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Assessment of the Agricultural Risk of Temporary Water Storage for the FM Diversion Staging Area

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Glossary of Terms

Affected Acreage	Total acreage of storage area that has some flooded acreage, even if the inundation does not cover the entire storage area. For example, if a storage area is 500 acres in size, but only 200 acres are submerged with flood water, the flooded acreage is 200 and the affected acreage is 500.
Days of Delay	The difference in total days between the Without and With Diversion conditions and does not necessarily reflect the number of days a producer may be delayed. For example, a storage area has 20 total days (days to flood, days of inundation, and dry-down) for Without Diversion conditions and 25 total days With Diversion. The days of delay due to the Diversion are 5 days; however, the number of days of planting delay may be more, the same, or less than the 5 days of difference between conditions—the extent of the delay depends upon when regional planting begins.
Distribution	The range of a known value given the statistical characteristics of the underlying information or data. It represents the relative number of times each possible outcome will occur in a number of trials or replications. Values in a distribution often are combined with the probability of that value occurring over a specified period or under a specific set of conditions.
Dry-down	A period for the land to dry out to the extent that normal field operations may occur. The dry-down period was assumed to include time for removal of flood residue.
Effects of Flooding are gone	In this study, 'effects of flooding are gone' refers to when a storage area has gone through the required dry-down period. At that point, the land may be planted (if regional planting has started) or in the situations where regional planting has not begun, those lands will have to wait for general conditions to improve before planting.
Existing Conditions/ Without Diversion	Refers to the hydrology-related conditions currently present within the staging area and within each individual storage area. "Existing conditions" is synonymous with the terms "Without Diversion."
Flood Event	Spring flood events resulting primarily from snow melt that are sufficiently large to require use of the staging area as part of the FM Diversion.
Flooded Acreage	Only the actual acreage of lands within storage areas that are inundated (submerged) with flood water. These acreages can be equal to the total size of the storage area if the entire storage area is submerged or can represent a portion of acreage within a storage area.
Flood Start	The calendar date when the Red River reaches 17,000 cubic feet per second (cfs) in Fargo. Snow melt and runoff would already be occurring prior to this date so the definition does not necessarily define when a spring flood event actually begins.

Staging Area	'Staging Area' refers to the area of the FM Diversion project where water will be temporarily stored during spring flood events. Retention of water will be created through man-made levies and natural topography. Water collected in the staging area will subsequently be drained away through the Red and Wild Rice rivers and the Diversion channel.
Staging Activation	The calendar date during a spring flood event when the staging area would begin storing water. Activation of the Diversion staging area is when the Red River reaches 21,000 cfs in Fargo. However, activation of the staging area will actually be based on gages and flow monitoring upstream of Fargo.
Standard Deviation	A measure of how widely values deviate or differ from the average. Standard deviation is a common measure of variability.
Storage Area	Geographic units within the staging area that are delineated by man-made (e.g., roads) and natural features. The effects of temporary water storage were treated equally for all acres within an individual storage area. These areas are identified by range, township, county, acreage, and elevation (msl). For hydrology purposes, the storage areas are treated as one homogenous tract.
Target Yield	Yield that agricultural producers strive to obtain and adjust the level of inputs and farm practices to achieve.
Total days	The number of days from when the staging area is activated to the end of the dry-down period. That period may or may not differ between existing conditions and conditions expected with use of the Diversion.
Uncertainty	Uncertainty is a term applied to situations where it may be impossible to reasonably measure the odds of something occurring.
With Diversion	Refers to the hydrology conditions that are expected to prevail during large spring flood events when the FM Diversion project is operational.

Assessment of the Agricultural Risk of Temporary Water Storage for the FM Diversion Staging Area

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Executive Summary

The proposed Fargo/Moorhead Area Diversion Project (FM Diversion) is intended to reduce the flood risk for Fargo, Moorhead, and other communities in Cass County, North Dakota and Clay County, Minnesota. The FM Diversion is comprised of a water storage embankment and tie-back levies upstream of the metro area, flood protection dikes in the Fargo/Moorhead communities, and a Diversion channel to route water around the Fargo/Moorhead/West Fargo metro area. The embankment, tie back levies, and natural rise in the Red River basin will create a staging area in which water will be temporarily collected during times of high flow during flood events.

The implications of temporary water storage raise a number of questions, such as the effects of inundation on public infrastructure (e.g., roads, bridges), cultural landmarks (e.g., cemeteries), residential and commercial structures, delivery of public services (e.g., fire and rescue), and agricultural lands.

This study is based on the re-alignment of the FM Diversion staging area, often called ‘Plan B’. The re-alignment was the result of the Governors of Minnesota and North Dakota creating a joint Task Force consisting of various stakeholders from both states to devise plans to mitigate upstream impacts of the FM Diverison Project (Technical Advisory Group 2018).

Study Approach

In an attempt to provide a broad assessment of the potential agricultural effects, **the study included the following factors:**

- **Gross revenues:** Revenues from crop production in the staging area during flood years Without the Diversion and With the Diversion.
- **Flood event start dates:** Range of likely dates when the staging area would be activated based on historical observations of when the Red River has reached 17,000 cfs in Fargo.
- **Regional planting start dates:** Dates when spring planting begins.
- **Planting rates**: Time required to plant crops based on overall spring planting conditions.
- **Agronomic considerations:** Crop rotations, periods when planting delays result in yield losses, dates when crops may be switched, and dates when crops would qualify for prevent planting.
- **Crop yields:** The anticipated yields that agricultural producers strive to obtain and adjust the level of inputs and farm practices to achieve. Crops modeled were wheat, corn, sugarbeets, and soybeans. The percentage of each crop was based on county-level planting data.
- **Yield reduction functions:** Amount of target yield lost due to delays in planting.
- **Crop prices**: A 7-year Olympic average of marketing year prices.
- **Dry-down period**: A 10-day period and a 14-day period were used to represent the time necessary for the land to dry-down and complete any required clean up after being inundated, With or Without the Diversion.

- **Hydrology Data:** Detailed hydrology data for 241 storage areas comprising 54,481 acres were provided by Houston-Moore Group (2019) based on previous work from the U.S. Army Corps of Engineers.
    - **Flood Size** – 10-year, 20-year, 25-year, 25-year Long Flood (LF), 25-year Extra Long Flood (ELF), 2009-like, 50-year, 100-year, 500-year, and a probabilistic maximum flood (PMF).
    - **Acreage Flooded**—acreage of land inundated based on general field elevation and size of flood event.
    - **Duration of Flooding**— number of days storage areas were flooded and when flood waters leave the storage areas.
    - **Without Diversion** and **With Diversion**—both hydrology conditions were modeled.
    - **Flood Effects vary by Storage Area and Flood Size**

      Hydrology Group 1 - Areas that do not flood With or Without the Diversion
      Hydrology Group 2 - Areas that already flood but flood duration is unchanged With Diversion
      Hydrology Group 3 - Areas that already flood but flood duration is longer With the Diversion
      Hydrology Group 4 - Areas that already flood but flood duration is shorter With the Diversion
      Hydrology Group 5 - Would not normally flood but will now flood With Diversion

      Excluding the 10-year flood event, about 20 percent to 50 percent of the staging area acreage evaluated in this study will either flood longer (Group 3) With the Diversion or will now flood (Group 5) With the Diversion.

- **Key Assumptions and Omissions**:
    - **Crop Insurance** – the implications of Federal crop insurance coverage for lands affected by operation of the Diversion staging area were not addressed. Loss of Federal crop insurance mitigation of spring flooding would increase the per-acre losses on some lands and increase overall losses in the staging area during a flood event.
    - **Affected Acreage** – if any portion of a storage area was inundated all acreage of the storage area was assumed to be affected. This assumption could increase the overall acreage affected by spring flooding but would not affect the per-acre losses.

A Monte Carlo simulation, using historical data, was used to generate 10,000 most-likely combinations of flood starts, planting rates, and planting start dates independently. Hydrology data, combined with a dry-down period, were used with the Monte Carlo simulation to estimate the conditions, frequency, and magnitude of planting delays.

Results

The study focused on **1)** the additional time the FM Diversion adds to the number of days for the effects of flooding to be gone, and **2)** how often those additional days are likely to result in planting delays. A storage area would have delayed planting if the combination of inundation and dry-down periods extended past the date when regional planting starts. Conversely, if the combined time of inundation and dry-down occurred prior to when regional planting started, there would be no planting delays and the storage area would be planted at the same time as other land in the region. These criteria were applied to both existing conditions (Without Diversion) and With Diversion.

- Combining a **dry-down period** (either 10-day or 14-day) with the **hydrology data** revealed:
    - A majority of acres will require a total of 16 to 25 days for effects of flooding to be gone after activation of the staging area.
    - The Diversion will add approximately 1 to 10 days of additional time for the effects of flooding to be gone on lands that flood longer with the diversion (i.e., these lands would flood without the diversion). The majority of those lands will experience 2 to 5 days of additional time due to the Diversion.
    - Between 2,500 to 6,500 acres (depending upon flood event size) will flood due to the diversion that would not otherwise flood, and the time for the effects of flooding to be gone on those lands varies from 16 to 25 days after activation of the staging area.

- Examining **regional planting start dates** and likely **flood event start dates** revealed:
    - Annual probability ranges from 45 to 64 percent that the majority of acreage in the staging area, either with existing conditions or With the Diversion, would experience some planting delay for corn, sugarbeets, and wheat in a flood year (i.e., flood year of sufficient size to activate the staging area).
    - Annual probability is less than 15 percent that the majority of acreage in the staging area would experience some planting delays for soybeans in a flood year.

The study focused on those storage areas that flood longer (Group 3) and those storage areas that flood with use of the Diversion but would not otherwise experience spring flooding (Group 5).

Despite the high probability of a planting delay during a 25-year or larger flood, the overall average per-acre losses within the storage areas were relatively small. When all crops were averaged, per-acre losses for nearly all storage areas were modest as a result of averaging all replications (years) with no losses (e.g., early flood with late regional planting start) and averaging revenues from soybeans, which have little revenue loss and represent the largest share of acreage among the four crops (e.g., over 50 percent in Cass County).

Estimated revenue losses, averaged for all acres within the hydrology groups, are unlikely to equal event-level revenue losses for individual producers. For example, for producers planning to raise soybeans, the probability and magnitude of revenue losses are quite low. However, for a producer raising corn in the same storage area, the planting delays due to the Diversion may result in revenue losses substantially larger than the average reported for the overall storage area or hydrology group.

Executive Summary Table 1
Annual Chance of Revenue Loss due to Delayed Planting from Operation of the Diversion, Composite Average of All Crops, 10-day Dry Down Period

	Size of Flood Event				
	10-Year	20-Year	25-Year	25-Year Long Flood	25-Year Extra Long Flood
Storage Areas that Flood Longer With the Diversion (Group 3)					
Any Revenue Loss	29.5%	59.7%	53.4%	100%	100%
$1 to $25 per acre	29.5%	59.7%	53.4%	100%	100%
More than $25 per acre	<0.1%	<0.1%	<0.1%	<0.1%	<0.1%
Storage Areas that Flood With the Diversion but would not Flood under Existing Conditions (Group 5)					
Any Revenue Loss	19.3%	52.6%	44.9%	48.8%	56.1%
$1 to $25 per acre	19.1%	47.2%	42.1%	46.5%	51.2%
More than $25 per acre	0.2%	5.4%	2.8%	2.3%	4.9%
	2009-like	50-Year	100-Year	500-Year	PMF
Storage Areas that Flood Longer With the Diversion (Group 3)					
Any Revenue Loss	91.9%	56.1%	99.2%	100%	99.4%
$1 to $25 per acre	91.8%	56.1%	99.9%	97.6%	99.4%
More than $25 per acre	0.1%	<0.1%	<0.1%	2.4%	<0.1%
Storage Areas that Flood With the Diversion but would not Flood under Existing Conditions (Group 5)					
Any Revenue Loss	48.9%	52.5%	59.8%	56.2%	na
$1 to $25 per acre	45.6%	48.6%	52.7%	43.3%	na
More than $25 per acre	3.3%	3.9%	7.1%	12.9%	na

Note: *Per-acre revenue losses represent a composite of corn, wheat, soybeans and sugarbeets, based on their respective share of county crop acreage. Therefore, losses per acre for any hydrology group represent an average of the storage areas within that group and an average of revenues from all crops, even if some crops did not experience a planting delay or revenue loss.*

Executive Summary Table 2 Annual Chance of Revenue Loss due to Delayed Planting from Operation of the Diversion, Composite Average of All Crops, 14-day Dry Down Period					
	Size of Flood Event				
	10-Year	20-Year	25-Year	25-Year Long Flood	25-Year Extra Long Flood
Storage Areas that Flood Longer With the Diversion (Group 3)					
Any Revenue Loss	44.9%	74.5%	69.9%	100%	100%
$1 to $25 per acre	44.9%	74.5%	69.9%	100%	100%
More than $25 per acre	<0.1%	<0.1%	<0.1%	<0.1%	<0.1%
Storage Areas that Flood With the Diversion but would not Flood under Existing Conditions (Group 5)					
Any Revenue Loss	33.2%	67.5%	59.8%	63.6%	71.2%
$1 to $25 per acre	31.8%	50.1%	49.1%	54.7%	54.7%
More than $25 per acre	1.4%	17.4%	10.7%	16.5%	16.5%
	2009-like	50-Year	100-Year	500-Year	PMF
Storage Areas that Flood Longer With the Diversion (Group 3)					
Any Revenue Loss	97.5%	71.2%	99.9%	100%	99.9%
$1 to $25 per acre	96.4%	71.2%	99.8%	98.0%	99.9%
More than $25 per acre	1.1%	<0.1%	0.1%	2.0%	<0.1%
Storage Areas that Flood With the Diversion but would not Flood under Existing Conditions (Group 5)					
Any Revenue Loss	63.7%	67.4%	74.7%	71.3%	na
$1 to $25 per acre	51.3%	53.2%	53.9%	40.2%	na
More than $25 per acre	12.4%	14.2%	20.8%	31.1%	na

Note: *Per-acre revenue losses represent a composite of corn, wheat, soybeans and sugarbeets, based on their respective share of county crop acreage. Therefore, losses per acre for any hydrology group represent an average of the storage areas within that group and an average of revenues from all crops, even if some crops did not experience a planting delay or revenue loss.*

Executive Summary Table 3
Range of Per-Acre Crop Losses Observed in the Study, Storage Areas that Flood Longer, using a 10-day Dry Down Period

	10-Year	20-Year	25-Year	25-Year Long Flood	25-Year Extra Long Flood
			Corn		
Lower (5%)	-$1.47	-$8.99	-$9.39	-$9.46	-$18.62
Average	-$0.20	-$1.86	-$1.70	-$1.96	-$4.88
Upper (5%)	$0.00	$0.00	$0.00	-$0.04	-$0.19
			Wheat		
Lower (5%)	-$1.57	-$5.83	-$13.81	-$12.42	-$20.24
Average	-$0.29	-$1.50	-$3.36	-$5.36	-$7.91
Upper (5%)	$0.00	-$0.00	$0.00	-$0.04	-$0.52
			Sugarbeets		
Lower (5%)	-$4.53	-$27.34	-$34.09	-$31.12	-$49.28
Average	-$0.81	-$8.30	-$9.04	-$8.85	-$17.70
Upper (5%)	$0.00	-$0.00	-$4.30	-$0.30	-$0.59
			Soybeans		
Lower (5%)	$0.00	-$0.05	-$0.02	-$0.28	-$1.10
Average	$0.00	$0.00	$0.00	-$0.09	-$0.20
Upper (5%)	$0.00	$0.00	$0.00	$0.00	$0.00

	2009-like	50-year	100-year	500-year	PMF
			Corn		
Lower (5%)	-$26.96	-$15.12	-$16.44	-$26.44	-$18.44
Average	-$7.68	-$2.89	-$3.80	-$21.37	-$9.48
Upper (5%)	$0.00	$0.00	-$0.01	-$12.99	-$1.50
			Wheat		
Lower (5%)	-$18.10	-$21.00	-$18.39	-$9.24	-$8.58
Average	-$5.45	-$5.89	-$6.35	-$6.41	-$6.61
Upper (5%)	$0.00	$0.00	-$0.05	-$3.17	-$1.95
			Sugarbeets		
Lower (5%)	-$64.52	-$46.06	-$45.22	-$46.56	-$27.51
Average	-$28.64	-$13.12	-$15.76	-$38.85	-$20.42
Upper (5%)	$0.00	$0.00	-$0.07	-$29.02	-$3.93
			Soybeans		
Lower (5%)	-$3.23	-$0.05	-$0.22	-$24.47	-$9.96
Average	-$0.26	$0.00	-$0.02	-$12.74	-$1.22
Upper (5%)	$0.00	$0.00	$0.00	-$1.64	$0.00

Executive Summary Table 4
Range of Per-Acre Crop Losses Observed in the Study, Storage Areas that Now Flood (new flooding), using a 10-day Dry Down Period

	10-Year	20-Year	25-Year	25-Year Long Flood	25-Year Extra Long Flood
			Corn		
Lower (5%)	-$11.03	-$47.21	-$35.08	-$33.20	-$45.59
Average	-$0.71	-$7.61	-$3.97	-$3.61	-$6.01
Upper (5%)	$0.00	$0.00	$0.00	$0.00	$0.00
			Wheat		
Lower (5%)	-$21.81	-$65.55	-$56.83	-$52.82	-$67.19
Average	-$1.50	-$12.60	-$7.34	-$6.71	-$10.61
Upper (5%)	-$0.00	$0.00	$0.00	$0.00	$0.00
			Sugarbeets		
Lower (5%)	-$65.58	-$195.27	-$152.90	-$158.90	-$195.43
Average	-$4.53	-$37.39	-$20.75	-$20.71	-$31.16
Upper (5%)	-$0.00	$0.00	$0.00	$0.00	$0.00
			Soybeans		
Lower (5%)	$0.00	-$0.13	-$0.01	-$0.01	-$0.04
Average	$0.00	-$0.01	$0.00	$0.00	$0.00
Upper (5%)	$0.00	$0.00	$0.00	$0.00	$0.00

	2009-like	50-year	100-year	500-year	PMF
			Corn		
Lower (5%)	-$38.22	-$40.63	-$49.67	-$65.72	na
Average	-$4.69	-$5.10	-$7.32	-$11.22	na
Upper (5%)	$0.00	$0.00	$0.00	$0.00	na
			Wheat		
Lower (5%)	-$56.16	-$62.31	-$61.29	-$88.96	na
Average	-$7.55	-$9.27	-$9.00	-$18.27	na
Upper (5%)	$0.00	$0.00	$0.00	$0.00	na
			Sugarbeets		
Lower (5%)	-$176.11	-$183.15	-$196.08	-$258.69	na
Average	-$25.61	-$27.82	-$34.15	-$54.21	na
Upper (5%)	$0.00	$0.00	$0.00	$0.00	na
			Soybeans		
Lower (5%)	-$0.02	-$0.03	-$0.12	-$0.23	na
Average	$0.00	$0.00	-$0.01	-$0.01	na
Upper (5%)	$0.00	$0.00	$0.00	$0.00	na

Executive Summary Table 5
Range of Per-Acre Crop Losses Observed in the Study, Storage Areas that Flood Longer, using a 14-day Dry Down Period

	10-Year	20-Year	25-Year	25-Year Long Flood	25-Year Extra Long Flood
			Corn		
Lower (5%)	-$1.47	-$12.75	-$13.36	-$13.49	-$25.59
Average	-$0.20	-$3.56	-$3.43	-$3.67	-$8.38
Upper (5%)	$0.00	$0.00	-0.00	-$0.02	-$0.35
			Wheat		
Lower (5%)	-$1.61	-$6.02	-$14.10	-$12.64	-$20.52
Average	-$0.56	-$2.53	-$5.83	-$5.71	-$11.42
Upper (5%)	$0.00	$0.00	$0.00	-$0.02	-$1.57
			Sugarbeets		
Lower (5%)	-$1.20	-$7.32	-$34.49	-$31.59	-$49.95
Average	-$0.31	-$2.61	-$15.18	-$14.33	-$26.16
Upper (5%)	$0.00	$0.00	$0.00	-$0.29	-$0.60
			Soybeans		
Lower (5%)	-$0.01	-$0.43	-$0.24	-$0.49	-$2.81
Average	$0.00	-$0.02	-$0.01	-$0.08	-$0.42
Upper (5%)	$0.00	$0.00	$0.00	$0.00	$0.00
	2009-like	**50-year**	**100-year**	**500-year**	**PMF**
			Corn		
Lower (5%)	-$35.83	-$21.46	-$23.36	-$26.29	-$20.73
Average	-$12.83	-$5.71	-$6.97	-$19.77	-$12.94
Upper (5%)	-$0.23	$0.00	-$0.02	-$11.48	-$3.23
			Wheat		
Lower (5%)	-$18.62	-$21.41	-$18.72	-$9.26	-$8.65
Average	-$8.57	-$9.70	-$9.72	-$6.81	-$7.17
Upper (5%)	-$0.06	$0.00	-$0.05	-$3.12	-$3.25
			Sugarbeets		
Lower (5%)	-$65.29	-$46.59	-$45.40	-$46.68	-$27.51
Average	-$38.80	-$21.45	-$24.02	-$40.33	-$23.46
Upper (5%)	-$0.80	$0.00	-$0.08	-$30.29	-$7.01
			Soybeans		
Lower (5%)	-$9.15	-$0.52	-$1.26	-$24.32	-$13.56
Average	-$0.84	-$0.03	-$0.08	-$13.43	-$2.78
Upper (5%)	$0.00	$0.00	$0.00	-$2.32	$0.00

Executive Summary Table 6
Range of Per-Acre Crop Losses Observed in the Study, Storage Areas that Now Flood (new flooding), using a 14-day Dry Down Period

	10-Year	20-Year	25-Year	25-Year Long Flood	25-Year Extra Long Flood
			Corn		
Lower (5%)	-$25.01	-$76.51	-$60.63	-$58.06	-$75.25
Average	-$2.33	-$16.12	-$9.78	-$9.06	-$13.86
Upper (5%)	$0.00	$0.00	$0.00	$0.00	$0.00
			Wheat		
Lower (5%)	-$43.30	-$90.62	-$83.45	-$78.85	-$93.57
Average	-$4.58	-$23.42	-$16.27	-$14.95	-$21.51
Upper (5%)	$0.00	$0.00	$0.00	$0.00	$0.00
			Sugarbeets		
Lower (5%)	-$21.10	-$52.08	-$221.55	-$233.01	-$270.03
Average	-$2.16	-$12.45	-$44.69	-$45.42	-$62.63
Upper (5%)	$0.00	$0.00	$0.00	$0.00	$0.00
			Soybeans		
Lower (5%)	$0.00	-$1.30	-$0.19	-$0.15	-$0.50
Average	$0.00	-$0.06	-$0.01	-$0.01	-$0.02
Upper (5%)	$0.00	$0.00	$0.00	$0.00	$0.00

	2009-like	50-year	100-year	500-year	PMF
			Corn		
Lower (5%)	-$64.70	-$68.29	-$80.58	-$102.91	na
Average	-$11.14	-$12.01	-$16.07	-$23.21	na
Upper (5%)	$0.00	-$0.24	$0.00	$0.00	na
			Wheat		
Lower (5%)	-$82.38	-$88.66	-$87.60	-$113.41	na
Average	-$16.41	-$19.27	-$18.79	-$32.90	na
Upper (5%)	$0.00	$0.00	$0.00	$0.00	na
			Sugarbeets		
Lower (5%)	-$251.23	-$256.92	-$267.80	-$336.12	na
Average	-$53.47	-$57.07	-$65.94	-$97.33	na
Upper (5%)	$0.00	$0.00	$0.00	$0.00	na
			Soybeans		
Lower (5%)	-$0.32	-$0.37	-$1.09	-$2.13	na
Average	-$0.02	-$0.02	-$0.06	-$0.11	na
Upper (5%)	$0.00	$0.00	$0.00	$0.00	na

Executive Summary Table 7
Comparison of Average Per-acre Losses between 10-day and 14-day Dry Down Periods Averaged Across all Crops and Storage Areas for Hydrology Groups Three and Five

	10-Year	20-Year	25-Year	25-Year Long Flood	25-Year Extra Long Flood
Hydrology Group 3 (floods longer)					
10-day	-$0.15	-$1.50	-$1.49	-$1.64	-$3.75
14-day	-$0.31	-$2.61	-$2.72	-$2.81	-$6.02
From 10-day to 14 day ($)	-$0.16	-$1.11	-$1.23	-$1.16	-$2.27
From 10-day to 14 day (%)	109.2%	74.0%	82.9%	71.0%	60.5%
Frequency of Loss, 10-day	29.5%	59.7%	53.4%	100%	100%
Frequency of Loss, 14-day	44.9%	74.5%	69.9%	100%	100%
Change in Likelihood of Loss from 10 to 14-day dry down	15.5%	14.8%	16.5%	0.0%	0.0%
Hydrology Group 5 (new flooding)					
10-day	-$0.70	-$6.34	-$3.65	-$3.28	-$5.17
14-day	-$2.16	-$12.45	-$8.30	-$7.63	-$11.06
From 10-day to 14 day ($)	-$1.47	-$6.11	-$4.67	-$4.35	-$5.89
From 10-day to 14 day (%)	210.6%	96.4%	128.3%	132.5%	114.0%
Frequency of Loss, 10-day	19.3%	52.6%	44.9%	48.8%	56.1%
Frequency of Loss, 14-day	33.2%	67.5%	59.8%	63.6%	71.2%
Change in Likelihood of Loss from 10 to 14-day dry down	13.9%	14.9%	14.9%	14.8%	15.1%

	2009-like	50-year	100-year	500-year	PMF
Hydrology Group 3 (floods longer)					
10-day	-$5.70	-$2.40	-$3.02	-$17.91	-$6.25
14-day	-$8.94	-$4.33	-$5.10	-$20.92	-$8.59
From 10-day to 14 day ($)	-$3.24	-$1.92	-$2.08	-$3.01	-$2.35
From 10-day to 14 day (%)	56.9%	79.8%	68.7%	16.8%	37.6%
Frequency of Loss, 10-day	91.9%	56.1%	99.2%	100%	99.4%
Frequency of Loss, 14-day	97.5%	71.2%	99.9%	100%	99.9%
Change in Likelihood of Loss from 10 to 14-day dry down	5.6%	15.1%	0.7%	0.0%	0.5%
Hydrology Group 5 (new flooding)					
10-day	-$4.18	-$4.61	-$6.42	-$9.25	na
14-day	-$9.20	-$10.03	-$13.16	-$17.68	na
From 10-day to 14 day ($)	-$5.03	-$5.42	-$6.74	-$8.43	na
From 10-day to 14 day (%)	120.4%	117.5%	105.1%	91.2%	na
Frequency of Loss, 10-day	48.9%	52.5%	59.8%	56.2%	na
Frequency of Loss, 14-day	63.7%	67.4%	74.7%	71.3%	na
Change in Likelihood of Loss from 10 to 14-day dry down	14.8%	14.9%	14.9%	15.2%	na

na = not applicable.
PMF = Probabilistic Maximum Flood.

Note: Per-acre revenue losses represent a composite of corn, wheat, soybeans and sugarbeets, based on their respective share of county crop acreage. Therefore, losses per acre for any hydrology group represent an average of the storage areas within that group and an average of revenues from all crops, even if some crops did not experience a planting delay or revenue loss.

Per-acre losses and the likelihood of incurring a planting delay generally increased from high frequency (small) floods to low frequency (large) floods.

The annual likelihood of incurring a revenue loss, measured by averaging revenue losses across all crops, ranged from around 50 percent up nearly 100 percent for lands that flood longer for both the 10-day and 14-day dry down scenarios. When all crops were averaged among the acreage for lands than now flood, the annual probability of revenue losses from delayed planting generally ranged from 50 to 75 percent. These conditions suggest a high probability of incurring some planting delays resulting from use of the staging area.

The magnitude of revenue losses were evaluated across all 10,000 replications and for just those replications that resulting in a revenue loss. For lands that now flood, the simulation showed that 25 percent to 50 percent of the replications did not generate a planting delay that created revenue losses. However, the frequency of planting delays for soybeans were much lower than wheat, corn, and sugarbeets, lowering overall per-acre losses. Also, soybeans represented the largest share of acreage, so average values were again sensitive to the lower frequency and magnitude of losses with soybeans.

Adding four days to the dry down period, resulted in two effects. The *likelihood* of incurring planting delays that result in a revenue loss increased by about 15 percent across all 10 flood events for both lands that flood longer with the Diversion and lands that experience new flooding from operation of the Diversion.

Adding four days to the dry down period also increased the *magnitude* of per-acre revenue losses for both Hydrology Groups 3 and 5. For lands that flood longer, the additional days of dry down increased average per-acre revenue losses by about 60 to 80 percent across nearly all flood events. However, considering the relatively low average revenue losses, the nominal increases in per-acre losses were generally $1 to $3 per acre for lands experiencing longer flooding. For lands that experience new flooding, the longer dry down period increased losses from 100 percent to 120 percent which translates into about $4 to $8 per acre increase in revenue losses compared to a 10 day dry down period.

Conclusions

Overall, the economic impact of Diversion Operations on planting delays in the 241 storage areas was modest. In evaluating the historical data and expected differences in flooding created by the Diversion, several reasons underpin this conclusion.

There are no recorded flows on the Red River due to rain that would have triggered the use of the Diversion during the crop-growing season. Historically, the Diversion would have never been needed to protect against a summer flood. The Diversion is not expected to create losses after spring planting season.

Spring snow melt and runoff, in most cases, occur early relative to the regional planting season. During much of the flood-event, no planting occurs due to snow melt, cold temperaturs, and overall wet conditions. Statistical analysis of the historical data suggest there was limited overlap between spring runoff and planting.

The engineering data indicate that the combined capacity of the Red River and the Diversion channel, once the community is protected with dikes, will move extensive amounts of water around the community. The exact amount and timing will not be known until the Diversion Operating Manual is finalized by the U.S. Corps of Engineers, but the preliminary indications are that the Red River will handle 17,000 cfs through the community and the Diversion channel will handle an additional 22,000 cfs around the community. However, despite the stated capacities, the timing and flow of flood waters also will be based on the characteristics of the flood-event, and all floods are unique (e.g., compare the 1997 flood event to the 2009 flood event). The combined flow capacity of 39,000 cfs clearly exceeds the largest flow in Fargo of 29,800 cfs observed in 2009. Both the stated design capacity of the Diversion and the current hydrology data suggest that water will not be retained in the staging area for extensive periods, and it is highly likely that those lands will be planted in a flood year.

In the more modest flood events (e.g., 25-year and 50-year events), many storage areas are not adversely affected by the Diversion. About 20 percent to 40 percent of acreage in the staging area, most lying in relatively low elevations, would experience flooding Without the Diversion. Current hydrology modeling suggests that the majority of lands that would flood Without the Diversion will experience 1 to 10 days of additional time for the effects of flooding to be gone (Group 3). For those lands, the Diversion may contribute to a delayed planting but is not responsible for all of the delayed planting. Most lands that will experience new flooding With the Diversion (Group 5) would require up to 20 to 30 days from the date when the staging area is activated until the effects of flooding are gone, depending upon dry down assumptions. However, not all of those days translate directly into planting delays. For much of that period, general weather conditions, such as temperature and normal dry-down from snow melt, prevent spring planting.

The impacts of planting delays from Diversion operations on corn, wheat, and sugarbeets are likely to be substantially different than soybeans. Soybeans had the lowest frequency and magnitude of revenue loss of the four crops. Soybeans also have the lowest relative yield decline of the four crops when planted beyond the optimal period. Over the planting periods evaluated in this study, planting delays have less relative impact on soybeans than corn, wheat, or sugarbeets. Soybeans also are planted later in the spring, reducing the likelihood of planting delays due to the use of the staging area. This combination of factors is why soybeans have the lowest per-acre revenue losses. Soybeans also comprise the largest share of crops grown in the staging area, which further reduces the average revenue losses when all crop losses are combined within an entire storage area.

Operation of the Diversion creates a high likelihood of modest planting delays and subsequent revenue loss. The likelihood of incurring a planting delay increases as flood events increase in size and duration. Results are somewhat sensitive to the assumptions used for dry down periods, as adding four days to the 10-day dry down period increases both the likelihood and magnitude of losses from planting delays.

Due to the complexity of the hydrology, which varies by storage area for the flood events evaluated, generalized statements about how producers will be individually affected are difficult. Revenue losses across all acres and crops within a storage area and by hydrology group measures the potential cumulative losses in the staging area and identifies general risk. However, care should be exercised that generalities and averages mask substantial differences for individual crops and storage areas. The economic impacts on some agricultural producers are likely to be considerably different from the average values within the hydrology groups.

Total losses in this study were based on the assumption that if any portion of a storage area was inundated, all land within that storage area was equally affected. Given the lack of available data to refine that assumption, developing estimates using all acreage was the best approach. However, overall losses due to the use of the Diversion would be sensitive to that assumption. Finally, including the value of lost insurance indemnities would increase total losses.

Assessment of the Agricultural Risk of Temporary Water Storage for the FM Diversion Staging Area

Dean A. Bangsund, Saleem Shaik, David Saxowsky, Nancy M. Hodur, and Elvis Ndembe*

The proposed Fargo/Moorhead Area Diversion (FM Diversion) is intended to reduce the flood risk for Fargo, North Dakota, Moorhead, Minnesota and other communities in Cass County, North Dakota and Clay County, Minnesota. The project is being pursued by the Flood Diversion Board of Authority (FM Diversion Authority) in collaboration with the U.S. Army Corps of Engineers (USACE).[1] The FM Diversion is comprised of a water storage embankment and tie-back levies upstream of Fargo, flood protection dikes in the Fargo/Moorhead communities, and a Diversion channel to route water around the Fargo/Moorhead/West Fargo metro area. The embankment, tie back levies, and natural rise in the Red River basin will create a staging area in which water will be temporarily collected during times of high flow during spring flood events.[2]

Current design of the FM Diversion is that temporary water storage will occur during spring flood events when the predicted flow of the Red River exceeds 21,000 cubic feet per second (cfs) in Fargo. Five flood events since 1969, all occurring in the spring, would have triggered use of the FM Diversion using that criterion. The flow of the Red River at Fargo has not exceeded 21,000 cfs more than one flood event within a year's time.

Researchers in the Department of Agribusiness & Applied Economics at North Dakota State University prepared an initial assessment in 2015 of the risk and economic effects on spring planting resulting from the proposed temporary water storage during spring flood events (Bangsund et al. 2015)[3]. Following completion of the initial agricultural risk assessment in 2015 and with a mandate from the 2015 North Dakota Legislature, engineers reviewed and refined hydrology data to ensure all agricultural lands affected by six inches or more of inundation during temporary water storage associated with the FM Diversion were identified and evaluated (Bangsund et al. 2016).

This study represents the third economic assessment relating to temporary water storage associated with operation of the FM Diversion. All of the methods developed in the previous assessments (Bangsund et al. 2015; 2016) were retained in this study while economic values and other parameters were updated through the most recent data.

Previous studies evaluating the risk of planting delays resulting from use of the FM Diversion's staging area were based on the original USACE design. Efforts to mitigate the upstream impacts from temporary water storage associated with the original design resulted in the staging area being moved west from its original location (Technical Advisory Board). The re-designed staging area is often referred to as 'Plan B'. This study is based on the revised (Plan B) staging area (Figure 1).

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[1] Additional information is available on the FM Diversion web site http://www.fmDiversion.com/authority.php

[2] Additional materials and information on the physical dimensions and placement of key elements of the FM Diversion can be found on the FM Diversion web site http://www.fmDiversion.com/pdf/StructureFeatures20140401_1117.pdf

[3] Report is available at: http://ageconsearch.umn.edu/bitstream/211469/2/AAE745.pdf

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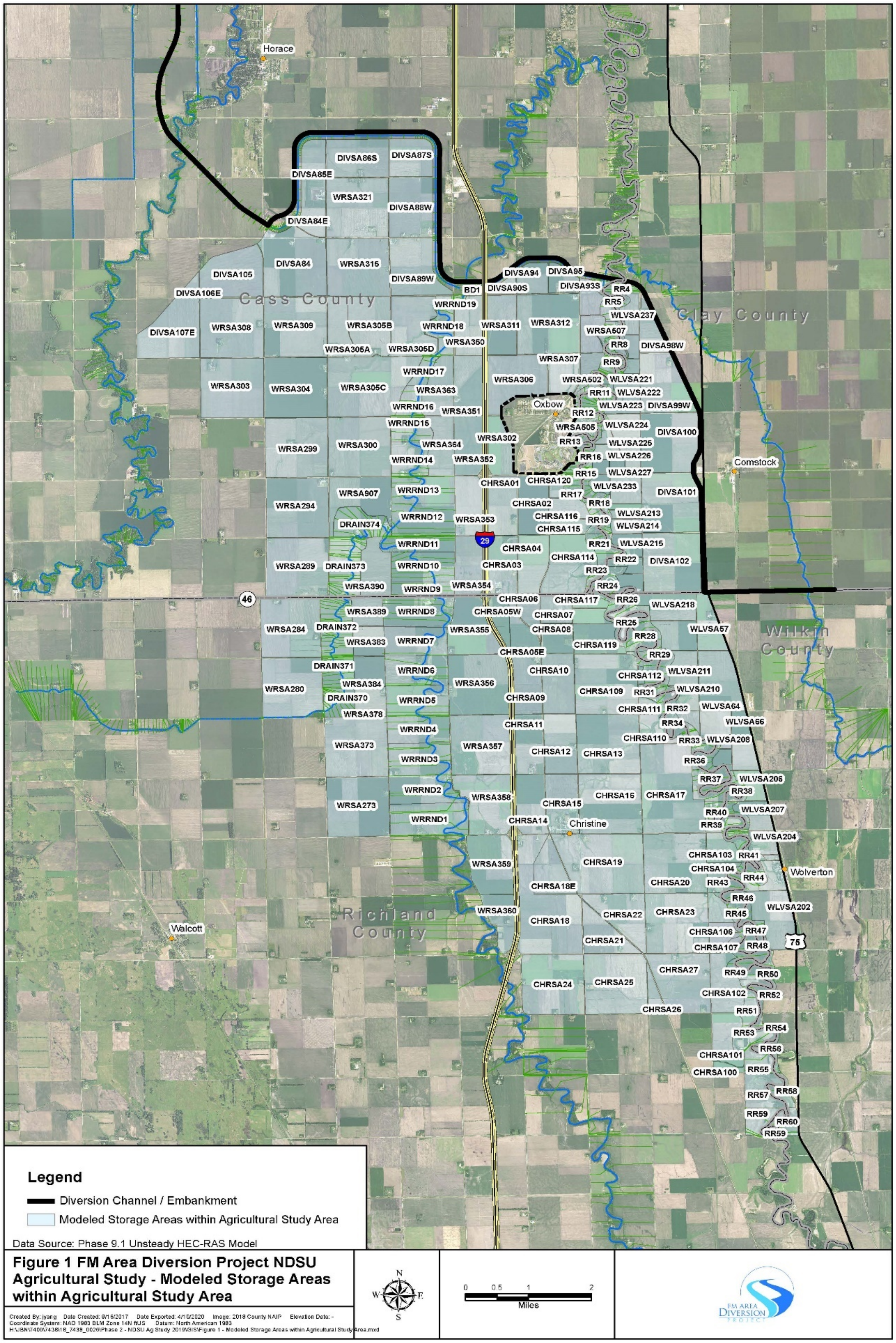

Figure 1. Storage Areas Associated With FM Diversion Staging Area, 2019
Source: Houston-Moore Group (2019).

Historical Flood Events

The Red River and the Wild Rice River are the primary sources of water flowing into the staging area. Other nearby rivers, such as the Sheyenne River in North Dakota and the Buffalo River in Minnesota will not likely contribute water to the staging area. However, large flood events on the Sheyenne River can result in breakout flow that would make it into Richland County Drain 37 and then into the staging area. Water will not be collected in the staging area unless the combined flow of the Red and Wild Rice Rivers exceeds 21,000 cfs. The USACE indicates it will monitor the flow of the two rivers upstream of Fargo to determine when to begin staging water (i.e., activate the Project).

An indicator of the combined flow of these two rivers is the historic flow of the Red River at Fargo, which is downstream from the confluence of the Wild Rice and Red rivers. Information on flows for the Red River in Fargo are presented for two thresholds: 17,000 cfs and 21,000 cfs. United States Geological Survey (USGS) data indicate that the flow of the Red River in Fargo has reached or exceeded 17,000 cfs 11 times since 1902 and exceeded 21,000 cfs 5 times since 1902 (Table 1).[4]

Dates pertaining to the 17,000 cfs threshold were used to develop the stochastic distribution of staging area activation dates in the Monte Carlo simulation. This threshold is consistent with previous analyses on the potential planting delays associated with operation of the FM Diversion staging area, provides more historical observations for statistical analysis, and produces a slightly more conservative distribution of staging area activation dates in the Monte Carlo simulation. The average date when the Red River in Fargo reaches 21,000 cfs is April 3. By comparison, the same date for the 17,000 cfs threshold in April 5 (Table 1). An April 5 mean date provides a slightly more conservative distribution for the Monte Carlo simulation.

[4] Maximum discharges are presented as Peak Streamflow for each given year. Additional information on historical water flows can be obtained from the USGS web site http://waterdata.usgs.gov/nwis/dv?referred_module=sw&site_no=05054000.

Table 1. Dates When Red River Exceeded 17,000 and 21,000 Cubic Feet per Second at Fargo, North Dakota			
Years	Dates for 17,000 CFS	Dates for 21,000 CFS	Maximum CFS[a]
1969	April 13 to April 18	April 13 to April 16	25,300
1978	April 3	None	17,500
1979	April 19	None	17,300
1989	April 8 to April 10	None	18,900
1997	April 9 to April 28	April 14 to April 25	28,000
2001	April 12 to April 17	None	20,300
2006	April 3 to April 7	None	19,900
2009	March 25 to April 3	March 26 to March 31	29,500
2010	March 19 to March 24	March 20 to March 21	21,200
2011	April 7 to April 17	April 8 to April 13	27,200
2019	April 7 to April 9	None	19,500
Average first date for Fargo Gage	April 5	April 3	

[a] Maximum discharges are presented as Peak Streamflow for each given year.

Red River did not reach 17,000 CFS in 107 of 118 years from 1902 to 2019.
Red River did not reach 21,000 CFS in 113 of 118 years from 1902 to 2019.

Source: U.S. Geological Survey (2019).

Using the 17,000 cfs and 21,000 cfs thresholds, all of the high flow events have occurred since 1969; three of which occurred consecutively from 2009 through 2011. The most extensive flood events occurred in 1997 and 2009. The general timing of these recent occurrences raises concern that larger flood events may be more frequent (17,000 cfs for 11 times in 50 years) than suggested by long-term historical data (17,000 cfs for 11 times in 118 years). The flow of the Red River at Fargo has not exceeded 17,000 cfs more than once within a year's time.

USGS Gage 05054000 on the Red River at Fargo, ND has a discharge-frequency relationship that is based on historical streamflow gage records. The Federal Emergency Management Agency (FEMA) has defined the various flood event sizes for the Red River at Fargo based on discharge rates and probability of occurrence (Table 2) (FEMA 2015). These discharges were defined using a period of record extending from 1902 to 1971. For the FM Diversion Project, USACE developed new hydrology using an updated period of record that extends from 1902 to 2009. Because of the additional years of record, and the additional years were generally wetter than the previous period, the discharges increased for a given probability of occurrence. Prior phases of the project utilized what is known as Wet-Cycle hydrology, which was developed from a shorter period of record (1942-2009), but it is not currently being used in the current design (Plan B).

The discharge-frequency curves indicate the relationship between discharge rates and flood events, for example, 21,000 cfs is approximately a 20-year event meaning a flood event of that size has a 5 percent probability of occurring in any year.

Table 2. Historical Discharges, Red River in Fargo and Estimated Discharges and Probability of Occurrence				
	Peak Discharge (cfs) in Red River at Fargo			
	FEMA	U.S. Army Corps of Engineers		USGS
Flood Event and Annual Probability of Occurrence	Effective FIS[a] (1902-1971)	Wet-Cycle[b] (1942-2009)	Period of Record[c] (1902-2009)	Fargo Gage 05054000
10-year 10.0%	10,300	17,300	13,865	
50-year 2.0%	22,300	29,300	26,000	
100-year 1.0%	29,300	34,700	33,000	
500-year 0.2%	50,000	61,700	66,000	
1997 Historical				28,000
2006 Historical				19,900
2009 Historical				29,500
2010 Historical				21,200
2011 Historical				27,200
2019 Historical				19,500

[a] FEMA (2015). FIS – Flood Insurance Study.

[b] Wet-Cycle Hydrology was an approach developed by a panel of experts engaged by the USACE to assess whether the whole period of record or a subset of the period of record should be used as part of the FM Diversion plan. The panel concluded that a subset of the period of record should be used.

[c] Period of Record hydrology, USACE

Source: U.S. Army Corps of Engineers (2013); U.S. Geological Survey (2019).

The maximum or peak discharge for any event does not indicate the total volume of water during the event. The flood event of 1997, for example, contained more water than the 2009 flood event although the peak discharge rate for the 1997 flood event was lower than the peak discharge rate for 2009 flood event. The difference was that the 1997 flood event lasted for a longer time (11 days of flow in excess of 21,000 cfs compared to 6 days in 2009). When determining which land will flood, maximum flow is critical, but in this study where the analysis is focusing on land flooded due to stored water, total volume is the more critical consideration. Thus, the flow rate needs to be converted to a volume by incorporating a measure of duration of inundation.

The highest flow on the Red River in Fargo has been associated with spring flooding due to snow melt and rains during the snow melt period. The earliest that the flow exceeded 17,000 cfs was March 19 (2010) and the latest that the flow exceeded 17,000 cfs was April 28 (1997) (Table 3). The highest peak flow was in 2009 when the flow reached 29,500 cfs (based on USGS data). In two years (1978 and 1979), the flow reached 17,000 cfs for only one day. Occasional heavy summer rain has not increased the flow of the river above the critical flow of 21,000 cfs [for example, the flow of the Red River at Fargo reached 13,100 cfs in early July 1975 and early June 2007; there also was high water (about 10,000 to 11,000 cfs) in late June 2013 and June 2009]. Based on these data, it is assumed that the Project would have been operated five times since 1902.

The timing and duration of the flood event, relative to planting dates will drive the impact on agricultural production. The time of spring melt and planting seasons for 2000-2019 and 1997 have been summarized (Table 3).

Table 3. Dates of Red River Spring Flows and Spring Planting Dates, 1997 through 2019								
Year	Flood Event Size	Date Fargo Flow Reached 17,000 cfs[a]	Average Daily Peak Fargo flow (cfs)	Date of Maximum Fargo Flow	Recorded Date Fargo Flow Declined to Less than 17,000 cfs[b]	Early Planting Start Date[c]	More General Planting Start Date[c]	Days available to Drain & Dry Land before Start of General Planting[d]
2000	No flood		3,060	Mar. 25		Apr. 16	Apr. 16	
2002	No flood		1,940	Apr. 1		Apr. 7	Apr. 27	
2003	No flood		1,780	Apr. 22		Apr. 13	Apr. 26	
2004	No flood		1,320	Mar. 27		Apr. 4	Apr. 18	
2005	No flood		3,990	Apr. 1		Apr. 10	Apr. 17	
2007	No flood		8,770	Apr. 6		Apr. 15	Apr. 21	
2008	No flood		2,220	Apr. 18		Apr. 13	Apr. 26	
2012	No flood		3,770	Mar. 18		Apr. 8	Apr. 15	
2013	No flood		15,900	Apr. 30		May 5	May 5	
2014	No flood		9,490	May 3		Apr. 20	May 10	
2019	20-year	Apr. 7	19,600	Apr. 8	Apr. 10	Apr. 28	May 5	25
2006	25-year	Apr. 3	19,800	Apr. 5	Apr. 8	Apr. 16	Apr. 23	15
2001	25-year	Apr. 12	20,200	Apr. 14	Apr. 18	Apr. 22	May 6	18
2010	25-year	Mar. 19	21,100	Mar. 21	Mar. 25	Apr. 11	Apr. 18	24
1997	25-year	Apr. 9	27,800	Apr. 17	Apr. 29	na	na	na
2011	50-year	Apr. 7	26,100	Apr. 9	Apr. 18	Apr. 24	May 8	20
2009	70-year	Mar. 25	29,100	Mar. 28	Apr. 4	Apr. 19	May 3	29

NOTE: The 17,000 cfs threshold is used to portray the simulated staging activation dates in the analysis. The actual activation dates will correspond to a higher threshold of 21,000 cfs. The 17,000 cfs enables more comparisons between flow rates and planting start dates than would be observed using a 21,000 cfs threshold.

