28	21
12	0	0	62	88	90	69
13	0	0	33	47	48	37
14	0	0	46	66	67	52
15	0	0	0	0	0	0
<b>TOTAL</b>						<b>90,227.0</b>

**Table MI 4**  
**M&I Increase in June-Sep Permitted Live Flow Diversions 2020-2070**  
**(No Action 2070 EXPECTED USE)**

REACH	Apr	May	Jun	Jul	Aug	Sep
1a	0	0	1,677	2,379	2,435	1,864
1b	0	0	2,688	3,813	3,903	2,988
1c	0	0	500	709	726	556
2	0	0	0	0	0	0
3	0	0	3,124	4,430	4,535	3,471
4	0	0	176	250	256	196
5	0	0	791	1,122	1,148	879
6	0	0	1	2	2	2
7	0	0	90	127	130	100
8	0	0	486	690	706	540
9	0	0	1,300	1,844	1,887	1,445
10	0	0	0	0	0	0
11	0	0	5	7	7	5
12	0	0	16	22	23	18
13	0	0	24	35	35	27
14	0	0	56	80	81	62
15	0	0	0	0	0	0
<b>TOTAL</b>						<b>54,469.0</b>

**Table MI 5**  
**M&I Increase in Apr-May Permitted Live Flow Diversions 2020-2070**  
**(No Action & ARP: EXPECTED USE & PEAK USE)**

REACH	Apr	May	Jun	Jul	Aug	Sep
1a	1,953	2,321	0	0	0	0
1b	5,492	6,526	0	0	0	0
1c	381	452	0	0	0	0
2	21	25	0	0	0	0
3	2,462	2,926	0	0	0	0
4	143	170	0	0	0	0
5	625	743	0	0	0	0
6	1	2	0	0	0	0
7	59	70	0	0	0	0
8	371	441	0	0	0	0
9	868	1,032	0	0	0	0
10	0	0	0	0	0	0
11	4	4	0	0	0	0
12	12	14	0	0	0	0
13	19	23	0	0	0	0
14	38	45	0	0	0	0
15	0	0	0	0	0	0
<b>TOTAL</b>						<b>27,245.7</b>

**Table MI 6**  
**M&I Increase in Permitted Live Flow Diversion 2020-2070 for Interconnections**  
**(No Action PEAK USE)**

REACH	Apr	May	Jun	Jul	Aug	Sep
1a	0	0	0	0	0	0
1b	0	0	4,865	6,900	7,064	5,407
1c	0	0	281	398	407	312
2	0	0	0	0	0	0
3	0	0	0	0	0	0
4	0	0	0	0	0	0
5	0	0	0	0	0	0
6	0	0	0	0	0	0
7	0	0	0	0	0	0
8	0	0	0	0	0	0
9	0	0	656	930	952	729
10	0	0	0	0	0	0
11	0	0	0	0	0	0
12	0	0	0	0	0	0
13	0	0	0	0	0	0
14	0	0	0	0	0	0
15	0	0	0	0	0	0
<b>TOTAL</b>						<b>28,901.4</b>

**Table MI 7**  
**M&I Increase in Permitted Live Flow Diversion 2020-2070 for Interconnections**  
**(No Action EXPECTED USE)**

REACH	Apr	May	Jun	Jul	Aug	Sep
1a	0	0	0	0	0	0
1b	0	0	2,750	3,900	3,992	3,056
1c	0	0	76	108	110	84
2	0	0	0	0	0	0
3	0	0	0	0	0	0
4	0	0	0	0	0	0
5	0	0	0	0	0	0
6	0	0	0	0	0	0
7	0	0	0	0	0	0
8	0	0	0	0	0	0
9	0	0	0	0	0	0
10	0	0	0	0	0	0
11	0	0	0	0	0	0
12	0	0	0	0	0	0
13	0	0	0	0	0	0
14	0	0	0	0	0	0
15	0	0	0	0	0	0
<b>TOTAL</b>						<b>14,075.4</b>

**Table MI 8**  
**M&I Increase in WVP Releases for Deficits 2020-2070**  
**(ARP PEAK USE)**

REACH	Apr	May	Jun	Jul	Aug	Sep
1a	0	0	4,327	6,137	6,282	4,809
1b	0	0	12,911	18,310	18,744	14,347
1c	0	0	271	384	393	301
2	0	0	96	136	139	107
3	0	0	1,832	2,599	2,660	2,036
4	0	0	0	0	0	0
5	0	0	549	778	797	610
6	0	0	0	0	0	0
7	0	0	52	73	75	57
8	0	0	669	949	971	743
9	0	0	0	0	0	0
10	0	0	0	0	0	0
11	0	0	0	0	0	0
12	0	0	0	0	0	0
13	0	0	0	0	0	0
14	0	0	2	2	2	2
15	0	0	0	0	0	0
<b>TOTAL</b>						<b>103,151.6</b>

**Table MI 9**  
**M&I Increase in WVP Releases for Deficits 2020-2070**  
**(ARP EXPECTED USE)**

REACH	Apr	May	Jun	Jul	Aug	Sep
1a	0	0	1,707	2,421	2,479	1,897
1b	0	0	5,924	8,402	8,601	6,583
1c	0	0	36	51	53	40
2	0	0	52	74	76	58
3	0	0	0	0	0	0
4	0	0	0	0	0	0
5	0	0	40	56	57	44
6	0	0	0	0	0	0
7	0	0	0	0	0	0
8	0	0	6	8	8	6
9	0	0	0	0	0	0
10	0	0	0	0	0	0
11	0	0	0	0	0	0
12	0	0	0	0	0	0
13	0	0	0	0	0	0
14	0	0	0	0	0	0
15	0	0	0	0	0	0
<b>TOTAL</b>						<b>38,682.3</b>

**Table MI 10**  
**M&I Increase in WVP Releases for SSI 2020-2070**  
**(ARP EXPECTED & PEAK USE)**

REACH	Apr	May	Jun	Jul	Aug	Sep
1a	0	0	1,570	1,553	1,553	1,558
1b	0	0	1,778	1,758	1,758	1,764
1c	0	0	49	49	49	49
2	0	0	0	0	0	0
3	0	0	59	58	58	59
4	0	0	229	226	226	227
5	0	0	206	204	204	205
6	0	0	0	0	0	0
7	0	0	296	293	293	294
8	0	0	0	0	0	0
9	0	0	329	326	326	327
10	0	0	3	3	3	3
11	0	0	0	0	0	0
12	0	0	0	0	0	0
13	0	0	0	0	0	0
14	0	0	0	0	0	0
15	0	0	0	0	0	0
<b>TOTAL</b>						<b>17,950.0</b>

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