[a] Perhaps a day or two after the Project would have been activated based on gages south of Fargo.

[b] Latest recorded date for peak acreage flooded due to the Project, assuming that outflow from staging area does not drop below 17,000 cfs while there is water in the staging area.

[c] Early planting date was defined as the first calendar date reported by National Agricultural Statistics Service for when spring planting begun. More General Planting date was defined to represent the date when about 20 percent of a crop has been planted. Both Early Planting and More General Planting dates are for wheat, corn, and sugarbeets.

[d] Time between date Fargo flow declines to less than 17,000 cfs and the general planting start date.

Information on daily river heights and flow rates for the Red River in Fargo from 1902 through 2019 was obtained from United States Geological Survey (2019). While the Red River Valley has experienced a number of spring flood events since 1902, only 10 events have exceeded 17,000 cfs (Figure 2). The flow in 1978 reached 17,000 cfs for one day and is not included in Figures 2 and 3. However, only five events have surpassed 21,000 cfs and would have been large enough to have triggered the use of FM Diversion staging area. Historically, flood events with river flows exceeding 17,000 cfs in Fargo have occurred over a one-month period from about the third week in March to the third week in April. Seven of the ten flood events have occurred during an eight-day period from April 6th through April 13th (Figure 2).

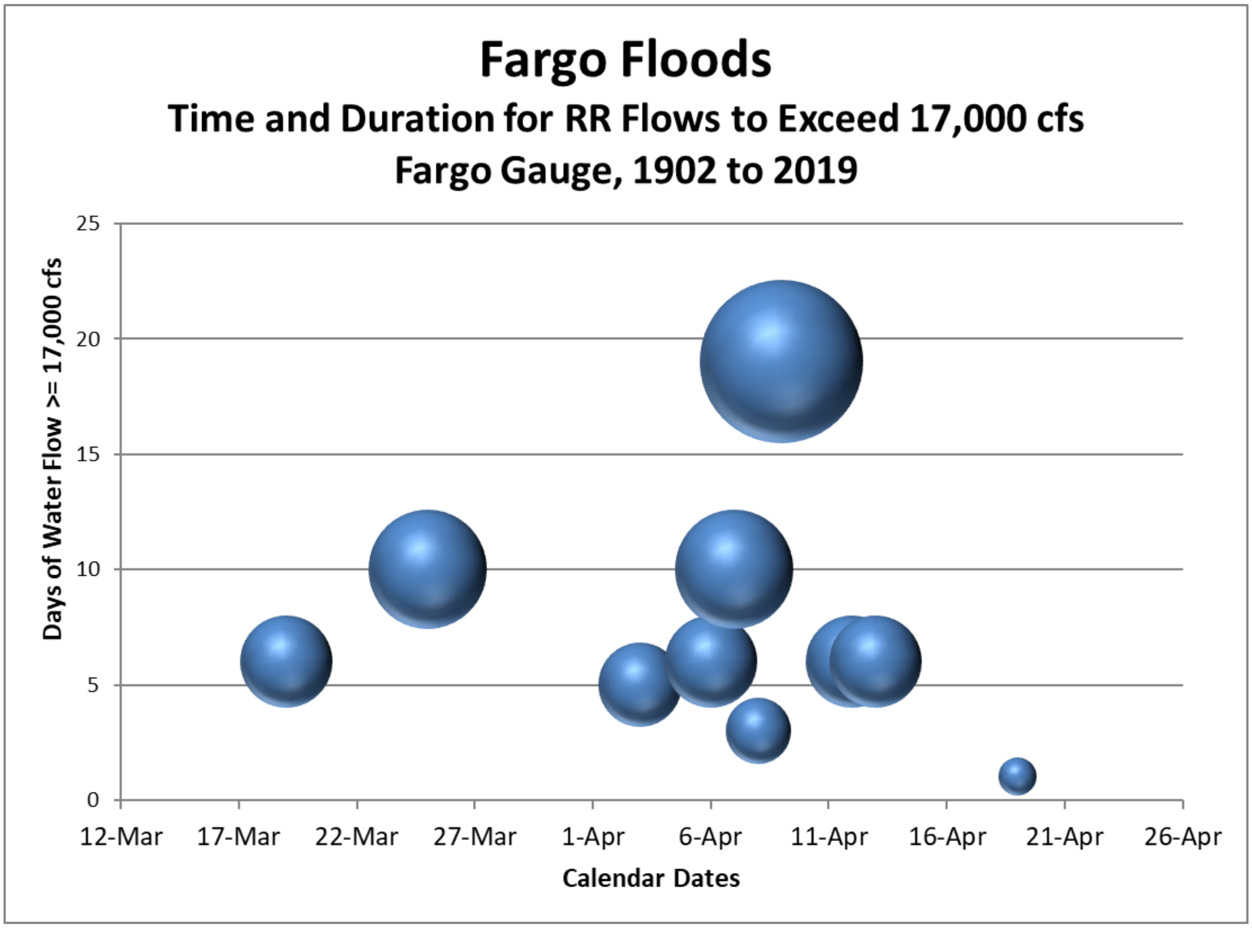

Figure 2. Relative Size and Calendar Dates for Flood Events in Fargo Sufficiently Large to Trigger Use of FM Diversion Staging Area, 1902 through 2019.
Source: U.S. Geological Survey (2019).

The timing of the flood events over the 1902 to 2019 period shows that most of the large flood events have occurred in the latter part of the period (Figure 3). The frequency the region will experience for future flood events is not estimated in this study. This assessment does not predict how many large flood events will occur in the future in the Fargo/Moorhead area. Rather, the probability of a flood event occurring in any particular year is limited to the definition for flood sizes (e.g., 25-year flood event has a 4 percent chance of occurring in any given year).

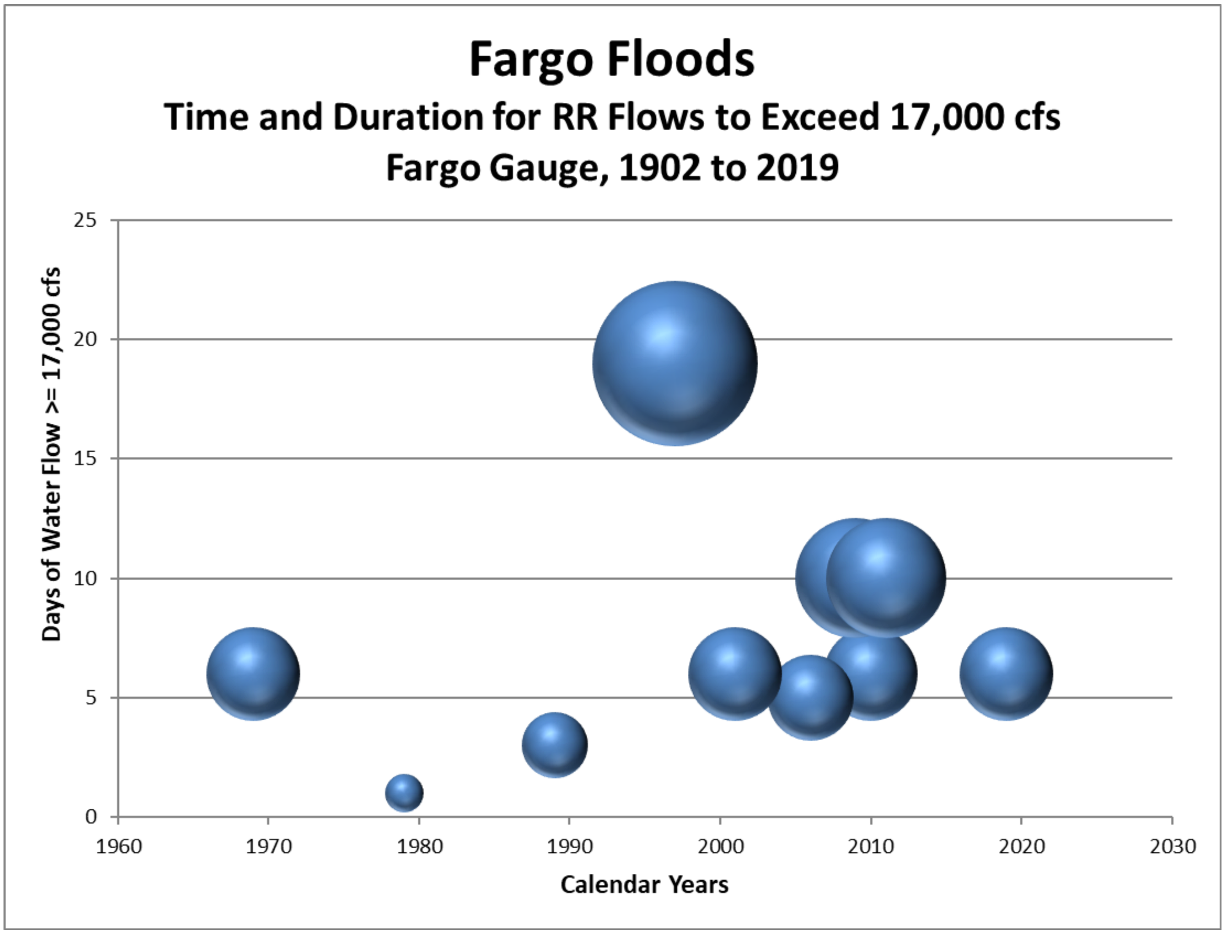

Figure 3. Years for Flood Events in Fargo/Moorhead Sufficiently Large to Trigger Use of FM Diversion Staging Area, 1902 through 2019.
Source: U.S. Geological Survey (2019).

Implications for Agricultural Production

The implications of temporary water storage raise a number of questions, such as the effects of inundation on public infrastructure (e.g., roads, bridges), cultural landmarks (e.g., cemeteries), residential and commercial structures, delivery of public services (e.g., fire and rescue), and agricultural lands. This study represents an update from the two previous studies by including recent economic data and in refined hydrology effects on agricultural lands.

The following points underpin the analysis:

- Net Impact - The impact of the proposed Diversion on production agriculture in the staging area is the difference between:
    - 1) the gross revenues from production agriculture in the staging area WITHOUT the Diversion
    - 2) the gross revenues from production agriculture in the staging area WITH the Diversion.

  Note: The measure of damage created by the FM Diversion should not to be confused with the difference between gross revenues in a flood year and gross revenues in a non-flood year[5].

- Flood Event Size - The staging area would be filled to capacity only in case of an extremely large (but also low probability) flood event (e.g., 100-year, 500-year, PMF events). Smaller flood events, even though their flow exceeds 17,000 cfs and would require water storage, are not likely to fill the staging area. Thus, the higher elevations in the staging area, such as 925 feet above mean sea level (msl), may rarely be impacted by the operation of the Diversion. The study addresses how acreage of land inundated varies among flood event sizes based on general field elevation and volume of water associated with different flood events as opposed evaluations examining peak or crest flow rates.

- Hydrology and Inundation - FM Diversion staging area primarily affects agricultural lands by either:
    - 1) Retaining water longer than would otherwise occur. In these circumstances, the lands would have flooded even Without the Diversion. Many of those areas are in lower relative elevations, and often experience spring flooding. The impact of the Diversion on these agricultural lands would result from the additional time the land remains inundated. The time required to clear debris and time necessary to dry out is NOT an impact of the Diversion because the land would have been inundated even Without the Diversion.
    - 2) Land that now floods that would not otherwise be inundated. These lands could potentially be impacted by the time that water is on the land and the time required for the lands to dry-down and to remove debris.
    - In both cases, the duration of inundation is a critical component of the analysis, and must be considered over a range of flood event sizes for land throughout the staging area.

[5] This study only examines the effects of temporary water storage associated with spring flood events. The Diversion is expected to only be needed to protect against spring-time rain and snowmelt. Based on historical records, the Diversion would have never been needed to protect against a summer flood.

- Flood Start Dates - Converting water storage duration and dry-down periods into planting delays must account for when a flood event occurs and how long the flood event lasts. Flood events do not occur on the same calendar date(s), nor do they always have the same duration. Therefore, the effects on agricultural producers can vary based on both the start date of the flood event and how long the flood event lasts.

- Spring Planting Dates - Spring planting does not start on the same date(s) every year. Planting conditions can vary considerably from year-to-year; therefore, planting delays due to the Diversion cannot be estimated without also knowing when producers can typically begin planting.

- Planting Rates - Spring planting conditions are not always constant during a planting season, nor are they necessarily consistent among years. Therefore, conditions during the spring planting season also must be included in the analysis to account for how long it takes to plant a crop.

- Agronomic Factors - Agronomic considerations include crop rotations, yields, and time periods when planting delays result in yield losses.

- Crop Prices - Crop prices are an important part of farm revenue, yet prices vary almost annually and are unlikely to be the same for all flood years.

- Insurance Eligibility - There are repercussions of a man-made versus natural flood event for crop insurance eligibility. Producers stand to lose potential revenues from crop insurance during years when the staging area is used if similar insurance provisions or mechanisms are not available to them.

The economic impact of storing water in the staging area is the difference between the economic value of agricultural crop production in the staging area Without the Diversion and the economic value of agricultural crop production in the staging area when the Diversion is operated. A number of potential factors may affect a producer as a result of the Diversion, such as soil productivity changes resulting from erosion[6], additional costs to travel in and out of the region if farmsteads are moved/relocated outside the staging area, reduction in yield due to planting delays, reduction in revenues if crops cannot be planted, potential costs of post-flood cleanup, and potential effects on crop quality (e.g., sugar content in sugarbeets). Theoretically, the potential loss of value to agricultural land in the staging area arising from a restriction or abatement on future residential or commercial development should be mitigated through Federal easements. While a number of effects may warrant consideration from an agricultural producer's perspective, this study focuses only on the economic effects of planting delays on yields and producer revenues.

The following sections describe the data that were gathered to address the key study points and the analytical approaches, assumptions, and methods used to evaluate the key issues. Additional detail is contained in several appendices, and as well as throughout the report.

[6] Erosion has occurred in previous large flood events, such as the 1997 flood. Based on hydrographs showing the rate of water inundation and rate of water out-flow between the Without Diversion conditions and With Diversion conditions, erosion may occur in the staging area on the in-fill or out-flow phases of operation. The issue of potential erosion of crop land has not been specifically addressed in the current hydrology modeling.

Data Sources

Information collected for the study includes historical information about when producers begin planting, rate of planting progress, crop yields, crop acreage, crop prices, frequency and severity of flood events, yield losses due to delayed planting, dry-down periods, and target yields for regional crops, in addition to hydrology modeling output for storage areas comprising a substantial portion of the FM Diversion staging area.

Planting Start Dates

The timing of crop planting in the Red River Basin is a function of weather, or more specifically, temperature and precipitation. In addition to when planting occurs, the time required to plant a crop also is affected by weather during the planting period. USDA National Agricultural Statistics Service (NASS) monitors spring planting progress for several crops in Minnesota and North Dakota. Planting progress data track when producers begin planting and the rate of acreage planted.

An important component in the analysis is to capture variability in spring planting conditions. NASS planting progress data identify the week when planting begins and then estimate cumulative percentage of acres planted in subsequent weeks. Often the first week of planting shows small percentages of acreage planted; small acreage also is planted in the final days of the planting season. The data imply that most acreage of key crops is planted over a short period, relative to the total planting time in any given year (National Agricultural Statistics Service 2019). Planting progress data for soybeans in North Dakota illustrates that the majority of acreage in most years is planted over a relatively short period (Figure 4).

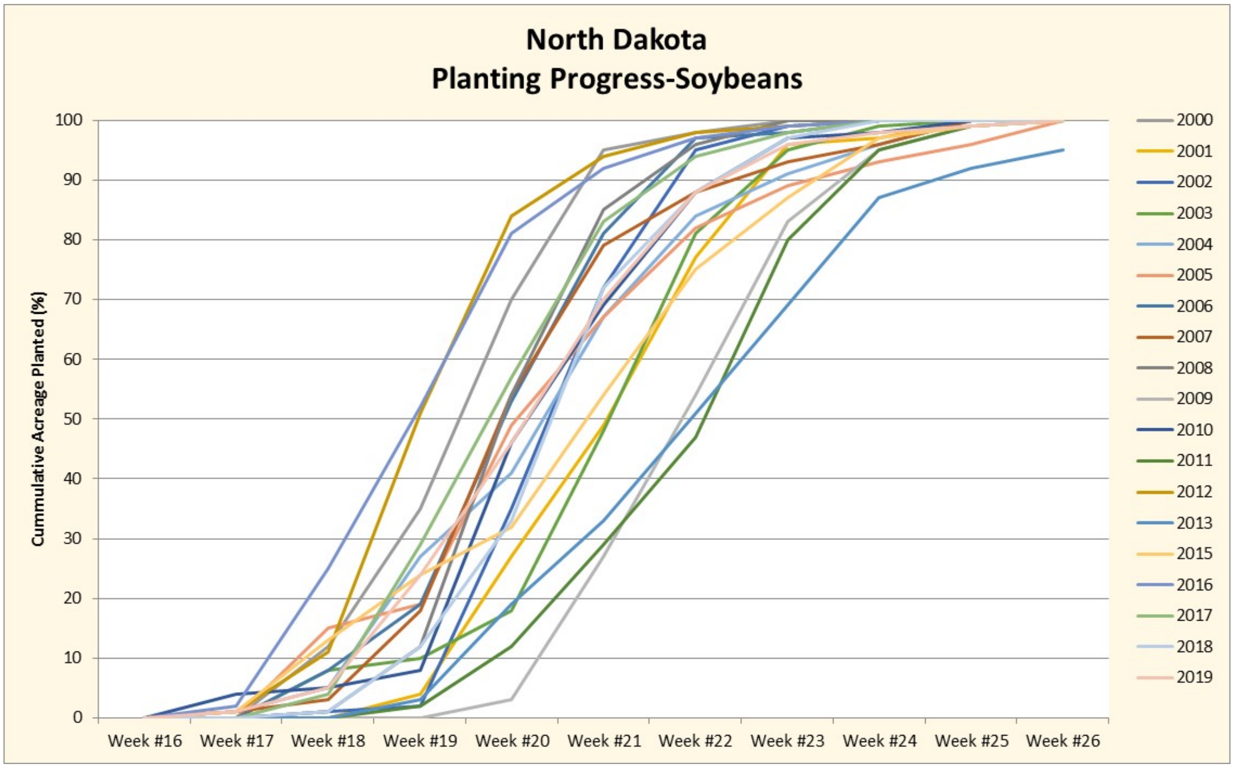

Figure 4. Statewide Planting Progress, Soybeans, North Dakota, 2000 through 2019.
Source: National Agricultural Statistics Service (2019).

The study region predominately grows corn, soybeans, sugarbeets, and wheat. A problem with statewide planting progress data is that spring planting conditions can vary considerably in different regions of the state. For example, planting progress for wheat is likely to be influenced by conditions in the western growing regions of North Dakota since the majority of wheat in the state is produced outside of the Red River Valley. Those effects also are a concern for progress data for corn and soybeans in Minnesota and North Dakota. Much of the soybeans and corn in Minnesota are raised south and east of the Red River Valley, and may not mirror planting conditions in the Red River Valley. Corn and soybeans have greatly expanded acreage to the west and north in North Dakota. Therefore, statewide planting progress data for corn and wheat were not considered representative of historical conditions within the southern Red River Valley.

Planting progress data for sugarbeets in North Dakota predominately reflect conditions present in the Red River Valley. While a small percentage of acres are grown near the Montana border in western North Dakota, the vast majority of sugarbeets raised in North Dakota are in the Red River Valley. Planting start times for wheat and corn are similar to sugarbeets. Because statewide planting progress reports are influenced by conditions elsewhere in the state, NASS data on sugarbeet planting were used as a proxy for planting start dates for wheat and corn in the study region. Since soybean data specific to the Red River Valley were not available, the study used North Dakota statewide planting progress data for soybeans.

<u>Planting Rates</u>

A planting progress rate was based on the length of time for planting progress to move from 20 percent completion to 80 percent completion (Figure 5). Examining only the period from 20 to 80 percent planted eliminates the unique circumstances associated with early planting and late planting.

The very earliest planting typically does not represent actions by the majority of producers, and can represent attempts to plant a crop that are not reflective of general planting conditions. Similarly, after about 80 percent or more of the crop acreage is planted, the additional time to plant the remaining crop acreage also is not representative of general planting conditions or the planting activities of most agricultural producers.

Planting progress data were used to estimate the annual variability in the seasonal planting conditions. Examining the percentage of acreage planted between 20 percent and 80 percent completion thresholds revealed considerable variation in planting conditions over the past 20 years (Figure 6). Those variations are reflective of the temperature and moisture conditions present during planting operations, and can vary depending upon crop and year (National Agricultural Statistics Service 2019).

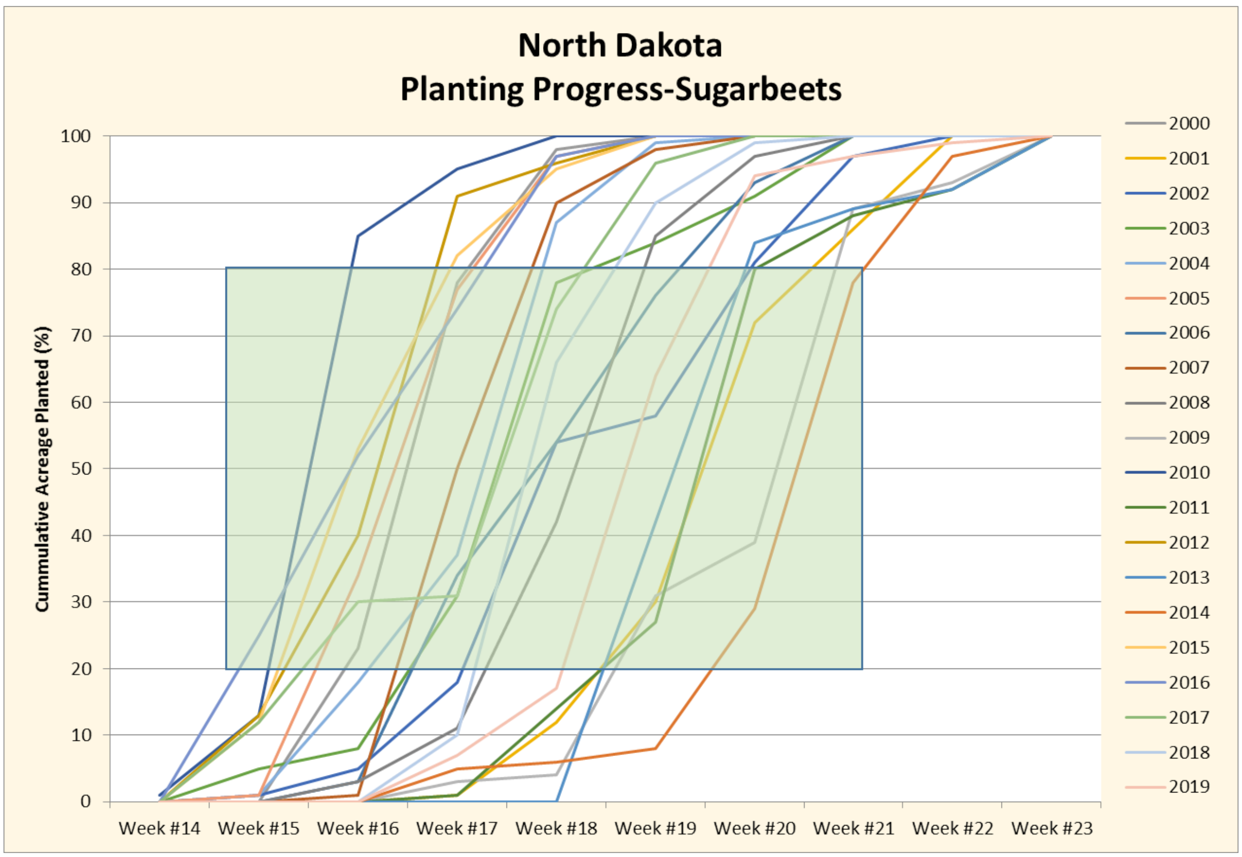

Figure 5. Example of Using of Statewide Planting Progress Data to Estimate Planting Rates between 20 Percent and 80 Percent of Planting Completion, Sugarbeets, North Dakota, 2000 through 2019.
Source: National Agricultural Statistics Service (2019).

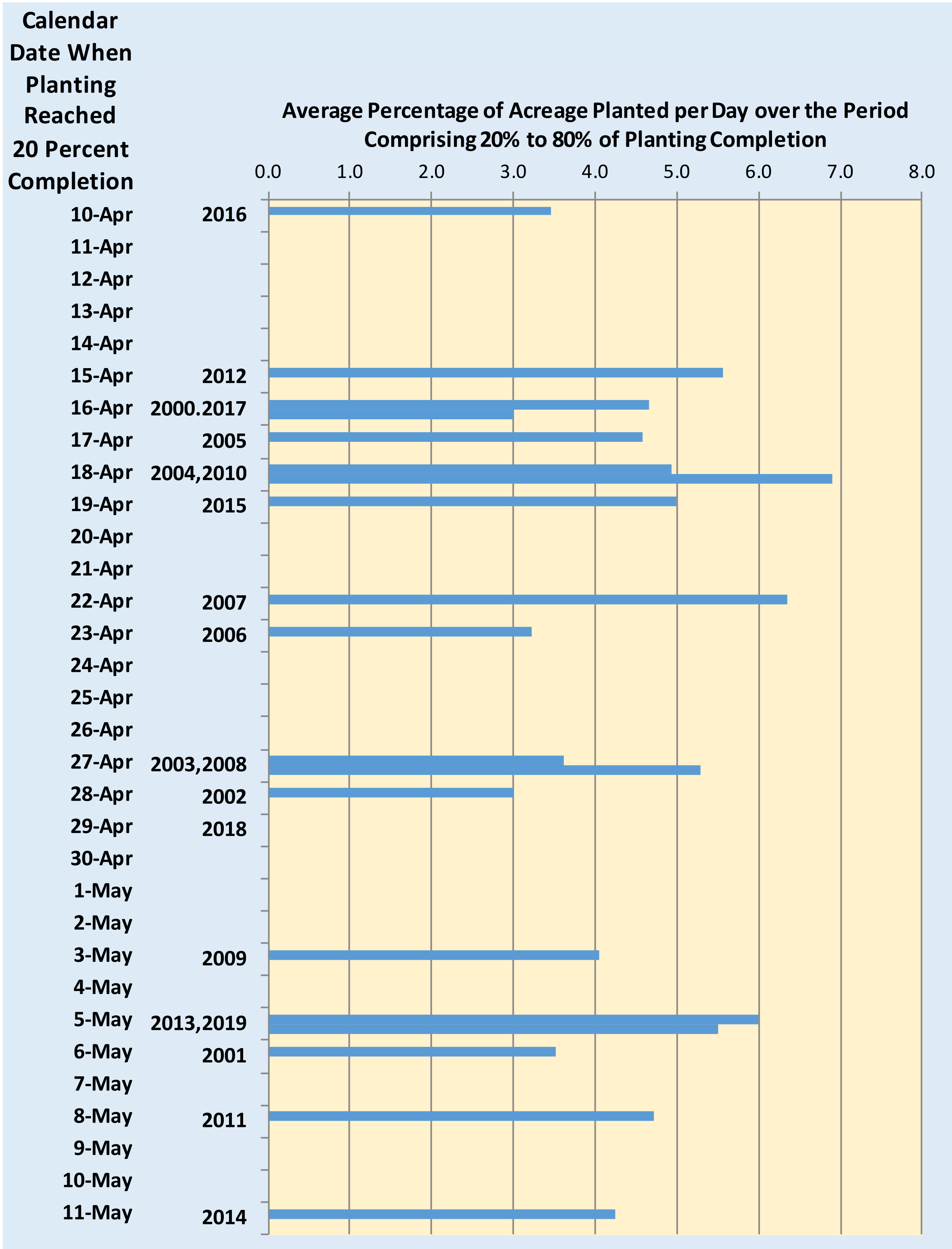

Figure 6. Average Daily Planting Rates for 20 Percent to 80 Percent of Planting Progress, and Calendar Dates when Planting Reaches 20 Percent Completion, Sugarbeets, North Dakota, 2000 through 2019.
Source: National Agricultural Statistics Service (2019).

Crop Share

Information on acreage of crops raised in the four-county study area was obtained from NASS (2019). Predominant crops in the study region since 2000 have been corn, soybeans, sugarbeets, and wheat. Other crops are raised in the study region, but data for Cass and Richland Counties indicate that those crops comprised about 10 percent of all planted acreage from 2012 through 2017 (Farm Service Agency 2019). Acreage planted to soybeans has remained relatively stable while corn acreage has increased and wheat acreage has decreased from 2000 through 2018 (Figures 7 and 8). A three-year average from 2016 through 2018, by county, was used to estimate the crop share percentage in the staging area (Table 4). Those percentages remained constant across all of the flood event sizes.

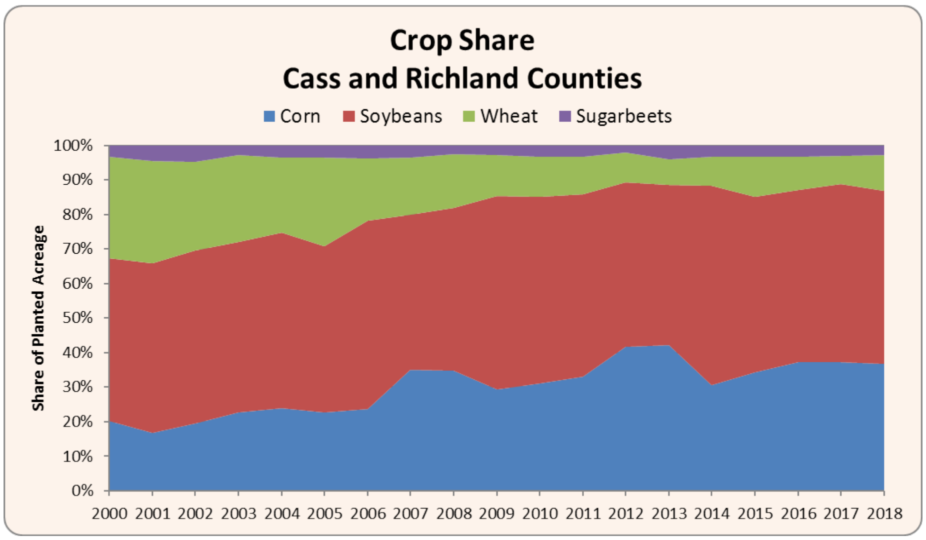

Figure 7. Relative Share of Corn, Soybeans, Wheat and Sugarbeet Acreage Cass and Richland Counties, North Dakota, 2000 through 2018.
Source: National Agricultural Statistics Service (2019).

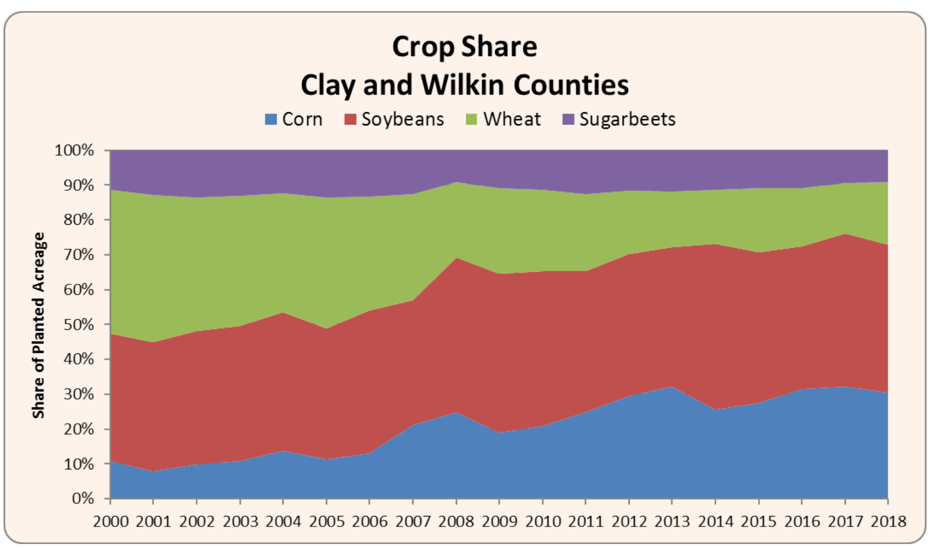

Figure 8. Relative Share of Corn, Soybeans, Wheat and Sugarbeet Acreage, Clay and Wilkin Counties, Minnesota, 2000 through 2018.
Source: National Agricultural Statistics Service (2019).

Table 4. Average Crop Share, Counties in FM Diversion Staging Area, 2016 through 2018				
	Minnesota Counties		North Dakota Counties	
Crop	Clay	Wilkin	Cass	Richland
	------------------------------- Percent of Planted Acreage -------------------------------			
Corn	33.28	32.70	33.40	43.39
Soybeans	45.76	37.77	55.59	48.54
Sugarbeets	10.45	14.01	9.70	5.59
Wheat	10.52	15.52	1.31	2.48

Note: Crop shares estimated assuming 100 percent of planted acreage devoted to those four crops. Totals may not sum to 100 due to rounding. Sugarbeet acreage was left at the share found in the planting acreage data from NASS since sugarbeets are grown under contract their ratio of acreages should remain nearly constant over the period. Therefore, share devoted to sugarbeets was not pro-rated in the calculation to arrive at 100 percent of planting acres for the four crops. Corn, wheat, and soybean shares were pro-rated in the pro-portion of historical data to arrive at 100 percent of crop land.

Crop Yields

An appropriate question is what yield should be used in the analysis. Historical crop yields reflect both planting conditions and seasonal growing conditions. Therefore, past yields may not be the most appropriate for estimating relative yield losses due to planting delays since those historical yields may already reflect less than optimal planting conditions, and most certainly include factors which occur after planting that affect yield.

The growing conditions after planting are assumed to be unrelated to the FM Diversion. An analysis of how past yields may be adjusted to account for all factors of production was considered beyond the scope of this study. Producers indicate that timing of planting is important as crops planted during optimal conditions generally are better able to capitalize on favorable growing conditions and also are generally more capable of withstanding unfavorable growing conditions, resulting in relatively better yields (NDSU Focus Group).

Yields from NASS were used as a starting point for estimating a target yield (Tables 5 and 6). Target yield would be the estimated or anticipated yield that agricultural producers strive to obtain and adjust the level of inputs and farm practices to achieve (e.g., fertilizer, seed rate, seed maturity, seed bed preparation). A target yield was used to estimate yield reductions from delayed planting. NASS yields were adjusted based on input from a producer focus group (Tables 7 and 8). Seven producers provided estimates of their target yields. The focus group participants indicated that target yields for producers in the staging area would be about 125 percent of the NASS yields (Tables 7 and 8).

County average yields mask the variability that may exist during periods when spring planting has been delayed due to past flood events because a considerable amount of planted acreage in those counties is not subject to delays associated with spring flooding along the Red River or Wild Rice River. Yield data based on field-level production records or records from individual producers within the staging area would be more accurate than using county-level yields. However, field-level data were not available for this study.

Table 5. Crop Yields, Per Planted Acre, Clay and Wilkin Counties, Minnesota, 2004 through 2018								
	Clay County				Wilkin County			
Year	Corn	Soybeans	Wheat	Sugarbeets	Corn	Soybeans	Wheat	Sugarbeets
	------------- bu/acre -------------			- tons/acre -	------------- bu/acre -------------			- tons/acre -
2004	92.4	20.8	59.0	19.4	122.8	26.3	55.2	23.4
2005	132.0	37.3	43.1	19.5	138.8	36.5	37.1	17.6
2006	115.9	34.6	50.7	24.2	127.7	36.6	50.6	26.4
2007	123.3	34.8	44.5	21.2	111.6	30.8	35.0	19.7
2008	146.0	35.3	na	19.0	144.7	31.5	na	13.6
2009	118.4	28.9	49.4	21.5	115.0	28.5	39.1	14.8
2010	138.4	35.6	53.3	27.5	150.3	36.5	52.4	26.9
2011	110.3	33.4	40.1	15.7	119.7	30.6	39.7	18.4
2012	145.3	36.7	56.7	25.8	164.6	41.5	58.9	25.8
2013	128.7	34.8	56.5	24.9	133.4	31.2	48.9	24.8
2014	129.1	35.0	51.4	20.5	134.5	36.7	50.4	21.4
2015	152.3	40.4	na	27.5	164.7	40.0	58.3	25.9
2016	174.6	43.6	58.1	31.4	179.7	43.9	62.7	28.9
2017	163.9	40.8	67.1	31.6	180.1	39.0	60.9	31.4
2018	184.2	46.7	na	28.5	na	47.2	52.7	26.9

na=not available.
Source: National Agricultural Statistics Service (2019).

Table 6. Crop Yields, Per Planted Acre, Cass and Richland Counties, North Dakota, 2004 through 2018								
	Cass County				Richland County			
Year	Corn	Soybeans	Wheat	Sugarbeets	Corn	Soybeans	Wheat	Sugarbeets
	------------- bu -------------			-- ton --	------------- bu -------------			-- ton --
2004	97.2	24.7	55.0	20.4	121.7	29.0	57.3	22.1
2005	139.6	38.3	41.5	19.6	129.4	35.3	31.5	16.2
2006	123.2	35.7	48.2	24.4	131.7	36.6	46.1	25.0
2007	111.1	31.8	33.6	21.7	118.6	32.5	33.1	19.1
2008	143.2	32.1	61.2	23.4	141.6	32.1	56.8	19.2
2009	120.9	31.8	53.8	21.7	112.3	29.4	44.8	15.6
2010	140.1	35.2	55.3	26.8	142.3	35.1	49.4	25.2
2011	100.1	26.9	25.6	11.3	95.3	29.0	31.2	15.8
2012	129.3	33.9	56.4	25.5	154.1	40.5	59.4	na
2013	125.6	31.9	57.1	na	132.9	32.1	50.8	25.3
2014	135.4	37.8	59.4	na	129.6	36.2	54.7	24.2
2015	144.8	39.4	64.6	na	158.7	37.8	61.6	25.8
2016	182.2	45.2	67.0	na	182.3	46.4	na	30.0
2017	170.2	37.5	71.0	na	186.1	41.8	na	na
2018	183.2	43.6	58.3	na	190.2	47.8	57.0	na

na=not available.
Source: National Agricultural Statistics Service (2019).

Table 7. Target Yields, Per Planted Acre, Clay and Wilkin Counties, Minnesota								
	Clay County				Wilkin County			
	Corn	Soybeans	Wheat	Sugarbeets	Corn	Soybeans	Wheat	Sugarbeets
	------------- bu/acre -------------			- tons/acre -	------------- bu/acre -------------			- tons/acre -
NASS yield, Olympic Average 2012 – 2018								
	153.8	39.8	58.0	27.1	143.3	37.1	56.7	30.1
Producer Target Yields as Percentage of NASS yields								
	120%	125%	130%	120%	120%	125%	130%	120%
Target Yields Used in the Study[a]								
	184.6	49.8	69.6	35.3	172.0	46.4	68.0	39.2

na=not available.

[a] Target yields estimated at 120% of NASS yields for corn, 125% for soybeans, 130% for wheat, and 120% for sugarbeets based on focus group discussion with producers (Bangsund et al. 2015).

Sources: National Agricultural Statistics Service (2019); Bangsund et al. (2015).

Table 8. Target Yields, Per Planted Acre, Cass and Richland Counties, North Dakota								
	Cass County				Richland County			
	Corn	Soybeans	Wheat	Sugarbeets	Corn	Soybeans	Wheat	Sugarbeets
	------------- bu/acre -------------			- tons/acre -	------------- bu/acre -------------			- tons/acre -
NASS yield, Average 2012 – 2018								
	152.8	38.6	56.4	57.5	161.9	40.4	55.7	37.0
Producer Target Yields as a Percentage of NASS yields								
	120%	125%	130%	120%	120%	125%	130%	120%
Target Yields Used in the Study[a]								
	183.3	48.2	67.7	39.20[b]	194.3	50.6	66.8	39.2

na=not available.

[a] Target yields estimated at 120% of NASS yields for corn, 125% for soybeans, 130% for wheat, and 120% for sugarbeets based on focus group discussion with producers (Bangsund et al. 2015).

[b] Yield from Richland County used for Cass County due to omissions in data from National Agricultural Stasticis Service.

Sources: National Agricultural Statistics Service (2019); Bangsund et al. (2015).

Crop Prices

NASS crop price data represent statewide marketing-year average prices. A 7-year olympic average of North Dakota prices from 2012 through 2018 was used to represent commodity prices in the four-county study region (Table 9).

Table 9. Statewide Average Marketing-year Prices, Minnesota and North Dakota, 2008 through 2018								
	Minnesota				North Dakota			
Year	Corn	Soybeans	Wheat	Sugarbeets	Corn	Soybeans	Wheat	Sugarbeets
	---------------- $/bu ----------------			-- $/ton --	---------------- $/bu ----------------			-- $/ton --
2008	3.92	10.10	7.06	49.90	3.74	9.71	7.31	51.00
2009	3.47	9.39	4.72	49.80	3.18	9.26	4.82	51.90
2010	5.01	10.90	6.10	67.60	5.01	10.90	6.61	69.90
2011	6.09	12.40	8.06	68.30	5.81	11.90	8.24	60.80
2012	6.67	14.30	8.13	74.20	6.46	14.00	8.07	69.10
2013	4.30	12.90	6.68	52.60	3.91	12.40	6.62	44.90
2014	3.58	9.96	5.48	45.10	3.34	9.49	5.74	44.20
2015	3.37	8.75	4.69	46.40	3.28	8.49	4.80	48.30
2016	3.21	9.23	4.69	33.80	3.01	8.97	4.68	36.60
2017	3.18	9.17	5.76	42.50	3.04	8.88	5.74	44.20
2018	3.40	8.40	5.25	na	3.30	7.98	5.09	na
7-yr Olympic Average	3.57	10.00	5.57	37.32	3.37	9.65	5.56	43.64

Na=not available.
Statewide average marketing year prices for Minnestota shown for comparison only.
Source: National Agricultural Statistics Service (2019).

Hydrology within Staging Area

The Houston-Moore Group (2019), based on previous work by the U.S. Army Corps of Engineers, provided information on the expected flooding of land in the staging area for existing conditions (Without Diversion) and conditions anticipated With Diversion. The hydrology modeling was based on 10-year, 20-year, 25-year, 25-year long, 25-year extra long, 2009-like, 50-year, 100-year, 500-year and probabilistic maximum flood (PMF) events. The flood event sizes represent the annual probability or likelihood of a spring flood event reaching a certain size (e.g., crest height, volume of water flow). For example, a 100-year flood event has a 1 percent probability of occurring in any given year, and is a larger flood than a 25-year or 50-year flood, which have a probability of occurring 4 percent and 2 percent in any given year, respectively.

The hydrology modeling was based a compilation of data to produce synthetic flood events and simulated floods from key recent floods. A 1997-like flood event is represented by the 25-year extra long flood. The 1997 flood event represents an event where high flow rates were present in the Red River for longer periods than any other previously documented flood event, that is, flows exceeded 17,000 cfs for 20 days. The long duration of the 1997 flood event provides a valuable contrast to the 2009 flood event. The 2009 flood event produced record crest heights in Fargo, but the flood event was of relatively short duration, that is, 10 days with flows exceeding 17,000 cfs (see Table 3 on page 5).

Hydrology modeling was provided for 241 storage areas within the staging area. The 241 storage areas total 54,481 acres. Data for each storage area included location, approximate elevation, size (acreage), water elevation over the course of a flood event, time (days) for inundation to occur from when staging is initiated, and duration of water inundation (days). Both Without and With Diversion conditions were provided for each storage area for each flood event (Appendix A).

Focus Group Discussions with Agricultural Producers

The research team conducted a focus group meeting in 2015 with farmers and producers who may be affected by the staging area. Eighteen people attended, including a representative from the FM Diversion Authority, members of the FM Diversion Authority Agricultural Policy Sub-Committee, agricultural producers, and the NDSU research team (Bangsund et al. 2015).

The purpose of the focus group meeting was to solicit discussion and insight from agricultural producers on six key issues important to the study. The research team also sought insight from participants on any additional issues that might need to be included in the study or general concerns of producers. While the focus group meeting was conducted several years prior to this study, the content of that meeting and insights shared by producers remain relavent for this assessment.

The following points summarize insights gathered during the focus group session.

1. Dry-down Period. The consensus was that dry-down time of 10 days under good conditions would be an appropriate approximation. Naturally, dry-down time would be affected by weather conditions. Producers also indicated that dry-down in April is different than dry-down in May. It was suggested that April is generally dryer which would imply faster dry-down. In May, producers often experience more rainfall which extends the dry-down period. This study included both a 10-day and 14-day dry down period.

2. Yield loss due to planting delays. Yields for some crops are more sensitive to planting dates than other crops. For example, producers indicated that soybeans are not as sensitive to planting delays as other crops. Consensus was that a 5 percent yield decline per day for corn would represent a maximum yield loss, and that 2-5 percent per day of planting delay was more typical. Wheat losses were estimated to be approximately a bushel per day. Declines would not be linear but rather exponential with greater losses per day the further away from optimal plant dates.

3. Planting Rate. Producers stated that if necessary, planting can be done very quickly! One producer said he completed planting in 8 days one year. However, it was recognized that those conditions are not representative of typical planting rates. The consensus was 7 days (in the field) per crop or roughly 21 planting days to plant all spring crops was a reasonable approximation. Also, members of the group noted that it is not very likely to get 21 consecutive planting days. Participants approximated that those 21 planting days generally occur over a 40-day (calendar) period. There were some inconsistencies in comments regarding planting rates. Some participants seemed to suggest that their planting rate was faster than 21 days of field time.

4. Target Yields. Producers were somewhat hesitant to talk about their yields but they were willing to write down their individual yields confidentially. Prior to some of the producers providing their individual yields, it was suggested the RMA times 110 percent might be a good estimate. Another producer suggested RMA times 125 percent. One participant suggested using the t-yield used for crop insurance for beginning farmers, but others felt that would be too low. It was suggested that as far as the applicability of county level data, Richland County data may be more representative of the impacted (storage) area than Cass County data. Most of Richland County is more likely to represent conditions in the Red River Valley than Cass County. Cass County extends beyond the Red River Valley to the west, and includes crop land considered to be outside of the Red River Valley.

5. Planting Start Dates. Participants indicated that corn plant dates are approximately equal to the planting dates for sugarbeets. In the study area, it was generally agreed that plant start dates would lag

the county-wide plant start dates by about 5 days. This lag was largely due to soil conditions in the study region. Planting dates for wheat in Minnesota may be an appropriate proxy for the impacted area as most of the wheat grown in Minnesota is in east central to north central Minnesota which would be similar to the study area. The group agreed that sugarbeet plant start dates are fairly representative of plant start dates and would provide a reasonable proxy for start plant dates for wheat and corn in the region.

6. Switch Crops Planting Dates. The initial statement regarding crop switch dates was that crop insurance greatly influences plant switch dates. There were some comments about recent or upcoming changes to crop insurance. There was consensus among the producers that switch decisions regarding wheat were less elastic due to the desire/need to have those acres part of a 4-year sugarbeet rotation. Producers indicated that they are not likely to switch their wheat acres even when planting dates are delayed beyond optimal. They also indicated that they would not be eager, willing or likely to switch from corn to soybeans. They stated that they would likely wait until June 1st before switching from corn to soybeans. A June 1st switch date was later than suggested by crop production and agronomy specialists.

7. Other Issues brought forward by participants of the focus group.

a. Debris Deposit. There was quite a bit of discussion on the impact of flood debris on the land. Debris deposits include crop residues, branches, logs and other miscellaneous deposits. Participants indicated the debris has to be removed or burned. In cases when the debris cannot be removed or burned, producers have been forced to rake the debris at fairly high speed. Debris and beach lines impact dry-down and often the land has to dry-down before they can get on the land to clean up debris. There was no discussion about trying to quantify how much time it would take to clean-up the debris and whether this task represented a potential additional delay to planting. This issue may warrant further study to quantify the physical effects.

b. Physical Effects on Soil from Water Storage. These topics also may require further study. There may be little physical research available to quantify these impacts.

i. Water Depth and Compaction. This issue was raised during the discussion that no one knows if there are physical effects on the soil, such as soil compaction as a result of greater depths of water. During conversations after the meeting, it was suggested that the issue of compaction as a result of water storage likely was not an issue.

ii. Soil Organisms. While there was little discussion during the meeting, this issue was mentioned as a potential physical effect on soil from water storage, especially if the water remains on the land for long periods.

iii. Erosion. Producers wondered whether there would be additional erosion as a result of the Diversion quickly collecting water on the land and then quickly draining the water away.

c. Timing of Seed Orders. Again, there was limited discussion on this topic. Producers indicated there could be impacts on seed orders if forced to plant different maturing crops due to planting delays. Producers often try to purchase seed well in advance of spring planting, often during the winter when it is discounted. Again, not much discussion and the effects were not well described.

Methodology

A combination of factors needs to be considered in evaluating the impacts of temporary water storage on agricultural production in the staging area (Figure 9) with respect to spring planting conditions. The key *physical* factors would include timing of flood events, frequency of flood events, duration of flood events, length of time land is inundated, dry-down period, planting start dates, and planting progress rates. Key *economic* factors include agronomically optimal planting periods, reductions in crop yields for acreage planted after optimal planting window, switch dates to stop planting a crop and shift remaining acreage to another crop, crop yields, prevent planting date on which planting for the season will stop and acreage will remain unplanted, and crop prices.

The analytical framework was divided into modeling the physical effects of temporary water storage and then evaluating the economic effects. Historical data were used to determine a distribution or range of values for flood event start times, planting start dates, and planting rates. The physical effects were then modeled using a simulation approach that generated 10,000 combinations of flood event start dates, planting start dates, and planting rates. Each of the 10,000 combinations represents a possible spring planting condition.

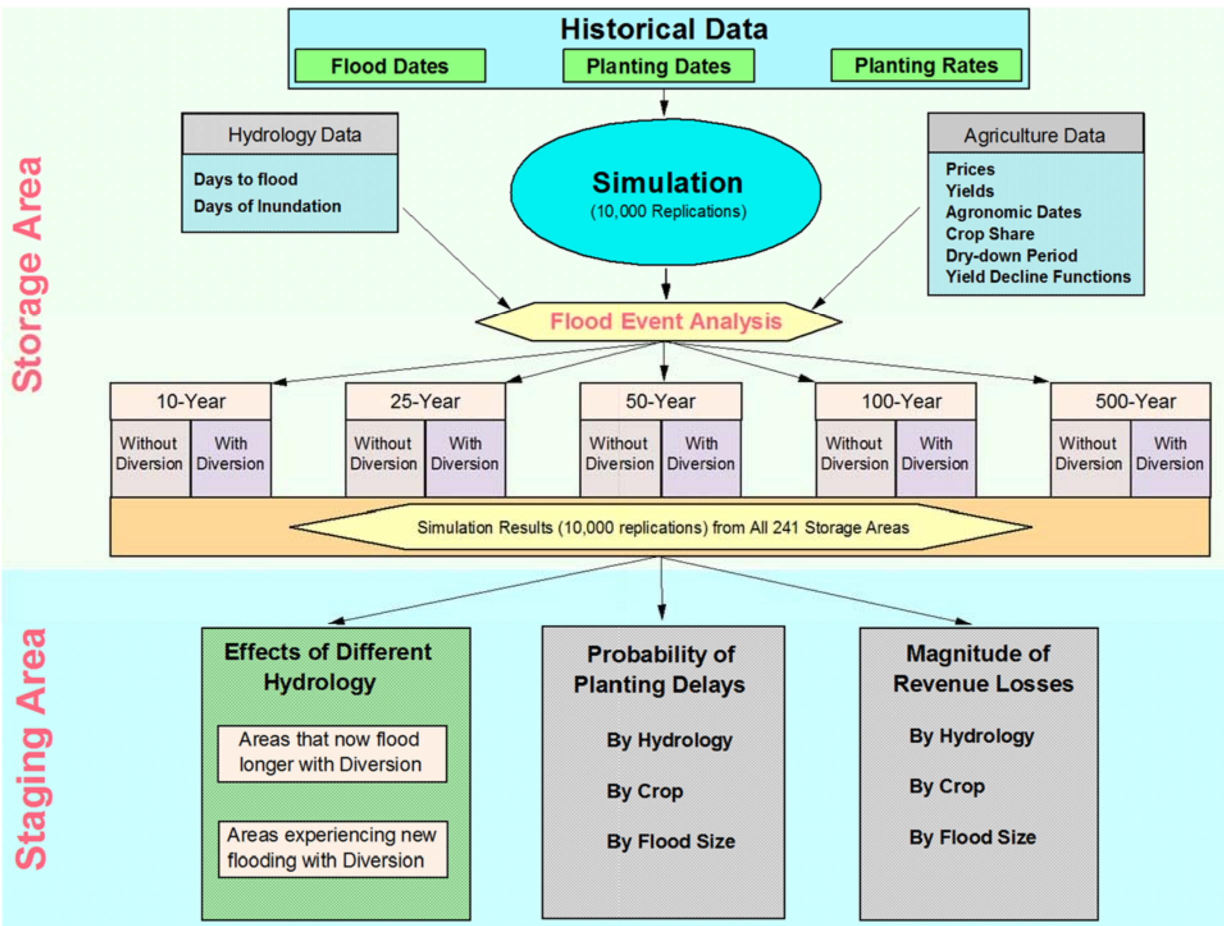

Figure 9. Flow Diagram for Simulation Analysis of Effects on Agricultural Production in the FM Diversion Staging Area.

Each of the 10,000 combinations was applied to the 10 flood events and the two conditions of Without and With the Diversion for each of the 241 storage areas. The crop share, yields (including a decline in yields for late planting), and price were applied to calculate the economic impact of staging water.

The physical effects, such as size of flood event and duration of water storage, were derived from the hydrology modeling for each storage area. The analysis assumed future flood event frequencies were appropriately defined using the event-size probabilities associated with the hydrology modeling. *** *A 10-day or a 14-day dry-down period was used in all scenarios if a storage area was inundated regardless of the duration or depth of water.* ***

A set of producer decisions were developed that allowed the model to treat planting options consistently among the storage areas and across the 10,000 potential combinations of spring planting conditions. Optimal planting windows, switch dates, and "prevent planting" (do not plant) dates for wheat, corn, soybeans, and sugarbeets, in conjunction with planting rates, were used to calculate how many acres were planted during optimal conditions, how many acres were planted after optimal periods but prior to switch dates, how many acres were switched to another crop, and how many acres were "prevent planting" (land that is not planted that season due to delayed planting). The economic framework translated the combination of the physical effects into gross crop revenues for both the Without and With Diversion scenarios (Figure 9).

The methodology produced estimated gross revenues per acre for each storage area for current conditions (i.e., Without Diversion) and With Diversion conditions for each of the 10 flood events. The difference between the Without Diversion conditions and With Diversion conditions provided estimates of the effects of temporary water storage on gross revenues.

The economic effects for each flood event are associated with an annual probability of occurrence. The potential reductions in revenue associated with operating the staging area for a 25-year flood event represent the losses that have a 4 percent chance of occurring in any given year. Currently, the best manner to treat the frequency of when flood events occur is to define them based on the probability that they may occur during any particular year. The annual probability of occurrence and the amount or size of the flood event is determined or categorized based on historical climate, water flows, and other data (e.g., diking, channel constriction).

<u>Monte Carlo Simulations of Stochastic Variables</u>

Monte Carlo simulation is an analysis method that can address risk when the conditions or issues require evaluation over a wide range of potential possibilities. Monte Carlo simulations can use cross-section, time-series or panel data. The technique uses a random selection of possible model inputs by 'pulling' a value from a statistical distribution of those inputs. The technique is therefore helpful in defining the frequency of possible outcomes and probabilities associated with those outcomes.

In this study, a statistical range of potential flood event start dates, regional planting dates, and regional planting rates were generated and used in a Monte Carlo simulation. An implied assumption is that the data used in this study are sufficient to represent a reasonable range of potential future outcomes. The accuracy of the Monte Carlo simulation is limited to the predictive capacity of the underlining data.

The statistical distribution of flood event start dates, planting start dates, and planting rates were assumed to be independent rather than jointed or conditional. For example, this assumption implies that the pace of spring planting is not a function of the flood event start date. In other words, a March flood event does not produce a slower planting season than an early April flood event or vice versa. In some cases, independent distributions may produce conditions that have a low probability of occurrence. For example, the distribution of flood event start dates and regional plant dates, over the past 20 years, have overlapped during the second week in April. There have been years when spring planting has begun at a time that would be equivalent to when a flood event was occurring in a previous year. To correct for potential problems with overlapping independent distributions, certain conditions were tested and adjusted within the model. The model will not allow a regional planting start date to precede a flood event start date.

Monte Carlo simulations also can use joint, conditional or multivariate statistical approaches, rather than independent distributions, when two or more variables are a function of other values in the analysis. Using joint, conditional, or multivariate distributions in this study would result in complex nested modeling due of two or more potentially linked conditions. Spring planting dates for land that does not flood would potentially require a different joint or conditional distribution with spring flood dates than lands affected by spring flooding. Considering the three distributions used in this study are all related to weather, estimation of the statistical links or causality among those variables would exceed the scope of this initial study.

An additional issue with statistical distributions is that applying assumptions of their predictive capacity from data that represents different sets of conditions can produce statistical anomalies when those distributions are combined into a single simulation. Such is the case with the lack of geographical specificity of the planting data. The study used statewide planting data on sugarbeets to represent starting times for corn, wheat, and sugarbeets since sugarbeets are primarily grown in the Red River Valley. However, the study used North Dakota statewide planting data for soybeans, which likely contains factors influencing planting progress that may not mirror conditions faced by producers in the Red River Valley within the same growing season. Since the sugarbeet and soybean planting data potentially represent combinations of factors than may not be reflective of both crops in the Red River Valley, the study used independent distributions. This approach resulted in a small number of planting conditions that were agronomically unlikely within the study region. However, applying alternative statistical techniques would not rectify the explanatory capacity present in the available data.

Statistical distributions of data can exhibit different shapes. A normal distribution of data resembles a bell shaped curve, suggesting an average value in the middle and approximately equal deviations on either side of the average value. This assumption is widely used in Monte Carlo simulations. With shorter data series and those with unknown probabilities, a uniform distribution is often used. A uniform distribution assumes an equal probability of occurrence of an event over a specific range or period.

Distribution of Flood Start Dates

U.S. Geological Survey (USGS) daily water flow data for Fargo for period of record was originally examined to produce a statistical distribution of flood event start dates based on dates when river flows peaked. Due to high variability with the flow data in non-flood years and difficulty in correlating the calendar dates of peak flows in non-flood years, actual calendar dates when the Red River equaled or exceeded 17,000 cfs were used instead of USGS daily flow data over the period of record to produce a distribution of flood event start dates. The 17,000 cfs was used in this study for purposes of create a statistical distribution of staging activation dates; the actual activation of the staging area will be based on 21,000 cfs at the Fargo gage.

The distribution of flood event start dates was assumed to be sufficient to model the approximate start date for use of the staging area. Actual use of the staging area will likely involve monitoring of gage heights further upstream, and will likely result in the staging area being activated slightly sooner than suggested using dates that correspond with river flow levels in Fargo. The timing of the use of the staging area will be more defined when final operating procedures for the Diversion are completed. The use of flood event dates for Fargo, as opposed to dates associated with river flows at gages farther upstream, will result in the staging area being activated slightly later than may actually occur for any given flood event. Best estimates suggest the use of the Fargo flow data may delay, for purposes of this study, the triggering of the staging area by 1 to 2 days. A delay of 2 days or less was not perceived to materially alter the results of this assessment.

Dates for when the Red River equaled or exceeded 17,000 cfs in Fargo suggest an average flood date of April 5^{th} (Figure 10). Over 70 percent of the time, the calendar dates for the flood start would fall between March 31^{st} and April 10^{th}.

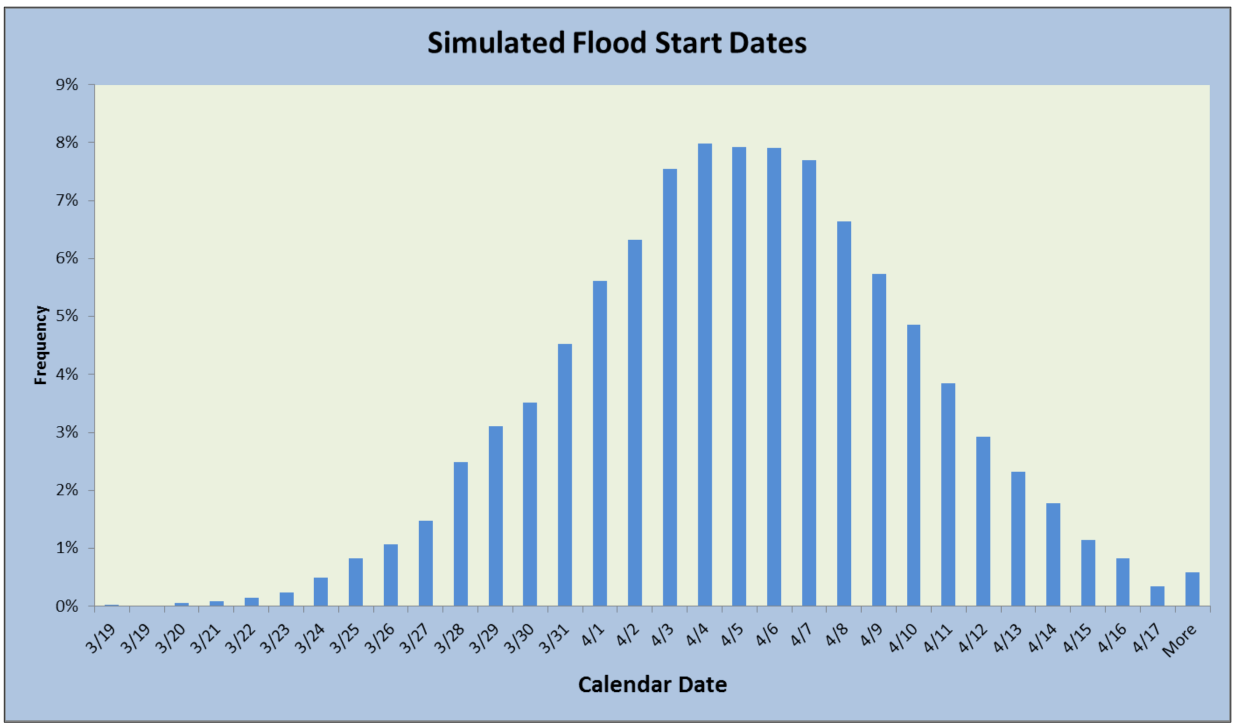

Figure 10. Monte Carlo Simulated Distribution of Calendar Dates When Red River Flows Would Trigger Use of the FM Diversion Staging Area.

Distribution of Planting Start Dates

The distribution of planting start dates for wheat, corn, and sugarbeets was based on NASS planting progress data for sugarbeets in North Dakota. Sugarbeets in North Dakota were considered the best proxy for start dates for corn and wheat since the progress data for sugarbeets was largely influenced by conditions in the Red River Valley, and producers traditionally begin planting wheat and corn at nearly the same period as sugarbeets. Producers in the focus group agreed, in the absence of better data, that sugarbeet planting progress data would be suitable for planting start dates for corn and wheat.

The planting start dates for sugarbeets in North Dakota were almost evenly distributed between April 14th and May 11th from 2000 through 2019, assuming a start date when 20 percent of crop acreage was planted (see Figure 5). A uniform distribution was chosen as the best representation of planting start dates for sugarbeets, corn, and wheat in the FM Diversion Staging Area (Figure 11). The distribution suggests any date from April 15th through May 9th has nearly an equal chance (4 percent) of being selected per replication.

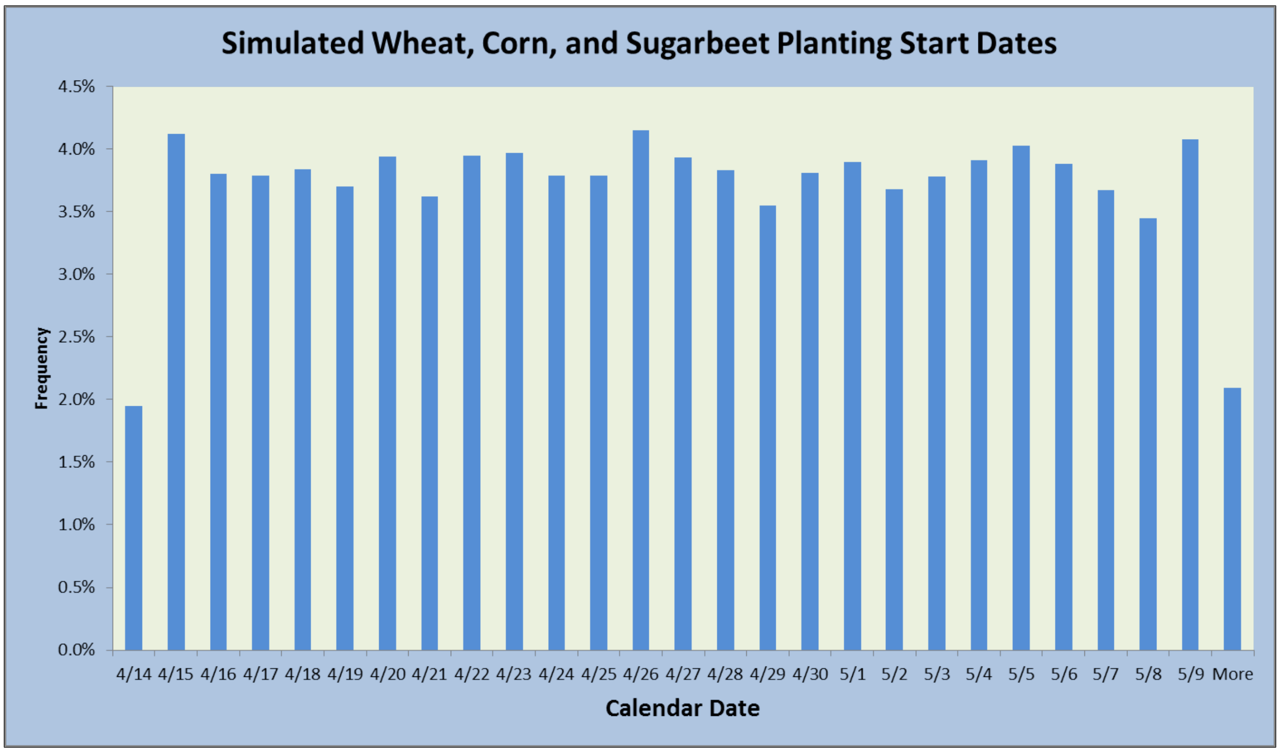

Figure 11. Monte Carlo Simulated Distribution of Regional Planting Start Dates, Wheat, Corn, and Sugarbeets, FM Diversion Staging Area.

The distribution of planting start dates for soybeans was based on NASS planting progress data for soybeans in North Dakota (National Agricultural Statistics Service 2019). Unlike the planting start dates for sugarbeets, soybean planting start dates for North Dakota were clustered from May 11th to May 19th. The NASS data for planting start dates for soybeans suggest the use of a normal distribution.

The distribution of soybean planting start dates ranged from May 1 through May 31. The highest likelihood for soybean planting start dates mirrored the NASS data, and around 75 percent of the replications would use a date from May 8th through May 19th (Figure 12).

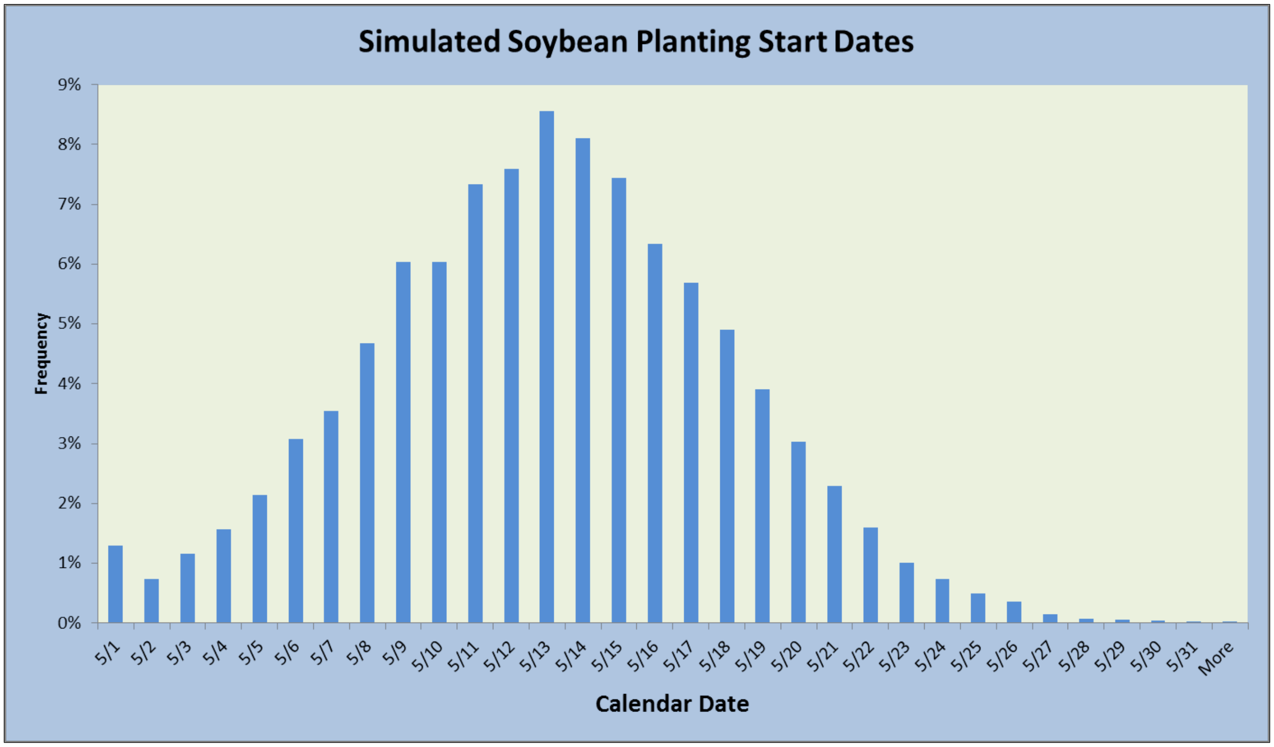

Figure 12. Monte Carlo Simulated Distribution of Planting Start Dates, Soybeans, FM Diversion Staging Area.

Distribution of Planting Rates

NASS data from 2000 through 2019, based on the rate of acreage planted per day from 20 percent to 80 percent of planting progress, was used to estimate the annual variability in planting rates. Separate estimates where generated for wheat, corn, sugarbeets and soybeans using planting progress data for North Dakota.

The typical time required to plant a crop was based on information gathered from agricultural producers. Producers indicated that increases in planting capacity have occurred in recent years, which may suggest that the planting rates for regional crops may exceed historical observations. Even though the regional rate of planting progress was adjusted to reflect current production capacities, the variability from year to year was retained when creating the distributions. The annual variability in the planting rates was considered to be reflective of the annual planting conditions (i.e., moisture, temperature) over the 2000 to 2019 period (see Figure 6).

The distributions of planting rates for the four crops are similar (Figures 13 and 14). Around 50 percent of planting conditions are represented by a planting rate of 6 percent to 8 percent of crop acreage per day over the planting season. A daily rate of 7 percent equates to approximately a 14-day planting period.

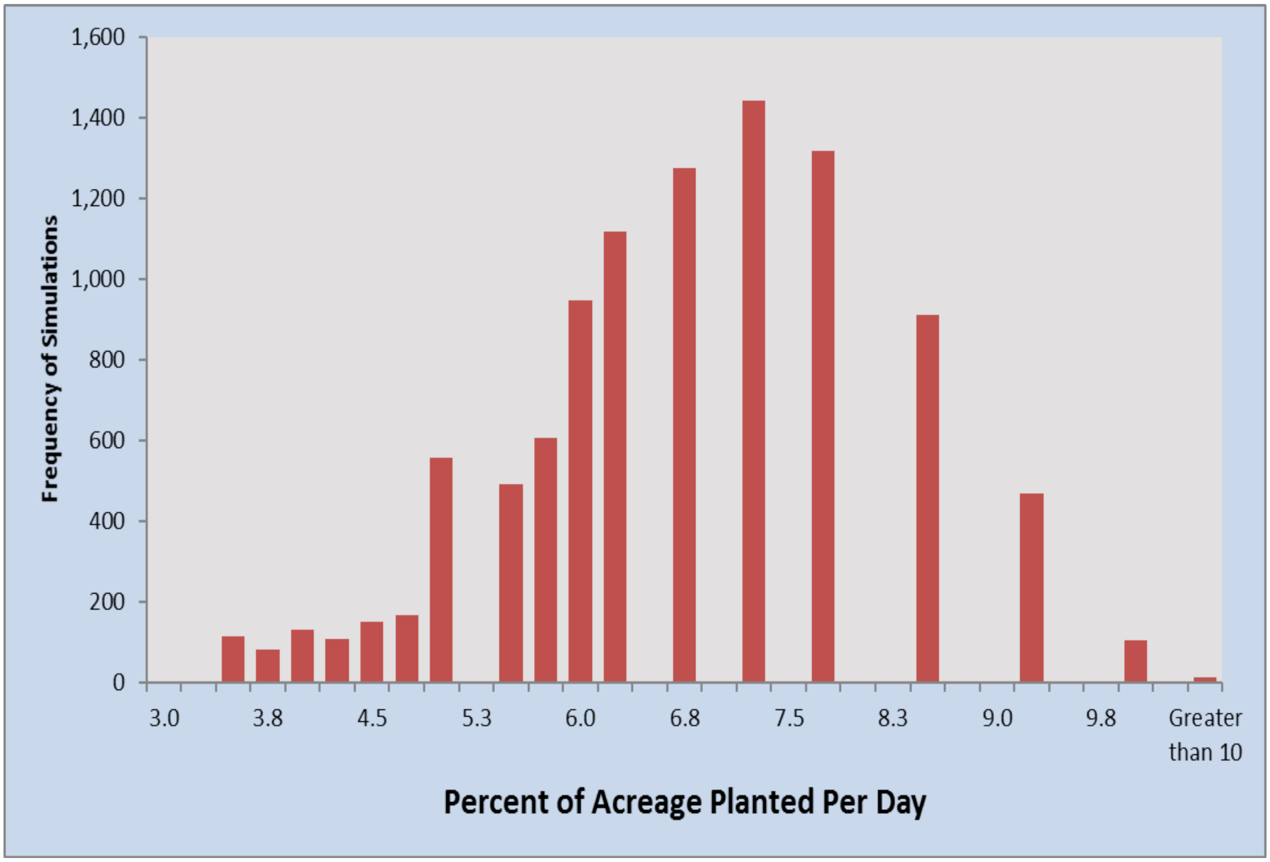

Figure 13. Monte Carlo Simulated Distribution of Average Seasonal Planting Rates, Wheat, Corn, and Sugarbeets, FM Diversion Staging Area.

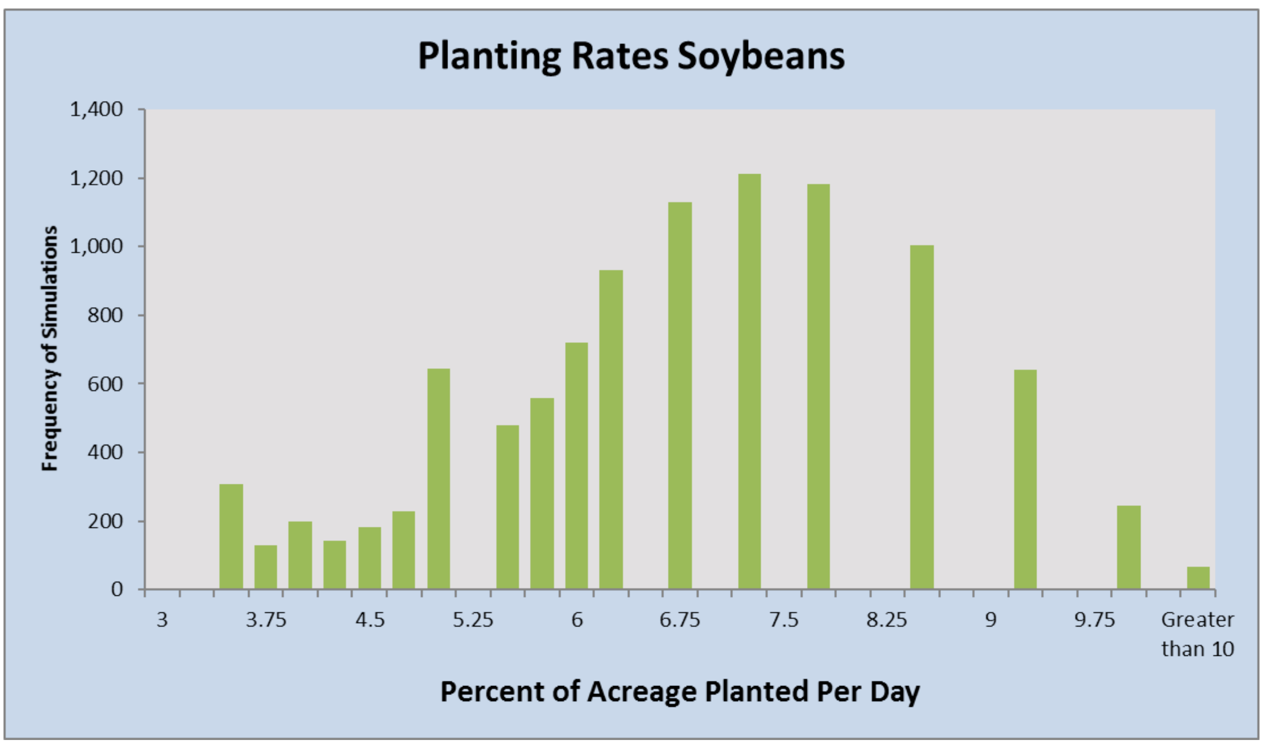

Figure 14. Monte Carlo Simulated Distribution of Average Seasonal Planting Rates, Soybeans, FM Diversion Staging Area.

Creating a Timeline for Hydrology Data

The most important element of the hydrology data for this study was to estimate how temporary water storage might affect spring planting. The hydrology data can be interpreted and used to describe different metrics for temporary water storage, such as days for the land to become inundated, days the land remains flooded, depth of inundation, and difference in time for water to leave the land between Without and With Diversion conditions.

The USACE and the FM Diversion Authority have evaluated and stated the hydrology data using the length of time that water remains on the land. For example, in Figure 10, the storage area is flooded for 10 days Without the Diversion and 14.5 days With the Diversion. The net difference in time the land is flooded is 4.5 days. While that interpretation is accurate when describing the number of days storage areas are inundated, measuring only days of inundation is insufficient to estimate when the effects of flooding may be gone. In Figure 10, some of the 4.5 days of additional inundation occur earlier in the flooding period and some of the additional days extend the time the land would be flooded with existing conditions. Since a key assumption in this study is that the duration and depth of inundation do not change the time required for the land to dry out (e.g., dry-down is the same if water is on the land 5 days or 8 days or whether it is 1 foot or 4 feet), the important metric is the additional time required for the water to leave the land. In Figure 10, the additional days for water to leave the land is 3 days. However, knowing the additional days required for water to leave the storage area is still insufficient to estimate the effects on planting activities. *** *This study placed the hydrology data into a timeline to measure time for the lands to become ready to plant*.***

To begin a timeline of effects relating to temporary water storage, the study used the activation of the staging area as the starting point. An important note is that flood size will influence the use of the staging area and affect the duration of water storage on inundated lands. The effects of different-sized flood events are covered in the hydrology data, but hydrology modeling does not predict calendar dates of future flood events even though the modeling uses various dates for the flood events in the hydrology analysis.

The number of days from when the Diversion is activated to when inundation occurs and the number of days flood water remains on the storage area was estimated from the hydrology modeling data (Figure 15). These periods should not be confused with the number of days the land is inundated (i.e., metrics that have been previously used by USACE and FM Diversion Authority to describe the length of flooding).

Data from the hydrology modeling contain water elevations that are delineated into 12-hour increments. The length of time from when the staging area is activated until the water elevation exceeds the approximate field elevation[7] is measured by counting the number of 12-hour periods from the start of staging until the water elevation exceeds the storage area elevation. Once inundated, the length of time the storage area remains flooded can be estimated by counting the number of 12-hour

[7] The Approximate Field Elevation was obtained through a site specific elevation review (i.e., using LiDAR data) within each individual storage area. The intent was to identify the elevation at which the field would first become inundated with flooding. Given the complexity of representing the ever-sloping topography of an entire storage area (which may have a footprint upwards of two square miles) with a single elevation, the hydrology modeling used the lowest reasonable field elevation to represent the entire storage area. Ditch elevations also were identifiable using LiDAR data; however, ditch elevations were excluded in estimations of the approximate field elevation because they could retain water even though the field remains dry. Therefore, the lowest reasonable elevation, excluding ditches, was used as the Approximate Field Elevation (Houston Engineering 2015).

periods that water elevation (i.e., flood waters) remains above the storage area elevation. The combination of those two periods provides an estimate of the total days from staging activation to when flood waters have receded from a storage area.

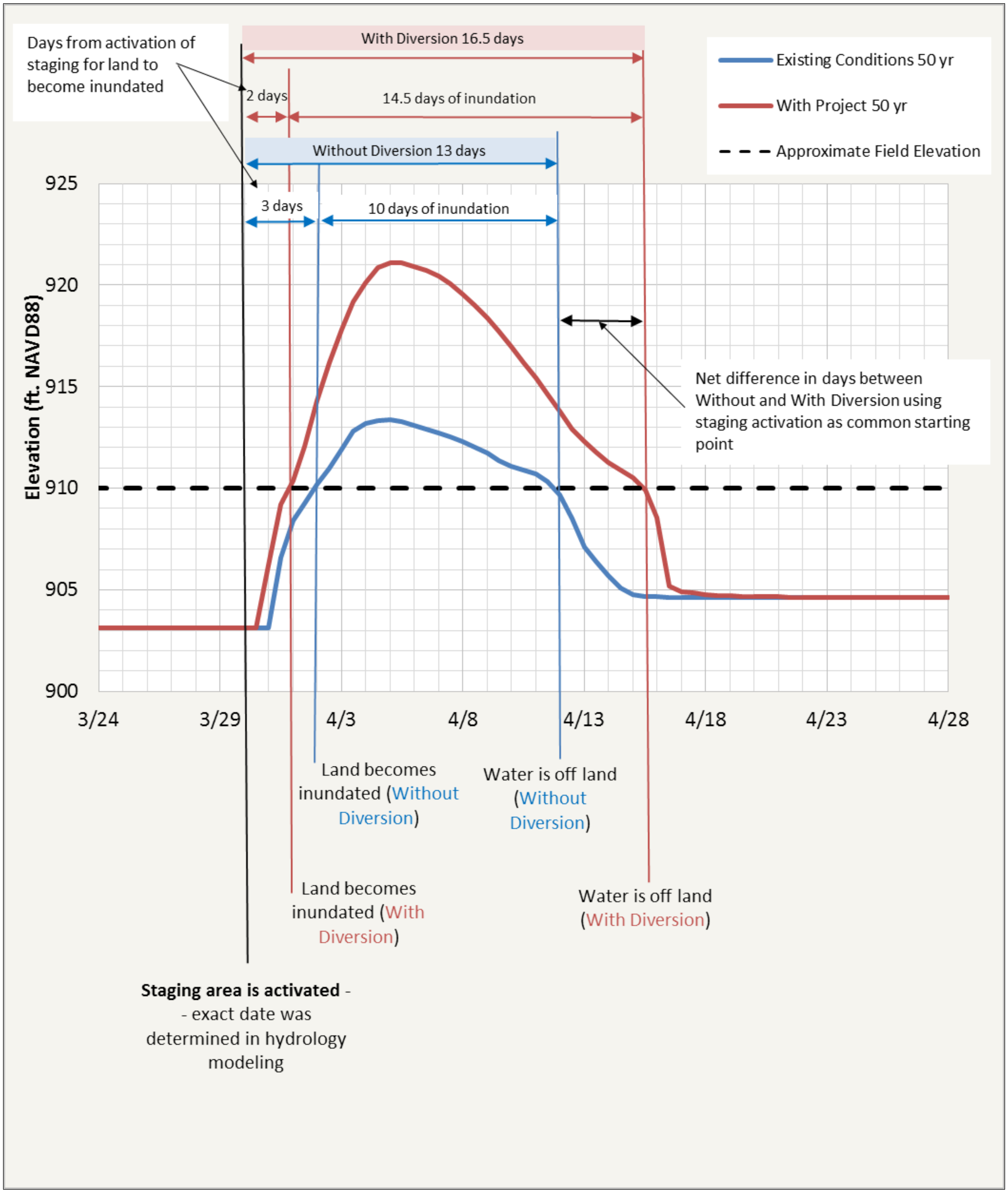

Figure 15. Placement of Hydrology Data in a Timeline, Demonstration of Use of Hydrograph Data for a Single Storage Area, With and Without Diversion.

Source: Bangsund et al. (2015).

A modeling process chronologically traces key activities during the spring planting season for each of the 241 storage areas. The first step combines start times for flood events (i.e., calendar dates from the simulations) with the hydrology data. The process estimates the number of days between activation of the staging area and when planting can occur (Figure 16). The potential time (i.e., days) from activation to when planting can occur varies based on size of flood event and location of the storage area with the staging area. A 10-day and a 14-day dry-down period is used on all storage areas that are inundated with current conditions or With Diversion conditions. For storage areas that are not inundated with flood water (either With or Without the Diversion), planting start dates represent the simulated distribution of planting start dates (see section on Distribution of Planting Start Dates on page 25). This process combines flood start dates and produces calendar dates to begin evaluation of planting activities.

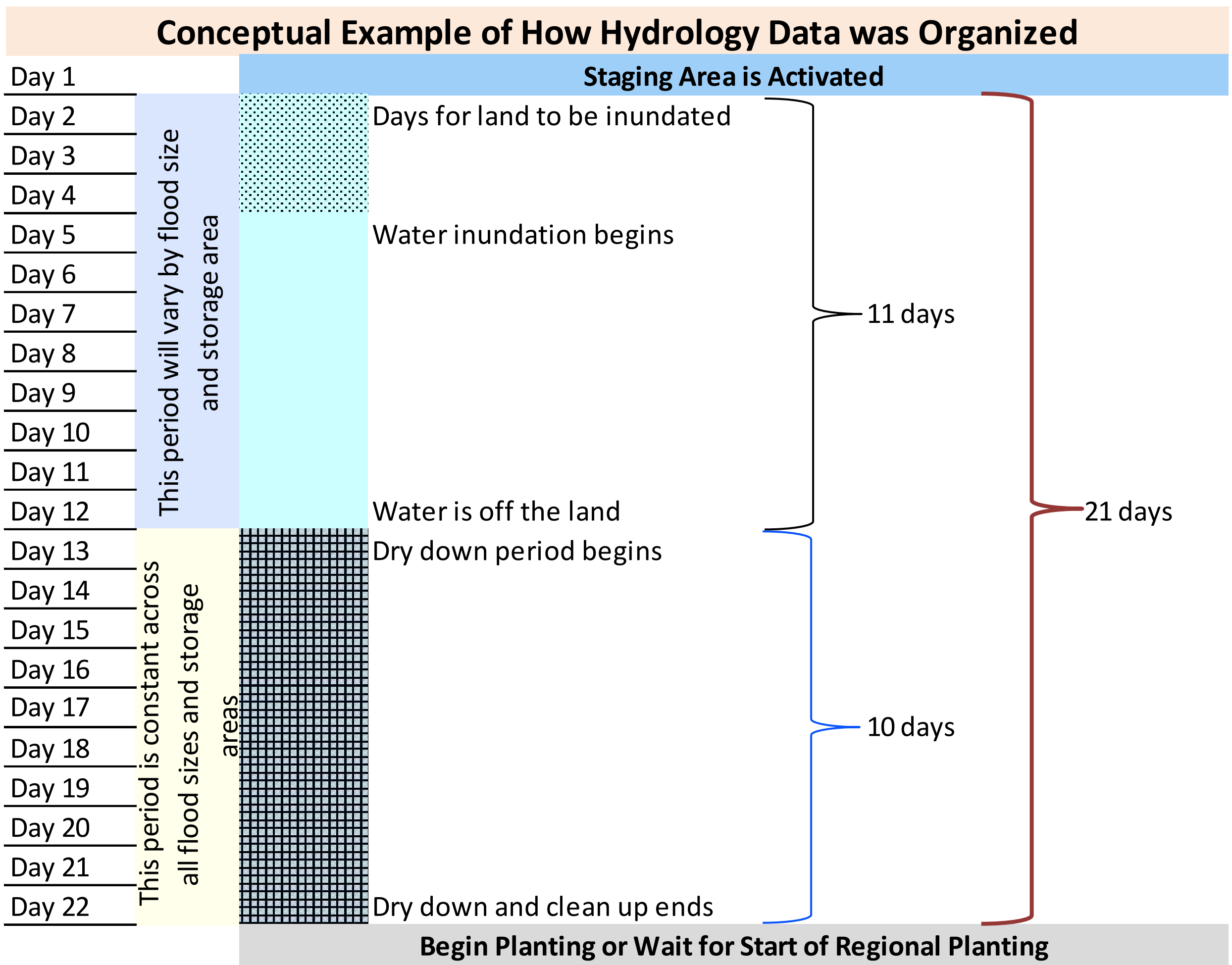

Figure 16. Example of the Analytical Framework of the Time Line from Activation of Staging Area to When Planting can occur for Storage Areas having Spring Flooding using a 10-day Dry Down Period.
Note: A 14-day dry down period was also used in the analysis, but not presented in Figure 16.

Planting Framework

A series of planting decisions and producer actions were developed, specific to each crop and based on key agronomic dates, to narrow the range of producer behavior in flood years. The planting decions (and corresponding key dates) are combined with the hydrology timeline.

Each crop has an optimal planting period based on typical agronomic growing conditions throughout the year. If a crop is planted within that period, the producer generally has the best opportunity to realize maximum potential yields. Those opportunities are a generalization as each spring planting and subsequent growing seasons are different. Obviously, conditions in the spring and timing of when the crop is planted play an important role in crop yields, but a number of other weather-related factors also affect yields (e.g., temperature and precipitation throughout growing season, harvest conditions, wind or hail, summer flooding). For corn, timing of planting has been estimated to account for approximately 22 to 24 percent of the variability in yield trend departures from year to year (Nielson 2013). Stated alternatively, 76 to 78 percent of the yield variability is due to conditions unrelated to planting date.

This analysis focuses on estimating the effects of potential delays in spring planting due to temporary water storage on agricultural lands. As such, yields are assumed to be relative to the spring planting conditions, meaning that the yield obtained will be less than the yield that would have been obtained had the crop been planted during the optimal period. However, even with optimal planting conditions, yields are not likely to achieve maximum potential unless other factors throughout the growing season also remain favorable.

The model contains dates that correspond with agronomically optimal planting periods, switch dates to move unplanted acreage from one crop to another crop due to delays in planting, and "prevent plant" dates (Figure 17). The optimal planting dates were obtained from NDSU agronomy specialists (Ransom 2014b). Switch dates represent a consensus from discussions with agronomists, farm management specialists and producers (Ransom 2014b, Swenson 2014a; Aakre 2014, Olson 2014, and NDSU Focus Group discussion in 2015. Prevent plant dates were obtained from NDSU Extension (2018).

The analysis considers two possible dates for producers to begin planting and the model uses the latest of the following dates.

1) Spring planting start dates, based on historical data, when producers generally beginning planting.

2) Date when the land dries after spring flooding; those dates are based on spring flood start dates, size of flood event, hydrology associated with the storage area, and a dry-down period.

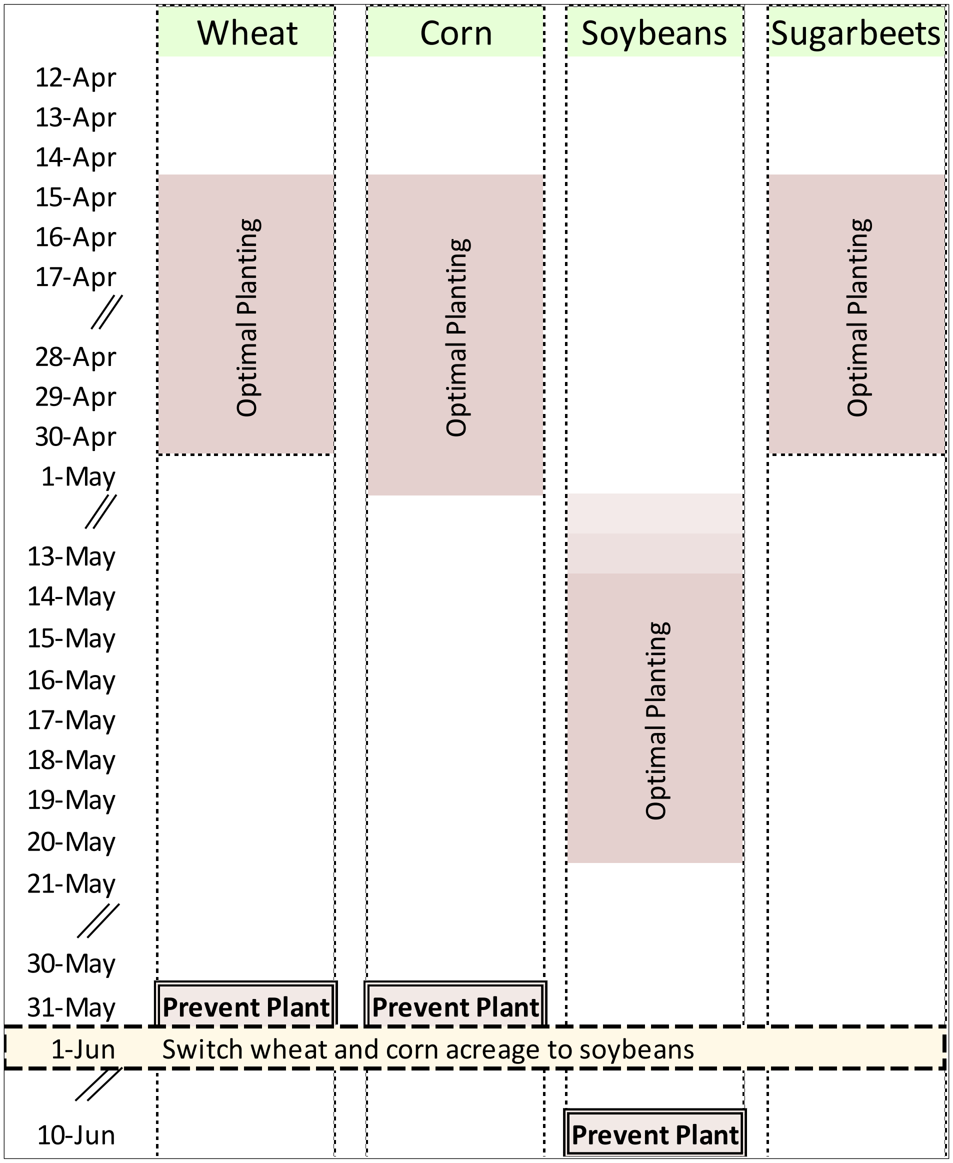

Figure 17. Optimal, Switch, and Prevent Plant Dates, Major Crops, Minnesota and North Dakota Counties in the FM Diversion Staging Area.

For example if planting in the region begins on April 10th, but due to flooding planting on a particular storage area cannot begin until April 15th, the model begins planting on April 15th for that storage area. Alternatively if the date when the storage area was expected to have dried out from flooding was April 8th (assume an early flood event of short duration) but planting in the region did not begin until April 12th, planting for that storage area would begin on April 12th.

Producer Decisions

Producers might experience numerous potential planting scenarios, depending upon flood start date, size of flood event, planting rates, and hydrology characteristics of the storage area. Figure 18 outlines potential combinations of planting start dates with agronomic dates. Six potential sets of planting circumstances were identified based on general dates when a producer may be able to begin planting. Those situations are identified below.

1) ***Producers would have no disadvantage in yields***—this situation is represented by the row labeled "A" in Figure 18. In this situation, the producer is not delayed in planting because the regional planting start date (shown as April 25^{th} in Figure 22) occurs after the potential planting date suggested by the hydrology of the storage area. This condition would result in no difference between current conditions and With Diversion scenarios.

2) ***Producers are delayed in planting relative to the regional start date (April 25^{th} in Figure 22), but producers are able to start planting within the optimal agronomic window for all crops***—this situation is represented by the row labeled "B" in Figure 18. In this situation, the producer would experience fewer days to plant during the optimal planting window relative to if they could have started planting on the regional start date. Depending upon the average planting rate that season, the effects of this planting situation may or may not have any bearing on acres switched to other crops or prevent plant acres.

3) ***Producers are delayed in planting relative to the regional start date and begin planting after the optimal planting window for all crops except soybeans***—this situation is represented by the row labeled "C" in Figure 18. In this situation, the producer would plant wheat, corn, and sugarbeets after the optimal planting window, and depending upon that year's planting rate, some wheat and corn acreage may be switched to soybeans or not be planted. Producers would still plant some acreage within the optimal window for soybeans.

4) ***Producers have missed the optimal planting window for all crops, but can begin planting prior to prevent plant dates for all crops***—this situation is represented by the row labeled "D" in Figure 18. In this situation, there is increased likelihood that some corn acreage will be switched to soybeans and/or not planted. A similar situation exists for wheat, except some wheat acreage might still be planted past the prevent plant date if that acreage is needed for a sugarbeet rotation. All soybean acreage planted would have reduced yield potential. Some soybean acreage may not be planted prior to the prevent plant date. Sugarbeets would be planted but with a substantial yield reduction.

5) ***Producers have missed the "prevent plant" deadline for wheat and corn, and have limited days to plant soybeans before the "prevent plant" deadline***—this situation is represented by the row labeled "E" in Figure 18. Sugarbeets could be planted but at a substantial yield reduction. All wheat and corn acreage would be placed into prevent plant. Some soybean acreage would be planted up to the prevent plant deadline, and any unplanted soybean acreage at that point would be not planted.

6) ***Producers have been delayed to the extent that no planting could begin prior to the prevent plant deadlines for wheat, corn, and soybeans***—this situation is represented by the row labeled "F" in Figure 18. Sugarbeets would be planted, but would produce a considerably reduced yield. All acreage for wheat, corn, and soybeans would be not planted.

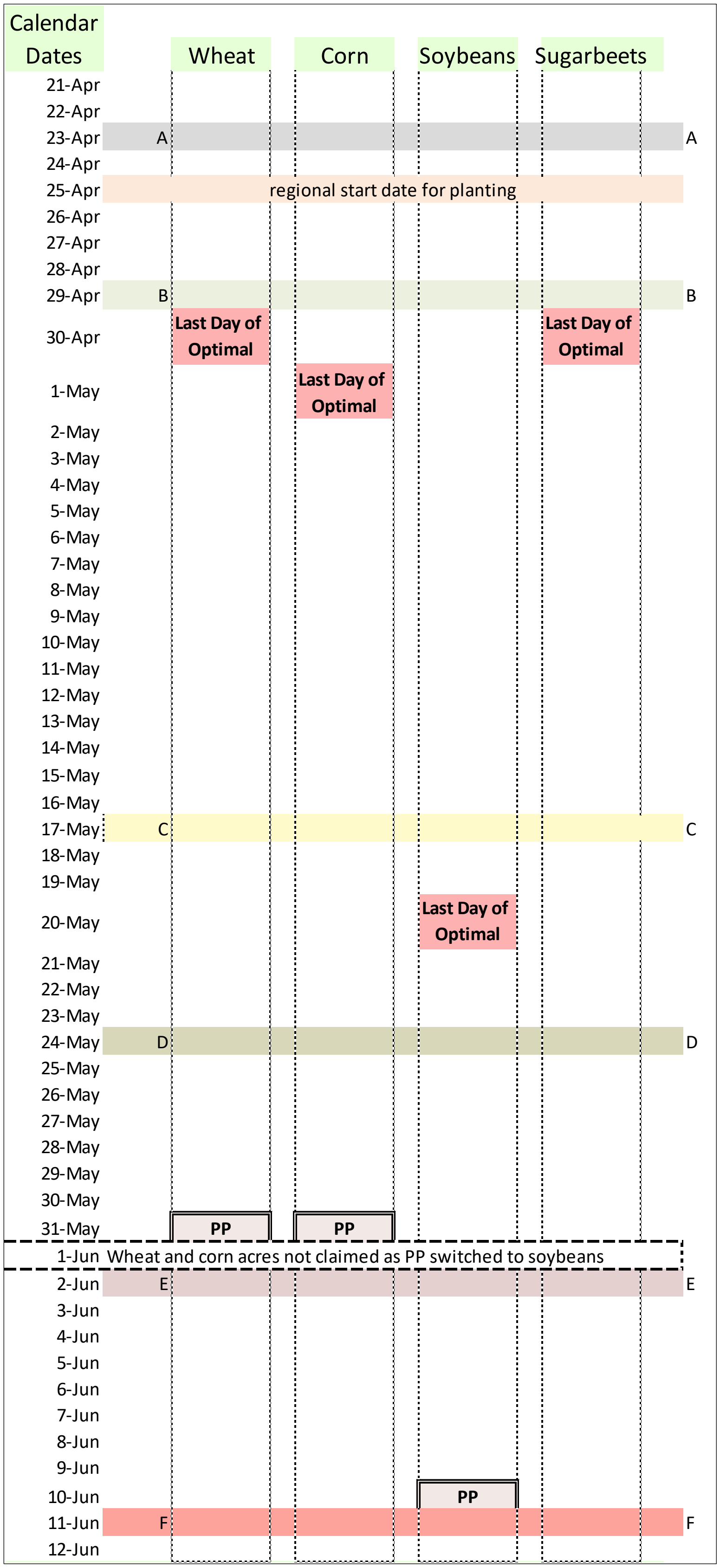

Figure 18. Outline of Planting Decisions based on Potential Planting Start Dates.
***PP** refers to Prevent Plant Date.

Allocation of Acreage between Prevent Plant and Switching Crops

The model does not estimate producer-level economics to determine if the producer would be better or worse off by claiming prevent plant versus switching wheat and corn acreage to soybeans (see Appendix B for an example of an NDSU Extension decision guide addressing those issues). Economic criteria for those types of planting decisions would vary depending upon insurance coverage levels, past actual production history (APH) yields, potential future implications for changes to the APH, crop price, and individual producer expectations for profitability of switching acreage. The programming requirements to provide a stochastic distribution of producer-level profitability and future price expectations exceeded the scope of this study. Finally, producers will lose eligibility to claim Federal Crop Insurance prevent plant for lands within the staging area during a year when the diversion operates the staging area further complicating economic decisions.

Including producer-level economics within the model to guide acreage allocations to prevent planting versus switching to another crop would improve the analysis. However, the omission of those criteria in the modeling process was not considered a major concern for this study. The treatment of planting decisions was applied equally between the Without and With Diversion scenarios.

In previous periods, economics have favored planting a crop rather than claiming prevent plant (Swenson 2014a, Aakre 2014). Producers at the focus group meeting in 2015 also commented to the same current conditions (Bangsund et al. 2015). However, those economics vary from year to year and among individual producers based on profitability and insurance coverage. Acreage claimed by producers as prevent plant varied considerably from 2009 through 2019 in the counties comprising the FM Diversion staging area (Appendix C). Although Farm Service Agency reports prevent plant acreage, the acreage reported as prevent plant does not necessarily mean all of those acres were idled that season (Olschlager 2015). Crop insurance has provisions where land can be claimed as prevent plant (e.g., corn) but may still be planted to another crop (e.g., soybeans). However, the payments and stipulations for planting a second crop differ from the payments when claiming a prevent plant condition and not planting a second crop. The stipulations on claiming prevent plant and planting a second crop currently make that option unattractive to most producers. The producer also could elect to plant acreage that was unsuitable to plant to their first crop choice and place that acreage into another crop without claiming prevented planting.

The analysis used a basic assumption that 20 percent of the land for wheat, corn, and soybeans that was unplanted as of the prevent plant deadline would be treated as prevent plant. The other 80 percent of that acreage would be shifted to another crop. The options for wheat and corn were to shift that acreage to soybeans. Unplanted acreage of soybeans after the prevent plant deadline was allocated to prevent plant and considered idled for the growing season.

Economic Variables

Storage areas in the staging area are assigned the percentage of wheat, corn, soybeans, and sugarbeets grown in the respective county (see Table 4). A three-year average from 2016 through 2018 was used to estimate crop shares. By assigning some wheat, corn, soybean, and sugarbeet acreage to each storage area, the analysis does not have to distinguish among which crops would be raised on the storage area in any given year. The process also treats planting activities equally among all the storage areas, and does not suggest that storage areas close to the river or prone to flooding will only raise one crop and all the storage areas at higher elevations will only raise another crop.

An important component in the analysis is the variability in spring planting conditions. The rate of planting progress is based on a combination of historical data and information obtained from producers, and is represented by the percentage of acreage planted each day, averaged over the planting season. The planting rate in any particular season is based on the simulated distributions of planting rates. The planting rate is then used across all crops for the entire planting season. Planting rates are assumed to be consistent across crops (i.e., the planting rate for wheat is not different than the planting rate for corn) within a planting season. For example, early spring planting conditions for corn and wheat may be slow due to cool temperatures and/or moisture. However, those conditions may change by the time soybean planting begins. Of course, the reverse situation also is possible as conditions may be more favorable early in the planting season than later in the planting season.

Yield Losses

During non-optimal planting periods, the analysis uses a daily yield reduction over the spring planting period. For example if a crop is likely to have a 1 percent yield loss for each day of delayed planting, yield on the first day following the last optimal planting date for acres planted that day would be 1 percent less than the target yield. Acres planted on the second day following the optimal planting window would receive a yield 2 percent less than the target yield. The analysis continues with daily yield reductions until planting for that crop is completed, switched, or results in prevent plant. Appendix D contains yield reductions and potential revenues for each crop, by county, by planting date over the spring planting horizon.

-) Sugarbeets

Data were collected from several sources to evaluate the likely yield losses associated with delayed planting for sugarbeets (Cattanach et al. 1991; Dexter 2015; Metzger 2015; Peters 2015). The most frequent estimate of yield loss was 1.5 tons per acre per week. Evaluating the Minn-Dak Farmers Cooperative data revealed a yield loss of 1.43 tons per acre per week from May 6th through June 24th over the 2000-2014 period (Metzer 2015). The yield loss over that period was primarily linear. Based on those sources, the study used a yield loss rate of 1 percent per day for sugarbeet acreage planted after May 1st.

-) Soybeans

Data from the University of Minnesota-Crookston indicates that soybean yield reduction due to planting delays is relatively low from May 10th through June 10th but yield losses increase substantially throughout the rest of June (Figure 19) (Severson 2014). Producers attending the focus group meeting also indicated that yield loss due to delayed planting for soybeans was relatively minor until well into June. While the yield loss curve based on University of Minnesota data is not linear from May 19th through June 30th, a linear rate of 0.5 percent per day results in similar yield losses from May 10th

through June 10th (Figure 19). Kandel (2015) acknowledged that the University of Minnesota, Crookston data are appropriate for estimating yield losses in the southern Red River Valley. Any acres of soybeans not planted by June 10th were assigned to prevent plant, therefore yield losses were not modeled after that date.

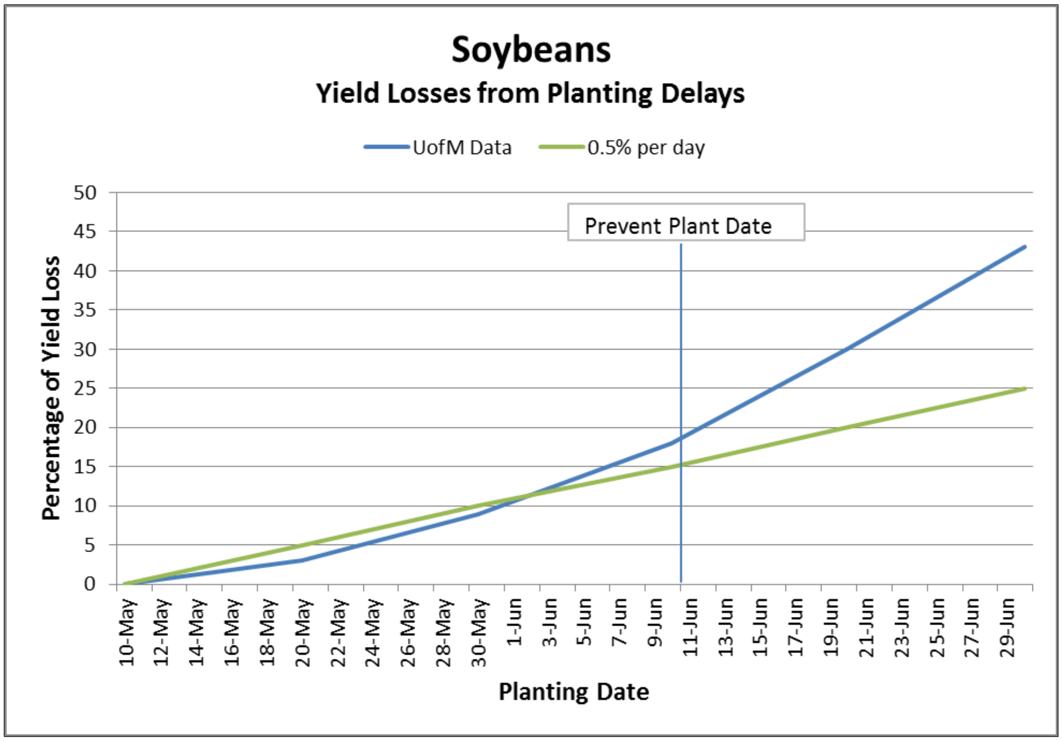

Figure 19. Yield Response to Delayed Planting, Soybeans, Red River Valley.
Source: Severson (2014).

-) Corn

Yield response from delayed planting for corn is well-documented in the Corn Belt producing region of the United States (Nafziger, E. 2008, 2011, 2012; Van Roekel and Coulter 2011; Myers and Wiebold 2013; Thomison and Geyer 2013; Doerge et al. 2015). Despite the widespread discussion of declining corn yields associated with delayed planting of corn, few articles directly address the issue of yield reduction for growing regions in North Dakota.

In southern Minnesota, Van Roekel and Coulter (2011) found that corn yields declined from 18 to 30 percent when planting was delayed by 4 weeks. They also found that it was not likely that producers could increase plant density (i.e., corn plants per acre) to offset economic losses from late planting. Coulter (2015) indicated optimal planting dates range from late April to early May in central to southern Minnesota, and suggested corn yields are likely to decline by 16 percent if planting is delayed until early June. Doerge et al. (2015) indicated that corn yield in the northern Corn Belt region declined about 35 percent when planted 6 weeks past optimal dates. However, yield losses over the six-week period were not linear. Northern Corn Belt was defined to include northern Iowa, southern and central Minnesota, southeast South Dakota, and central Missouri. Shafer (2011) presented information on typical yield losses for many of the states in the Corn Belt region of the United States. In Minnesota, yield losses declined from 97 percent of yield potential on May 5th to 59 percent of yield potential by June 19th.

Ransom (2014a) indicated that yield for corn in southeastern North Dakota declines about 1.1 to 3 bushels per day by June 1st. Those rates, based on estimated yield potential (see Tables 7 and 8 for target yields), would equate to about 0.75 percent to 2.2 percent per day. Ransom (2014b) indicated a general rule of thumb would be 1 percent per day yield loss past optimal planting window. Lauer (2015) provided information on yield effects of planting delays for several growing regions in Wisconsin. The northern growing region of Wisconsin is considered a 70-95 day maturity zone for corn. Yield losses in that maturity zone were expected to be 36 percent to 38 percent when planting was delayed to June 1st.

Producers who participated in the focus group session indicated yield losses ranging from 2 percent to 5 percent per day (Bangsund et al. 2015). However, producers indicated 5 percent per day was considered an absolute maximum loss. The majority of producers felt losses around 2 percent per day were more common. However, a 2 percent per day yield loss would result in a 60 percent decline in yield by June 1st. The degree of yield loss using a linear rate of 2 percent per day exceeded published estimates, and was inconsistent with producers' decision to switch from corn to soybeans around June 1st. Expected yields using a 2 percent per day yield loss would suggest producers would continue to plant corn when expected yields dropped below 60 bushels per acre in the staging area, which would coincide with switching corn to soybeans around June 1st. Producers would likely switch corn to another crop prior to reaching the point where yield potential for corn was 60 bushels per acre or less. The northern growing region of Wisconsin was perceived to be a reasonable proxy for the growing region in the southern Red River Valley. The yield loss reported for planting delays for northern Wisconsin resulted in yield declines that were between 1 percent and 2 percent yield loss per day by June 1st (Figure 24).

The University of Minnesota yield losses for corn were considered to be heavily influenced by a longer growing season as much of the state's corn is produced further south than the FM Diversion staging area. The longer growing season decreases the risk of early frost, and usually increases the potential for a warmer growing season, which can mitigate the yield declines associated with delayed planting. The 2 percent per day linear rate was perceived to overestimate the yield declines for corn in the study region. The yield loss from northern Wisconsin was considered the best fit for this study.

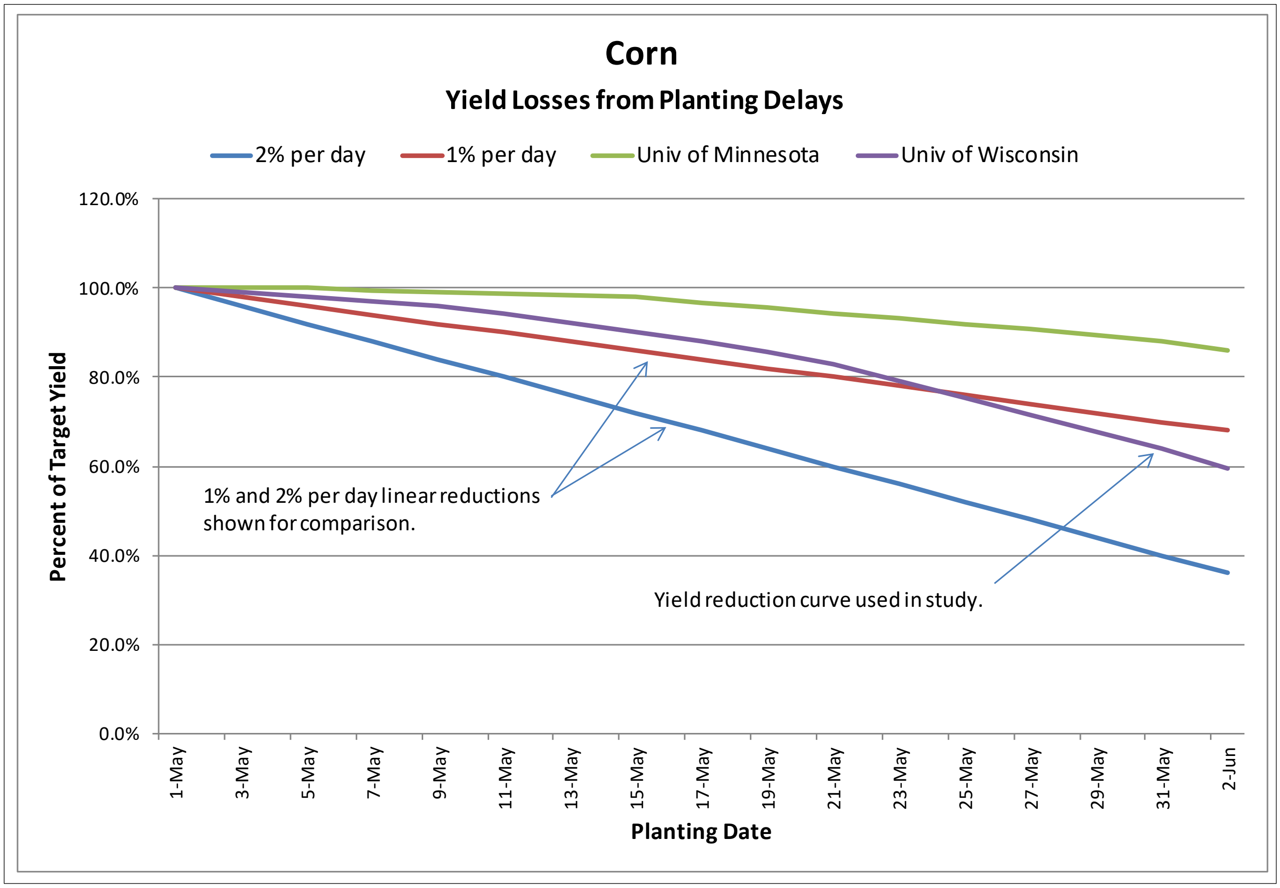

Figure 20. Yield Responses to Delayed Planting for Corn, Red River Valley.
Sources: Lauer (2015); Coulter (2015); Bangsund et al. (2015).

-) Wheat

Ransom (2014a) reported yield losses for wheat to be around 1.5 bushels per day for planting after optimal dates. Ransom (2014b) indicated a general rule of thumb would be a 1 percent per day reduction in wheat yield for acreage planted after the optimal date. Producers who participated in the Focus Group session indicated yield losses were around 1 bushel per day for delayed planting. Based on target yields, a yield loss of 1 bushel per day represented 1.6 percent per day. A yield loss of 1.5 bushels per day would represent a yield loss of 2.4 percent per day. This study used a 1 bushel per day yield loss associated with delayed planting, which equates to about 1.6 percent per day (Table 10).

Table 10. Yield Rate Declines Associated With Planting Delays, Red River Valley		
	Last Optimal Calendar Date for Planting	Relative Yield loss if Planting Occurs after Optimal Date
Wheat[a]	April 30	1.67% per day
Corn[b]	May 1	Week 1-3.5%, Week 2-9.9%, Week 3-19.0%, Week 4-32.1%
Soybeans[c]	May 20	0.5% per day
Sugarbeets[d]	May 1	1.0% per day

[a] Ransom (2014a, 2014b); Bangsund et al. (2015).
[b] Ransom (2014a, 2014b); Lauer (2015).
[c] Ransom (2014b), optimal dates. Severson (2014) and Kandel (2015), yield losses.
[d] Metzer (2015); Peters (2015).

Value of Switch Acres

Wheat acreage switched to soybeans was valued at the per-acre gross revenue for wheat using wheat yield on the date when the acreage was switched. Soybeans are a relatively higher value crop than wheat and switching acres of wheat to soybeans might skew the estimated revenues associated with planting delays. To avoid generating a revenue premium for switching wheat acreage to soybeans, the acreage of wheat switched to soybeans was not valued based on subsequent soybean production from those acres, but rather was estimated by multiplying the expected wheat yield as of June 1 by the price for wheat. This valuation process was applied to all wheat acres switched to soybeans. Corn acreage switched to soybeans was estimated using the same methods as wheat.

Soybeans were modeled to not have a switch crop. If soybean acreage was not completed by the prevent plant deadline, all remaining acres of soybeans were considered idle for the season.

Sugarbeets also were modeled to not have a switch crop. Although the prevent plant date for sugarbeets is May 31, few acres of sugarbeets are ever claimed as prevent plant in the study counties (Appendix C). Typically, sugarbeets are planted until all acres are completed, even if planting extends beyond May 31. Prevent plant acreage for sugarbeets was not included in the analysis.

Study Limitations

This study is not without limitations. Some of those limitations and assumptions are related to available data while other shortcomings are based on limitations of the methodology. Further, some limitations are a natural consequence of limited resources and definitive timelines that prevent studying every caveat of an issue.

Combining weather and producer behavior is difficult, and the study was not able to include all factors that may affect spring planting, yield loss, or reductions in producer incomes in the staging area. The following topics are acknowledgements of the additional issues or refinements that could be included in future studies. Further, this list helps to reiterate the complexities of modeling all of the potential producer effects that may result from the FM Diversion. By identifying and discussing these issues, stakeholders, planners, producers, landowners, and the general public will have a clear understanding of the study.

If all of the potential subjects or issues could be adequately incorporated into future studies, they would refine the magnitude of losses and further articulate producer-level effects. However, aside from perhaps the largest omission (e.g., farm insurance), the study's current data and methodology could potentially draw similar conclusions even if the omitted factors were addressed. This is due to the general relationship between when the staging area would be activated and when producers are expected to be able to begin planting. Unless the hydrology effects were to substantially change, those fundamental relationships would remain present in an expanded study.

- **Crop Insurance**: The study did not take federal crop insurance into consideration. Crop insurance is an important financial tool for producers. Several important questions would need to be addressed with respect to crop insurance including eligibility if the staging area is used and potential affects in non-flood years from adjustments to lower yields in a flood year. Discussions between the FM Diversion Authority and Risk Management Agency reveal that Federal crop insurance for prevent plant would not be available to producers within the staging area if the staging area is operated. However, considering the economic importance of prevent plant options for producers, the FM Diversion Authority is considering options to mitigate the loss of prevent plant insurance.

  The implication for loss of prevent plant coverage is important. Some storage areas within the staging area flood for extended periods, but hydrology data suggests the FM Diversion does not increase the flood duration on those storage areas (e.g., Hydrology Group 2). If producers are ineligible for Federal Crop Insurance for prevent plant because the staging area was activated, then lands not adversely impacted by operation of the staging area could still incur losses from the inability to claim prevent plant on those lands. In other words, losses to producers could be from the loss of prevent plant insurance on lands within the staging area not adversely impacted by the operation of the staging area. Those potential losses were not addressed in this study.

- **Land Productivity**: The study does not address short- and long-term land productivity issues, how water storage may affect soil organisms, soil compaction, erosion or other soil/agronomy concerns

- **Flood Debris**: Debris is a big concern for producers, especially for the storage areas that do not currently flood. Flooding creates a shoreline effect, or depositing of crop residue and other materials at the edge of flood waters. These deposits of debris can be problematic depending upon water inundation, previous year's crop, fall tillage, field topography, or deposits of non-agricultural materials (e.g., trees, garbage). Debris left by flood waters increases the dry-down time in areas of deposits and increases time requirements to prepare a field for planting. Producers indicated that no single method exists to easily manage flood debris. Some of the more common methods include burning, moving the debris to field edges, or using tillage to disperse the debris. Land under the debris windrows or deposits will not dry-down at the same rate as non-covered areas. The study assumed that debris was handled within the 10-day or 14-day dry-down periods.

- **Use of State-level Data**: State-level data for sugarbeet planting in North Dakota was used for planting start dates for wheat, corn, and sugarbeets. Planting conditions throughout the spring can vary substantially at a state level. This is especially so if a crop is raised over a large area (e.g., wheat in North Dakota, corn in Minnesota). The study did not have historical data on planting start times specific to the staging area for corn, wheat, and soybeans. However, considering sugarbeets are planted at approximately the same time as wheat and corn, those planting dates were considered the best source of data for those crops. Site-specific planting start dates for soybeans would potentially refine the study results; however, soybeans are planted sufficiently late in the spring as to have much less likelihood of delay associated with temporary water storage. Subtile adjustment of those dates is not likely to change that conclusion.

- **Likelihood of Prevent Planting in Non-flood Years**: The analysis does not include the potential adjustment to the likelihood of prevented planting occurring the year after a prevented plant season. Evaluation of the effects of temporary water storage were limited to a single planting season.

- **Dry-down Period**: The 10-day and 14-day dry-down periods are an assumption based on professional opinion of producers and soil scientists. Empirical data on actual dry-down times following flood inundation were not available. Dry-down is a function of precipitation (fall and spring), temperature in the spring, presence or absence of fall tillage, soil type, wind, cloud cover, and crop residue. The month of May tends to receive more precipitation than the month of April. The implication is that if water recedes within the month of April from a flood event the relative dry-down period may be shorter than if water does not recede until sometime in the month of May.

  Since inundated lands are saturated after water leaves the land, their ability to absorb additional moisture is likely to be considerably less than non-flooded lands. The study does not estimate the probability of a rain or precipitation event occurring during the dry-down period. The dry-down period can potentially vary by storage area, so the days required for dry down will not necessarily be the same among all inundated storage areas.

- **Economics of Crop Switching**: The study did not include the influences that relative profitability of particular crops might play on a producer's decision to switch planting to other crops. For example, if corn price is high and profitability from corn is perceived or anticipated to be better than soybeans (even with reduced yields), producers may plant beyond the date when they would normally switch corn acreage to soybean acreage. The opposite may occur if corn profitability is perceived to be lower than soybeans—producers may switch late planted corn acreage to soybeans earlier in the planting season than otherwise suggested.

- **Alternative Maturity Varieties:** Switching the maturity of certain crop varieties, primarily corn and soybeans, may be a potential strategy for producers to mitigate planting delays. However, shorter maturing crops generally yield less than longer maturing crops, and the net difference in a delayed planting start with a shorter maturity variety versus a longer maturing variety is not clear. Also related to the issue of switching maturities for crops would be the economics of crop switching, which could include an added element of including adjustments for alternative maturing crop varieties.

- **Crop Mix within Storage Areas**: The study had to assume an equal distribution (percentage) of the region's crops among each storage area. In reality, many storage areas may only produce one or two crops in any given season.

- **Yield Potential versus Actual Yields**: The yields used in the model were based on a combination of NASS data and information from producers. It was beyond the scope of this study to determine to what degree historical spring planting conditions have influenced yields. Alternatively, a number of factors affect yield, and those factors are present throughout most of the growing season. Planting conditions are one of many factors that affect yield in any given year.

- **Crop Quality**: The study did not incorporate any crop quality issues. For example, the potential effect of delayed planting on sugar content for sugarbeets was not addressed in the study.

- **Organic Crop Production**: It is unclear what effects temporary water storage may have on organic producers within the storage area. Those effects may include a loss of certification due to the presence of flood waters and/or a difference in revenue loss from delayed planting if organic yields and prices are different from those used in this study.

- **Sub-surface Drain Tile**: The presence or absence of subsurface drain tile was not included in the hydrology modeling, nor considered in the assumptions for dry-down time used in the analysis. NDSU Extension agronomists indicate that drain tile, in many circumstances, can facilitate faster removal of spring flood waters and reduce dry-down time after a flood event. Data on the acreage currently using subsurface drain tile within the staging area were not collected, and current hydrology modeling by the FM Diversion Authority has not incorporated the potential improvement in rate of flood water drainage due to subsurface drain tile. While subsurface drain tile may improve dry-down time, data were not available to quantify that improvement. Considering the expense of installing drain tile, it would be unlikely that reducing planting delays associated only with flood years would be economically sufficient to justify the expense of installing drain tile.

- **Production Costs and Profitability**: While the study focused on producer revenues, another important element pertains to profitability. The analysis did not address any potential changes in production costs that could arise from the presence of the Diversion, nor does the analysis provide estimates of the lost *Net Revenue* for producers.

Analysis of Staging Area Hydrology

Data from the hydrology modeling were used to estimate the difference between the existing conditions and conditions that would be expected if the FM Diversion operated the staging area. Some storage areas naturally flood within the staging area due to proximity or elevation relative to the Red River or Wild Rice River, depending upon size of the flood event. Other storage areas would not flood with existing conditions but the staging area would create conditions where those lands would flood. Therefore, the staging area can create three general outcomes: 1) no effect, as the land either does not flood or the amount of time the land is flooded remains unchanged, 2) change in time flooded, land that would flood naturally Without the Diversion now floods longer or shorter due to the use of the staging area, or 3) new flooding, land floods With the Diversion when that land would not otherwise flood. The hydrology data provided the basis where the effects of operating the staging area could be measured for each storage area.

A critical element in understanding the potential agricultural implications of short-term water storage on farmlands in the FM Diversion staging area relates to the duration or absence of water storage within the staging area. Understanding the hydrology differences between conditions Without the Diversion and conditions created by the FM Diversion form the basis to evaluate the potential effects on spring field work.

The 241 storage areas in this study were grouped into five categories. Each category represents a different set of conditions between current hydrology and hydrology created by the FM Diversion with respect to spring flooding (Table 11).

- **Hydrology Group 1**: Storage areas that will not be flooded/inundated if the Diversion is operated. This outcome is due to land at a relatively high elevation in the staging area (*Does Not Flood*).
- **Hydrology Group 2**: Storage areas that will be flooded/inundated for the same duration whether or not the Diversion is operated; usually the lowest land in the staging area (*Floods the Same*)
- **Hydrology Group 3**: Land that will be flooded/inundated longer as a result of operating the Diversion (*Floods Longer*)
- **Hydrology Group 4**: Storage areas that will be flooded/inundated a shorter duration as a result of operating the Diversion because the features of the Diversion will drain the water away more quickly; however, the shortened storage time often is no more than a day (*Floods Shorter*)
- **Hydrology Group 5**: Storage areas that do not flood, but will be flooded/inundated With the Diversion (*New Flooding)*

The 241 storage areas will not necessarily be in the same hydrology group for all 10 flood event sizes. A storage area with a relatively low elevation (e.g., 909 ft msl) may be in Group 3 for most flood events, meaning it would flood With or Without the Diversion but floods longer With the Diversion. A storage area with a relatively high elevation (e.g., 925 ft msl) may be in Group 1 for most flood events, meaning that it would not be inundated regardless of the Diversion except for very large flood events. A storage area with a mid-elevation (e.g., 919 ft msl) may be in Group 3 during a large flood event, Group 5 in a moderate flood event, and Group 1 during a small flood event.

Table 11. Description of General Hydrology Conditions for Storage Areas Within the FM Diversion Staging Area		
Hydrology Group	Description With Existing Conditions	Effects of the FM Diversion[a]
1	Does not flood	Does not flood
2	Already floods	Flood duration is unchanged
3	Already floods	Flood duration is longer
4	Already floods	Flood duration is shorter
5	Does not flood	Will now flood With Diversion

[a]The flooding effects of operating the Diversion do not necessarily imply all acreage within that storage area is inundated.

Relating to the timing of spring planting, land contained within Hydrology Groups 3 and 5 are the only storage areas that incur adverse economic effects from the operation of the Diversion staging area and are likely to receive the greatest attention during policy discussions and debates. For most practical purposes dealing with spring planting and flooding activity, storage areas in Groups 1, 2 and 4 are not meaningfully impacted by the operation of the Diversion. ***NOTE: Crop land in hydrology groups 1, 2, and 4 can still incur planting delays and have prevent plant conditions in flood years, based on the hydrology data it is assumed that those planting conditions are not created by the operation of the Diversion.***

The timing and duration of water inundation varies considerably among the storage areas for each of the 10 flood event sizes. In a 10-year flood event, over 77 percent of the acreage as defined by the 241 storage areas is not inundated, whereas in a 500-year flood event only 3 percent of the acreage is not inundated (Table 12). Storage areas that either flood the same duration or flood with less duration With the FM Diversion (Hydrology Groups 2 and 4, respectively) comprise 19 percent of acreage in a 10-year event. That share increases to 45 percent in a 500-year event. Storage areas in Hydrology Groups 3 and 5 (lands that are inundated longer or lands that flood as a result of the Diversion) comprise about 4 percent of the staging area in a 10-year flood but comprise around 50 percent of the acreage in 50-year, 100-year, and 500-year events. (Appendix A contains detailed information on the hydrology groups for the 10 flood events).

The length of time from activation of the staging area until water leaves a storage area varies among the hydrology groups for any particular flood event, and also varies across the 10 flood event sizes for each of the hydrology groups (Table 13). For example, the average length of time from activation of the staging area until water leaves storage areas in Hydrology Group 2 (flood duration is the same) ranges from 4.5 days in a 25-year flood event to 18 days in a 100-year flood event.

Table 12. Acreage of Hydrology Groups, by Size of Flood, Operation of the FM Diversion Staging Area										
	10-year Event		20-year Event		25-year Event		25-year Long Event		25-year Extra Long Event	
Group	Acres	Percent of Total	Acres	Percent of Total	Acres	Percent of Total	Acres	Percent of Total	Acres	Percent of Total
1[a]	42,093	77.6	26,264	48.1	19,071	36.1	12,042	25.3	12,042	25.3
2[a]	8,210	15.8	13,483	24.9	5,752	7.0	12,082	19.9	15,878	30.7
3[a]	908	2.5	7,032	17.4	23,277	46.5	23,657	42.3	12,360	23.6
4[a]	2,155	2.9	5,384	6.7	0	0	1,865	2.5	9,366	10.4
5[a]	1,115	1.2	2,318	2.9	6,381	10.4	4,835	10.0	4,835	10.0
Total[b]	54,481	100	54,481	100	54,481	100	54,481	100	54,481	100
	2009 like Event		50-year Event		100-year Event		500-year Event		PMF Event	
Group	Acres	Percent of Total	Acres	Percent of Total	Acres	Percent of Total	Acres	Percent of Total	Acres	Percent of Total
1[a]	6,665	11.6	11,086	24.1	6,316	11.6	2,302	2.9	0	0.0
2[a]	16,971	33.2	11,257	17.0	15,942	29.5	18,724	36.5	22,414	39.0
3[a]	16,010	35.3	17,126	36.9	16,076	31.5	23,461	49.4	13,636	29.9
4[a]	11,220	12.0	9,605	10.4	9,773	12.9	7,376	8.7	18,432	31.1
5[a]	3,617	1.9	5,137	11.6	6,374	14.5	2,618	2.5	0	0.0
Total[b]	54,481	100	54,481	100	54,481	100	54,481	100	54,481	100

PMF = probabilistic maximum flood.
[a]Group 1 represents land that does not flood With Diversion. Group 2 represents land that floods for the same duration. Group 3 represents lands that flood longer With the Diversion. Group 4 represents lands where inundation is shorter With the Diversion. Group 5 represents lands that now flood With Diversion would otherwise not flood. Not all acres within storage areas for Groups 2, 3, 4, and 5 will be inundated.
[b]Based on total acreage of the 241 storage areas.
Source: Houston-Moore Group (2019).

Table 13. Days from Staging Activation until Water Leaves the Storage Area, Average of All Storage Areas Within Each Hydrology Group for Each Flood Event										
Hydrology Group	10-year Event		20-year Event		25-year Event		25-year Long Event		25-year Extra Long Event	
	WO	W	WO	W	WO	W	WO	W	WO	W
	days									
1	0	0	0	0	0	0	0	0	0	0
2	4.9	4.9	6.1	6.1	6.4	6.4	13.5	13.5	18.9	18.9
3	4.3	4.8	7.1	9.0	7.4	9.6	10.6	12.4	14.6	17.2
4	4.2	2.1	6.9	6.0	na	na	7.8	6.1	15.6	14.1
5	0	17.6	0	8.5	0	7.5	0	7.8	0	9.8
Hydrology Group	2009 like Event		50-year Event		100-year Event		500-year Event		PMF Event	
	WO	W	WO	W	WO	W	WO	W	WO	W
	days									
1	0	0	0	0	0	0	0	0	0	0
2	20.4	20.4	13.0	13.0	17.7	17.7	32.4	32.4	35.5	35.5
3	6.9	10.2	9.2	11.7	10.3	13.3	22.3	24.7	20.9	22.5
4	16.3	14.9	14.7	13.4	17.8	16.3	21.7	19.0	44.9	42.1
5	0	7.5	0	8.9	0	9.5	0	12.5	0	0

WO = Without Diversion and W = With Diversion. PMF = probabilistic maximum flood.
Source: Houston-Moore Group (2019).

****This study is only concerned with the difference in when water leaves the storage area between the Without Diversion and With Diversion conditions.**** The difference between the Without Diversion and With Diversion conditions excluding dry down, averaged across all storage areas within a hydrology group, varies from zero days for Hydrology Group 2 in all events to 17.5 days for Hydrology Group 5 in a 10-year event (Table 13)[8]. The large difference in days for Group 5 in a 10-year event is due to one storage area. Crop production on that storage area is unlikely, and with few other Group 5 storage areas in that category in a 10-year event, the difference in days is largely due to the extremely long water retention in that one storage area (see details for DIVSA98W in Appendix A).

In Hydrology Group 3, the net difference in time for water to leave the land ranges from 0.3 days in the 2009-like flood event to 3 days in a 100-year flood event. The Diversion is expected to add less than 3 days for water to leave the land for Hydrology Group 3 in the other 9 flood events. Hydrology Group 5 has the largest difference, with no flooding Without the Diversion to having 9 to 12 days from staging area activation until water leaves the land in 4 of the 10 flood events (Table 13).

Table 13 represents the average of all storage areas within each of the five hydrology groups for each of the flood event sizes; some storage areas will experience longer periods for flood waters to leave while others within the same hydrology group will experience shorter periods. Detailed hydrology data for all 241 storage areas is contained in Appendix A.

*** *An important clarification is that some storage areas within certain hydrology groups will be inundated longer than storage areas in other hydrology groups, and that the classification of the storage areas is based on the type of effects created by the Diversion, not based on how long the water is on the land or how long it takes for the water to leave the land. For example, a storage area in Hydrology Group 2 that floods the same duration (e.g., 12 days Without and 12 days With Diversion) may be inundated for a longer period than a storage area in Hydrology Group 3 that now floods longer With the Diversion (e.g., from 8 days of inundation Without Diversion to 10 days of inundation With Diversion).****

The distribution of acres affected within the staging area varies between Minnesota and North Dakota, both in terms of hydrology impacts and flood event size (Table 14). With the location of the staging area shifting west, most of the inundated acreage in all hydrology groups lies in North Dakota. (Table 14). Additional information on acreage of storage areas, by county and duration of inundation, is detailed in Appendix A.

[8] One storage area, DIVSA85E, is primarily responsible for the large difference in total days between With and Without Diversion conditions in the 10-year flood event. That storage area shifts to Hydrology Group 3 in the 9 larger flood events. Therefore, the average of storage areas in Hydrology Group 5 for the 10-year flood event are skewed as a result of the conditions in that storage area. Appendix A contains detailed hydrology data for each storage area, and that information can be used to evaluate conditions for any single storage area in the FM Diversion staging area.

Table 14. Distribution of Storage Areas, by State, Size of Flood Event, and Hydrology Group					
	Flood Event Size				
State and Hydrology Group	10-year	20-year	25-year	25-year Long	25-year Extra Long
Minnesota	--------------- Total Acreage of All Storage Areas in Hydrology Group ---------------				
1 No flooding	7,501	5,810	3,292	1,740	1,740
2 Floods Same	714	1,157	472	999	2,024
3 Floods Longer	53	1,300	2,255	4,134	3,109
4 Floods Shorter	0	0	2,248	852	852
5 No Flood, Now Floods	0	0	0	541	541
North Dakota					
1 No flooding	34,591	20,453	15,777	10,301	10,301
2 Floods Same	7,496	12,325	5,280	11,082	13,853
3 Floods Longer	854	5,731	21,021	19,522	9,249
4 Floods Shorter	2,155	5,384	0	1,011	8,513
5 No Flood, Now Floods	1,115	2,317	4,132	4,293	4,293
	Flood Event Size				
State and Hydrology Group	2009 like	50-year	100-year	500-year	PMF
Minnesota	--------------- Total Acreage of All Storage Areas in Hydrology Group ---------------				
1 No flooding	1,295	2,671	880	140	0
2 Floods Same	1,579	525	1,321	1,670	2,253
3 Floods Longer	4,705	4,109	4,331	5,605	4,186
4 Floods Shorter	400	210	0	852	1,828
5 No Flood, Now Floods	288	752	1,735	0	0
North Dakota					
1 No flooding	5,369	8,414	5,435	2,161	0
2 Floods Same	15,390	11,001	14,620	17,053	20,160
3 Floods Longer	11,304	13,016	11,744	17,855	9,449
4 Floods Shorter	10,819	9395	9,772	6,523	16,602
5 No Flood, Now Floods	3,327	4384	4,638	2,618	0
PMF = probabilistic maximum flood.					

Based on hydrology data representing HEC-RAS 9.1 CLOMAR modeling[9], the acreage of land inundated with use of the staging area varies by frequency or size of flood event (Table 15). The hydrology modeling estimates the amount of acreage that would flood with the operation of the Diversion and acreage that would flood naturally with existing conditions. Very little additional flooding occurs within the staging area for a 10-year event With the Diversion. However, for the other flood events, inundated acreage With the Diversion varies from about 13,000 acres for a 20-year event to 51,500 acres for the PMF event (Table 15). By contrast, under existing conditions about 11,400 acres would be naturally flooded with a 20-year event and 49,000 acres would be flooded with a PMF event.

9 Data provided by Houston-Moore Group (2019) based on previous work by the U.S. Army Corps of Engineers.

Table 15. Acreage Inundated by Spring Flood Events, by Flood Frequency, With and Without FM Diversion Staging Area				
	Estimated Acreage of Land Inundated[a]		Percentage of Acreage Inundated[b]	
Flood Event	With Use of FM Diversion Staging Area	With Existing Conditions (no Diversion)	With Use of FM Diversion Staging Area	With Existing Conditions (no Diversion)
10-Yr	4,464	4,423	8.2	8.1
20-Yr	13,021	11,395	23.9	20.9
25-Yr	17,943	12,861	32.9	23.6
25-Yr LF	22,546	17,166	41.4	31.5
25-Yr ELF	22,864	17,188	42.0	31.5
2009-like	29,214	20,833	53.6	38.2
50-Yr	24,399	17,486	44.8	32.1
100-Yr	31,649	20,975	58.1	38.5
500-Yr	45,960	39,725	84.4	72.9
PMF	51,573	49,102	94.7	90.1

PMF = probabilistic maximum flood.
[a]Only acreage submerged by water.
[b] Based on acreage of 54,481 for defined storage area. Acreage affected by flooding will likely be greater than acreage of land inundated/flooded.
Source: Houston-Moore Group (2019).

The hydrology modeling also can show the duration of flooding changes for storage areas inside the staging area. The 10-year event had little difference in the duration of flooding based on acreage of affected storage areas inside the staging area; however, about 16,000 to 23,500 acres associated with storage areas would flood longer with use of the staging area in the 100-year and 500-year events, respectively (Table 16). In some cases, the duration of flooding would be less with use of the staging area due primarily to improved water flow as a result of the Diversion channel, modified culverts, and/or other water conveyance features. About 2,200 acres with the 10-year event and about 7,400 acres with the 500-year event would experience a shorter flood inundation With the Diversion (Table 16). Hydrology modeling indicated that improved hydrology implemented within the staging area would reduce flood durations on over 11,000 acres in a 2009-like flood event and 18,000 acres in a PMF event.

With a 25-year event With the Diversion, the engineering data estimate that 23,300 affected acres would store water longer and 6,400 affected acres would store water that otherwise would not store water. With a 50-year event, the Diversion would cause 17,100 affected acres to store water longer and 5,100 affected acres would store water that would not otherwise be inundated. Table 15 represents flooded acreage, but this study used affected acreage (i.e., all acreage within a storage area) as represented in Tables 16 and 17.

Table 16. Difference in Storage Area Acreage affected by Spring Flood Events, by Flood Frequency, With and Without FM Diversion Staging Area				
		Change in the DURATION of Water Inundation[a]		
Flood Event	Acreage of Storage Areas NOW FLOODED Due to Use of Staging Area[b] (Group 5)	Storage Areas where Inundation is the SAME with Use of Staging Area (Group 2)	Storage Areas where Inundation is LONGER with Use of Staging Area (Group 3)	Storage Areas where Inundation is SHORTER with Use of Staging Area (Group 4)
	---------- acres ----------			
10-Yr	1,115	8,210	908	2,155
20-Yr	2,318	13,483	7,032	5,384
25-Yr	6,381	5,752	23,277	0
25-Yr LF	4,835	12,082	23,657	1,865
205-Yr ELF	4,835	15,878	12,360	9,366
2009-like	3,617	16,971	16,010	11,220
50-Yr	5,137	11,527	17,126	9,605
100-Yr	6,374	15,942	16,076	9,773
500-Yr	2,618	18,724	23,461	7,376
PMF	0	22,414	13,636	18,432

PMF = probabilistic maximum flood.
[a] Based on how many days flood water remains on the land.
[b] Only acreage of the 241 storage areas. Not all acres within storage areas will be inundated for any particular flood event.
Source: Houston-Moore Group (2019).

Storage Area versus Land Inundated

Land associated with the FM Diversion can be measured by acreage actually flooded and acreage affected by flooding. In this study, *flooded acreage* represents land that will be submerged or inundated with temporary water and *affected acreage* represents the size of the storage area that contains flooded land (Figure 21). Due to varying elevations, the *acreage affected* by temporary water storage is likely to be greater than the acreage of land that temporarily holds flood water (Figure 22). Appendix A contains maps illustrating the *flooded acreage* within the 241 storage areas by size of flood event.

The economic analysis did not distinguish between the amount of flooded acreage within a storage area and the total acreage of the storage area. This study assumes any flooding within a storage area results in the entire storage area being affected. Flooding of land often affects access and/or use of adjacent or nearby lands. The extent or degree to which additional land is affected by flooding within any particular storage area will vary based on a number of factors. While this overall assumption results in a conservative estimate of the acreage affected by temporary water storage, data to refine these assumptions were not available. Including all acreage of a storage area that has some inundation does not influence the per-acre revenue losses estimated in the study.

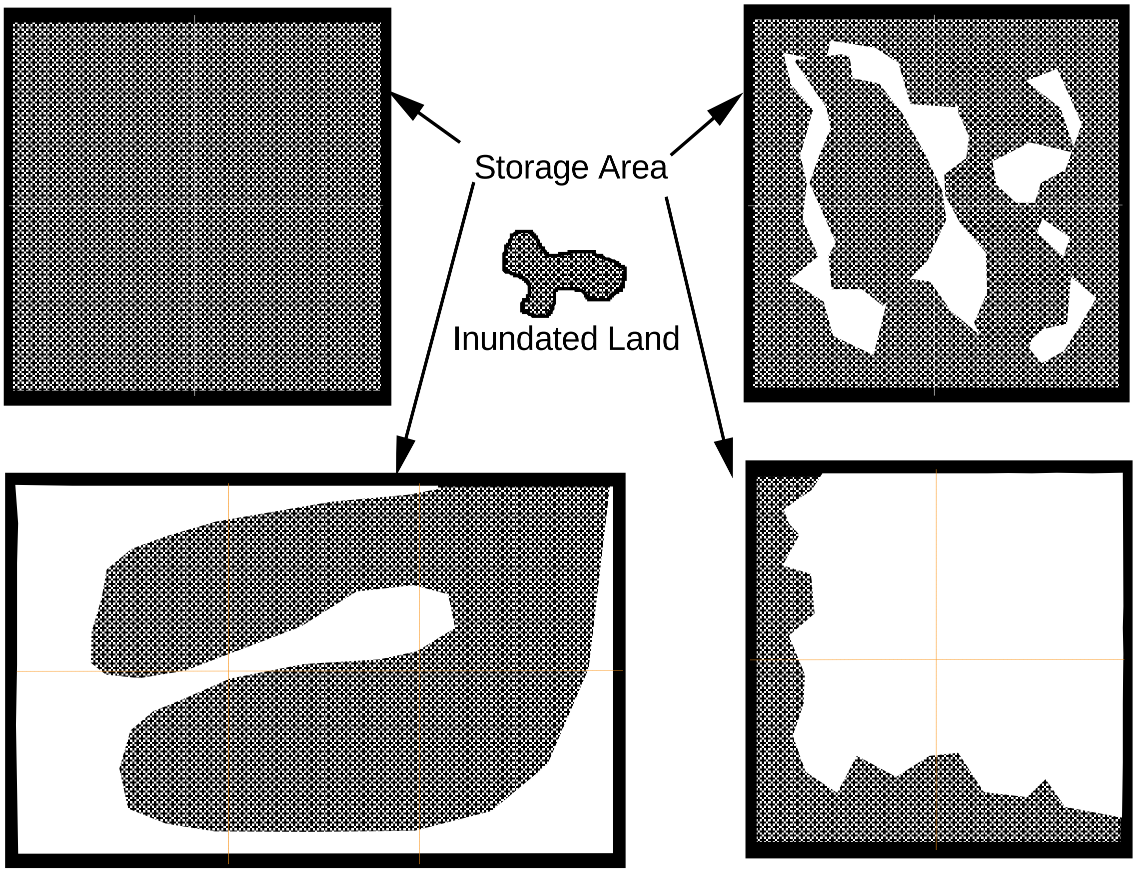

Figure 21. Conceptual Examples of Potential Land Inundation and Storage Area Size, FM Diversion Staging Area.

Determining the extent that inundated acreage affects non-inundated acreage, from a production agriculture perspective, was beyond the scope of this study. Factors associated with accessibility (e.g., surrounding water prevents, blocks, or delays access to non-flooded land) and farmability (e.g., producer may choose to delay planting until all or a large majority of the acres are fit to plant even though not all acres were inundated) are covered by using the acreage of the entire storage area. Further evaluation of the hydrology, land accessibility, producer planting preferences, and land ownership within the staging area would be required to refine the amount of acreage not inundated but affected by temporary water storage.

Table 17. Total Acreage of Storage Areas affected by Spring Flood Events, by Flood Frequency, With and Without FM Diversion Staging Area				
	Total Acreage of Storage Areas having Some Spring Flooding		Percentage of Acreage Affected[a]	
Flood Event	With Use of FM Diversion Staging Area	With Existing Conditions (no Diversion)	With Use of FM Diversion Staging Area	With Existing Conditions (no Diversion)
10-Yr	12,388	11,273	22.7	20.7
20-Yr	28,217	25,899	51.8	47.5
25-Yr	35,411	29,030	65.0	53.3
25-Yr LF	42,439	37,604	77.9	69.0
25-Yr ELF	42,439	37,604	77.9	69.0
2009-like	47,817	44,200	87.8	81.1
50-Yr	43,396	38,258	79.7	70.2
100-Yr	48,165	41,791	88.4	76.7
500-Yr	52,179	49,561	95.8	91.0
PMF	54,481	54,481	100	100

PMF = probabilistic maximum flood.

[a] Based on the 241 storage areas encompassing 54,481 acres.

Source: Houston-Moore Group (2019).

Dry-down Periods

Inundated land needs time to dry after water recedes. Although the time necessary for dry-down will vary based on temperature, wind, precipitation, soil type, fall tillage, and cloud cover, the study used a 10-day and 14-day dry-down and clean-up (e.g., remove or disperse debris) period after the water leaves the land. The dry down period (i.e., 10 days, 14 days) is added to all storage areas that have inundation for either the Without Diversion or With Diversion conditions. The only hydrology group where the additional 10-days or 14-days of dry-down are the result of the Diversion is Hydrology Group 5. For all storage areas in Group 5, the Diversion creates a potential delay equal to the days from staging activation until the water recedes plus additional days (either 10 or 14) for the land to dry out.

Hydrology Groups 2, 3, and 4 also will require a dry-down period before planting, but the dry-down period is not an impact attributable to the Diversion. For example, if a storage area floods for 8 days With the Diversion and floods for 8 days Without the Diversion (Group 2), the 10 or 14 days of dry-down would have occurred in the absence of the Diversion. Even in situations when the Diversion results in inundation that extends beyond inundation with existing conditions, the Diversion would be responsible for the additional days for the water to leave the land, but not the 10- or 14-day dry-down period.

By placing the hydrology data into a timeline and adding time required for the land to dry out, the study can begin to assess potential planting delays. *Total days* represents the sum of days for the land to become inundated, days the land is inundated, and a dry-down period. *Potential days of delay* in this study are defined as the difference between total days Without the Diversion and total days With the Diversion.

Three important issues with respect to understanding how the hydrology data are measured, used and discussed in this study include:

- *Total days* for a storage area are not equal to the days that the storage area is inundated. Total days is the measure from when the staging area is activated to when the effects of flooding are gone. Total days includes a dry-down period for all storage areas that have any flooding.
- The difference in Total Days between Without and With Diversion conditions represents the *potential days of delay*. However, it is important to understanding that potential days of delay do not necessarily equal actual planting delays.
- The metrics used to describe the hydrology effects in this study will not match the metrics used in previous reports by the USACE and FM Diversion Authority. The differences are that this study needed to create a timeline whereas previous public reports and presentations by the USACE and FM Diversion Authority discussed the duration of flooding.

Analysis of Risk

This study examins several important issues related to how temporary water storage in the FM Diversion staging area might affect spring planting. Below is an outline of study findings.

Evaluation of Potential Planting Delays: This section examines the length of time needed for the effects of flooding to be gone and matches that information with planting progress data to estimate the probability of incurring planting delays.

Evaluation of Flood Events: Estimates of the frequency of revenue losses are presented by hydrology group and size of flood event. Gross revenues per acre are provided by hydrology group for flood years with existing conditions (Without Diversion) and conditions With the Diversion. The gross revenues represent a combined average of all four crops with all storage areas within the hydrology groups across the entire range of conditions generated in the Monte Carlo simulation.

> Estimation of Gross Revenues Only in Years With Losses: Gross revenues are presented for only conditions that produce a revenue loss. Conditions when planting delays were not observed were removed to provide a more accurate estimate of the value of the revenue loss if there was a planting delay.
>
> Estimation of Potential Revenue Losses by Crop: The difference in per-acre revenues between existing conditions and With the Diversion are provided by crop and size of flood event. The estimates would be analogous to the per acre revenue losses if only a single crop comprised the entire acreage with a storage area.
>
> Distribution of Total Revenue Losses: Total revenue losses are presented graphically to view the magnitude of potential liabilities in the staging area.

Evaluation of Potential Planting Delays

Two key factors in assessing the likelihood of planting delays included 1) how much time flooded lands require for the effects of flooding to be gone and 2) how long after a flood event until general planting begins. Data on flood start dates (i.e., when the Diversion staging area would be activated), historical data on regional planting progress, and hydrology data on the duration of flooding within the Diversion staging area were evaluated and used in the Monte Carlo simulations.

The follow section examines the number of days from when the staging area is activated to when the effects of flooding would be gone and compares that to the number of days from flood start (i.e., staging area activation) to when regional planting begins. Flooding results in delayed planting when inundated lands require more time for the effects of flooding to be gone than the time from flood start to when regional planting begins. Stated alternatively, if regional planting begins before the effects of flooding are over for inundated lands, those lands will experience delayed planting. However, the analysis focuses on 1) the additional time the Diversion adds to when the effects of flooding are gone, and 2) how often those additional days result in planting delays.

Flood Dates and Planting Dates for Wheat, Corn, and Sugarbeets

Key factors in the study include when the Diversion staging area would be activated and when planting begins in the region. Knowing the date when the staging area is activated is critical because that starts the countdown to when the effects of flooding will be gone. Likewise, when producers are able to begin planting, based on general spring conditions, is critical since that provides a date that can be used to estimate potential planting delays.

Historical dates when the Red River first reached 17,000 cfs in Fargo was compared to historical dates when planting began for North Dakota sugarbeets (Figure 22). The reason for examining the date when the Red River reaches 17,000 cfs is because that date corresponds to when the staging area would be activated[10]. Dates when the Red River has reached 17,000 cfs in Fargo have ranged from March 19, 2010 to April 12, 2001. The average date the flood events reached 17,000 cfs was March 31. The hydrology modeling provided by the Houston-Moore Group (2019), which was based on previous work by the U.S. Army Corps of Engineers, uses the Diversion activation date as the time from which the water flow is evaluated, and the Diversion activation date for this study is when the Red River reaches 17,000 cfs in Fargo.

Based on historical data, the number of days from when the Red River in Fargo reached 17,000 cfs to the start of spring planting ranged from 9 days in 2001 to 25 days in 2009 (Figure 22). The average number of days between the Red River reaching 17,000 cfs and the start of spring planting (i.e., first date reported) was 18 days. If the 20 percent of planting completion threshold is used instead of the first reported spring planting date, the average number of days increases to 29 days. This study used a 20 percent threshold to estimate when most producers are actively planting. The historical data suggest a range from 19 to 38 days from when the Red River in Fargo reaches 17,000 cfs until spring planting reaches 20 percent completion (Table 18).

[10] Operation of the staging area is expected to use gage information upstream of Fargo; however, those details will be finalized when the operational plan for the staging area is completed. This study used Fargo gage dates as a point in time when the staging area would be activated.

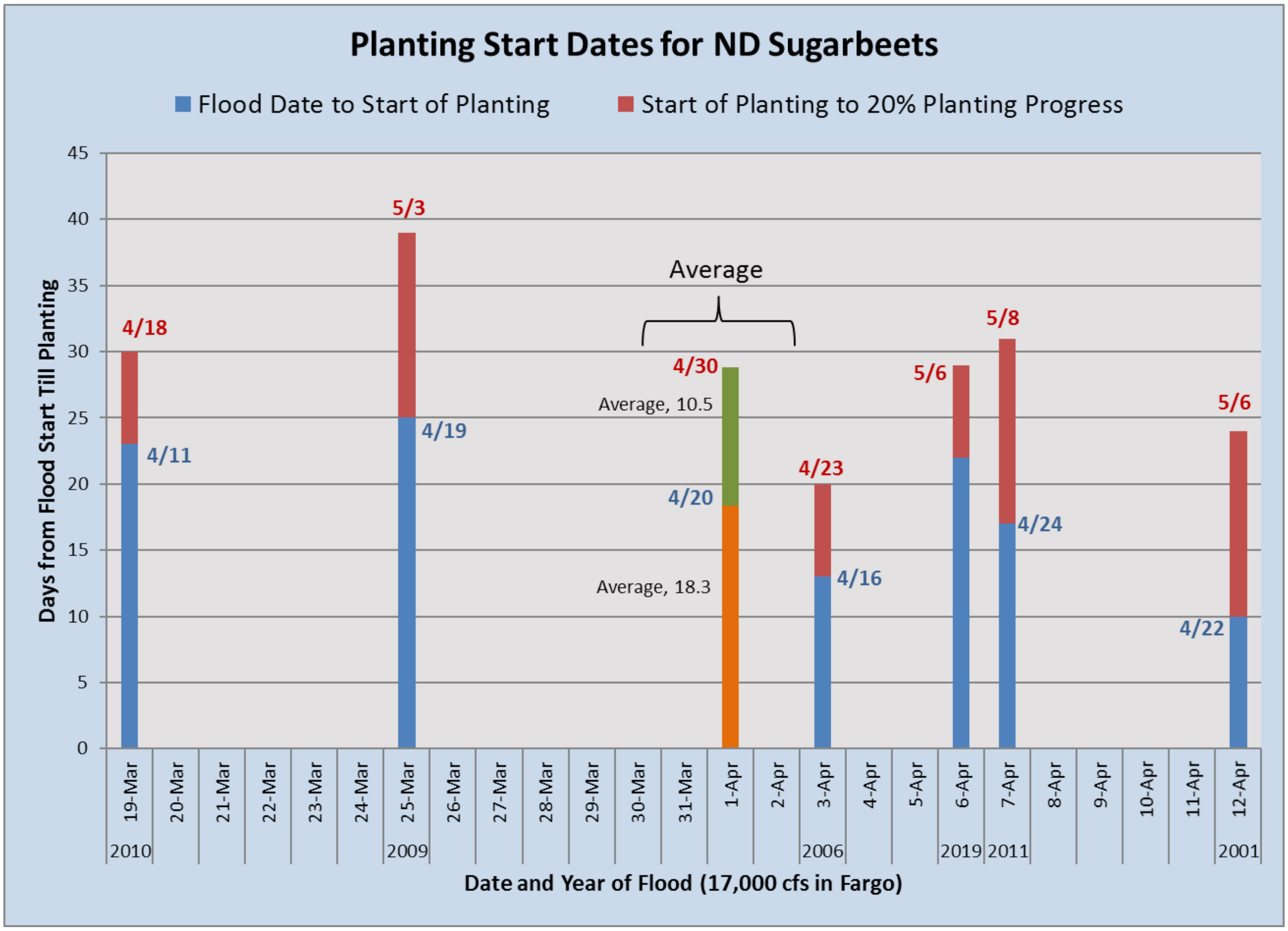

Figure 22. Historical Planting Start Dates for North Dakota Sugarbeets and Dates when Red River Reached 17,000 cfs in Fargo, 2000 through 2019.
Sources: National Agricultural Statistics Service (2019); U.S. Geological Survey (2019).

Figure 22 and Table 18 identify the difference in regional planting start dates and the dates when the Red River reached 17,000 cfs in Fargo. Another element of the planting data is to compare planting start dates for years *without* major flood events to the planting start dates *with* major flood events. The data indicate that a major flood event does not always lead to a later spring planting start date (Figure 23). In recent years (e.g., 2013 & 2018), spring planting start dates have been later than the planting start dates in flood years 2006, 2009, 2010, and 2019. If a 20 percent threshold is used to evaluate planting start dates, the start date in 2014 exceeds the same metric in all years with a major flood event (Figure 24). Also in 5 of the last 20 years, regional planting dates to reach 20 percent completion in non-flood years are later than the planting dates in 2 of the 6 flood years. The historical data suggest that a major flood event is not always going to result in regional planting dates being later than dates for non-flood years (Figure 24).

Table 18. Historical Dates, Red River Reaches 17,000 cfs in Fargo, Regional Planting Start Dates for Sugarbeets in North Dakota, 2000 through 2019					
Major Flood Events[a]		Regional Planting Start Date[a]			
Year	Date when Red River Reaches 17,000 cfs in Fargo	0 Percent Completion	20 Percent Completion	Days Between Flood Start and Start of Spring Planting	Days Between Flood Start and 20% Completion of Spring Planting
2010	March 19	April 11	April 18	23	29
2009	March 25	April 19	May 3	25	38
2006	April 3	April 16	April 23	13	19
2011	April 7	April 24	May 8	17	30
2001	April12	April 22	May 6	10	23
2019	April 6	April 28	May 5	22	29
Average	April 1	April 20	April 30	18	29

[a]Planting progress data for flood years 1997, 1989, 1979, and 1969 were not available.

[b]Data for North Dakota sugarbeet planting progress.

Sources: National Agricultural Statistics Service (2019); U.S. Geological Survey (2019).

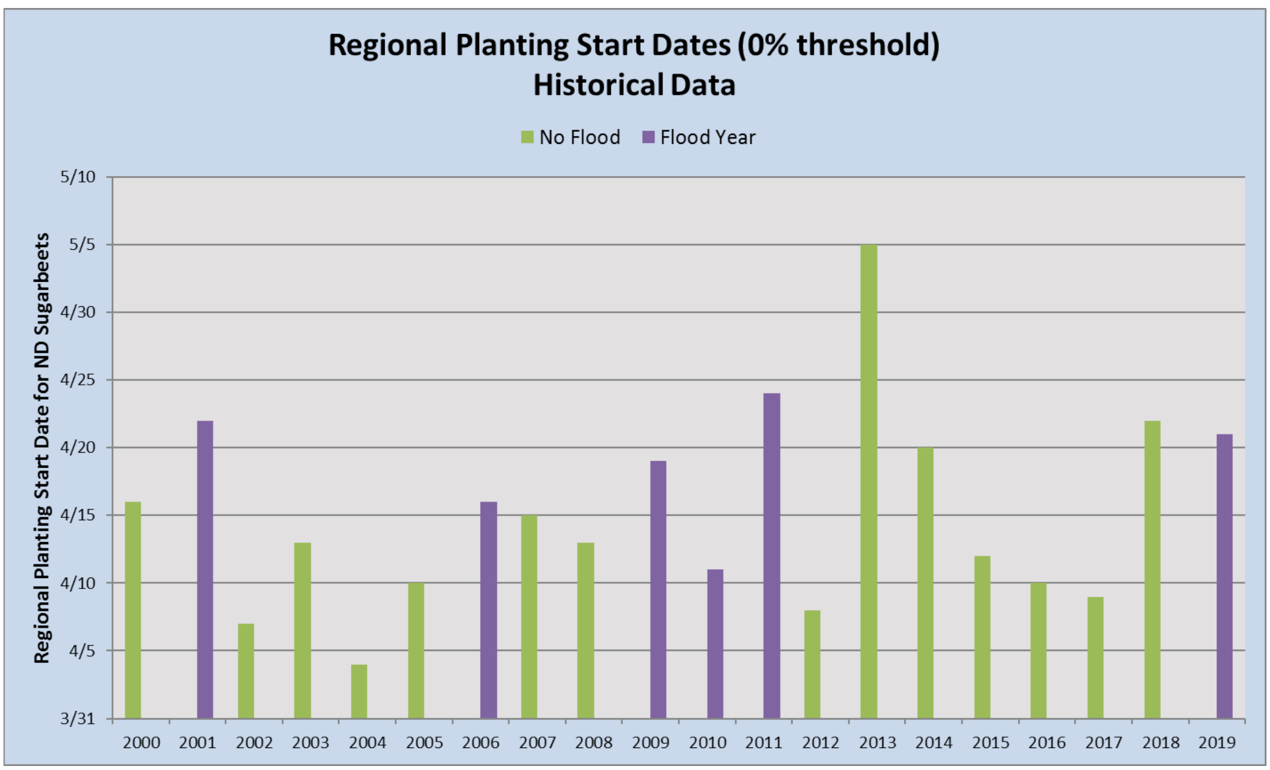

Figure 23. Comparison of Planting Start Dates for North Dakota Sugarbeets in Flood and Non-flood Years, 2000 through 2019.

Source: National Agricultural Statistics Service (2019).

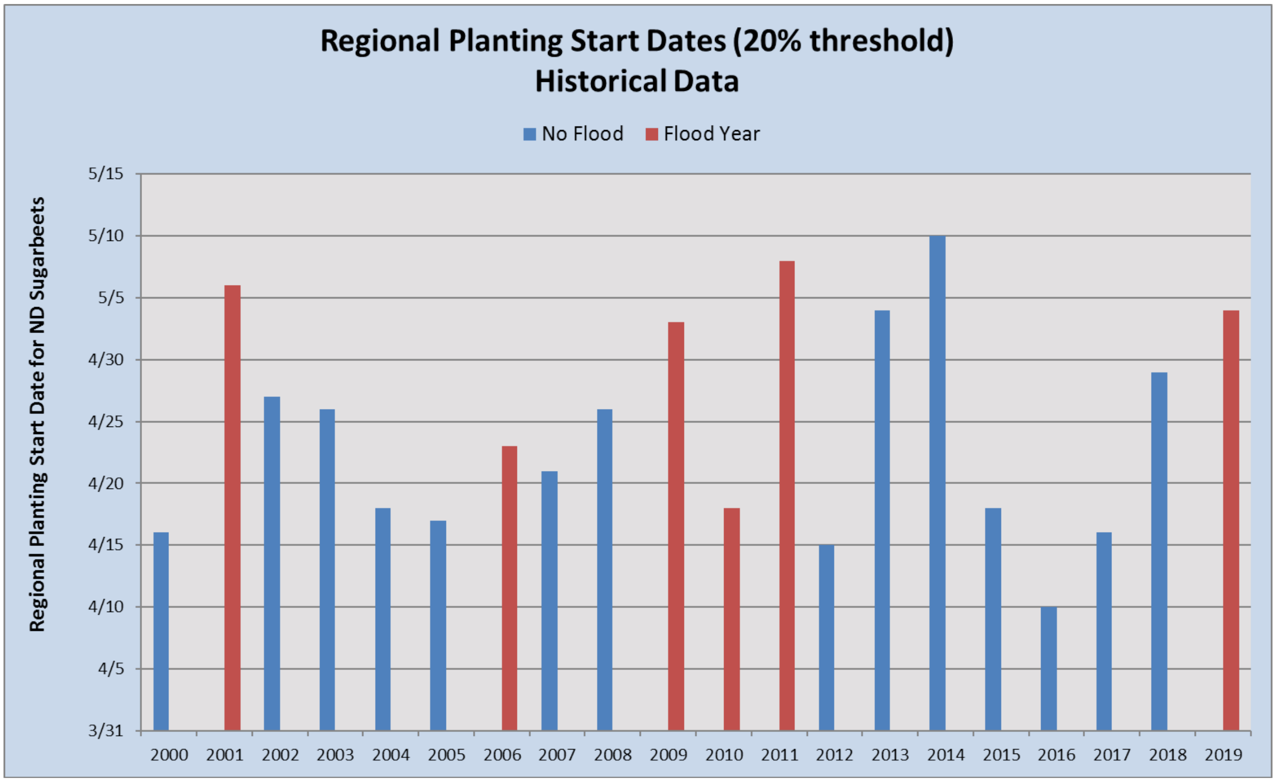

Figure 24. Comparison of Dates for 20 Percent Planting Completion for North Dakota Sugarbeets in Flood and Non-flood years, 2000 through 2019.
Source: National Agricultural Statistics Service (2019).

Historical data on when the Red River has reached 17,000 cfs were used to produce a distribution of dates that are likely given the ability of the historical data to predict future flood dates. A statistical analysis of the data provided both a range of calendar dates and the future likelihood (i.e., probability) of the staging area being triggered on those dates. While the distribution developed for this study limits flood event start dates from March 19 to April 18 (Figure 25), the distribution should not be interpreted as suggesting there is zero probability of a flood event start date falling outside of that range. While the likelihood may be extremely low, that possibility still exists.

Historical data on when regional planting has reached 20 percent completion were used to produce a range and future probability for those dates. However, unlike the flood start dates, the historical planting completion data suggested that a nearly equal chance exists in any given year that planting of sugarbeets in North Dakota will fall between April 14 and May 10.

Combining the distribution of dates for regional planting and dates for activation of the staging area illustrates the number of days between the triggering of the staging area (17,000 cfs in Fargo) to when regional planting completion has reached 20 percent (Figure 26). Statistics used to produce the distributions indicate that those dates actually overlap in a small number of potential combinations; however, the analysis eliminated any situations where a regional planting date precedes a flood start date.

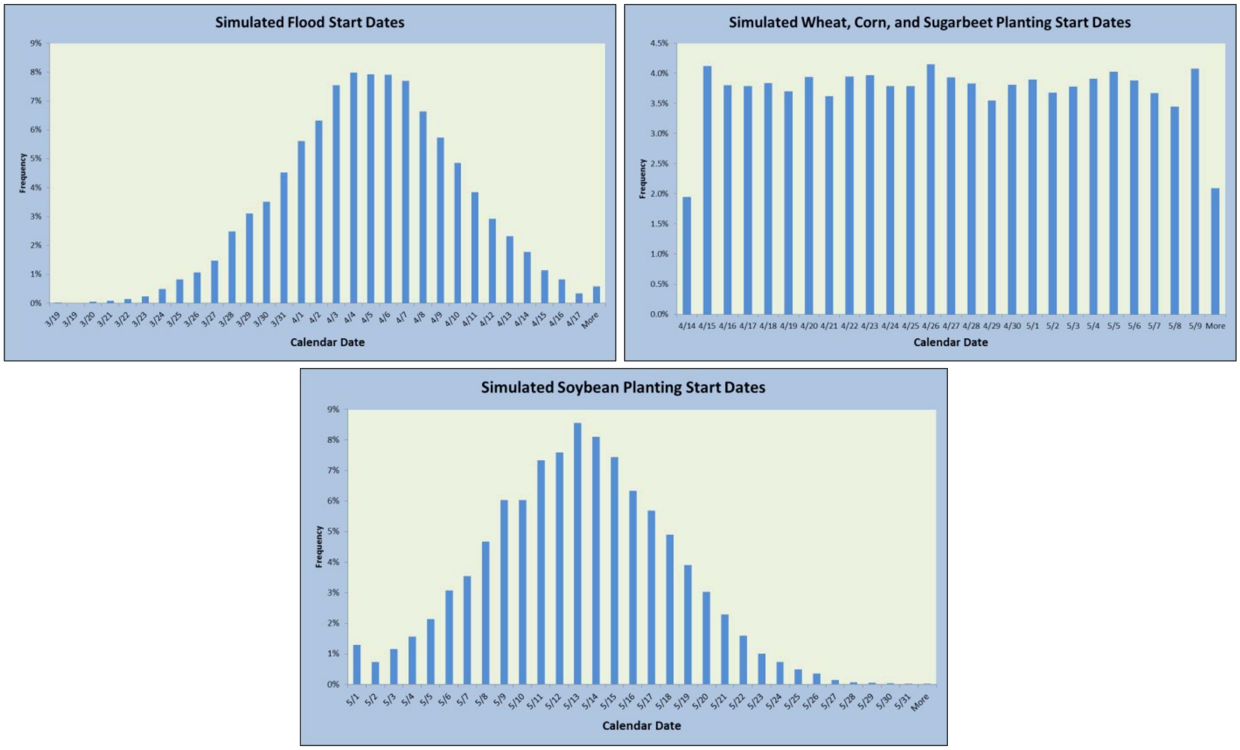

Figure 25. Distributions of the Dates for Staging Area Activation, Corn, Wheat, Sugarbeets, and Soybean Planting Dates Corresponding With 20 Percent Completion.

The statistical distributions not only show the range of days between staging activation date and regional planting dates, but also illustrate the frequency or probability of that range. Figure 22 and Table 18 already illustrate that the historical data show a range of 10 to 25 days from when the Red River reaches 17,000 cfs in Fargo and when planting activity is first reported by NASS. Also, the historical data show a range of 19 to 38 days from when the staging area would be triggered to when planting progress reaches 20 percent completion. Over the 10,000 replications, the difference (in days) between staging area activation and when regional planting reaches 20 percent completion varied from 0 days to 49 days (Figure 26). While the simulation produced a range larger than observed with existing data, the chance of the difference exceeding 40 days or being less than 10 days is about 12 percent (Table 19). About 70 percent of the replications in the simulation suggest that the difference between the staging area activation date and when regional planting may reach 20 percent completion falls between 11 and 30 days. Alternatively, the difference between the staging area activation date and regional planting date will be 11 to 30 days over 70 percent of the time (Table 19).

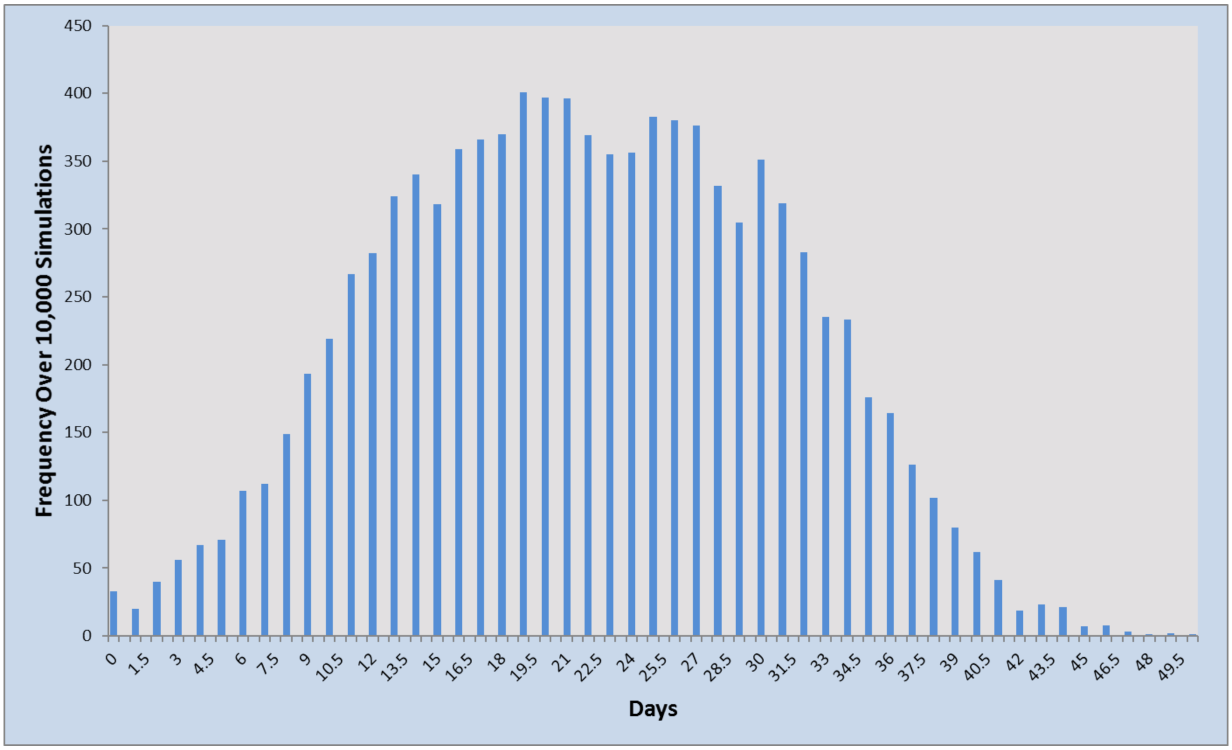

Figure 26. Monte Carlo Simulation, Difference in Days between Staging Area Activation and Regional Planting Reaching 20 percent Completion, Sugarbeets, Corn, and Wheat.

Table 19. Monte Carlo Simulation, Distribution of the Difference in Days between Staging Area Activation and Regional Planting Reaching 20 percent Completion for Sugarbeets, Corn, and Wheat

Days[a]	Number of Replications	Percent of Monte Carlo Simulation
0	33	0.3
1 to 15	2,565	25.7
16 to 20	1,893	18.9
21 to 25	1,859	18.6
26 to 30	1,744	17.4
31 to 35	1,246	12.5
36 to 40	534	5.3
41 to 45	111	1.1
>45	15	0.2

[a] Days were estimated by subtracting the flood start date (date when staging area is activated) from the regional planting start date (20% threshold). Days therefore represent the time required for the effects of flooding to be gone without incurring a planting delay due to a spring flood event.

Flood Start Dates and Planting Dates for Soybeans

Historical dates when the Red River first reached 17,000 cfs were compared to historical dates when planting began for North Dakota soybeans (Figure 27). The number of days from when the Red River in Fargo reached 17,000 cfs to the start of spring planting of soybeans ranged from 22 days in 2019 to 54 days in 2009 (Figure 27). The average number of days between the Red River reaching 17,000 cfs and the start of spring planting for soybeans was 33 days. If the number of days required to reach 20 percent of planting completion is included, the average number of days increases to 43 days. This study used a 20 percent threshold to estimate when most producers are actively planting. The historical data suggest a range from 31 to 58 days from when the Red River in Fargo reaches 17,000 cfs until spring planting for soybeans reaches 20 percent completion (Table 20).

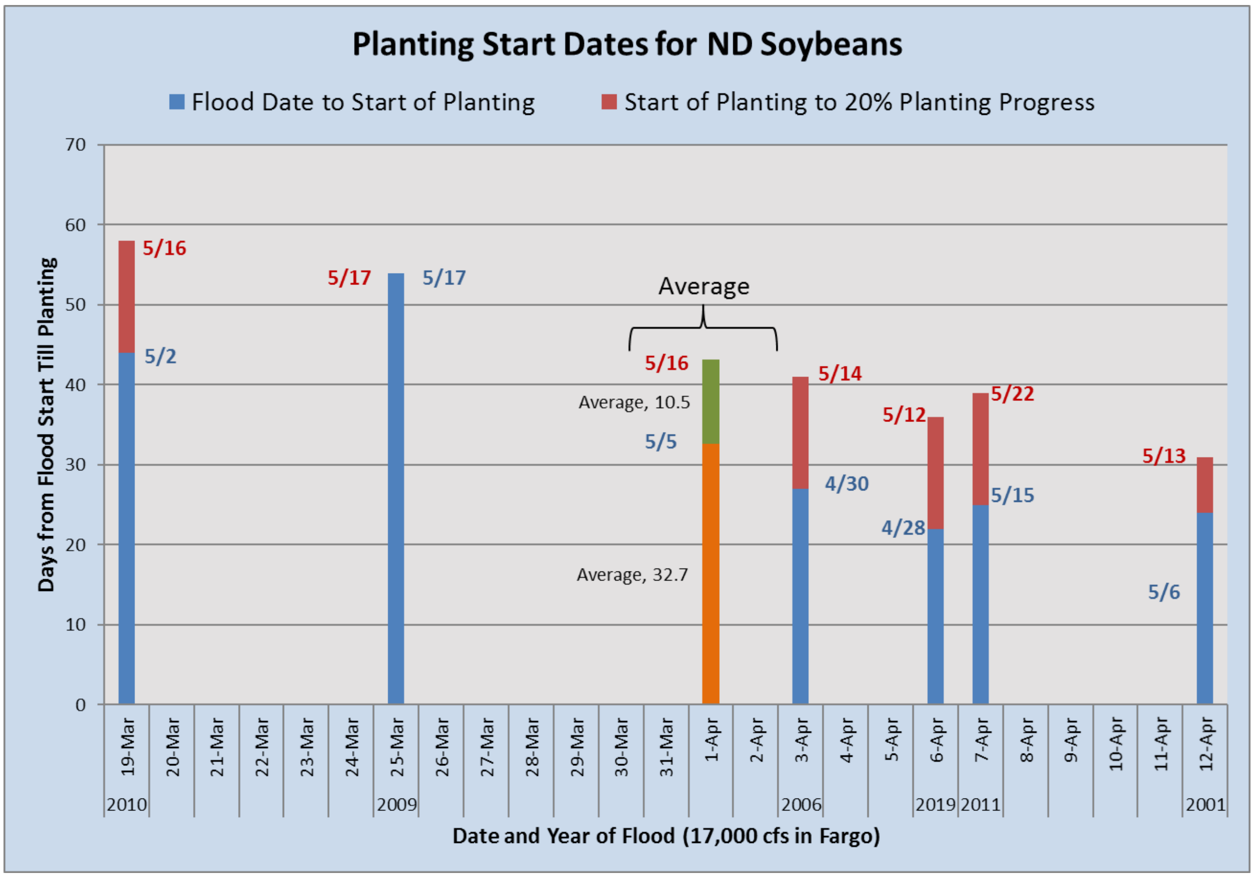

Figure 27. Historical Planting Start Dates for North Dakota Soybeans and Dates when Red River Reached 17,000 cfs in Fargo, 2000 through 2019.
Sources: National Agricultural Statistics Service (2019); U.S. Geological Survey (2019).

Figure 27 and Table 20 identify the difference in regional planting start dates for soybeans and the dates when the Red River reached 17,000 cfs in Fargo. Another element of the planting data is to compare planting start dates for years *without* major flood events to the planting start dates *with* major flood events. The data indicate that a major flood event does not always lead to a later spring planting start date for soybeans (Figure 28). Aside from flood years 2009 and 2011, spring planting start dates between flood years and non-flood years are similar. If a 20 percent threshold is used to evaluate planting start dates, the start date in 2003 exceeds the same metric in all years with a major flood event (Figure 29). Also in 10 of the last 20 years, regional planting dates for 4 flood years and 6 non-flood years have started approximately in the same week. The historical data suggest that a major flood event is not always going to result in regional planting dates for soybeans being later than dates for non-flood years (Figure 29).

Table 20. Historical Dates, Red River Reaches 17,000 cfs in Fargo, Regional Planting Start Dates for Soybeans in North Dakota, 2000 through 2019

Major Flood Events[a]		Regional Planting Start Date[a]			
Year	Date when Red River Reached 17,000 cfs in Fargo	0 Percent Completion	20 Percent Completion	Days Between Flood Reaching 17,000 cfs in Fargo and Start of Spring Planting	Days Between Flood Reaching 17,000 cfs in Fargo and 20% Completion of Spring Planting
2010	March 19	May 2	May 16	44	58
2009	March 25	May 18	May 17	54	54
2006	April 3	April 30	May 14	27	41
2011	April 7	May 15	May 22	25	39
2001	April12	May 6	May 13	24	31
2019	April 6	April 28	May 12	22	36
Average	March 31	May 5	May 15	33	43

[a]Planting progress data for flood years 1997, 1989, 1979, and 1969 for North Dakota for corn, soybeans, and sugarbeets were not available. Spring wheat, barley and oats planting progress data were available for 1997, but not available for 1989, 1979, and 1969.

[b]Data for North Dakota Sugarbeet planting progress.

Sources: National Agricultural Statistics Service (2019); U.S. Geological Survey (2019).

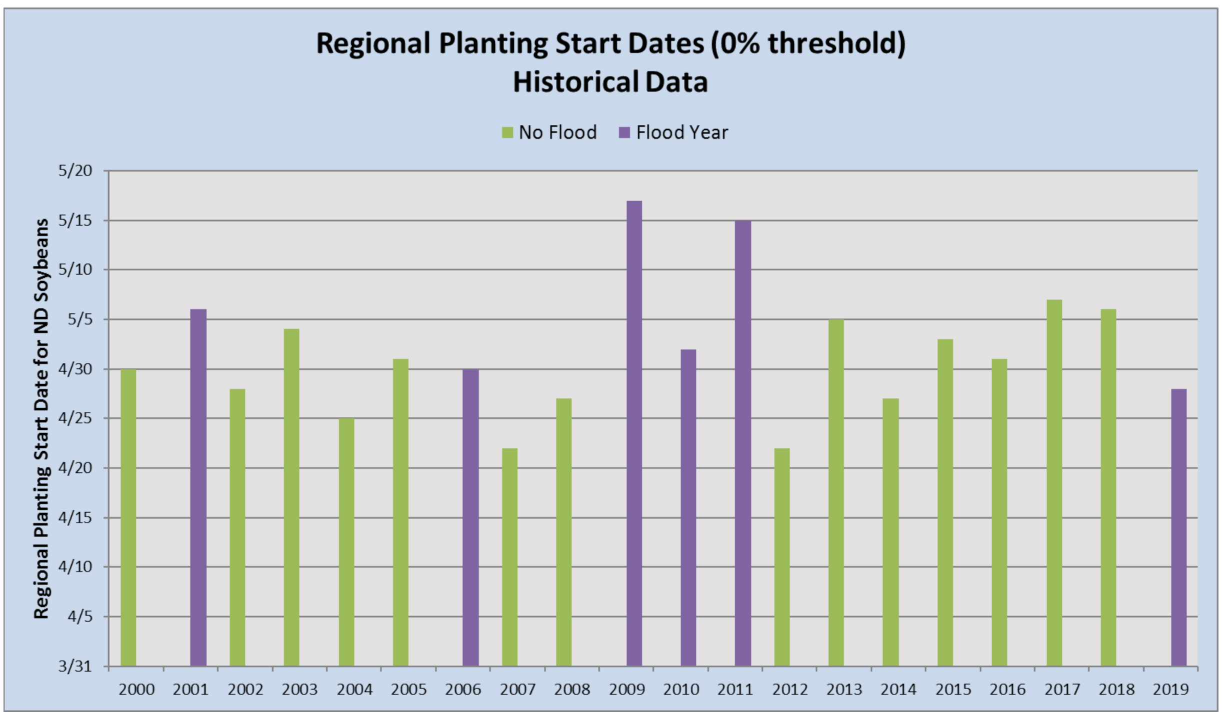

Figure 28. Comparison of Planting Start Dates for North Dakota Soybeans in Flood and Non-flood Years, 2000 through 2019.

Source: National Agricultural Statistics Service (2019).

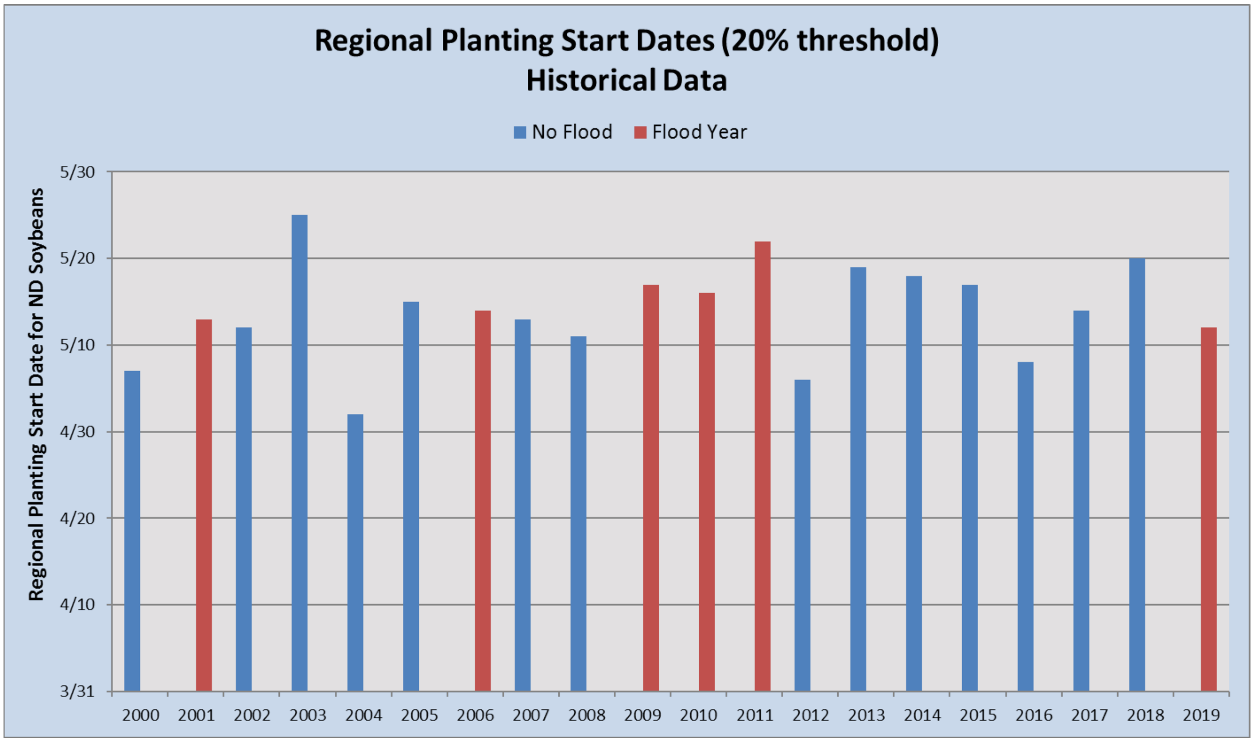

Figure 29. Comparison of Dates for 20 Percent Planting Completion for North Dakota Soybeans in Flood and Non-flood Years, 2000 through 2019.
Source: National Agricultural Statistics Service (2019).

Historical data on when regional planting for soybeans has reached 20 percent completion were used to produce a range and future probability for those dates. The historical planting completion data suggested that planting of soybeans in North Dakota will fall between May 1 and May 31, with an average start date around May 13.

Combining the distribution of dates for regional planting and dates for activation of the staging area illustrates the number of days between the triggering of the staging area (17,000 cfs in Fargo) to when regional planting completion for soybeans has reached 20 percent (Figure 30).

The statistical distributions not only can show the range of days between staging activation date and regional planting dates, but also can illustrate the frequency or probability of that range. Figure 27 and Table 20 illustrate that the historical data show a range of 24 to 54 days from when the Red River reaches 17,000 cfs in Fargo and when planting activity for soybeans is first reported by NASS. Also, the historical data show a range of 31 to 58 days from when the staging area would be triggered to when planting progress reaches 20 percent completion. Over the 10,000 replications, the difference (in days) between staging area activation and when regional planting reaches 20 percent completion varied from 10 days to 61 days (Figure 30). While the simulation produced a range larger than observed with existing data, the chance of the difference exceeding 50 days or being less than 15 days is about 4 percent (Table 21). About 80 percent of the replications in the simulation suggest that the difference between the staging area activation date and when regional planting may reach 20 percent completion falls between 30 and 50 days. Alternatively, the difference between the staging area activation date and regional planting date will be 30 to 50 days over 80 percent of the time (Table 21).

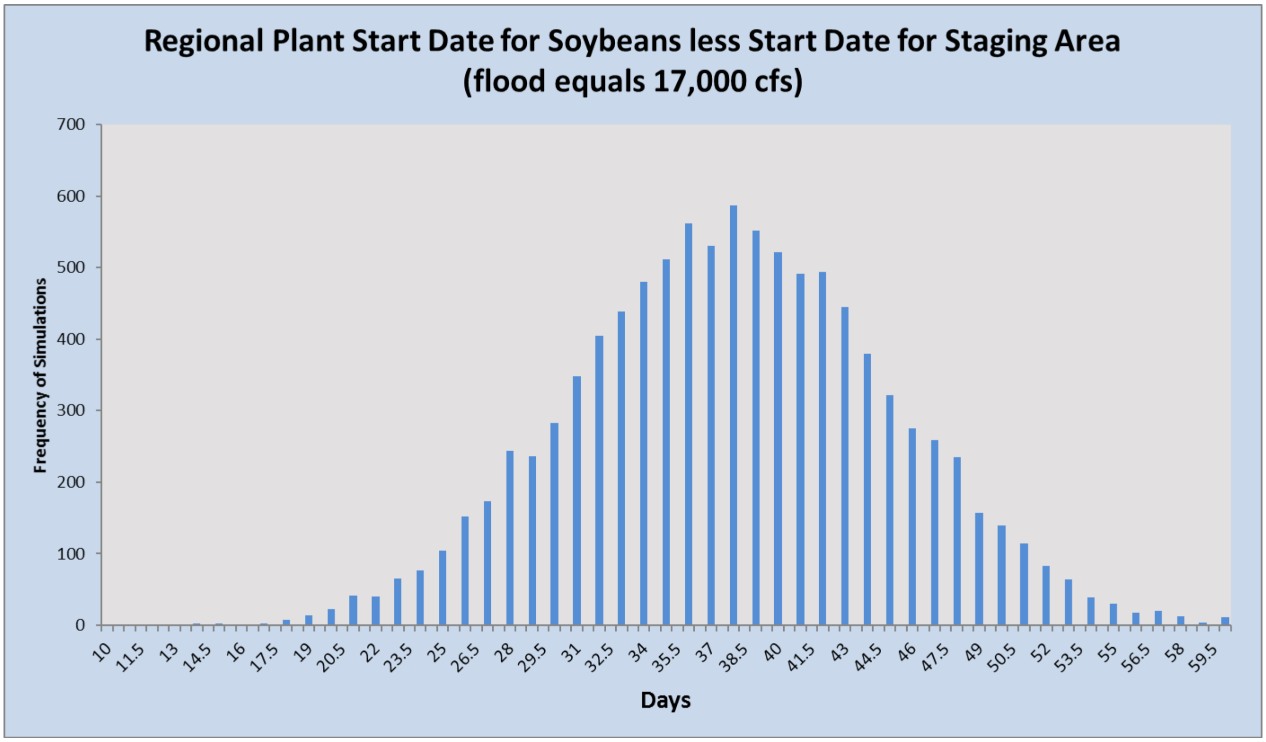

Figure 30. Monte Carlo Simulation, Difference in Days between Staging Area Activation and Regional Planting Reaching 20 percent Completion for Soybeans.

Table 21. Monte Carlo Simulation, Distribution of the Difference in Days between Staging Area Activation and Regional Planting Reaching 20 percent Completion for Soybeans

Days[a]	Number of Replications	Percent of Monte Carlo Simulation
0-15	6	0.1
16-20	47	0.5
21-25	327	3.3
26-30	1,089	10.9
31-35	2,183	21.8
36-40	2,754	27.5
41-45	2,133	21.3
46-50	1,066	10.7
>50	395	4.0

[a] Days were estimated by subtracting the flood start date (date when staging area is activated) from the regional planting start date (20% threshold). Days therefore represent the time required for the effects of flooding to be gone without incurring a planting delay due to a spring flood event.

Time Required for Effects of Flooding to be Over During Flood Years

A critical element in evaluating the potential agricultural implications of short-term water storage on farmlands in the FM Diversion staging area relates to the duration or absence of water storage within the staging area. Understanding the differences in water storage between the Without Diversion and With Diversion conditions forms the basis to evaluating the potential effects on spring field work.

The time required for the effects of flooding to be gone in the staging area, With or Without the Diversion, varies from 0 days to more than 40 days during a flood event (Tables 13a and 13b). Essentially, lands in the staging area would experience a wide range of days for the effects of flooding to be gone in either condition. This suggests that natural flooding would affect a substantial amount of acreage within the staging area. Also, the general time required for the effects of flooding to be gone and the acreages affected increases with flood event size for both existing conditions and With the Diversion (Tables 22 and 23).

Another way to examine how the staging area may create planting delays is to examine the difference in days (i.e., days from activation until regional planting starts) between the two conditions. The difference between With and Without Diversion conditions represents the additional time that the land requires for the effects of flooding to be gone due to the Diversion. The extra days attributable to the Diversion may not result in planting delays because planting delays will depend upon when the flood event occurs, duration of the flood event, and when regional planting activity begins. However, the difference in time required for the effects of flooding to be gone between existing conditions and With the Diversion helps to clarify the magnitude of *potential* delays (Tables 24 and 25).

Table 22. Total Days from Staging Area Activation until the Effects of Flooding are gone, With and Without Diversion, by Size of Flood Event using 10-Day Dry Down Period

Total	Size of Flood Event									
	10-year		20-year		25-year		25-year LF		25-year ELF	
Days[a]	W	WO	W	WO	W	WO	W	WO	W	WO
	acres of storage areas									
0	42,757	43,208	26,899	28,582	19,071	25,452	12,042	16,877	12,042	16,877
1-15	8,603	7,670	9,247	9,659	5,532	9,106	5,753	9,291	3,958	5,559
16-20	2,672	3,603	13,744	14,616	20,583	17,887	17,362	11,184	6,504	4,986
21-25			4,442		8,878	1,767	13,416	11,869	12,306	6,322
26-30					267	267	4,223	3,723	10,688	11,425
31-35							1,269	1,269	7,023	7,503
36-40							90	90	1,542	1,542
41-45									90	159
46-50									177	108
51-55							177	177		
56-60	150		150		150		150		150	
61-65										
65+										
Total	54481	54,481	54,481	54,481	54,481	54,481	54,481	54,481	54,481	54,481

Total	Size of Flood Event									
	2009-year		50-year		100-year		500-year		PMF-year	
Days[a]	W	WO	W	WO	W	WO	W	WO	W	WO
	acres of storage areas									
0	7,065	10,281	11,296	16,223	6,316	12,690	2,302	4,920	0	0
1-15	2,162	6,222	756	4,384	1,027	2,041	638	794	0	0
16-20	20,574	13,765	13,687	11,309	6,475	8,634	1,909	3,660	997	1,506
21-25	12,731	13,313	24,732	16,743	26,383	13,485	10,803	7,772	2,443	2,786
26-30	272	1,838	3,683	4,406	11,475	14,975	16,490	12,773	7,372	6,673
31-35	5,796	3,331		1,240	1,864	1,864	3,057	5,499	3,242	2,060
36-40	523	523			311	311	5,728	6,508	7,228	8,389
41-45	2,488	2,263	177	177	214	214	2,451	3,722	6,654	4,277
46-50	717	942			90	90	4,060	4,142	6,012	4,481
51-55	985	985					2,713	1,513	2,217	2,501
56-60	1,169	1,019	150				1,360	989	17,130	19,026
61-65					327	177	2,971	2,189	1,187	2,784
65+										
Total	54,481	54,481	54,481	54,481	54,481	54,481	54,481	54,481	54,481	54,481

W=With Diversion, WO=Without Diversion. PMF = probabilistic maximum flood.

[a] Total days are equal to the sum of days for land to become inundated, days of inundation, and 14-day dry-down period. Total days until the effects of flood are gone are NOT equivalent to planting delays.

Table 23. Total Days from Staging Area Activation until the Effects of Flooding are gone, With and Without Diversion, by Size of Flood Event using 14-Day Dry Down Period

	Size of Flood Event									
Total	10-year		20-year		25-year		25-year LF		25-year ELF	
Days[a]	W	WO	W	WO	W	WO	W	WO	W	WO
	acres of storage areas									
0	42,757	43,208	26,899	25,582	19,071	25,452	12,042	16,877	12,042	16,877
1-15	848	158	0	0	0	42	1,438	795	1,438	795
16-20	8,724	9,307	11,529	12,386	7,773	12,350	6,144	10,828	3,153	5,396
21-25	2,002	1,809	12,372	11,977	25,661	15,012	21,643	13,981	7,520	5,051
26-30			3,531	1,536	1,650	1,447	8,328	7,797	10,957	6,876
31-35					177	177	3,200	2,666	12,034	13,147
36-40							1,359	1,359	5,651	4,802
41-45									1,269	1,269
46-50									159	267
51-55								69	108	
56-60							177	108		
61-65	150		150		150		150		150	
65+										
Total	54,481	54,481	54,481	54,481	54,481	54,481	54,481	54,481	54,481	54,481

	Size of Flood Event									
Total	2009-year		50-year		100-year		500-year		PMF-year	
Days[a]	W	WO	W	WO	W	WO	W	WO	W	WO
	acres of storage areas									
0	7,065	10,281	11,296	16,223	6,316	12,690	2,302	4,920	0	0
1-15	0	0	0	210	0	0	0	0	0	0
16-20	4,441	11,631	2,085	6,324	1,073	4,039	1,421	1,739	0	0
21-25	21,520	9,623	21,335	14,619	9,385	8,172	1,961	3,411	2,269	2,741
26-30	9,582	13,057	17,038	13,897	26,821	15,488	16,016	11,221	1,869	2,582
31-35	1,089	1,030	2,400	3,032	8,447	11,804	10,819	8,933	7,036	5,902
36-40	5,067	3,293	0	0	1,497	1,497	3,959	6,569	2,880	2,219
41-45	358	358	0	0	340	385	5,072	5,976	9,041	8,363
46-50	2,488	2,488	177	177	185	139	2,204	4,381	7,133	5,395
51-55	894	894	0	0	90	90	4,852	3,380	4,509	4,048
56-60	808	808	0	0		0	1,896	1,058	7,140	5,724
61-65	1,169	1,019	150	0	327	177	1,741	805	11,417	16,115
65+								2,088	1,187	1,395
Total	54,481	54,481	54,481	54,481	54,481	54,481	54,481	54,481	54,481	54,481

W=With Diversion, WO=Without Diversion. PMF = probabilistic maximum flood.

[a] Total days are equal to the sum of days for land to become inundated, days of inundation, and 14-day dry-down period. Total days until the effects of flood are gone are NOT equivalent to planting delays.

Table 24. Difference in Days Required for Effects of Flooding to be gone between Existing Conditions and With the Diversion using 10-Day Dry Down Period

Difference in Total Days[a]	Size of Flood Event				
	10-Year	20-Year	25-Year	25-Year LF	25-Year ELF
	------------------------------ acres of storage areas------------------------------------				
- days[b]	0	1,865	0	9,366	9,605
0	24,823	24,124	24,823	27,920	22,613
1 to 5	22,460	22,657	22,460	10,311	14,485
6 to 10	668	850	668	1,898	2,490
11 to 15	0	110	0	0	0
16 to 20	5,866	4,660	5,866	3,758	3,959
21 to 25	515	65	515	1,077	1,178
26 to 30					
31 to 35				150	150
36 to 40		150			
>40	150		150		
Total	54,481	54,481	54,481	54,481	54,481

Difference in Total Days[a]	Size of Flood Event				
	2009-Year	50-Year	100-Year	500-Year	PMF-Year
	------------------------------ acres of storage areas------------------------------------				
- days[b]	11,220	9,605	9,773	7,376	18,432
0	23,635	22,613	22,259	21,026	22,414
1 to 5	14,026	14,485	15,285	20,807	12,793
6 to 10	1,023	2,490	640	542	843
11 to 15	886	0	73	961	
16 to 20	3,107	3,959	3,210	1,002	
21 to 25	434	1,178	3,091	2,618	
26 to 30				150	
31 to 35	150	150	150		
36 to 40					
40+					
Total	54,481	54,481	54,481	54,481	54,481

PMF = probabilistic maximum flood.

[a] Total days for the effects of flooding to be over With the Diversion less the total days for the effects of flooding to be gone Without the Diversion. Total days are equal to the sum of days for land to become inundated, days of inundation, and 14-day dry-down period.

[b] Situations where total days are fewer With the Diversion than Without the Diversion.

Table 25. Difference in Days Required for Effects of Flooding to be gone between Existing Conditions and With the Diversion using 14-Day Dry Down Period

Difference in Total Days[a]	Size of Flood Event				
	10-Year	20-Year	25-Year	25-Year LF	25-Year ELF
	acres of storage areas				
- days[b]	2,155	5,384	0	1,865	9,366
0	50,303	39,747	24,823	24,124	27,920
1 to 5	908	6,269	22,460	22,657	10,311
6 to 10	0	613	668	850	1,898
11 to 15	691	0	0	0	0
16 to 20	274	782	1,501	1,465	0
21 to 25	0	0	4,880	3,306	4,252
26 to 30	0	1,536	0	65	584
31 to 35	0	0	0	0	150
36 to 40	0	0	0	150	0
>40	150	150	150	0	0
Total	54,481	54,481	54,481	54,481	54,481

Difference in Total Days[a]	Size of Flood Event				
	2009-Year	50-Year	100-Year	500-Year	PMF-Year
	acres of storage areas				
- days[b]	11,220	9,605	9,773	7,376	18,432
0	23,635	22,613	22,259	21,026	22,414
1 to 5	14,026	14,485	15,285	20,807	12,793
6 to 10	1,023	2,490	640	542	843
11 to 15	811	0	0	961	0
16 to 20	773	948	120	1,002	0
21 to 25	2,409	4,124	4,453	509	0
26 to 30	434	65	1,801	2,259	0
31 to 35	150	150	150	0	0
36 to 40	0	0	0	0	0
40+	0	0	0	0	0
Total	54,481	54,481	54,481	54,481	54,481

PMF = probabilistic maximum flood.
[a] Total days for the effects of flooding to be over With the Diversion less the total days for the effects of flooding to be gone Without the Diversion. Total days are equal to the sum of days for land to become inundated, days of inundation, and 14-day dry-down period.
[b] Situations where total days are fewer With the Diversion than Without the Diversion.

Comparing the results in Tables 23 and 24 with the results in Table 26, it is clear that in flood years a high probability exists that lands in the staging area will experience delayed planting for sugarbeets, corn, and wheat. For example, in Tables 23 and 24, nearly 38,500 acres will require 16 to 25 days for the effects of flooding to be gone in a 50-year flood event With the Diversion and nearly 28,000 acres will require the same period for the effects of flooding to be gone with existing conditions. Correspondingly, in Table 26, a period of 16 to 20 days would result in a planting delay 45 percent of the time and a period of 21 to 25 days would result in planting delays nearly 64 percent of the time. In a 50-year flood event, the majority of acres (either Without or With the Diversion) would have a 40 to 60 percent chance of experiencing a planting delay. The probability of a planting delay increases with the size of the flood event, both for Existing Conditions and With the Diversion. Therefore, modeling based on the current data suggests that planting delays are highly probable for the majority of acres in the staging area. However, it must be stressed that the analysis is focused solely on the degree of planting delays caused by the Diversion.

In Table 27, lands that would require 40 or more days for the effects of flooding to be gone would experience a planting delay 64 percent of the time for soybeans. However, the majority of land will require 25 or fewer days for the effects of flooding to be gone With the Diversion or with existing conditions (Tables 22 and 23), which suggests a low probability of planting delays for soybeans (Table 16). If the time for the effects of flooding to be over is 25 or fewer days after the staging area is triggered, the chance of planting delays for soybeans is around 4 percent. Table 27 indicates that lands would need to have 35 or more days for the effects of flooding to be over after staging area activation to have a greater than 50 percent chance for planting delays for soybeans.

Table 26. Comparing the Days until the Effects of Flooding are over with the Days from Staging Activation until Regional Planting Reaches 20 Percent Completion for Sugarbeets in North Dakota

Total Days From Staging Activation until Effects of Flooding are over[a]	Annual Chance that Regional Planting Start Date would occur Prior to When Effects of Flooding are over[b]	Annual Chance that Effects of Flooding are over before Regional Plant Date[b]
-------- days --------	----------------------- percent	-----------------------
0	0.3	99.7
1-15	26.0	74.0
16-20	44.9	55.1
21-25	63.5	36.5
25-30	80.9	19.1
31-35	93.4	6.6
36-40	98.7	1.3
41-45	99.9	0.1
>45	100	0

[a] Total days are equal to days for land to become inundated, days of inundation, and a dry-down period. Total days until the effects of flooding are over are NOT equivalent to planting delays.
[b] Based on the 10,000 replications from the Monte Carlo simulation. Regional planting start date is when regional planting has reached 20 percent completion.

Table 27. Comparing the Days until the Effects of Flooding are over to the Days from Staging Activation until Regional Planting Reaches 20 Percent Completion for Soybeans in North Dakota		
Total Days From Staging Activation until Effects of Flooding are over[a]	Annual Chance that Regional Planting Start Date would occur Prior to When the Effects of Flooding are over[b]	Annual Chance that Effects of Flooding are over before Regional Plant Date[b]
-------- days --------	----------------------- percent	-----------------------
0-15	0.05	99.95
16-20	0.5	99.5
21-25	3.8	96.2
26-30	14.7	85.3
31-35	36.5	64.5
36-40	64.1	35.9
41-45	85.4	14.6
46-50	96.1	3.9
51-55	99.4	0.6
>55	100	0

[a] Total days are equal to days for land to become inundated, days of inundation, and a dry-down period. Total days until the effects of flooding are over are NOT equivalent to planting delays.
[b] Based on the 10,000 replications from the Monte Carlo simulation. Regional planting start date is when regional planting has reached 20 percent completion.

Summary of Planting Dates, Flood Start Dates, and Time Required for Effects of Flooding to be Over

Inundated lands require a certain amount of time for the effects of flooding to be gone (i.e., water must leave the land and then it must dry-down). On the other end of the spectrum, there is a certain amount of time between when a flood event starts (i.e., 17,000 cfs in Fargo) to when regional planting typically begins. This section examined the number of days from when the staging area is activated to when the effects of flooding are over and compared that period to the number of days from flood event start (i.e., staging area activation) to when regional planting begins. Flood events result in delayed planting when inundated lands require more time for the effects of flooding to be gone than the time from flood event start to when regional planting begins. Stated alternatively, if regional planting begins before the effects of flooding are over for inundated lands, those lands will experience delayed planting. However, the analysis focused on 1) the additional time the Diversion adds to the time required for the effects of flooding to be gone, and 2) how often those additional days are likely to result in planting delays. The following points below highlight the evaluation of flood start dates, time for effects of flooding to be over, and planting start dates.

-) Historical data suggest flood years do not necessarily result in a later planting start date than non-flood years for sugarbeets, corn, or wheat in the Red River Valley. Planting start dates for soybeans also show that planting start dates are nearly the same between flood years and non-flood years. Therefore, a flood year does not guarantee a later regional planting date than a non-flood year.

-) Historical data reveal that regional planting for sugarbeets, corn, and wheat has reached 20 percent completion between 19 to 38 days after Red River first reaches 17,000 cfs in Fargo. This is the range of days under which inundated lands have time for the effects of flooding to be gone before planting sugarbeets, corn, and wheat without incurring planting delays.

-) Historical data reveal that regional planting for soybeans has reached 20 percent completion between 31 to 58 days after the Red River first reaches 17,000 cfs in Fargo. This is the range of days under which inundated lands have time for the effects of flooding to be gone before planting soybeans without incurring planting delays.

-) Using historical data for corn, sugarbeets, and wheat, the Monte Carlo simulation revealed (see Table 10):

-) a 45 percent annual chance that regional planting would begin within 20 days of the Red River reaching 17,000 cfs in Fargo
-) a 36 percent annual chance that regional planting would begin between 21 to 30 days after Red River reached 17,000 cfs in Fargo
-) a 19 percent annual chance that regional planting would begin 30 or more days after the Red River reached 17,000 cfs in Fargo

-) Using historical data for soybeans, the Monte Carlo simulation revealed (see Table 12):

-) a 37 percent annual chance that regional planting would begin within 35 days of the Red River reaching 17,000 cfs in Fargo
-) a 49 percent annual chance that regional planting would begin between 36 to 45 days after Red River reached 17,000 cfs in Fargo
-) a 15 percent annual chance that regional planting would begin 45 or more days after the Red River reached 17,000 cfs in Fargo

-) Combining a dry-down period with the hydrology data revealed:

Assuming a 10-day dry down period

-) Half of the acres within the staging area will require 16 or more days for the effects of flooding to be over after activation of the staging area for 25-year and smaller flood events. That percentage increases to 85 percent of the acreage with 50-year and larger flood events (Table 28).

Assuming a 14-day dry down period

-) Over 60 percent of the acres within the staging area will require 16 or more days for the effects of flooding to be over after activation of the staging area for 25-year and smaller flood events. That percentage increases to 88 percent of the acreage with 50-year and larger flood events (Table 28).

Table 28. Dry Down Periods and Percentage of Staging Area by Days Required for Effects of Flooding to be Over			
Time Required for Effects of Flooding to be Over		Flood Sizes	
		25yr Extra Long and Smaller	50yr and Larger
10-day Dry Down		percent of staging area acres	
	0 to 15 days	50	15
	16 to 25 days	38	35
	25+ days	12	50
14-day Dry Down			
	0 to 15 days	37	12
	16 to 25 days	42	18
	25+ days	21	70

Take Aways

-) Flood size has a greater effect on amount of acreage reqiring more than 25 days for flooding effects to be over than the increase from 10-day to 14-day dry down periods.

-) In the smaller flood events, an increase in dry down from 10 days to 14 days reveals the sensitivity of the hydrology data with respect to the amount of acreage requiring 16 or more days for the effects of flooding to be over. In the smaller floods, four additional days of dry down reduces the acreage that requires 15 or fewer days, and increases the acreage requiring 16 to 25 days and over 25 days.

-) In the larger flood events, an increase in dry down from 10 days to 14 days reveals less sensitivity of the hydrology data with respect to the amount of acreage requiring 15 or fewer days for the effects of flooding to be over. However, adding 4 days to dry down shifts an additional 20 percent of the staging area to require 25 or more days for the effects of flooding to be over.

-) Examining the Monte Carlo distribution of regional planting start dates and distribution of flood event start dates reveals

-) 64 percent annual chance that regional planting date for corn, sugarbeets, and wheat will be 21 or more days after the staging area is activated (Figure 7, Table 15)

-) 45 percent annual chance that regional planting date for corn, sugarbeets, and wheat will be 20 or fewer days after the staging area is activated (Figure 7, Table 15))

-) Annual probability ranges from 45 to 64 percent that the majority of acreage in the staging area, either with existing conditions or With the Diversion, would experience some planting delay for corn, sugarbeets, and wheat in a flood year (i.e., flood year of sufficient size to activate the staging area)

-) 64 percent annual chance that regional planting date for soybeans will be more than 35 days after the staging area is activated.

-) 36 percent annual chance that regional planting date for soybeans will be less than 35 days after the staging area is activated.

-) annual probability is less than 15 percent that the majority of acreage in the staging area would experience some planting delays for soybeans in a flood year.

-) The range of time needed for lands in the staging area to be ready for planting is similar to the amount of time between when the staging area is activated and when regional planting would start for corn, wheat, and sugarbeets, implying

-) High probability of some planting delays for corn, wheat, and sugarbeets

-) Low probability of large planting delays for corn, wheat, and sugarbeets

-) The range of time needed for lands in the staging area to be ready for planting is shorter than the time between when the staging area is activated and when regional planting would start for soybeans, implying

-) Low probability of planting delays for soybeans

Evaluation of Probabilities and Per Acre Losses for All Flood Events

Two key elements to the analysis are 1) how likely are damages to occur during a flood year and 2) what is the dollar value of those losses. The following results combine the elements discussed in the previous two sections; how the time for the effects of flooding to be gone overlaps with when regional planting will begin and how the delayed planting results in revenue losses. Examples of how different conditions can produce different levels of revenue loss are presented in Appendix D.

Probability of Losses from Planting Delays in Flood Event Year

No two flood events are the same nor are spring planting conditions homogeneous across years. Therefore, it becomes difficult to predict a point estimate of the potential effects of water storage on planting operations, which is precisely the reason for conducting a simulation over a range of different conditions. The analysis estimates how frequent revenues losses occur over the range of different flood event start dates, planting start dates, and planting rates for each storage area in the 10 flood events. Storage areas that do not flood or flood the same duration would not be impacted by the staging area, so the emphasis on estimating flood-related revenue losses can be focused on those storage areas that flood longer With the Diversion (Group 3) and those storage areas that now flood with use of the staging area but would not otherwise experience a spring flood event (Group 5).

Tables 29 through 48 relate to two tables for each flood event. One table shows the probability of losses for all hydrology groups; however, only hydrology groups 3 and 5 will have losses in crop revenues due to the diversion. The secondar table for each flood event contains the probability of losses for Hydrology Groups 3 and 5 delineated into groups based on how many extra days are added by the Diversion for the effects of flooding to be over. The ranges are based on 5-day increments, such as 1 to 5 days, 20 to 25 days, and upward to the last category including all storage areas with more than 30 days of delay.

For the tables showing average losses for just the five hydrology groups, the range of losses are placed into four-$25 per-acre increments. Each range of average per-acre losses has a probability of annual occurance for a flood event. The probabilities showing is the tables are only for flood events, and do not account for the probability of having a flood or not having a flood. The probability of having a flood is implied within the size of the flood events (e.g., 50-year flood, 500-year flood). Per-acre losses represent a composite average of all crops and all storage areas in that hydrology group. In addition to the incremental per-acre loss categories, a "no loss" category is provided along with the probability that all the storage tracts in that hydrology group will not incur any planting delays due to the Diversion. For hydrology group 4, the probability of a revenue gain associated with the Diversion is provided since the Diversion is expected to result in less days of inundation for those tracts; however, potential revenue gains were not tracked beyond the probability of occurance (i.e., $ per-acre ranges for positive gains were not estimated).

A few examples are provided for the 50-year event (Tables 41 and 42). In Table 41, Hydrology Group 3 (lands that flood longer) have zero percent probability of not incurring some planting delays. Correspondingly, the composite average across all storage areas for all acres falls into the range of $1 to $25 per acre. About 17,100 acres in Hydrolgy Group 3 would be affected by that overall range of revenue losses for a 50-year event. Hydrology Group 5 (land that represents new flooding) is likely to experience a broader range of potential revenue losses. In a 50-year event, those storage areas have a 47 percent probability of not incurring a planting delay due to the diversion. When planting losses are incurred, losses ranging from $1 to $25 per acre are likely 46 percent of the time. Losses ranging from

$26 to $50 per acre are likely 6 percent of the time. A very slight probability (<1%) that losses could average $51 to $75 per acre.

In Table 42, overall average losses for Hydrology Groups 3 and 5 are further defined by the difference in total days between Without Diversion and With Diversion conditions. An important note on all of the tables that identify the overall average per acre revenue losses delineated by the difference in total days is that the difference in total days is not necessarily sufficient to create a greater probability of revenue loss or a larger per-acre revenue loss. The reason behind this condition is that the total time the water is on the land differs among those groups, and those groups only represent the difference between Without and With Diversion conditions. For example, storage areas that have 1 to 5 additional days in a 50-year flood event may be flooded for 19.6 days Without the Diversion and 21.3 days with the Diversion (21.3 minus 19.6 = 1.7 additional days). Now if storage areas that have have 16 to 20 additional days in a 50-year flood event indicate they will be affected for 0 days Without the Diversion and 18.3 days with the Diversion (18.3 minus 0 = 18.3 additional days). However, as was discussed in previous sections, the longer the land contains water, the greater the odds of a revenue loss due to delay planting. In the example above, storage areas that are affected for greater than 21 days will have a higher probability of incurring a planting delay than storage tracts that are affected for 18 days, even though the Diversion is responsible for more days in the latter case. The results presented in Table 42 demonstrate this condition.

The overall losses for storages areas where the diversion adds 1 to 5 total days are, on average, lower than the other storage tracts in Hydrology Groups 3 and 5 (Table 42). However, the probability of loss is greater for the 1 to 5 day storage areas than the other groups. Of course, when days of delay are greater than 30, Table 42 is showing those tracts to have a 100 percent chance of incurring a planting delay, and those delays are expected to be substantial (greater than $100 per acre). However, only 150 acres are subject to those large revenue losses, compared to about 14,500 acres in the 1 to 5 days of delay group.

Tables 29 through 48 represent probabilities and per acre losses that are a composite average of all crops raised in the respective storage areas. Not all the storage areas in each category necessarily have to be located in the same county—the staging area contains storage areas in four counties. Therefore, due to yield and crop roation differences among the counties, average losses presented in Tables 29 through 48 are not necessarily going to represent any single storage area. The average losses presented in those tables represent all four crops. Also, sugarbeets (and a lesser extent wheat) may not be raised on all lands within any given storage area. The frequency and magnitude of revenue losses for each of the four crops are presented in Appendix E.

Table 29. Probability of Revenue Losses Resulting from Use of the Staging Area, by Hydrology Group, 10-year Flood Event

Hydrology Groups	No Loss	$0 to $25/acre[a] Loss	$26 to $50/acre[a] Loss	$51 to $75/acre[a] Loss	$76 to $100/acre [a] Loss	More than $100 acre[a] Loss	Positive Impact per Acre	Any Loss	Acres
	------------------------------- Based on 10,000 replications from Monte Carlo Simulation -------------------------------								
<u>10-day Dry Down Period</u>									
(1) Does not flood	100.0%	na	na	na	na	na	na	na	42,093
(2) Floods Same Duration	100.0%	na	na	na	na	na	na	na	8,210
(3) Floods Longer Duration	70.5%	29.5%	0.0%	0.0%	0.0%	0.0%	na	29.5%	908
(4) Floods Shorter Duration	74.2%	na	na	na	na	na	25.8%	na	2,155
(5) Now Floods With Diversion	80.8%	19.1%	0.1%	0.0%	0.0%	0.0%	na	19.3%	965
(6) All Groups	70.3%	9.7%	0.0%	0.0%	0.0%	0.0%	5.2%	9.7%	54,331
<u>14-day Dry Down Period</u>									
(1) Does not flood	100.0%	na	na	na	na	na	na	na	42,093
(2) Floods Same Duration	100.0%	na	na	na	na	na	na	na	8,210
(3) Floods Longer Duration	55.1%	44.9%	0.0%	0.0%	0.0%	0.0%	na	44.9%	908
(4) Floods Shorter Duration	59.1%	na	na	na	na	na	40.9%	na	2,155
(5) Now Floods With Diversion	66.8%	31.8%	1.3%	0.0%	0.0%	0.0%	na	33.2%	965
(6) All Groups	64.4%	15.4%	0.3%	0.0%	0.0%	0.0%	8.2%	15.6%	54,331

Na=not applicable.

[a] The range of losses per acre represent an average of all storage areas within the hydrology group.

NOTE: Staging area will not be used in a 10-year flood event. Effects are representative of changes in hydrology resulting from staging area infrastructure.

Table 30. Probability of Losses Resulting from Use of the Staging Area, Hydrology Groups Three and Five Delineated by Difference in Total Days between With and Without Diversion, 10-year Flood Event											
	Time from Activation of Staging Area until Effects of Flooding are Over[a]										
Hydrology Group	Without Diversion	With Diversion	Difference in Total Days	No Loss	$0 to $25/acre[b] Loss	$26 to $50/acre[b] Loss	$51 to $75/acre[b] Loss	$76 to $100/acre[b] Loss	More than $100/acre[b] Loss	Any Loss	Acres
	-------------------- days --------------------			------------------------- Based on 10,000 replications from Monte Carlo Simulation -------------------------							
10-day Dry Down Period											
3	14.33	14.8	1 to 5	70.5%	29.5%	0.0%	0.0%	0.0%	0.0%	29.5%	908
			6 to 10	na	na	na	na	na	na	na	na
5	0	12.0	11 to 15	80.8%	19.1%	0.1%	0.0%	0.0%	0.0%	19.2%	965
			16 to 20	na	na	na	na	na	na	na	na
			21 to 25	na	na	na	na	na	na	na	na
			26 to 30	na	na	na	na	na	na	na	na
5	0	59.0	30+	0.0%	0.0%	0.0%	0.0%	0.1%	99.9%	100.0%	150
14-day Dry Down Period											
3	18.3	18.8	1 to 5	55.1%	44.9%	0.0%	0.0%	0.0%	0.0%	44.9%	908
			6 to 10	na	na	na	na	na	na	na	na
5	0	14.5	11 to 15	77.3%	21.9%	0.8%	0.0%	0.0%	0.0%	22.7%	691
5	0	17.5	16 to 20	66.8%	30.4%	2.7%	0.1%	0.0%	0.0%	33.2%	274
			21 to 25	na	na	na	na	na	na	na	na
			26 to 30	na	na	na	na	na	na	na	na
5	0	63.0	30+	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	100.0%	150

Na=not applicable. There were no storage areas in those categories.

[a] Total days are defined as the sum of 1) days from staging activation until land becomes inundated, 2) days of inundation, and 3) dry-down period. Zero days mean the storage areas do not flood with existing conditions, but zero days do not necessarily mean conditions in the region are suitable for planting.

[b] The range of losses per acre represent an average of all storage areas within the groups.

Table 31. Probability of Revenue Losses Resulting from Use of the Staging Area, by Hydrology Group, 20-year Flood Event									
Hydrology Groups	No Loss	$0 to $25/acre[a] Loss	$26 to $50/acre[a] Loss	$51 to $75/acre[a] Loss	$76 to $100/acre [a] Loss	More than $100 acre[a] Loss	Positive Impact per Acre	Any Loss	Acres
	-------------------------------- Based on 10,000 replications from Monte Carlo Simulation --------------------------------								
10-day Dry Down Period									
(1) Does not flood	100.0%	na	na	na	na	na	na	na	26,264
(2) Floods Same Duration	100.0%	na	na	na	na	na	na	na	13,483
(3) Floods Longer Duration	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	na	100.0%	6,882
(4) Floods Shorter Duration	59.1%	na	na	na	na	na	40.9%	na	5,384
(5) Now Floods With Diversion	47.4%	47.2%	5.0%	0.4%	0.0%	0.0%	na	52.6%	2,318
(6) All Groups	57.5%	21.4%	1.0%	0.1%	0.0%	0.0%	8.2%	22.5%	54,331
14-day Dry Down Period									
(1) Does not flood	100.0%	na	na	na	na	na	na	na	26,264
(2) Floods Same Duration	100.0%	na	na	na	na	na	na	na	13,483
(3) Floods Longer Duration	25.5%	74.5%	0.0%	0.0%	0.0%	0.0%	na	74.5%	6,882
(4) Floods Shorter Duration	43.8%	na	na	na	na	na	56.2%	na	5,384
(5) Now Floods With Diversion	32.5%	50.1%	15.1%	2.0%	0.2%	0.0%	na	67.5%	2,318
(6) All Groups	51.6%	24.9%	3.0%	0.4%	0.0%	0.0%	11.2%	28.4%	54,331

na=not applicable.

[a] The range of losses per acre represent an average of all storage areas within the hydrology group.

NOTE: Staging area will not be used in a 10-year flood event. Effects are representative of changes in hydrology resulting from staging area infrastructure.

Table 32. Probability of Losses Resulting from Use of the Staging Area, Hydrology Groups Three and Five Delineated by Difference in Total Days between With and Without Diversion, 20-year Flood Event

	Time from Activation of Staging Area until Effects of Flooding are Over[a]										
Hydrology Group	Without Diversion	With Diversion	Difference in Total Days	No Loss	$0 to $25/acre[b] Loss	$26 to $50/acre[b] Loss	$51 to $75/acre[b] Loss	$76 to $100/acre[b] Loss	More than $100/acre[b] Loss	Any Loss	Acres
	-------------------- days --------------------			------------------------- Based on 10,000 replications from Monte Carlo Simulation -------------------------							
<u>10-day Dry Down Period</u>											
3	17.2	18.0	1 to 5	40.2%	59.8%	0.0%	0.0%	0.0%	0.0%	59.8%	6,269
3	15.0	21.0	6 to 10	55.0%	44.3%	0.7%	0.0%	0.0%	0.0%	45.0%	613
5	0	13.5	11 to 15	77.3%	22.5%	0.2%	0.0%	0.0%	0.0%	22.7%	782
			16 to 20	na	na	na	na	na	na	na	na
5	0	22.3	21 to 25	47.4%	39.7%	11.4%	1.4%	0.1%	0.0%	52.6%	1,536
			26 to 30	na	na	na	na	na	na	na	na
3	15.5	59.0	30+	0.0%	0.0%	0.0%	0.0%	0.1%	99.9%	100.0%	150
<u>14-day Dry Down Period</u>											
3	21.2	22.0	1 to 5	25.3%	74.7%	0.0%	0.0%	0.0%	0.0%	74.7%	6,269
3	19.0	25.0	6 to 10	40.2%	55.9%	3.9%	0.0%	0.0%	0.0%	59.8%	613
			11 to 15	na	na	na	na	na	na	na	na
5	0	17.5	16 to 20	63.1%	35.4%	1.4%	0.0%	0.0%	0.0%	36.9%	782
			21 to 25	na	na	na	na	na	na	na	na
5	0	26.3	26 to 30	32.5%	36.3%	24.4%	5.7%	0.9%	0.2%	67.5%	1,536
3	19.5	63.0	30+	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	100.0%	150

Na=not applicable. There were no storage areas in those categories.

[a] Total days are defined as the sum of 1) days from staging activation until land becomes inundated, 2) days of inundation, and 3) dry-down period. Zero days mean the storage areas do not flood with existing conditions, but zero days do not necessarily mean conditions in the region are suitable for planting.

[b] The range of losses per acre represent an average of all storage areas within the groups.

Table 33. Probability of Revenue Losses Resulting from Use of the Staging Area, by Hydrology Group, 25-year Flood Event

Hydrology Groups	No Loss	$0 to $25/acre[a] Loss	$26 to $50/acre[a] Loss	$51 to $75/acre[a] Loss	$76 to $100/acre [a] Loss	More than $100 acre[a] Loss	Positive Impact per Acre	Any Loss	Acres
	-------------------------------- Based on 10,000 replications from Monte Carlo Simulation --------------------------------								
<u>10-day Dry Down Period</u>									
(1) Does not flood	100.0%	na	na	na	na	na	na	na	19,071
(2) Floods Same Duration	100.0%	na	na	na	na	na	na	na	5,752
(3) Floods Longer Duration	46.6%	53.4%	0.0%	0.0%	0.0%	0.0%	na	53.4%	23,127
(4) Floods Shorter Duration	na	na	na	na	na	na	na	na	na
(5) Now Floods With Diversion	55.1%	42.1%	2.7%	0.1%	0.0%	0.0%	na	44.9%	6,381
(6) All Groups	60.3%	19.1%	0.5%	0.0%	0.0%	0.0%	0.0%	19.7%	54,331
<u>14-day Dry Down Period</u>									
(1) Does not flood	100.0%	na	na	na	na	na	na	na	19,071
(2) Floods Same Duration	100.0%	na	na	na	na	na	na	na	5,752
(3) Floods Longer Duration	30.1%	69.9%	0.0%	0.0%	0.0%	0.0%	na	69.9%	23,127
(4) Floods Shorter Duration	na	na	na	na	na	na	na	na	na
(5) Now Floods With Diversion	40.2%	49.1%	9.5%	1.2%	0.1%	0.0%	na	59.8%	6,381
(6) All Groups	54.1%	23.8%	1.9%	0.2%	0.0%	0.0%	0.0%	25.9%	54,331

na=not applicable.

[a] The range of losses per acre represent an average of all storage areas within the hydrology group.

NOTE: Staging area will not be used in a 10-year flood event. Effects are representative of changes in hydrology resulting from staging area infrastructure.

Table 34. Probability of Losses Resulting from Use of the Staging Area, Hydrology Groups Three and Five Delineated by Difference in Total Days between With and Without Diversion, 25-year Flood Event

Hydrology Group	Time from Activation of Staging Area until Effects of Flooding are Over[a]: Without Diversion	With Diversion	Difference in Total Days	No Loss	$0 to $25/acre[b] Loss	$26 to $50/acre[b] Loss	$51 to $75/acre[b] Loss	$76 to $100/acre[b] Loss	More than $100/acre[b] Loss	Any Loss	Acres
	---------- days ----------			---------- Based on 10,000 replications from Monte Carlo Simulation ----------							
10-day Dry Down Period											
3	17.4	19.2	1 to 5	40.2%	59.8%	0.0%	0.0%	0.0%	0.0%	59.8%	22,460
3	13.3	19.2	6 to 10	55.1%	43.7%	1.3%	0.0%	0.0%	0.0%	44.9%	668
			11 to 15	na	na	na	na	na	na	na	na
5	0	17.2	16 to 20	59.1%	37.6%	3.1%	0.2%	0.0%	0.0%	40.9%	5,866
5	0	20.5	21 to 25	55.1%	31.8%	10.8%	2.0%	0.3%	0.0%	44.9%	515
			26 to 30	na	na	na	na	na	na	na	na
3	17.0	59.0	30+	0.0%	0.0%	0.0%	0.0%	0.1%	99.9%	100.0%	150
14-day Dry Down Period											
3	21.4	23.2	1 to 5	25.3%	74.7%	0.0%	0.0%	0.0%	0.0%	74.7%	22,460
3	17.3	23.2	6 to 10	40.2%	58.7%	1.1%	0.0%	0.0%	0.0%	59.8%	668
			11 to 15	na	na	na	na	na	na	na	na
5	0	19.8	16 to 20	59.1%	36.2%	4.3%	0.4%	0.0%	0.0%	40.9%	1,501
5	0	22.1	21 to 25	40.2%	46.7%	11.4%	1.5%	0.1%	0.0%	59.8%	4,880
			26 to 30	na	na	na	na	na	na	na	na
3	21.0	63.0	30+	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	100.0%	150

Na=not applicable. There were no storage areas in those categories.

[a] Total days are defined as the sum of 1) days from staging activation until land becomes inundated, 2) days of inundation, and 3) dry-down period. Zero days mean the storage areas do not flood with existing conditions, but zero days do not necessarily mean conditions in the region are suitable for planting.

[b] The range of losses per acre represent an average of all storage areas within the groups.

Table 35. Probability of Revenue Losses Resulting from Use of the Staging Area, by Hydrology Group, 25-year Long Flood Event									
Hydrology Groups	No Loss	$0 to $25/acre[a] Loss	$26 to $50/acre[a] Loss	$51 to $75/acre[a] Loss	$76 to $100/acre [a] Loss	More than $100 acre[a] Loss	Positive Impact per Acre	Any Loss	Acres
	------------------------------- Based on 10,000 replications from Monte Carlo Simulation -------------------------------								
<u>10-day Dry Down Period</u>									
(1) Does not flood	100.0%	na	na	na	na	na	na	na	12,042
(2) Floods Same Duration	100.0%	na	na	na	na	na	na	na	12,082
(3) Floods Longer Duration	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	na	100.0%	23,507
(4) Floods Shorter Duration	43.8%	na	na	na	na	na	56.2%	na	1,865
(5) Now Floods With Diversion	51.2%	46.5%	2.2%	0.1%	0.0%	0.0%	na	48.8%	4,835
(6) All Groups	50.2%	29.3%	0.4%	0.0%	0.0%	0.0%	11.2%	29.8%	54,331
<u>14-day Dry Down Period</u>									
(1) Does not flood	100.0%	na	na	na	na	na	na	na	12,042
(2) Floods Same Duration	100.0%	na	na	na	na	na	na	na	12,082
(3) Floods Longer Duration	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	na	100.0%	23,507
(4) Floods Shorter Duration	28.7%	na	na	na	na	na	71.3%	na	1,865
(5) Now Floods With Diversion	36.4%	54.3%	8.3%	0.9%	0.1%	0.0%	na	63.6%	4,835
(6) All Groups	47.3%	30.9%	1.7%	0.2%	0.0%	0.0%	14.3%	32.7%	54,331

na=not applicable.

[a] The range of losses per acre represent an average of all storage areas within the hydrology group.

NOTE: Staging area will not be used in a 10-year flood event. Effects are representative of changes in hydrology resulting from staging area infrastructure.

Table 36. Probability of Losses Resulting from Use of the Staging Area, Hydrology Groups Three and Five Delineated by Difference in Total Days between With and Without Diversion, 25-year Long Flood Event

	Time from Activation of Staging Area until Effects of Flooding are Over[a]										
Hydrology Group	Without Diversion	With Diversion	Difference in Total Days	No Loss	$0 to $25/acre[b] Loss	$26 to $50/acre[b] Loss	$51 to $75/acre[b] Loss	$76 to $100/acre[b] Loss	More than $100/acre[b] Loss	Any Loss	Acres
	---------------------- days ----------------------			------------------------- Based on 10,000 replications from Monte Carlo Simulation -------------------------							
<u>10-day Dry Down Period</u>											
3	20.7	22.0	1 to 5	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	100.0%	22,657
3	13.7	20.0	6 to 10	55.1%	43.1%	1.9%	0.0%	0.0%	0.0%	44.9%	850
5	0	14.5	11 to 15	77.3%	20.8%	1.8%	0.1%	0.0%	0.0%	22.7%	110
5	0	17.8	16 to 20	59.1%	38.7%	2.2%	0.1%	0.0%	0.0%	40.9%	4,660
5	0	21.5	21 to 25	51.1%	36.8%	10.6%	1.4%	0.0%	0.0%	48.9%	65
			26 to 30	na	na	na	na	na	na	na	na
3	21.5	59.0	30+	0.0%	0.0%	0.0%	0.0%	0.1%	99.9%	100.0%	150
<u>14-day Dry Down Period</u>											
3	24.7	26.0	1 to 5	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	100.0%	22,657
3	17.7	24.0	6 to 10	40.2%	50.9%	8.8%	0.0%	0.0%	0.0%	59.8%	850
			11 to 15	na	na	na	na	na	na	na	na
5	0	19.3	16 to 20	59.1%	36.1%	4.4%	0.4%	0.0%	0.0%	40.9%	1,465
5	0	22.0	21 to 25	43.8%	44.7%	10.1%	1.3%	0.1%	0.0%	56.2%	3,306
5	0	25.5	26 to 30	36.3%	33.6%	23.2%	5.8%	0.9%	0.2%	63.7%	65
3	25.5	63.0	30+	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	100.0%	150

Na=not applicable. There were no storage areas in those categories.

[a] Total days are defined as the sum of 1) days from staging activation until land becomes inundated, 2) days of inundation, and 3) dry-down period. Zero days mean the storage areas do not flood with existing conditions, but zero days do not necessarily mean conditions in the region are suitable for planting.

[b] The range of losses per acre represent an average of all storage areas within the groups.

Table 37. Probability of Revenue Losses Resulting from Use of the Staging Area, by Hydrology Group, 25-year Extra Long Flood Event

Hydrology Groups	No Loss	$0 to $25/acre[a] Loss	$26 to $50/acre[a] Loss	$51 to $75/acre[a] Loss	$76 to $100/acre [a] Loss	More than $100 acre[a] Loss	Positive Impact per Acre	Any Loss	Acres
	------------------------------- Based on 10,000 replications from Monte Carlo Simulation -------------------------------								
10-day Dry Down Period									
(1) Does not flood	100.0%	na	na	na	na	na	na	na	12,042
(2) Floods Same Duration	100.0%	na	na	na	na	na	na	na	15,878
(3) Floods Longer Duration	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	na	100.0%	12,210
(4) Floods Shorter Duration	15.5%	na	na	na	na	na	84.5%	na	9,366
(5) Now Floods With Diversion	43.9%	51.2%	4.5%	0.4%	0.0%	0.0%	na	56.1%	4,835
(6) All Groups	48.8%	30.2%	0.9%	0.1%	0.0%	0.0%	16.9%	31.2%	54,331
14-day Dry Down Period									
(1) Does not flood	100.0%	na	na	na	na	na	na	na	12,042
(2) Floods Same Duration	100.0%	na	na	na	na	na	na	na	15,878
(3) Floods Longer Duration	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	na	100.0%	12,210
(4) Floods Shorter Duration	6.4%	na	na	na	na	na	93.6%	na	9,366
(5) Now Floods With Diversion	28.8%	54.7%	14.1%	2.1%	0.2%	0.0%	na	71.2%	4,835
(6) All Groups	45.8%	30.9%	2.8%	0.4%	0.0%	0.0%	18.7%	34.2%	54,331

na=not applicable.

[a] The range of losses per acre represent an average of all storage areas within the hydrology group.

NOTE: Staging area will not be used in a 10-year flood event. Effects are representative of changes in hydrology resulting from staging area infrastructure.

Table 38. Probability of Losses Resulting from Use of the Staging Area, Hydrology Groups Three and Five Delineated by Difference in Total Days between With and Without Diversion, 25-year Extra Long Flood Event

Hydrology Group	Time from Activation of Staging Area until Effects of Flooding are Over[a]: Without Diversion	With Diversion	Difference in Total Days	No Loss	$0 to $25/acre[b] Loss	$26 to $50/acre[b] Loss	$51 to $75/acre[b] Loss	$76 to $100/acre[b] Loss	More than $100/acre[b] Loss	Any Loss	Acres
	-------------------- days --------------------			------------------------- Based on 10,000 replications from Monte Carlo Simulation -------------------------							
10-day Dry Down Period											
3	25.8	27.2	1 to 5	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	100.0%	10,311
3	14.9	21.7	6 to 10	43.8%	52.3%	3.9%	0.0%	0.0%	0.0%	56.2%	1,898
			11 to 15	na	na	na	na	na	na	na	na
5	0	18.9	16 to 20	59.1%	37.1%	3.5%	0.3%	0.0%	0.0%	40.9%	3,758
5	0	21.2	21 to 25	43.8%	46.3%	8.8%	1.0%	0.1%	0.0%	56.2%	1,077
			26 to 30	na	na	na	na	na	na	na	na
3	26.0	59.0	30+	0.0%	0.0%	0.0%	0.0%	0.1%	99.9%	100.0%	150
14-day Dry Down Period											
3	29.8	31.2	1 to 5	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	100.0%	10,311
3	18.9	25.7	6 to 10	28.7%	55.9%	15.3%	0.1%	0.0%	0.0%	71.3%	1,898
			11 to 15	0.0%	na	na	na	na	na	na	na
			16 to 20	0.0%	na	na	na	na	na	na	na
5	0	23.4	21 to 25	40.2%	44.8%	13.0%	1.8%	0.2%	0.0%	59.8%	4,252
5	0	26.5	26 to 30	28.7%	42.1%	23.4%	4.9%	0.8%	0.2%	71.3%	584
3	30.0	63.0	30+	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	100.0%	150

Na=not applicable. There were no storage areas in those categories.

[a] Total days are defined as the sum of 1) days from staging activation until land becomes inundated, 2) days of inundation, and 3) dry-down period. Zero days mean the storage areas do not flood with existing conditions, but zero days do not necessarily mean conditions in the region are suitable for planting.

[b] The range of losses per acre represent an average of all storage areas within the groups.

Table 39. Probability of Revenue Losses Resulting from Use of the Staging Area, by Hydrology Group, 2009-like Flood Event

Hydrology Groups	No Loss	\$0 to \$25/acre[a] Loss	\$26 to \$50/acre[a] Loss	\$51 to \$75/acre[a] Loss	\$76 to \$100/acre [a] Loss	More than \$100 acre[a] Loss	Positive Impact per Acre	Any Loss	Acres
	------------------------------- Based on 10,000 replications from Monte Carlo Simulation -------------------------------								
10-day Dry Down Period									
(1) Does not flood	100.0%	na	na	na	na	na	na	na	6,665
(2) Floods Same Duration	100.0%	na	na	na	na	na	na	na	16,971
(3) Floods Longer Duration	8.1%	91.8%	0.1%	0.0%	0.0%	0.0%	na	100.0%	15,860
(4) Floods Shorter Duration	0.0%	na	na	na	na	na	100.0%	na	11,220
(5) Now Floods With Diversion	51.2%	45.6%	3.1%	0.2%	0.0%	0.0%	na	48.9%	3,617
(6) All Groups	51.9%	27.5%	0.6%	0.0%	0.0%	0.0%	20.0%	28.2%	54,331
14-day Dry Down Period									
(1) Does not flood	100.0%	na	na	na	na	na	na	na	6,665
(2) Floods Same Duration	100.0%	na	na	na	na	na	na	na	16,971
(3) Floods Longer Duration	2.6%	96.4%	1.0%	0.0%	0.0%	0.0%	na	97.4%	15,860
(4) Floods Shorter Duration	0.0%	na	na	na	na	na	100.0%	na	11,220
(5) Now Floods With Diversion	36.3%	51.3%	10.9%	1.3%	0.1%	0.0%	na	63.7%	3,617
(6) All Groups	47.8%	29.5%	2.4%	0.3%	0.0%	0.0%	20.0%	32.2%	54,331

na=not applicable.

[a] The range of losses per acre represent an average of all storage areas within the hydrology group.

NOTE: Staging area will not be used in a 10-year flood event. Effects are representative of changes in hydrology resulting from staging area infrastructure.

Table 40. Probability of Losses Resulting from Use of the Staging Area, Hydrology Groups Three and Five Delineated by Difference in Total Days between With and Without Diversion, 2009-like Flood Event

	Time from Activation of Staging Area until Effects of Flooding are Over[a]										
Hydrology Group	Without Diversion	With Diversion	Difference in Total Days	No Loss	$0 to $25/acre[b] Loss	$26 to $50/acre[b] Loss	$51 to $75/acre[b] Loss	$76 to $100/acre[b] Loss	More than $100/acre[b] Loss	Any Loss	Acres
	---------------------- days	----------------------		------------------------- Based on 10,000 replications from Monte Carlo Simulation -------------------------							
10-day Dry Down Period											
3	16.3	18.8	1 to 5	8.1%	91.9%	0.0%	0.0%	0.0%	0.0%	91.9%	13,887
3	25.5	33.4	6 to 10	10.3%	25.4%	57.8%	6.1%	0.3%	0.1%	89.7%	1,023
3	19.0	31.8	11 to 15	12.6%	33.9%	41.5%	10.5%	1.4%	0.1%	87.4%	811
5	0	12.0	11 to 15								77
5	0	17.3	16 to 20	59.1%	38.0%	2.7%	0.1%	0.0%	0.0%	40.9%	3,107
5	0	21.5	21 to 25	51.1%	38.2%	9.5%	1.1%	0.1%	0.0%	48.9%	434
			26 to 30	na	na	na	na	na	na	na	na
3	25.0	57.5	30+	0.0%	0.0%	0.0%	0.1%	0.2%	99.7%	100.0%	150
14-day Dry Down Period											
3	20.3	22.8	1 to 5	2.5%	97.5%	0.0%	0.0%	0.0%	0.0%	97.5%	14,026
3	29.5	37.4	6 to 10	3.5%	13.4%	61.9%	17.5%	2.2%	1.4%	96.5%	1,023
3	23.0	35.8	11 to 15	4.7%	19.1%	34.6%	31.8%	7.5%	2.3%	95.3%	811
5	0	19.2	16 to 20	59.1%	36.1%	4.4%	0.4%	0.0%	0.0%	40.9%	773
5	0	21.8	21 to 25	43.8%	43.1%	11.5%	1.4%	0.1%	0.0%	56.2%	2,409
5	0	25.5	26 to 30	36.3%	35.9%	22.5%	4.4%	0.7%	0.1%	63.7%	434
3	29.5	61.5	30+	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	100.0%	150

Na=not applicable. There were no storage areas in those categories.

[a] Total days are defined as the sum of 1) days from staging activation until land becomes inundated, 2) days of inundation, and 3) dry-down period. Zero days mean the storage areas do not flood with existing conditions, but zero days do not necessarily mean conditions in the region are suitable for planting.

[b] The range of losses per acre represent an average of all storage areas within the groups.

Table 41. Probability of Revenue Losses Resulting from Use of the Staging Area, by Hydrology Group, 50-year Flood Event

Hydrology Groups	No Loss	$0 to $25/acre[a] Loss	$26 to $50/acre[a] Loss	$51 to $75/acre[a] Loss	$76 to $100/acre [a] Loss	More than $100 acre[a] Loss	Positive Impact per Acre	Any Loss	Acres
	------------------------------- Based on 10,000 replications from Monte Carlo Simulation -------------------------------								
<u>10-day Dry Down Period</u>									
(1) Does not flood	100.0%	na	na	na	na	na	na	na	11,086
(2) Floods Same Duration	100.0%	na	na	na	na	na	na	na	11,527
(3) Floods Longer Duration	43.9%	56.1%	0.0%	0.0%	0.0%	0.0%	na	56.1%	16,976
(4) Floods Shorter Duration	18.7%	na	na	na	na	na	81.3%	na	9,605
(5) Now Floods With Diversion	47.5%	48.6%	3.7%	0.2%	0.0%	0.0%	na	52.5%	5,137
(6) All Groups	58.3%	20.9%	0.7%	0.0%	0.0%	0.0%	16.3%	21.7%	54,331
<u>14-day Dry Down Period</u>									
(1) Does not flood	100.0%	na	na	na	na	na	na	na	11,086
(2) Floods Same Duration	100.0%	na	na	na	na	na	na	na	11,527
(3) Floods Longer Duration	28.8%	71.2%	0.0%	0.0%	0.0%	0.0%	na	71.2%	16,976
(4) Floods Shorter Duration	8.1%	na	na	na	na	na	91.9%	na	9,605
(5) Now Floods With Diversion	32.6%	53.2%	12.4%	1.7%	0.2%	0.0%	na	67.4%	5,137
(6) All Groups	52.3%	24.9%	2.5%	0.3%	0.0%	0.0%	18.4%	27.7%	54,331

na=not applicable.
[a] The range of losses per acre represent an average of all storage areas within the hydrology group.
NOTE: Staging area will not be used in a 10-year flood event. Effects are representative of changes in hydrology resulting from staging area infrastructure.

Table 42. Probability of Losses Resulting from Use of the Staging Area, Hydrology Groups Three and Five Delineated by Difference in Total Days between With and Without Diversion, 50-year Flood Event

Hydrology Group	Time from Activation of Staging Area until Effects of Flooding are Over[a]: Without Diversion	With Diversion	Difference in Total Days	No Loss	$0 to $25/acre[b] Loss	$26 to $50/acre[b] Loss	$51 to $75/acre[b] Loss	$76 to $100/acre[b] Loss	More than $100/acre[b] Loss	Any Loss	Acres
	-------------------- days --------------------			------------------------- Based on 10,000 replications from Monte Carlo Simulation -------------------------							
10-day Dry Down Period											
3	19.6	21.3	1 to 5	43.8%	56.2%	0.0%	0.0%	0.0%	0.0%	56.2%	14,485
3	14.0	20.2	6 to 10	55.1%	43.9%	1.1%	0.0%	0.0%	0.0%	44.9%	2,490
			11 to 15	na	na	na	na	na	na	na	na
5	0	18.3	16 to 20	59.1%	37.8%	2.9%	0.2%	0.0%	0.0%	40.9%	3,959
5	0	21.0	21 to 25	47.4%	44.1%	7.8%	0.7%	0.1%	0.0%	52.6%	1,178
			26 to 30	na	na	na	na	na	na	na	na
3	25.0	60.0	30+	0.0%	0.0%	0.0%	0.0%	0.1%	100.0%	100.0%	150
14-day Dry Down Period											
3	23.6	25.3	1 to 5	28.7%	71.3%	0.0%	0.0%	0.0%	0.0%	71.3%	14,485
3	18.0	24.2	6 to 10	40.2%	54.1%	5.7%	0.0%	0.0%	0.0%	59.8%	2,490
			11 to 15								
5	0	19.7	16 to 20	59.1%	35.8%	4.7%	0.4%	0.0%	0.0%	40.9%	948
5	0	23.1	21 to 25	40.2%	43.3%	14.2%	2.0%	0.2%	0.0%	59.8%	4,124
5	0	26.5	26 to 30	32.5%	32.2%	25.9%	7.6%	1.4%	0.3%	67.5%	65
3	29.0	64.0	30+	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	100.0%	150

Na=not applicable. There were no storage areas in those categories.

[a] Total days are defined as the sum of 1) days from staging activation until land becomes inundated, 2) days of inundation, and 3) dry-down period. Zero days mean the storage areas do not flood with existing conditions, but zero days do not necessarily mean conditions in the region are suitable for planting.

[b] The range of losses per acre represent an average of all storage areas within the groups.

Table 43. Probability of Revenue Losses Resulting from Use of the Staging Area, by Hydrology Group, 100-year Flood Event

Hydrology Groups	No Loss	$0 to $25/acre[a] Loss	$26 to $50/acre[a] Loss	$51 to $75/acre[a] Loss	$76 to $100/acre [a] Loss	More than $100 acre[a] Loss	Positive Impact per Acre	Any Loss	Acres
	------------------------------ Based on 10,000 replications from Monte Carlo Simulation ------------------------------								
<u>10-day Dry Down Period</u>									
(1) Does not flood	100.0%	na	na	na	na	na	na	na	6,316
(2) Floods Same Duration	100.0%	na	na	na	na	na	na	na	15,942
(3) Floods Longer Duration	0.9%	99.1%	0.0%	0.0%	0.0%	0.0%	na	99.1%	15,926
(4) Floods Shorter Duration	22.2%	na	na	na	na	na	77.8%	na	9,773
(5) Now Floods With Diversion	40.2%	52.7%	6.4%	0.6%	0.1%	0.0%	na	59.8%	6,374
(6) All Groups	48.2%	30.4%	1.3%	0.1%	0.0%	0.0%	15.6%	31.8%	54,331
<u>14-day Dry Down Period</u>									
(1) Does not flood	100.0%	na	na	na	na	na	na	na	6,316
(2) Floods Same Duration	100.0%	na	na	na	na	na	na	na	15,942
(3) Floods Longer Duration	0.2%	99.8%	0.0%	0.0%	0.0%	0.0%	na	99.8%	15,926
(4) Floods Shorter Duration	10.3%	na	na	na	na	na	89.7%	na	9,773
(5) Now Floods With Diversion	25.3%	53.9%	17.4%	2.9%	0.5%	0.1%	na	74.7%	6,374
(6) All Groups	45.1%	30.8%	3.5%	0.6%	0.1%	0.0%	17.9%	34.9%	54,331

na=not applicable.
[a] The range of losses per acre represent an average of all storage areas within the hydrology group.
NOTE: Staging area will not be used in a 10-year flood event. Effects are representative of changes in hydrology resulting from staging area infrastructure.

Table 44. Probability of Losses Resulting from Use of the Staging Area, Hydrology Groups Three and Five Delineated by Difference in Total Days between With and Without Diversion, 100-year Flood Event

	Time from Activation of Staging Area until Effects of Flooding are Over[a]										
Hydrology Group	Without Diversion	With Diversion	Difference in Total Days	No Loss	$0 to $25/acre[b] Loss	$26 to $50/acre[b] Loss	$51 to $75/acre[b] Loss	$76 to $100/acre[b] Loss	More than $100/acre[b] Loss	Any Loss	Acres
	-------------------- days --------------------			------------------------- Based on 10,000 replications from Monte Carlo Simulation -------------------------							
10-day Dry Down Period											
3	20.8	22.9	1 to 5	0.8%	99.2%	0.0%	0.0%	0.0%	0.0%	99.2%	14,433
3	15.2	21.8	6 to 10	43.8%	52.4%	3.8%	0.0%	0.0%	0.0%	56.2%	640
5	0	13.0	11 to 15	84.0%	15.8%	0.2%	0.0%	0.0%	0.0%	16.0%	73
5	0	18.3	16 to 20	59.1%	36.5%	4.1%	0.4%	0.0%	0.0%	40.9%	3,210
5	0	21.8	21 to 25	40.2%	48.5%	9.9%	1.2%	0.1%	0.0%	59.8%	3,091
			26 to 30	na	na	na	na	na	na	na	na
3	28.5	60.5	30+	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	100.0%	150
14-day Dry Down Period											
3	24.8	26.9	1 to 5	0.1%	99.8%	0.0%	0.0%	0.0%	0.0%	99.9%	15,285
3	19.2	25.8	6 to 10	28.7%	56.4%	14.9%	0.1%	0.0%	0.0%	71.3%	640
			11 to 15	na	na	na	na	na	na	na	na
5	0	18.5	16 to 20	59.1%	37.0%	3.6%	0.3%	0.0%	0.0%	40.9%	120
5	0	23.0	21 to 25	40.2%	42.9%	14.3%	2.3%	0.3%	0.0%	59.8%	4,453
5	0	27.2	26 to 30	25.3%	41.4%	25.5%	6.4%	1.1%	0.2%	74.7%	1,801
3	32.5	64.5	30+	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	100.0%	150

Na=not applicable. There were no storage areas in those categories.

[a] Total days are defined as the sum of 1) days from staging activation until land becomes inundated, 2) days of inundation, and 3) dry-down period. Zero days mean the storage areas do not flood with existing conditions, but zero days do not necessarily mean conditions in the region are suitable for planting.

[b] The range of losses per acre represent an average of all storage areas within the groups.

Table 45. Probability of Revenue Losses Resulting from Use of the Staging Area, by Hydrology Group, 500-year Flood Event

Hydrology Groups	No Loss	$0 to $25/acre[a] Loss	$26 to $50/acre[a] Loss	$51 to $75/acre[a] Loss	$76 to $100/acre [a] Loss	More than $100 acre[a] Loss	Positive Impact per Acre	Any Loss	Acres
	------------------------------- Based on 10,000 replications from Monte Carlo Simulation -------------------------------								
<u>10-day Dry Down Period</u>									
(1) Does not flood	100.0%	na	na	na	na	na	na	na	2,302
(2) Floods Same Duration	100.0%	na	na	na	na	na	na	na	18,724
(3) Floods Longer Duration	0.0%	97.6%	2.4%	0.0%	0.0%	0.0%	na	100.0%	23,311
(4) Floods Shorter Duration	0.4%	na	na	na	na	na	99.6%	na	7,376
(5) Now Floods With Diversion	43.8%	43.3%	11.4%	1.4%	0.1%	0.0%	na	56.2%	2,618
(6) All Groups	48.8%	28.2%	2.8%	0.3%	0.0%	0.0%	19.9%	31.2%	54,331
<u>14-day Dry Down Period</u>									
(1) Does not flood	100.0%	na	na	na	na	na	na	na	2,302
(2) Floods Same Duration	100.0%	na	na	na	na	na	na	na	18,724
(3) Floods Longer Duration	0.0%	98.0%	2.0%	0.0%	0.0%	0.0%	na	100.0%	23,311
(4) Floods Shorter Duration	0.0%	na	na	na	na	na	100.0%	na	7,376
(5) Now Floods With Diversion	28.7%	40.2%	24.4%	5.7%	0.9%	0.2%	na	71.3%	2,618
(6) All Groups	45.7%	27.6%	5.3%	1.1%	0.2%	0.0%	20.0%	34.3%	54,331

na=not applicable.

[a] The range of losses per acre represent an average of all storage areas within the hydrology group.

NOTE: Staging area will not be used in a 10-year flood event. Effects are representative of changes in hydrology resulting from staging area infrastructure.

Table 46. Probability of Losses Resulting from Use of the Staging Area, Hydrology Groups Three and Five Delineated by Difference in Total Days between With and Without Diversion, 500-year Flood Event

Hydrology Group	Time from Activation of Staging Area until Effects of Flooding are Over[a] Without Diversion	With Diversion	Difference in Total Days	No Loss	$0 to $25/acre[b] Loss	$26 to $50/acre[b] Loss	$51 to $75/acre[b] Loss	$76 to $100/acre[b] Loss	More than $100/acre[b] Loss	Any Loss	Acres
	-------------------- days --------------------			------------------------ Based on 10,000 replications from Monte Carlo Simulation ------------------------							
10-day Dry Down Period											
3	32.2	33.6	1 to 5	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	100.0%	19,954
3	20.9	26.9	6 to 10	6.3%	74.6%	18.9%	0.2%	0.0%	0.0%	93.7%	542
3	39.5	52.3	11 to 15	0.0%	0.0%	0.5%	4.0%	13.3%	82.2%	100.0%	961
3	41.5	58.2	16 to 20	0.0%	0.3%	0.8%	1.3%	3.0%	94.7%	100.0%	1,002
5	0	22.5	21 to 25	43.8%	43.3%	11.4%	1.4%	0.1%	0.0%	56.2%	2,618
3	35.0	61.5	26 to 30	0.0%	0.0%	0.0%	0.0%	0.1%	99.9%	100.0%	150
			30+	na	na	na	na	na	na	na	na
14-day Dry Down Period											
3	36.2	37.6	1 to 5	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	100.0%	20,807
3	24.8	30.9	6 to 10	1.8%	55.4%	40.3%	2.4%	0.0%	0.0%	98.2%	542
3	43.5	56.3	11 to 15	0.0%	1.5%	1.4%	3.2%	8.6%	85.4%	100.0%	961
3	45.5	62.2	16 to 20	0.0%	3.6%	3.7%	4.4%	6.9%	81.3%	100.0%	1,002
5	0	25.0	21 to 25	40.2%	37.4%	18.8%	3.0%	0.5%	0.1%	59.8%	509
5	0	26.8	26 to 30	0.0%	42.9%	40.0%	15.1%	1.8%	0.2%	100.0%	2,259
3	39.0	65.5	26 to 30								
			30+	na	na	na	na	na	na	na	na

Na=not applicable. There were no storage areas in those categories.

[a] Total days are defined as the sum of 1) days from staging activation until land becomes inundated, 2) days of inundation, and 3) dry-down period. Zero days mean the storage areas do not flood with existing conditions, but zero days do not necessarily mean conditions in the region are suitable for planting.

[b] The range of losses per acre represent an average of all storage areas within the groups.

Table 47. Probability of Revenue Losses Resulting from Use of the Staging Area, by Hydrology Group, Probabilistic Maximum Flood Event

Hydrology Groups	No Loss	$0 to $25/acre[a] Loss	$26 to $50/acre[a] Loss	$51 to $75/acre[a] Loss	$76 to $100/acre [a] Loss	More than $100 acre[a] Loss	Positive Impact per Acre	Any Loss	Acres
	------------------------------- Based on 10,000 replications from Monte Carlo Simulation -------------------------------								
10-day Dry Down Period									
(1) Does not flood	na	na	na	na	na	na	na	na	na
(2) Floods Same Duration	100.0%	na	na	na	na	na	na	na	22,414
(3) Floods Longer Duration	0.6%	99.4%	0.0%	0.0%	0.0%	0.0%	na	99.4%	13,486
(4) Floods Shorter Duration	0.0%	na	na	na	na	na	100.0%	na	18,432
(5) Now Floods With Diversion	na	na	na	na	na	na	na	na	na
(6) All Groups	33.5%	33.1%	0.0%	0.0%	0.0%	0.0%	33.3%	33.3%	54,331
14-day Dry Down Period									
(1) Does not flood	na	na	na	na	na	na	na	na	na
(2) Floods Same Duration	100.0%	na	na	na	na	na	na	na	22,414
(3) Floods Longer Duration	0.1%	99.9%	0.0%	0.0%	0.0%	0.0%	na	99.9%	13,486
(4) Floods Shorter Duration	0.0%	na	na	na	na	na	100.0%	na	18,432
(5) Now Floods With Diversion	na	na	na	na	na	na	na	na	na
(6) All Groups	33.4%	33.3%	0.0%	0.0%	0.0%	0.0%	33.3%	33.3%	54,331

na=not applicable.

[a] The range of losses per acre represent an average of all storage areas within the hydrology group.

NOTE: Staging area will not be used in a 10-year flood event. Effects are representative of changes in hydrology resulting from staging area infrastructure.

Table 48. Probability of Losses Resulting from Use of the Staging Area, Hydrology Groups Three and Five Delineated by Difference in Total Days between With and Without Diversion, Probabilistic Maximum Flood Event

Hydrology Group	Time from Activation of Staging Area until Effects of Flooding are Over[a]: Without Diversion	With Diversion	Difference in Total Days	No Loss	$0 to $25/acre[b] Loss	$26 to $50/acre[b] Loss	$51 to $75/acre[b] Loss	$76 to $100/acre[b] Loss	More than $100/acre[b] Loss	Any Loss	Acres
	---------- days ----------			---------- Based on 10,000 replications from Monte Carlo Simulation ----------							
10-day Dry Down Period											
3	31	32.3	1 to 5	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	100.0%	12,793
3	29.3	35.6	6 to 10	0.8%	47.8%	45.2%	5.8%	0.5%	0.0%	99.2%	843
			11 to 15	na	na	na	na	na	na	na	na
			16 to 20	na	na	na	na	na	na	na	na
			21 to 25	na	na	na	na	na	na	na	na
			26 to 30	na	na	na	na	na	na	na	na
			30+	na	na	na	na	na	na	na	na
14-day Dry Down Period											
3	35.0	36.2	1 to 5	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	100.0%	12,793
3	33.3	39.6	6 to 10	0.1%	23.7%	55.7%	17.5%	3.0%	0.0%	99.9%	843
			11 to 15	na	na	na	na	na	na	na	na
			16 to 20	na	na	na	na	na	na	na	na
			21 to 25	na	na	na	na	na	na	na	na
			26 to 30	na	na	na	na	na	na	na	na
			30+	na	na	na	na	na	na	na	na

Na=not applicable. There were no storage areas in those categories.

[a] Total days are defined as the sum of 1) days from staging activation until land becomes inundated, 2) days of inundation, and 3) dry-down period. Zero days mean the storage areas do not flood with existing conditions, but zero days do not necessarily mean conditions in the region are suitable for planting.

[b] The range of losses per acre represent an average of all storage areas within the groups.

Gross Revenues per Acre With and Without Diversion

The gross revenues per acre were averaged over all 10,000 replications for the 5 hydrology groups for each of the 10 flood events in Tables 49 to 68. In addition to average revenues, the minimum and maximum observed gross revenues were included to provide some perspective on the potential range of observed revenues for the different hydrology groups. The standard deviation from the 10,000 replications is also provided. Larger standard deviations imply more variability in the overall range of average gross revenues per acre. Gross revenues are based on price and target yield assumptions, and yield decline functions.

Table 49. Gross Revenues, by Hydrology Group, With and Without Diversion, 10-year Flood Event				
	Gross Revenues Per Acre[a]			
Hydrology Group	Mean[b]	Minimum	Maximum	Standard Deviation
<u>10-day Dry Down Period</u>				
	With Existing Conditions (Without Diversion)			
(1) Does not flood	$656.88	$493.93	$688.71	$26.36
(2) Floods Same Duration	$685.87	$520.17	$722.13	$26.69
(3) Floods Longer Duration	$664.45	$499.48	$697.78	$25.57
(4) Floods Shorter Duration	$715.52	$542.56	$753.23	$28.05
(5) Now Floods With Diversion	$735.73	$557.81	$772.91	$30.18
(6) All Groups	$665.31	$501.21	$698.17	$26.46
	With Diversion			
(1) Does not flood	$656.88	$493.93	$688.71	$26.36
(2) Floods Same Duration	$685.87	$520.17	$722.13	$26.69
(3) Floods Longer Duration	$664.29	$499.48	$697.78	$25.50
(4) Floods Shorter Duration	$716.41	$542.56	$753.23	$28.41
(5) Now Floods With Diversion	$691.16	$524.81	$756.34	$27.89
(6) All Groups	$664.43	$500.53	$697.83	$26.41
<u>14-day Dry Down Period</u>				
	With Existing Conditions (Without Diversion)			
(1) Does not flood	$623.68	$463.07	$653.04	$24.61
(2) Floods Same Duration	$625.81	$464.37	$660.20	$23.06
(3) Floods Longer Duration	$622.61	$461.38	$655.29	$22.90
(4) Floods Shorter Duration	$631.48	$462.48	$665.22	$23.24
(5) Now Floods With Diversion	$638.42	$467.37	$668.36	$24.98
(6) All Groups	$624.56	$463.81	$654.91	$24.07
	With Diversion			
(1) Does not flood	$623.68	$463.07	$653.04	$24.61
(2) Floods Same Duration	$625.81	$464.37	$660.20	$23.06
(3) Floods Longer Duration	$622.30	$460.49	$655.29	$22.83
(4) Floods Shorter Duration	$633.20	$466.42	$665.22	$23.60
(5) Now Floods With Diversion	$636.25	$467.37	$668.36	$23.98
(6) All Groups	$624.58	$463.81	$654.91	$24.08

[a] Represents an average of all storage areas within the hydrology group. Revenues represent potential income based on planting conditions. Effects of crop growing conditions throughout the remainder of the season were not included.
[b] Average of all 10,000 replications.

Table 50. Gross Revenues, Hydrology Groups Three and Five Delineated by Difference in Total Days between With and Without Diversion, 10-year Flood Event					
		Gross Revenues Per Acre[a]			
Hydrology Group	Difference in Total Days	Mean[b]	Minimum	Maximum	Standard Deviation
10-day Dry Down Period					
		With Existing Conditions (Without Diversion)			
3	1 to 5	$625.08	$462.72	$655.29	$23.64
	6 to 10	na	na	na	na
5	11 to 15	$638.42	$467.37	$668.36	$24.98
	16 to 20	na	na	na	na
	21 to 25	na	na	na	na
	26 to 30	na	na	na	na
5	30+	$638.42	$467.34	$668.36	$24.98
		With Diversion			
3	1 to 5	$624.94	$462.72	$655.29	$23.58
	6 to 10	na	na	na	na
5	11 to 15	$637.72	$467.37	$668.36	$24.59
	16 to 20	na	na	na	na
	21 to 25	na	na	na	na
	26 to 30	na	na	na	na
5	30+	$349.83	$241.52	$569.82	$52.91
14-day Dry Down Period					
		With Existing Conditions (Without Diversion)			
3	1 to 5	$622.61	$461.38	$655.29	$22.90
	6 to 10	na	na	na	na
5	11 to 15	$638.42	$467.38	$668.36	$24.98
5	16 to 20	$638.42	$467.36	$668.36	$24.98
	21 to 25	na	na	na	na
	26 to 30	na	na	na	na
5	30+	$638.42	$467.34	$668.36	$24.98
		With Diversion			
3	1 to 5	$622.30	$460.49	$655.29	$22.83
	6 to 10	na	na	na	na
5	11 to 15	$636.78	$467.38	$668.36	$24.19
5	16 to 20	$634.92	$465.05	$668.36	$23.59
	21 to 25	na	na	na	na
	26 to 30	na	na	na	na
5	30+	$334.47	$241.24	$665.22	$42.95

Na=not applicable. There were no storage areas in those ranges.

[a] Represents an average of all storage areas within the hydrology group. Revenues represent potential income based on planting conditions. Effects of crop growing conditions throughout the remainder of the season were not included.

[b] Average of all 10,000 replications.

Table 51. Gross Revenues, by Hydrology Group, With and Without Diversion, 20-year Flood Event				
	Gross Revenues Per Acre[a]			
Hydrology Group	Mean[b]	Minimum	Maximum	Standard Deviation
10-day Dry Down Period				
	With Existing Conditions (Without Diversion)			
(1) Does not flood	$620.83	$462.58	$650.16	$24.59
(2) Floods Same Duration	$622.59	$464.00	$653.70	$23.38
(3) Floods Longer Duration	$626.85	$463.06	$661.29	$23.38
(4) Floods Shorter Duration	$634.42	$466.84	$667.19	$23.63
(5) Now Floods With Diversion	$638.42	$467.37	$668.36	$24.98
(6) All Groups	$624.13	$463.81	$654.91	$23.85
	With Diversion			
(1) Does not flood	$620.83	$462.58	$650.16	$24.59
(2) Floods Same Duration	$622.59	$464.00	$653.70	$23.38
(3) Floods Longer Duration	$625.35	$458.67	$661.29	$23.06
(4) Floods Shorter Duration	$634.86	$467.01	$667.19	$23.73
(5) Now Floods With Diversion	$632.08	$457.14	$668.36	$22.82
(6) All Groups	$623.71	$463.81	$654.91	$23.66
14-day Dry Down Period				
	With Existing Conditions (Without Diversion)			
(1) Does not flood	$620.83	$462.58	$650.16	$24.59
(2) Floods Same Duration	$619.40	$460.50	$653.70	$22.60
(3) Floods Longer Duration	$621.88	$450.14	$661.29	$22.69
(4) Floods Shorter Duration	$630.44	$455.43	$667.19	$22.85
(5) Now Floods With Diversion	$638.42	$467.37	$668.36	$24.98
(6) All Groups	$622.31	$463.81	$654.91	$23.10
	With Diversion			
(1) Does not flood	$620.83	$462.58	$650.16	$24.59
(2) Floods Same Duration	$619.40	$460.50	$653.70	$22.60
(3) Floods Longer Duration	$619.27	$444.74	$661.29	$22.65
(4) Floods Shorter Duration	$631.42	$457.69	$667.19	$22.87
(5) Now Floods With Diversion	$625.96	$446.16	$668.36	$22.49
(6) All Groups	$621.55	$463.63	$654.91	$22.86

Na=not applicable. There were no storage areas in those hydrology groups.

[a] Represents an average of all storage areas within the hydrology group. Revenues represent potential income based on planting conditions. Effects of crop growing conditions throughout the remainder of the season were not included.

[b] Average of all 10,000 replications.

Table 52. Gross Revenues, Hydrology Groups Three and Five Delineated by Difference in Total Days between With and Without Diversion, 20-year Flood Event

Hydrology Group	Difference in Total Days	Gross Revenues Per Acre[a] Mean[b]	Minimum	Maximum	Standard Deviation
10-day Dry Down Period					
		With Existing Conditions (Without Diversion)			
3	1 to 5	$625.88	$462.16	$660.59	$23.33
3	6 to 10	$636.78	$467.36	$668.36	$24.19
5	11 to 15	$638.42	$467.37	$668.36	$24.98
5	16 to 20	na	na	na	na
5	21 to 25	$638.42	$467.36	$668.36	$24.98
5	26 to 30	na	na	na	na
3	30+	$636.28	$467.34	$668.36	$24.00
		With Diversion			
3	1 to 5	$624.73	$458.99	$660.59	$23.07
3	6 to 10	$631.73	$455.36	$668.36	$23.02
5	11 to 15	$637.67	$467.37	$668.36	$24.57
5	16 to 20	na	na	na	na
5	21 to 25	$629.23	$449.48	$668.36	$22.83
5	26 to 30	na	na	na	na
3	30+	$349.83	$241.52	$569.82	$52.91
14-day Dry Down Period					
		With Existing Conditions (Without Diversion)			
3	1 to 5	$620.69	$448.98	$660.59	$22.67
3	6 to 10	$634.02	$462.05	$668.36	$23.39
5	11 to 15	na	na	na	na
5	16 to 20	$638.42	$467.37	$668.36	$24.98
5	21 to 25	na	na	na	na
5	26 to 30	$638.42	$467.36	$668.36	$24.98
3	30+	$632.97	$458.74	$668.36	$23.19
		With Diversion			
3	1 to 5	$618.73	$445.13	$660.59	$22.64
3	6 to 10	$624.79	$440.83	$668.36	$22.95
5	11 to 15	na	na	na	na
5	16 to 20	$636.10	$467.37	$668.36	$23.94
5	21 to 25	na	na	na	na
5	26 to 30	$620.81	$434.31	$668.36	$23.40
3	30+	$334.46	$241.24	$528.95	$42.87

Na=not applicable. There were no storage areas in those hydrology groups.

[a] Represents an average of all storage areas within the hydrology group. Revenues represent potential income based on planting conditions. Effects of crop growing conditions throughout the remainder of the season were not included.

[b] Average of all 10,000 replications.

Table 53. Gross Revenues, by Hydrology Group, With and Without Diversion, 25-year Flood Event				
	Gross Revenues Per Acre[a]			
Hydrology Group	Mean[b]	Minimum	Maximum	Standard Deviation
10-day Dry Down Period				
	With Existing Conditions (Without Diversion)			
(1) Does not flood	$622.76	$464.31	$652.17	$24.66
(2) Floods Same Duration	$622.86	$465.10	$655.57	$22.99
(3) Floods Longer Duration	$625.84	$464.28	$658.63	$23.26
(4) Floods Shorter Duration	na	na	na	na
(5) Now Floods With Diversion	$619.44	$457.45	$649.05	$24.66
(6) All Groups	$623.69	$463.81	$654.91	$23.65
	With Diversion			
(1) Does not flood	$622.76	$464.31	$652.17	$24.66
(2) Floods Same Duration	$622.86	$465.10	$655.57	$22.99
(3) Floods Longer Duration	$624.35	$460.45	$658.63	$22.92
(4) Floods Shorter Duration	na	na	na	na
(5) Now Floods With Diversion	$615.81	$457.45	$649.05	$23.16
(6) All Groups	$622.63	$463.81	$654.91	$23.24
14-day Dry Down Period				
	With Existing Conditions (Without Diversion)			
(1) Does not flood	$622.76	$464.31	$652.17	$24.66
(2) Floods Same Duration	$618.88	$458.24	$655.54	$22.30
(3) Floods Longer Duration	$621.54	$453.32	$658.62	$22.54
(4) Floods Shorter Duration	na	na	na	na
(5) Now Floods With Diversion	$619.44	$457.45	$649.05	$24.66
(6) All Groups	$621.44	$463.20	$654.91	$22.83
	With Diversion			
(1) Does not flood	$622.76	$464.31	$652.17	$24.66
(2) Floods Same Duration	$618.88	$458.24	$655.54	$22.30
(3) Floods Longer Duration	$618.82	$447.10	$658.62	$22.44
(4) Floods Shorter Duration	na	na	na	na
(5) Now Floods With Diversion	$611.14	$445.80	$649.05	$22.44
(6) All Groups	$619.31	$458.16	$654.91	$22.33

Na=not applicable. There were no storage areas in those hydrology groups.

[a] Represents an average of all storage areas within the hydrology group. Revenues represent potential income based on planting conditions. Effects of crop growing conditions throughout the remainder of the season were not included.

[b] Average of all 10,000 replications.

Table 54. Gross Revenues, Hydrology Groups Three and Five Delineated by Difference in Total Days between With and Without Diversion, 25-year Flood Event					
		Gross Revenues Per Acre[a]			
Hydrology Group	Difference in Total Days	Mean[b]	Minimum	Maximum	Standard Deviation
10-day Dry Down Period					
		With Existing Conditions (Without Diversion)			
3	1 to 5	$625.60	$464.23	$658.42	$23.24
3	6 to 10	$633.72	$465.83	$665.73	$24.01
	11 to 15	na	na	na	na
5	16 to 20	$617.78	$456.58	$647.35	$24.63
5	21 to 25	$638.42	$467.37	$668.36	$24.98
	26 to 30	na	na	na	na
3	30+	$635.67	$467.34	$668.36	$23.80
		With Diversion			
3	1 to 5	$624.21	$460.62	$658.42	$22.92
3	6 to 10	$629.26	$454.94	$665.73	$23.00
	11 to 15	na	na	na	na
5	16 to 20	$614.41	$456.58	$647.35	$23.21
5	21 to 25	$631.74	$455.37	$668.36	$23.02
	26 to 30	na	na	na	na
3	30+	$349.83	$241.52	$569.82	$52.91
14-day Dry Down Period					
		With Existing Conditions (Without Diversion)			
3	1 to 5	$621.28	$453.16	$658.41	$22.53
3	6 to 10	$630.54	$458.65	$665.73	$23.19
	11 to 15	na	na	na	na
5	16 to 20	$620.19	$456.77	$648.15	$23.94
5	21 to 25	$619.21	$456.47	$649.33	$24.89
	26 to 30	na	na	na	na
3	30+	$631.74	$455.31	$668.36	$23.02
		With Diversion			
3	1 to 5	$618.72	$447.30	$658.41	$22.43
3	6 to 10	$622.45	$440.45	$665.73	$22.87
	11 to 15	na	na	na	na
5	16 to 20	$615.13	$456.71	$648.15	$22.37
5	21 to 25	$609.91	$442.44	$649.33	$22.55
	26 to 30	na	na	na	na
3	30+	$334.46	$241.24	$528.95	$42.87

Na=not applicable. There were no storage areas in those hydrology groups.

[a] Represents an average of all storage areas within the hydrology group. Revenues represent potential income based on planting conditions. Effects of crop growing conditions throughout the remainder of the season were not included.

[b] Average of all 10,000 replications.

Table 55. Gross Revenues, by Hydrology Group, With and Without Diversion, 25-year Long Flood Event				
	Gross Revenues Per Acre[a]			
Hydrology Group	Mean[b]	Minimum	Maximum	Standard Deviation
10-day Dry Down Period				
	With Existing Conditions (Without Diversion)			
(1) Does not flood	$623.52	$464.50	$652.76	$24.57
(2) Floods Same Duration	$615.36	$448.37	$656.96	$22.17
(3) Floods Longer Duration	$617.85	$457.33	$653.46	$22.65
(4) Floods Shorter Duration	$620.57	$473.50	$658.98	$23.81
(5) Now Floods With Diversion	$627.97	$464.05	$657.38	$24.65
(6) All Groups	$619.55	$461.07	$654.62	$22.62
	With Diversion			
(1) Does not flood	$623.52	$464.50	$652.76	$24.57
(2) Floods Same Duration	$615.36	$448.37	$656.96	$22.17
(3) Floods Longer Duration	$616.21	$452.78	$653.38	$22.46
(4) Floods Shorter Duration	$622.92	$473.50	$658.98	$24.55
(5) Now Floods With Diversion	$624.69	$464.05	$657.38	$23.28
(6) All Groups	$618.62	$458.73	$654.59	$22.46
14-day Dry Down Period				
	With Existing Conditions (Without Diversion)			
(1) Does not flood	$623.52	$464.50	$652.76	$24.57
(2) Floods Same Duration	$606.06	$426.55	$656.26	$23.65
(3) Floods Longer Duration	$612.13	$444.77	$653.24	$22.25
(4) Floods Shorter Duration	$614.72	$461.07	$658.98	$23.08
(5) Now Floods With Diversion	$627.97	$464.05	$657.38	$24.65
(6) All Groups	$614.80	$452.12	$654.37	$22.08
	With Diversion			
(1) Does not flood	$623.52	$464.50	$652.76	$24.57
(2) Floods Same Duration	$606.06	$426.55	$656.26	$23.65
(3) Floods Longer Duration	$609.32	$438.76	$653.14	$22.43
(4) Floods Shorter Duration	$618.60	$471.04	$658.98	$23.49
(5) Now Floods With Diversion	$620.34	$453.02	$657.38	$22.55
(6) All Groups	$613.04	$448.11	$654.33	$22.06

Na=not applicable. There were no storage areas in those hydrology groups.

[a] Represents an average of all storage areas within the hydrology group. Revenues represent potential income based on planting conditions. Effects of crop growing conditions throughout the remainder of the season were not included.

[b] Average of all 10,000 replications.

Table 56. Gross Revenues, Hydrology Groups Three and Five Delineated by Difference in Total Days between With and Without Diversion, 25-year Long Flood Event					
		Gross Revenues Per Acre[a]			
Hydrology Group	Difference in Total Days	Mean[b]	Minimum	Maximum	Standard Deviation
10-day Dry Down Period					
		With Existing Conditions (Without Diversion)			
3	1 to 5	$617.42	$456.88	$653.19	$22.61
3	6 to 10	$629.28	$462.84	$660.57	$24.30
5	11 to 15	$612.41	$475.42	$647.87	$28.60
5	16 to 20	$628.78	$463.94	$658.03	$24.57
5	21 to 25	$596.45	$443.27	$626.93	$24.95
	26 to 30	na	na	na	na
3	30+	$630.31	$451.82	$668.36	$22.89
		With Diversion			
3	1 to 5	$615.92	$452.77	$653.11	$22.45
3	6 to 10	$624.01	$452.91	$660.57	$22.95
5	11 to 15	$610.14	$475.42	$647.87	$27.26
5	16 to 20	$625.55	$463.94	$658.03	$23.24
5	21 to 25	$587.77	$432.59	$626.93	$22.47
	26 to 30	na	na	na	na
3	30+	$349.83	$241.52	$569.82	$52.91
14-day Dry Down Period					
		With Existing Conditions (Without Diversion)			
3	1 to 5	$611.57	$444.12	$652.97	$22.25
3	6 to 10	$626.99	$462.01	$660.57	$23.52
	11 to 15	na	na	na	na
5	16 to 20	$620.14	$457.60	$648.45	$24.12
5	21 to 25	$632.06	$465.01	$661.93	$24.89
5	26 to 30	$596.45	$443.27	$626.93	$24.95
3	30+	$622.51	$436.95	$668.36	$23.17
		With Diversion			
3	1 to 5	$609.03	$438.78	$652.87	$22.42
3	6 to 10	$617.15	$438.27	$660.57	$22.80
	11 to 15	na	na	na	na
5	16 to 20	$615.07	$457.60	$648.45	$22.51
5	21 to 25	$623.48	$450.44	$661.93	$22.71
5	26 to 30	$579.47	$411.69	$626.93	$22.70
3	30+	$334.46	$241.24	$528.95	$42.87

Na=not applicable. There were no storage areas in those hydrology groups.

[a] Represents an average of all storage areas within the hydrology group. Revenues represent potential income based on planting conditions. Effects of crop growing conditions throughout the remainder of the season were not included.

[b] Average of all 10,000 replications.

Table 57. Gross Revenues, by Hydrology Group, With and Without Diversion, 25-year Extra Long Flood Event				
	Gross Revenues Per Acre[a]			
Hydrology Group	Mean[b]	Minimum	Maximum	Standard Deviation
10-day Dry Down Period				
	With Existing Conditions (Without Diversion)			
(1) Does not flood	$623.52	$464.50	$652.76	$24.57
(2) Floods Same Duration	$598.96	$417.67	$652.98	$24.60
(3) Floods Longer Duration	$608.67	$444.22	$651.07	$22.27
(4) Floods Shorter Duration	$613.34	$435.44	$661.21	$23.14
(5) Now Floods With Diversion	$627.97	$464.05	$657.38	$24.65
(6) All Groups	$611.65	$447.49	$654.31	$22.13
	With Diversion			
(1) Does not flood	$623.52	$464.50	$652.76	$24.57
(2) Floods Same Duration	$598.96	$417.67	$652.98	$24.60
(3) Floods Longer Duration	$604.92	$433.28	$650.87	$22.71
(4) Floods Shorter Duration	$617.31	$444.87	$661.27	$22.65
(5) Now Floods With Diversion	$622.80	$459.48	$657.38	$22.87
(6) All Groups	$611.03	$445.63	$654.28	$22.25
14-day Dry Down Period				
	With Existing Conditions (Without Diversion)			
(1) Does not flood	$623.52	$464.50	$652.76	$24.57
(2) Floods Same Duration	$583.29	$386.34	$650.21	$29.84
(3) Floods Longer Duration	$599.47	$422.57	$649.91	$23.66
(4) Floods Shorter Duration	$600.71	$403.92	$660.11	$26.46
(5) Now Floods With Diversion	$627.97	$464.05	$657.38	$24.65
(6) All Groups	$602.82	$435.54	$653.05	$23.44
	With Diversion			
(1) Does not flood	$623.52	$464.50	$652.76	$24.57
(2) Floods Same Duration	$583.29	$386.34	$650.21	$29.84
(3) Floods Longer Duration	$593.45	$407.95	$649.49	$25.15
(4) Floods Shorter Duration	$606.59	$417.39	$660.69	$24.77
(5) Now Floods With Diversion	$616.91	$445.47	$657.38	$22.51
(6) All Groups	$601.50	$431.30	$653.06	$23.80

Na=not applicable. There were no storage areas in those hydrology groups.

[a] Represents an average of all storage areas within the hydrology group. Revenues represent potential income based on planting conditions. Effects of crop growing conditions throughout the remainder of the season were not included.

[b] Average of all 10,000 replications.

Table 58. Gross Revenues, Hydrology Groups Three and Five Delineated by Difference in Total Days between With and Without Diversion, 25-year Extra Long Flood Event

Hydrology Group	Difference in Total Days	Gross Revenues Per Acre[a] Mean[b]	Minimum	Maximum	Standard Deviation
10-day Dry Down Period					
		With Existing Conditions (Without Diversion)			
3	1 to 5	$607.10	$440.25	$651.31	$22.37
3	6 to 10	$617.18	$458.26	$649.77	$24.07
	11 to 15	na	na	na	na
5	16 to 20	$627.01	$464.26	$656.23	$24.56
5	21 to 25	$631.34	$463.33	$661.37	$24.96
	26 to 30	na	na	na	na
3	30+	$622.51	$436.95	$668.36	$23.17
		With Diversion			
3	1 to 5	$603.94	$430.56	$651.07	$22.85
3	6 to 10	$610.24	$446.47	$649.77	$22.65
	11 to 15	na	na	na	na
5	16 to 20	$622.58	$462.14	$656.23	$22.96
5	21 to 25	$623.58	$450.21	$661.37	$22.82
	26 to 30	na	na	na	na
3	30+	$349.83	$241.52	$569.82	$52.91
14-day Dry Down Period					
		With Existing Conditions (Without Diversion)			
3	1 to 5	$596.78	$415.39	$649.93	$24.34
3	6 to 10	$614.04	$456.57	$649.77	$23.14
	11 to 15	na	na	na	na
5	16 to 20	na	na	na	na
5	21 to 25	$627.18	$463.96	$656.50	$24.60
	26 to 30	$633.74	$464.70	$663.75	$24.96
3	30+	$610.64	$410.13	$668.19	$25.69
		With Diversion			
3	1 to 5	$591.89	$404.33	$649.44	$25.67
3	6 to 10	$601.93	$427.62	$649.76	$22.98
	11 to 15	na	na	na	na
5	16 to 20	na	na	na	na
5	21 to 25	$616.89	$447.04	$656.50	$22.50
	26 to 30	$617.08	$434.06	$663.74	$23.17
3	30+	$334.46	$241.24	$528.95	$42.87

Na=not applicable. There were no storage areas in those hydrology groups.

[a] Represents an average of all storage areas within the hydrology group. Revenues represent potential income based on planting conditions. Effects of crop growing conditions throughout the remainder of the season were not included.

[b] Average of all 10,000 replications.

Table 59. Gross Revenues, by Hydrology Group, With and Without Diversion, 2009-year Flood Event				
	Gross Revenues Per Acre[a]			
Hydrology Group	Mean[b]	Minimum	Maximum	Standard Deviation
10-day Dry Down Period				
	With Existing Conditions (Without Diversion)			
(1) Does not flood	$620.33	$461.49	$649.63	$24.61
(2) Floods Same Duration	$615.19	$460.21	$649.14	$22.94
(3) Floods Longer Duration	$574.87	$407.31	$643.54	$27.13
(4) Floods Shorter Duration	$592.73	$418.59	$656.32	$26.61
(5) Now Floods With Diversion	$633.48	$464.90	$663.27	$24.86
(6) All Groups	$599.81	$439.62	$649.87	$23.33
	With Diversion			
(1) Does not flood	$620.33	$461.49	$649.63	$24.61
(2) Floods Same Duration	$609.49	$452.10	$648.79	$22.42
(3) Floods Longer Duration	$574.87	$407.31	$643.54	$27.13
(4) Floods Shorter Duration	$597.08	$424.65	$657.12	$26.05
(5) Now Floods With Diversion	$629.31	$461.68	$663.27	$23.25
(6) All Groups	$598.76	$437.05	$649.94	$23.56
14-day Dry Down Period				
	With Existing Conditions (Without Diversion)			
(1) Does not flood	$620.33	$461.49	$649.63	$24.61
(2) Floods Same Duration	$610.59	$451.81	$648.98	$22.42
(3) Floods Longer Duration	$557.62	$386.44	$638.10	$30.08
(4) Floods Shorter Duration	$577.36	$402.07	$652.79	$28.14
(5) Now Floods With Diversion	$633.48	$464.90	$663.27	$24.86
(6) All Groups	$589.90	$427.09	$647.40	$23.93
	With Diversion			
(1) Does not flood	$620.33	$461.49	$649.63	$24.61
(2) Floods Same Duration	$601.64	$432.25	$647.90	$23.23
(3) Floods Longer Duration	$557.62	$386.44	$638.10	$30.08
(4) Floods Shorter Duration	$582.98	$408.87	$653.73	$27.23
(5) Now Floods With Diversion	$624.28	$448.67	$663.27	$22.63
(6) All Groups	$587.84	$422.78	$647.28	$24.65

Na=not applicable. There were no storage areas in those hydrology groups.

[a] Represents an average of all storage areas within the hydrology group. Revenues represent potential income based on planting conditions. Effects of crop growing conditions throughout the remainder of the season were not included.

[b] Average of all 10,000 replications.

Table 60. Gross Revenues, Hydrology Groups Three and Five Delineated by Difference in Total Days between With and Without Diversion, 2009-like Flood Event

Hydrology Group	Difference in Total Days	Gross Revenues Per Acre[a] Mean[b]	Minimum	Maximum	Standard Deviation
10-day Dry Down Period					
		With Existing Conditions (Without Diversion)			
3	1 to 5	$613.43	$459.27	$646.62	$23.13
3	6 to 10	$623.61	$438.86	$668.36	$23.04
5	11 to 15	$633.87	$466.18	$666.67	$23.56
5	16 to 20	$633.10	$464.64	$662.91	$24.87
5	21 to 25	$638.42	$467.37	$668.36	$24.98
	26 to 30	na	na	na	na
3	30+	$624.80	$440.79	$668.36	$22.95
		With Diversion			
3	1 to 5	$610.64	$457.92	$646.44	$22.71
3	6 to 10	$596.72	$379.63	$666.10	$30.26
5	11 to 15	$606.91	$406.27	$666.01	$25.97
5	16 to 20	$629.39	$462.86	$662.91	$23.39
5	21 to 25	$630.32	$451.89	$668.36	$22.89
	26 to 30	na	na	na	na
3	30+	$355.90	$241.79	$576.23	$56.59
14-day Dry Down Period					
		With Existing Conditions (Without Diversion)			
3	1 to 5	$609.30	$453.91	$646.45	$22.53
3	6 to 10	$612.28	$414.64	$668.27	$25.23
3	11 to 15	$630.71	$453.20	$668.36	$22.89
5	16 to 20	$630.03	$463.55	$659.48	$24.67
5	21 to 25	$633.70	$464.89	$663.56	$24.90
5	26 to 30	$638.42	$467.37	$668.36	$24.98
3	30+	$614.03	$419.51	$668.34	$24.78
		With Diversion			
3	1 to 5	$604.52	$442.49	$646.06	$22.61
3	6 to 10	$574.11	$329.24	$660.50	$39.15
3	11 to 15	$586.67	$359.46	$663.79	$34.08
5	16 to 20	$624.95	$457.88	$659.48	$22.94
5	21 to 25	$624.38	$447.82	$663.56	$22.71
5	26 to 30	$622.51	$437.03	$668.36	$23.17
3	30+	$337.25	$241.24	$540.33	$44.67

Na=not applicable. There were no storage areas in those hydrology groups.

[a] Represents an average of all storage areas within the hydrology group. Revenues represent potential income based on planting conditions. Effects of crop growing conditions throughout the remainder of the season were not included.

[b] Average of all 10,000 replications.

Table 61. Gross Revenues, by Hydrology Group, With and Without Diversion, 50-year Flood Event				
	Gross Revenues Per Acre[a]			
Hydrology Group	Mean[b]	Minimum	Maximum	Standard Deviation
10-day Dry Down Period				
	With Existing Conditions (Without Diversion)			
(1) Does not flood	$621.17	$464.13	$650.97	$24.87
(2) Floods Same Duration	$617.93	$451.25	$655.97	$22.31
(3) Floods Longer Duration	$615.27	$459.45	$648.89	$22.85
(4) Floods Shorter Duration	$620.86	$438.89	$666.45	$22.99
(5) Now Floods With Diversion	$628.62	$463.96	$658.31	$24.78
(6) All Groups	$619.29	$459.30	$654.81	$22.45
	With Diversion			
(1) Does not flood	$621.17	$464.13	$650.97	$24.87
(2) Floods Same Duration	$617.93	$451.25	$655.97	$22.31
(3) Floods Longer Duration	$612.86	$453.02	$648.89	$22.49
(4) Floods Shorter Duration	$623.29	$443.18	$666.50	$22.73
(5) Now Floods With Diversion	$624.01	$461.10	$658.31	$23.07
(6) All Groups	$618.53	$456.80	$654.82	$22.38
14-day Dry Down Period				
	With Existing Conditions (Without Diversion)			
(1) Does not flood	$621.17	$464.13	$650.97	$24.87
(2) Floods Same Duration	$609.76	$433.36	$655.79	$23.06
(3) Floods Longer Duration	$610.26	$447.91	$648.77	$22.29
(4) Floods Shorter Duration	$609.26	$413.40	$665.88	$25.45
(5) Now Floods With Diversion	$628.62	$463.96	$658.31	$24.78
(6) All Groups	$613.94	$449.33	$654.64	$22.00
	With Diversion			
(1) Does not flood	$621.17	$464.13	$650.97	$24.87
(2) Floods Same Duration	$609.76	$433.36	$655.79	$23.06
(3) Floods Longer Duration	$605.93	$437.30	$648.77	$22.52
(4) Floods Shorter Duration	$612.92	$422.71	$666.10	$24.45
(5) Now Floods With Diversion	$618.60	$447.57	$658.31	$22.51
(6) All Groups	$612.29	$444.99	$654.67	$22.12

Na=not applicable. There were no storage areas in those hydrology groups.

[a] Represents an average of all storage areas within the hydrology group. Revenues represent potential income based on planting conditions. Effects of crop growing conditions throughout the remainder of the season were not included.

[b] Average of all 10,000 replications.

Table 62. Gross Revenues, Hydrology Groups Three and Five Delineated by Difference in Total Days between With and Without Diversion, 50-year Flood Event					
		Gross Revenues Per Acre[a]			
Hydrology Group	Difference in Total Days	Mean[b]	Minimum	Maximum	Standard Deviation
<u>10-day Dry Down Period</u>					
		With Existing Conditions (Without Diversion)			
3	1 to 5	$617.62	$460.27	$651.66	$22.76
3	6 to 10	$601.64	$448.12	$632.78	$23.88
	11 to 15	na	na	na	na
5	16 to 20	$628.09	$464.31	$657.68	$24.73
5	21 to 25	$630.41	$462.77	$660.45	$24.95
	26 to 30	na	na	na	na
3	30+	$624.80	$440.79	$668.36	$22.95
		With Diversion			
3	1 to 5	$615.64	$454.49	$651.66	$22.49
3	6 to 10	$596.70	$444.48	$632.78	$22.53
	11 to 15	na	na	na	na
5	16 to 20	$624.18	$463.87	$657.68	$23.19
5	21 to 25	$623.46	$451.78	$660.45	$22.90
	26 to 30	na	na	na	na
3	30+	$344.81	$241.34	$563.21	$49.69
<u>14-day Dry Down Period</u>					
		With Existing Conditions (Without Diversion)			
3	1 to 5	$612.17	$447.21	$651.52	$22.33
3	6 to 10	$599.16	$448.12	$632.78	$23.03
	11 to 15	na	na	na	na
5	16 to 20	$619.97	$457.99	$648.43	$24.20
5	21 to 25	$631.12	$464.46	$661.08	$24.93
5	26 to 30	$614.03	$419.51	$668.34	$24.78
3	30+	$596.45	$443.27	$626.93	$24.95
		With Diversion			
3	1 to 5	$608.69	$439.30	$651.52	$22.56
3	6 to 10	$589.91	$425.68	$632.78	$22.30
	11 to 15	na	na	na	na
5	16 to 20	$614.74	$457.99	$648.43	$22.53
5	21 to 25	$620.14	$445.07	$661.08	$22.67
5	26 to 30	$332.24	$241.24	$517.89	$41.55
3	30+	$576.76	$406.28	$626.93	$23.08

Na=not applicable. There were no storage areas in those hydrology groups.

[a] Represents an average of all storage areas within the hydrology group. Revenues represent potential income based on planting conditions. Effects of crop growing conditions throughout the remainder of the season were not included.

[b] Average of all 10,000 replications.

Table 63. Gross Revenues, by Hydrology Group, With and Without Diversion, 100-year Flood Event				
	Gross Revenues Per Acre[a]			
Hydrology Group	Mean[b]	Minimum	Maximum	Standard Deviation
10-day Dry Down Period				
	With Existing Conditions (Without Diversion)			
(1) Does not flood	$621.20	$461.09	$650.18	$24.45
(2) Floods Same Duration	$604.87	$427.98	$654.24	$23.24
(3) Floods Longer Duration	$610.39	$454.30	$646.74	$22.46
(4) Floods Shorter Duration	$616.32	$430.58	$666.02	$23.79
(5) Now Floods With Diversion	$627.51	$467.59	$658.28	$25.36
(6) All Groups	$613.10	$448.94	$654.16	$22.08
	With Diversion			
(1) Does not flood	$621.20	$461.09	$650.18	$24.45
(2) Floods Same Duration	$604.87	$427.98	$654.24	$23.24
(3) Floods Longer Duration	$607.37	$446.37	$646.73	$22.38
(4) Floods Shorter Duration	$620.53	$437.89	$666.03	$23.14
(5) Now Floods With Diversion	$621.10	$463.53	$658.28	$23.15
(6) All Groups	$612.22	$446.08	$654.16	$22.28
14-day Dry Down Period				
	With Existing Conditions (Without Diversion)			
(1) Does not flood	$621.20	$461.09	$650.18	$24.45
(2) Floods Same Duration	$591.80	$398.73	$652.34	$26.84
(3) Floods Longer Duration	$603.49	$438.14	$646.56	$22.55
(4) Floods Shorter Duration	$602.73	$398.26	$664.98	$27.30
(5) Now Floods With Diversion	$627.51	$467.59	$658.28	$25.36
(6) All Groups	$604.80	$436.12	$653.37	$22.88
	With Diversion			
(1) Does not flood	$621.20	$461.09	$650.18	$24.45
(2) Floods Same Duration	$591.80	$398.73	$652.34	$26.84
(3) Floods Longer Duration	$598.39	$424.23	$646.54	$23.39
(4) Floods Shorter Duration	$608.91	$413.47	$665.51	$25.44
(5) Now Floods With Diversion	$614.36	$446.20	$658.28	$22.85
(6) All Groups	$602.87	$428.33	$653.45	$23.52

[a] Represents an average of all storage areas within the hydrology group. Revenues represent potential income based on planting conditions. Effects of crop growing conditions throughout the remainder of the season were not included.
[b] Average of all 10,000 replications.

Table 64. Gross Revenues, Hydrology Groups Three and Five Delineated by Difference in Total Days between With and Without Diversion, 100-year Flood Event					
		Gross Revenues Per Acre[a]			
Hydrology Group	Difference in Total Days	Mean[b]	Minimum	Maximum	Standard Deviation
10-day Dry Down Period					
		With Existing Conditions (Without Diversion)			
3	1 to 5	$609.96	$453.87	$646.48	$22.43
3	6 to 10	$620.82	$458.46	$653.01	$23.94
5	11 to 15	$620.80	$456.00	$648.50	$23.84
5	16 to 20	$622.11	$470.19	$654.04	$26.05
5	21 to 25	$633.28	$465.05	$662.92	$24.79
	26 to 30	na	na	na	na
3	30+	$614.03	$419.51	$668.34	$24.78
		With Diversion			
3	1 to 5	$607.10	$446.46	$646.47	$22.37
3	6 to 10	$613.90	$444.32	$653.01	$22.64
5	11 to 15	$619.98	$456.00	$648.50	$23.42
5	16 to 20	$617.62	$470.19	$654.04	$24.13
5	21 to 25	$624.74	$449.95	$662.92	$22.65
	26 to 30	na	na	na	na
3	30+	$340.68	$241.24	$553.03	$46.96
14-day Dry Down Period					
		With Existing Conditions (Without Diversion)			
3	1 to 5	$602.90	$437.20	$646.29	$22.59
3	6 to 10	$617.63	$454.01	$653.01	$23.06
5	11 to 15	na	na	na	na
5	16 to 20	$617.54	$463.53	$648.25	$25.43
5	21 to 25	$623.37	$467.65	$654.48	$25.55
5	26 to 30	$638.42	$467.35	$668.36	$24.98
3	30+	$598.47	$382.83	$666.47	$29.64
		With Diversion			
3	1 to 5	$598.09	$424.10	$646.27	$23.40
3	6 to 10	$605.56	$427.33	$653.00	$23.06
5	11 to 15	na	na	na	na
5	16 to 20	$613.13	$463.53	$648.25	$23.56
5	21 to 25	$612.26	$450.74	$654.48	$22.95
5	26 to 30	$619.62	$432.60	$668.35	$23.57
3	30+	$330.43	$241.23	$507.11	$40.64

Na=not applicable. There were no storage areas in those hydrology groups.

[a] Represents an average of all storage areas within the hydrology group. Revenues represent potential income based on planting conditions. Effects of crop growing conditions throughout the remainder of the season were not included.

[b] Average of all 10,000 replications.

Table 65. Gross Revenues, by Hydrology Group, With and Without Diversion, 500-year Flood Event				
	Gross Revenues Per Acre[a]			
Hydrology Group	Mean[b]	Minimum	Maximum	Standard Deviation
10-day Dry Down Period				
	With Existing Conditions (Without Diversion)			
(1) Does not flood	$527.64	$365.24	$625.58	$31.82
(2) Floods Same Duration	$563.17	$382.14	$641.28	$32.55
(3) Floods Longer Duration	$593.37	$392.16	$659.81	$29.28
(4) Floods Shorter Duration	$638.41	$467.36	$668.36	$24.98
(5) Now Floods With Diversion	$561.28	$390.09	$640.22	$29.76
(6) All Groups	$584.83	$365.24	$668.36	$48.12
	With Diversion			
(1) Does not flood	$527.64	$365.24	$625.58	$31.82
(2) Floods Same Duration	$545.26	$373.80	$634.78	$33.47
(3) Floods Longer Duration	$605.59	$416.13	$661.74	$25.52
(4) Floods Shorter Duration	$629.16	$449.52	$668.36	$22.81
(5) Now Floods With Diversion	$554.81	$386.65	$637.70	$29.89
(6) All Groups	$581.26	$365.24	$668.36	$49.11
14-day Dry Down Period				
	With Existing Conditions (Without Diversion)			
(1) Does not flood	$506.09	$337.07	$613.52	$34.52
(2) Floods Same Duration	$539.53	$358.81	$634.64	$37.64
(3) Floods Longer Duration	$571.80	$352.52	$655.40	$36.96
(4) Floods Shorter Duration	$638.41	$467.36	$668.36	$24.98
(5) Now Floods With Diversion	$540.78	$367.90	$632.62	$33.70
(6) All Groups	$570.28	$337.07	$668.36	$57.61
	With Diversion			
(1) Does not flood	$506.09	$337.07	$613.52	$34.52
(2) Floods Same Duration	$521.72	$346.20	$626.17	$36.47
(3) Floods Longer Duration	$588.86	$382.38	$659.62	$30.78
(4) Floods Shorter Duration	$620.73	$434.31	$668.36	$23.39
(5) Now Floods With Diversion	$534.60	$363.63	$629.56	$32.85
(6) All Groups	$566.18	$337.07	$668.36	$56.62

Na=not applicable. There were no storage areas in those hydrology groups.

[a] Represents an average of all storage areas within the hydrology group. Revenues represent potential income based on planting conditions. Effects of crop growing conditions throughout the remainder of the season were not included.

[b] Average of all 10,000 replications.

Table 66. Gross Revenues, Hydrology Groups Three and Five Delineated by Difference in Total Days between With and Without Diversion, 500-year Flood Event

Hydrology Group	Difference in Total Days	Gross Revenues Per Acre[a] Mean[b]	Minimum	Maximum	Standard Deviation
10-day Dry Down Period					
		With Existing Conditions (Without Diversion)			
3	1 to 5	$562.47	$385.53	$639.76	$31.71
3	6 to 10	$609.01	$443.86	$650.28	$22.27
5	11 to 15	$554.68	$292.05	$654.88	$47.21
5	16 to 20	$531.89	$260.94	$647.58	$56.17
5	21 to 25	$638.41	$467.36	$668.36	$24.98
3	26 to 30	$588.43	$363.75	$664.25	$33.41
	30+	na	na	na	na
		With Diversion			
3	1 to 5	$558.22	$380.03	$638.88	$32.81
3	6 to 10	$593.64	$407.62	$648.46	$24.81
5	11 to 15	$411.37	$245.04	$608.26	$74.51
5	16 to 20	$345.48	$241.45	$559.62	$49.19
5	21 to 25	$629.16	$449.52	$668.36	$22.81
3	26 to 30	$337.25	$241.24	$540.33	$44.67
	30+	na	na	na	na
14-day Dry Down Period					
		With Existing Conditions (Without Diversion)			
3	1 to 5	$541.53	$362.89	$633.94	$35.70
3	6 to 10	$600.50	$422.04	$649.33	$23.25
5	11 to 15	$516.48	$254.96	$642.57	$61.73
5	16 to 20	$487.10	$251.36	$633.65	$69.83
5	21 to 25	$638.42	$467.34	$668.36	$24.98
3	26 to 30	$633.37	$463.48	$667.62	$24.20
	30+	na	na	na	na
		With Diversion			
3	1 to 5	$536.43	$354.65	$632.74	$36.73
3	6 to 10	$577.77	$381.51	$645.88	$29.60
5	11 to 15	$368.86	$242.49	$586.15	$62.59
5	16 to 20	$332.60	$241.27	$517.44	$41.53
5	21 to 25	$624.80	$440.86	$668.36	$22.95
3	26 to 30	$600.43	$420.05	$656.95	$22.99
	30+	na	na	na	na

Na=not applicable. There were no storage areas in those hydrology groups.

[a] Represents an average of all storage areas within the hydrology group. Revenues represent potential income based on planting conditions. Effects of crop growing conditions throughout the remainder of the season were not included.

[b] Average of all 10,000 replications.

Table 67. Gross Revenues, by Hydrology Group, With and Without Diversion, Probabilistic Maximum Flood Event				
	Gross Revenues Per Acre[a]			
Hydrology Group	Mean[b]	Minimum	Maximum	Standard Deviation
10-year Dry Down Period				
	With Existing Conditions (Without Diversion)			
(1) Does not flood	na	na	na	na
(2) Floods Same Duration	$459.66	$286.87	$606.96	$45.90
(3) Floods Longer Duration	$569.08	$374.65	$642.61	$32.67
(4) Floods Shorter Duration	$383.02	$250.98	$582.40	$51.74
(5) Now Floods With Diversion	na	na	na	na
(6) All Groups	$460.82	$299.19	$607.48	$42.73
	With Diversion			
(1) Does not flood	na	na	na	na
(2) Floods Same Duration	$459.66	$286.87	$606.96	$45.90
(3) Floods Longer Duration	$562.83	$364.40	$641.43	$35.02
(4) Floods Shorter Duration	$421.64	$263.95	$601.48	$52.65
(5) Now Floods With Diversion	na	na	na	na
(6) All Groups	$472.37	$299.13	$613.66	$44.34
10-year Dry Down Period				
	With Existing Conditions (Without Diversion)			
(1) Does not flood	na	na	na	na
(2) Floods Same Duration	$429.54	$266.98	$588.11	$44.69
(3) Floods Longer Duration	$544.23	$342.86	$636.79	$40.44
(4) Floods Shorter Duration	$359.82	$246.34	$550.16	$43.32
(5) Now Floods With Diversion	na	na	na	na
(6) All Groups	$434.36	$278.83	$587.32	$40.86
	With Diversion			
(1) Does not flood	na	na	na	na
(2) Floods Same Duration	$429.54	$266.98	$588.11	$44.69
(3) Floods Longer Duration	$535.63	$326.61	$634.71	$43.49
(4) Floods Shorter Duration	$392.17	$254.30	$576.57	$46.59
(5) Now Floods With Diversion	na	na	na	na
(6) All Groups	$443.20	$277.53	$595.77	$43.68

[a] Represents an average of all storage areas within the hydrology group. Revenues represent potential income based on planting conditions. Effects of crop growing conditions throughout the remainder of the season were not included.
[b] Average of all 10,000 replications.

Table 68. Gross Revenues, Hydrology Groups Three and Five Delineated by Difference in Total Days between With and Without Diversion, Probabilistic Maximum Flood Event					
		Gross Revenues Per Acre[a]			
Hydrology Group	Difference in Total Days	Mean[b]	Minimum	Maximum	Standard Deviation
10-day Dry Down Period					
		With Existing Conditions (Without Diversion)			
3	1 to 5	$563.58	$370.35	$640.15	$33.22
3	6 to 10	$611.88	$423.67	$663.77	$24.22
	11 to 15	na	na	na	na
	16 to 20	na	na	na	na
	21 to 25	na	na	na	na
	26 to 30	na	na	na	na
	30+	na	na	na	na
		With Diversion			
3	1 to 5	$558.75	$362.30	$639.12	$34.97
3	6 to 10	$584.61	$381.79	$658.48	$33.10
	11 to 15	na	na	na	na
	16 to 20	na	na	na	na
	21 to 25	na	na	na	na
	26 to 30	na	na	na	na
	30+	na	na	na	na
14-day Dry Down Period					
		With Existing Conditions (Without Diversion)			
3	1 to 5	$538.20	$336.04	$633.67	$41.03
3	6 to 10	$597.61	$398.48	$661.13	$28.55
	11 to 15	na	na	na	na
	16 to 20	na	na	na	na
	21 to 25	na	na	na	na
	26 to 30	na	na	na	na
	30+	na	na	na	na
		With Diversion			
3	1 to 5	$531.63	$324.40	$631.92	$43.29
3	6 to 10	$559.54	$344.08	$652.51	$41.44
	11 to 15	na	na	na	na
	16 to 20	na	na	na	na
	21 to 25	na	na	na	na
	26 to 30	na	na	na	na
	30+	na	na	na	na

Na=not applicable. There were no storage areas in those hydrology groups.

[a] Represents an average of all storage areas within the hydrology group. Revenues represent potential income based on planting conditions. Effects of crop growing conditions throughout the remainder of the season were not included.

[b] Average of all 10,000 replications.

Estimation of Gross Revenues Only in Years When Diversion Creates Losses

Over the range of conditions evaluated in the Monte Carlo simulation, a number of combinations of planting start dates and flood event start dates do not result in revenue losses while a considerable number of situations result in revenue losses. When both outcomes are averaged, the values are useful in framing the magnitude of the potential revenue losses in the staging area from a policy perspective. But those revenue estimates do not accurately portray the average value when only losses are evaluated. In other words, if producers have a spring where planting delays actually occur, those potential revenue losses are likely to differ from values that have been combined with years when delays did not occur.

The estimated gross revenues for only the replications where a revenue loss was incurred due to delayed planting associated With the Diversion are presented in Tables 69 through 78. Gross revenues presented in Tables 69 through 78 cannot be compared to gross revenues in the previous section. Observations in the simulation where revenue losses were produced by the Diversion does not necessarily imply that gross revenues will be lower than the average of all replications. The reason is that the entire simulation includes situations where the Diversion does not create a planting delay ($0 losses due to Diversion), but many of those situations are from late regional planting start dates. Having a late regional planting start date is much more likely to produce lower relative revenues than earlier plant start dates due to the use of the yield decline curves.

Table 69. Gross Revenues Only in Years with Losses from Operation of Staging Area, Hydrology Groups Three and Five Delineated by Difference in Total Days between With and Without Diversion, 10-year Flood Event

Hydrology Group	Difference in Total Days	Gross Revenues Per Acre[a] Mean	Minimum	Maximum	Standard Deviation
10-day Dry Down Period					
		With Existing Conditions (Without Diversion)			
3	1 to 5	$639.06	$469.26	$655.28	$16.36
	6 to 10	na	na	na	na
5	11 to 15	$657.74	$502.84	$668.36	$14.83
	16 to 20	na	na	na	na
	21 to 25	na	na	na	na
	26 to 30	na	na	na	na
5	30+	$638.42	$467.34	$668.36	$24.98
		With Diversion			
3	1 to 5	$638.56	$468.80	$655.27	$16.48
	6 to 10	na	na	na	na
5	11 to 15	$654.12	$498.94	$668.33	$15.72
	16 to 20	na	na	na	na
	21 to 25	na	na	na	na
	26 to 30	na	na	na	na
5	30+	$349.83	$241.52	$569.82	$52.91
14-day Dry Down Period					
		With Existing Conditions (Without Diversion)			
3	1 to 5	$632.75	$461.38	$655.25	$18.20
	6 to 10	na	na	na	na
5	11 to 15	$657.25	$502.83	$668.36	$15.37
5	16 to 20	$638.42	$467.34	$668.36	$24.98
	21 to 25	na	na	na	na
	26 to 30	na	na	na	na
5	30+	$655.79	$472.23	$668.36	$16.15
		With Diversion			
3	1 to 5	$632.07	$460.49	$655.21	$18.37
	6 to 10	na	na	na	na
5	11 to 15	$650.04	$488.18	$668.29	$17.17
5	16 to 20	$334.44	$241.24	$527.97	$42.82
	21 to 25	na	na	na	na
	26 to 30	na	na	na	na
5	30+	$645.25	$465.05	$668.31	$18.69

Na=not applicable. There were no storage areas in those hydrology groups.
[a] Represents an average of all storage areas within the hydrology group. Revenues represent potential income based on planting conditions. Effects of crop growing conditions throughout the remainder of the season were not included.

Table 70. Gross Revenues Only in Years with Losses from Operation of Staging Area, Hydrology Groups Three and Five Delineated by Difference in Total Days between With and Without Diversion, 20-year Flood Event

Hydrology Group	Difference in Total Days	Gross Revenues Per Acre[a] Mean	Minimum	Maximum	Standard Deviation
10-day Dry Down Period					
		With Existing Conditions (Without Diversion)			
3	1 to 5	$635.10	$462.16	$660.50	$19.21
3	6 to 10	$650.03	$472.20	$668.36	$17.65
5	11 to 15	$657.24	$502.83	$668.36	$15.38
	16 to 20	na	na	na	na
5	21 to 25	$651.99	$472.21	$668.36	$18.13
	26 to 30	na	na	na	na
3	30+	$636.28	$467.34	$668.36	$24.00
		With Diversion			
3	1 to 5	$633.18	$458.99	$660.50	$19.58
3	6 to 10	$638.80	$455.36	$668.09	$20.43
5	11 to 15	$653.94	$497.76	$668.35	$16.16
	16 to 20	na	na	na	na
5	21 to 25	$634.53	$449.48	$668.26	$21.51
	26 to 30	na	na	na	na
3	30+	$349.83	$241.52	$569.82	$52.91
14-day Dry Down Period					
		With Existing Conditions (Without Diversion)			
3	1 to 5	$625.32	$448.98	$660.59	$21.40
3	6 to 10	$642.95	$462.05	$668.36	$19.63
	11 to 15	na	na	na	na
5	16 to 20	$654.99	$472.20	$668.36	$16.60
	21 to 25	na	na	na	na
5	26 to 30	$648.23	$472.21	$668.36	$20.16
3	30+	$632.97	$458.74	$668.36	$23.19
		With Diversion			
3	1 to 5	$622.69	$445.13	$660.59	$21.87
3	6 to 10	$627.52	$440.83	$667.68	$23.04
	11 to 15	na	na	na	na
5	16 to 20	$648.72	$469.43	$668.33	$17.89
	21 to 25	na	na	na	na
5	26 to 30	$622.13	$434.31	$666.68	$24.15
3	30+	$334.46	$241.24	$528.95	$42.87

Na=not applicable. There were no storage areas in those hydrology groups.
[a] Represents an average of all storage areas within the hydrology group. Revenues represent potential income based on planting conditions. Effects of crop growing conditions throughout the remainder of the season were not included.

Table 71. Gross Revenues Only in Years with Losses from Operation of Staging Area, Hydrology Groups Three and Five Delineated by Difference in Total Days between With and Without Diversion, 25-year Flood Event					
		Gross Revenues Per Acre[a]			
Hydrology Group	Difference in Total Days	Mean	Minimum	Maximum	Standard Deviation
10-day Dry Down Period					
		With Existing Conditions (Without Diversion)			
3	1 to 5	$635.23	$465.07	$658.31	$18.64
3	6 to 10	$646.56	$469.24	$665.73	$17.73
	11 to 15	na	na	na	na
5	16 to 20	$633.98	$465.65	$647.35	$15.86
5	21 to 25	$653.68	$472.22	$668.36	$17.17
	26 to 30	na	na	na	na
3	30+	$635.67	$467.34	$668.36	$23.80
		With Diversion			
3	1 to 5	$632.89	$460.62	$658.31	$19.11
3	6 to 10	$636.63	$454.94	$665.47	$20.23
	11 to 15	na	na	na	na
5	16 to 20	$625.75	$459.06	$647.33	$17.67
5	21 to 25	$638.81	$455.37	$668.09	$20.43
	26 to 30	na	na	na	na
3	30+	$349.83	$241.52	$569.82	$52.91
14-day Dry Down Period					
		With Existing Conditions (Without Diversion)			
3	1 to 5	$626.37	$453.16	$658.41	$20.77
3	6 to 10	$638.97	$458.65	$665.69	$19.81
	11 to 15	na	na	na	na
5	16 to 20	$635.47	$469.03	$648.15	$15.50
5	21 to 25	$631.45	$465.30	$649.33	$18.45
	26 to 30	na	na	na	na
3	30+	$631.74	$455.31	$668.36	$23.02
		With Diversion			
3	1 to 5	$622.95	$447.30	$658.41	$21.39
3	6 to 10	$625.44	$440.45	$665.08	$22.86
	11 to 15	na	na	na	na
5	16 to 20	$623.11	$456.71	$648.08	$18.74
5	21 to 25	$615.89	$442.44	$649.15	$20.93
	26 to 30	na	na	na	na
3	30+	$334.46	$241.24	$528.95	$42.87

Na=not applicable. There were no storage areas in those hydrology groups.
[a] Represents an average of all storage areas within the hydrology group. Revenues represent potential income based on planting conditions. Effects of crop growing conditions throughout the remainder of the season were not included.

Table 72. Gross Revenues Only in Years with Losses from Operation of Staging Area, Hydrology Groups Three and Five Delineated by Difference in Total Days between With and Without Diversion, 25-year Long Flood Event					
		Gross Revenues Per Acre[a]			
Hydrology Group	Difference in Total Days	Mean	Minimum	Maximum	Standard Deviation
10-day Dry Down Period					
		With Existing Conditions (Without Diversion)			
3	1 to 5	$617.42	$456.88	$653.19	$22.61
3	6 to 10	$643.21	$469.32	$660.57	$17.17
5	11 to 15	$637.91	$535.85	$647.87	$11.57
5	16 to 20	$644.62	$471.06	$658.03	$16.18
5	21 to 25	$611.92	$456.91	$626.93	$16.17
	26 to 30	na	na	na	na
3	30+	$630.31	$451.82	$668.36	$22.89
		With Diversion			
3	1 to 5	$615.92	$452.77	$653.11	$22.45
3	6 to 10	$631.48	$452.91	$660.30	$20.11
5	11 to 15	$627.92	$500.93	$647.80	$15.34
5	16 to 20	$636.72	$464.88	$658.00	$17.86
5	21 to 25	$594.15	$432.59	$626.23	$20.22
	26 to 30	na	na	na	na
3	30+	$349.83	$241.52	$569.82	$52.91
14-day Dry Down Period					
		With Existing Conditions (Without Diversion)			
3	1 to 5	$611.57	$444.12	$652.97	$22.25
3	6 to 10	$636.64	$462.01	$660.57	$19.11
	11 to 15	na	na	na	na
5	16 to 20	$635.76	$472.65	$648.45	$15.33
5	21 to 25	$644.92	$471.66	$661.93	$18.34
5	26 to 30	$608.08	$456.91	$626.93	$18.56
3	30+	$622.51	$436.95	$668.36	$23.17
		With Diversion			
3	1 to 5	$609.03	$438.78	$652.87	$22.42
3	6 to 10	$620.19	$438.27	$659.95	$22.77
	11 to 15	na	na	na	na
5	16 to 20	$623.37	$460.35	$648.38	$18.64
5	21 to 25	$629.64	$450.44	$661.82	$21.03
5	26 to 30	$581.40	$411.69	$625.89	$23.18
3	30+	$334.46	$241.24	$528.95	$42.87

Na=not applicable. There were no storage areas in those hydrology groups.
[a] Represents an average of all storage areas within the hydrology group. Revenues represent potential income based on planting conditions. Effects of crop growing conditions throughout the remainder of the season were not included.

Table 73. Gross Revenues Only in Years with Losses from Operation of Staging Area, Hydrology Groups Three and Five Delineated by Difference in Total Days between With and Without Diversion, 25-year Extra Long Flood Event					
		Gross Revenues Per Acre[a]			
Hydrology Group	Difference in Total Days	Mean	Minimum	Maximum	Standard Deviation
10-day Dry Down Period					
		With Existing Conditions (Without Diversion)			
3	1 to 5	$607.11	$440.25	$651.31	$22.37
3	6 to 10	$628.97	$465.78	$649.77	$18.03
	11 to 15	na	na	na	na
5	16 to 20	$642.94	$472.37	$656.23	$15.97
5	21 to 25	$644.22	$469.64	$661.37	$18.45
	26 to 30	na	na	na	na
3	30+	$622.51	$436.95	$668.36	$23.17
		With Diversion			
3	1 to 5	$603.95	$430.56	$651.07	$22.85
3	6 to 10	$616.62	$446.47	$649.60	$20.79
	11 to 15	na	na	na	na
5	16 to 20	$632.13	$462.14	$656.19	$18.58
5	21 to 25	$630.41	$450.21	$661.27	$20.76
	26 to 30	na	na	na	na
3	30+	$349.83	$241.52	$569.82	$52.91
14-day Dry Down Period					
		With Existing Conditions (Without Diversion)			
3	1 to 5	$596.78	$415.39	$649.93	$24.34
3	6 to 10	$621.11	$456.57	$649.77	$19.92
	11 to 15	na	na	na	na
	16 to 20	na	na	na	na
5	21 to 25	$639.09	$471.94	$656.50	$18.28
5	26 to 30	$642.52	$470.52	$663.75	$20.54
3	30+	$610.64	$410.13	$668.19	$25.69
		With Diversion			
3	1 to 5	$591.89	$404.33	$649.44	$25.67
3	6 to 10	$604.12	$427.62	$649.76	$23.31
	11 to 15	na	na	na	na
	16 to 20	na	na	na	na
5	21 to 25	$621.87	$447.04	$656.29	$21.43
5	26 to 30	$619.16	$434.06	$663.74	$23.54
3	30+	$334.46	$241.24	$528.95	$42.87

Na=not applicable. There were no storage areas in those hydrology groups.
[a] Represents an average of all storage areas within the hydrology group. Revenues represent potential income based on planting conditions. Effects of crop growing conditions throughout the remainder of the season were not included.

Table 74. Gross Revenues Only in Years with Losses from Operation of Staging Area, Hydrology Groups Three and Five Delineated by Difference in Total Days between With and Without Diversion, 2009-like Flood Event

Hydrology Group	Difference in Total Days	Gross Revenues Per Acre[a] Mean	Minimum	Maximum	Standard Deviation
10-day Dry Down Period					
		With Existing Conditions (Without Diversion)			
3	1 to 5	$615.71	$459.27	$646.62	$22.16
3	6 to 10	$625.08	$438.86	$668.36	$23.05
3&5	11 to 15	$637.29	$466.18	$666.67	$22.18
5	16 to 20	$649.11	$470.57	$662.91	$16.61
5	21 to 25	$652.85	$472.23	$668.36	$17.55
	26 to 30	na	na	na	na
3	30+	$624.80	$440.79	$668.36	$22.95
		With Diversion			
3	1 to 5	$612.68	$457.92	$646.44	$21.99
3	6 to 10	$595.12	$379.63	$666.10	$30.92
3&5	11 to 15	$606.43	$406.27	$666.01	$26.81
5	16 to 20	$640.04	$462.86	$662.88	$18.54
5	21 to 25	$636.27	$451.89	$667.85	$21.01
	26 to 30	na	na	na	na
3	30+	$355.90	$241.79	$576.23	$56.59
14-day Dry Down Period					
		With Existing Conditions (Without Diversion)			
3	1 to 5	$609.99	$453.91	$646.45	$22.23
3	6 to 10	$612.51	$414.64	$668.27	$25.43
3	11 to 15	$631.90	$453.20	$668.36	$22.47
5	16 to 20	$645.91	$470.09	$659.48	$16.36
5	21 to 25	$646.47	$470.70	$663.56	$18.48
5	26 to 30	$649.29	$472.23	$668.36	$19.51
3	30+	$614.03	$419.51	$668.34	$24.78
		With Diversion			
3	1 to 5	$605.08	$442.49	$646.06	$22.45
3	6 to 10	$572.95	$329.24	$660.50	$39.23
3	11 to 15	$585.67	$359.46	$663.79	$34.38
5	16 to 20	$633.51	$457.88	$659.42	$19.21
5	21 to 25	$629.89	$447.82	$663.43	$21.43
5	26 to 30	$624.30	$437.03	$667.06	$23.67
3	30+	$337.25	$241.24	$540.33	$44.67

Na=not applicable. There were no storage areas in those hydrology groups.

[a] Represents an average of all storage areas within the hydrology group. Revenues represent potential income based on planting conditions. Effects of crop growing conditions throughout the remainder of the season were not included.

Table 75. Gross Revenues Only in Years with Losses from Operation of Staging Area, Hydrology Groups Three and Five Delineated by Difference in Total Days between With and Without Diversion, 50-year Flood Event					
		Gross Revenues Per Acre[a]			
Hydrology Group	Difference in Total Days	Mean	Minimum	Maximum	Standard Deviation
10-day Dry Down Period					
		With Existing Conditions (Without Diversion)			
3	1 to 5	$626.72	$460.27	$651.33	$18.71
3	6 to 10	$615.80	$460.27	$632.78	$16.02
	11 to 15	na	na	na	na
5	16 to 20	$644.20	$472.27	$657.68	$16.12
5	21 to 25	$644.17	$469.29	$660.45	$17.86
	26 to 30	na	na	na	na
3	30+	$624.80	$440.79	$668.36	$22.95
		With Diversion			
3	1 to 5	$623.21	$454.49	$651.33	$19.68
3	6 to 10	$604.80	$444.48	$632.31	$19.03
	11 to 15	na	na	na	na
5	16 to 20	$634.64	$463.87	$657.63	$18.25
5	21 to 25	$630.95	$451.78	$660.36	$20.32
	26 to 30	na	na	na	na
3	30+	$344.81	$241.34	$563.21	$49.69
14-day Dry Down Period					
		With Existing Conditions (Without Diversion)			
3	1 to 5	$616.92	$447.21	$651.52	$20.96
3	6 to 10	$608.92	$451.99	$632.78	$18.24
	11 to 15	na	na	na	na
5	16 to 20	$635.72	$473.47	$648.43	$15.30
5	21 to 25	$643.17	$471.38	$661.08	$18.70
5	26 to 30	$606.94	$456.91	$626.93	$19.30
3	30+	$614.03	$419.51	$668.34	$24.78
		With Diversion			
3	1 to 5	$612.03	$439.30	$651.52	$22.22
3	6 to 10	$593.45	$425.68	$632.13	$21.98
	11 to 15	na	na	na	na
5	16 to 20	$622.94	$460.70	$648.34	$18.71
5	21 to 25	$624.81	$445.07	$660.78	$21.84
5	26 to 30	$577.77	$406.28	$625.34	$23.97
3	30+	$332.24	$241.24	$517.89	$41.55

Na=not applicable. There were no storage areas in those hydrology groups.
[a] Represents an average of all storage areas within the hydrology group. Revenues represent potential income based on planting conditions. Effects of crop growing conditions throughout the remainder of the season were not included.

Table 76. Gross Revenues Only in Years with Losses from Operation of Staging Area, Hydrology Groups Three and Five Delineated by Difference in Total Days between With and Without Diversion, 100-year Flood Event

Hydrology Group	Difference in Total Days	Gross Revenues Per Acre[a] Mean	Minimum	Maximum	Standard Deviation
10-day Dry Down Period					
		With Existing Conditions (Without Diversion)			
3	1 to 5	$610.17	$453.87	$646.48	$22.35
3	6 to 10	$632.29	$464.65	$653.01	$18.26
5	11 to 15	$639.10	$498.46	$648.50	$13.83
5	16 to 20	$640.33	$486.28	$654.04	$15.40
5	21 to 25	$645.13	$470.92	$662.92	$18.72
	26 to 30	na	na	na	na
3	30+	$614.03	$419.51	$668.34	$24.78
		With Diversion			
3	1 to 5	$607.29	$446.46	$646.47	$22.31
3	6 to 10	$619.97	$444.32	$652.89	$21.02
5	11 to 15	$634.03	$490.96	$648.49	$15.19
5	16 to 20	$629.36	$476.06	$654.02	$18.20
5	21 to 25	$630.84	$449.95	$662.74	$20.92
	26 to 30	na	na	na	na
3	30+	$340.68	$241.24	$553.03	$46.96
14-day Dry Down Period					
		With Existing Conditions (Without Diversion)			
3	1 to 5	$602.93	$437.20	$646.29	$22.57
3	6 to 10	$624.46	$454.01	$653.01	$20.08
	11 to 15	na	na	na	na
5	16 to 20	$635.16	$485.43	$648.25	$14.89
5	21 to 25	$636.37	$481.06	$654.48	$18.33
5	26 to 30	$646.09	$472.21	$668.36	$21.34
3	30+	$598.47	$382.83	$666.47	$29.64
		With Diversion			
3	1 to 5	$598.12	$424.10	$646.27	$23.40
3	6 to 10	$607.54	$427.33	$653.00	$23.50
	11 to 15	na	na	na	na
5	16 to 20	$624.40	$475.75	$648.13	$17.56
5	21 to 25	$617.78	$450.74	$654.21	$21.66
5	26 to 30	$620.94	$432.60	$668.35	$24.28
3	30+	$330.43	$241.23	$507.11	$40.64

Na=not applicable. There were no storage areas in those hydrology groups.

[a] Represents an average of all storage areas within the hydrology group. Revenues represent potential income based on planting conditions. Effects of crop growing conditions throughout the remainder of the season were not included.

Table 77. Gross Revenues Only in Years with Losses from Operation of Staging Area, Hydrology Groups Three and Five Delineated by Difference in Total Days between With and Without Diversion, 500-year Flood Event					
		Gross Revenues Per Acre[a]			
Hydrology Group	Difference in Total Days	Mean	Minimum	Maximum	Standard Deviation
10-day Dry Down Period					
		With Existing Conditions (Without Diversion)			
3	1 to 5	$562.47	$385.53	$639.76	$31.71
3	6 to 10	$610.36	$443.86	$650.28	$21.93
3	11 to 15	$554.68	$292.05	$654.88	$47.21
3	16 to 20	$531.89	$260.94	$647.58	$56.17
5	21 to 25	$651.14	$472.21	$668.36	$18.68
3	26 to 30	$588.43	$363.75	$664.25	$33.41
	30+	na	na	na	na
		With Diversion			
3	1 to 5	$558.22	$380.03	$638.88	$32.81
3	6 to 10	$593.95	$407.62	$648.46	$25.21
3	11 to 15	$411.37	$245.04	$608.26	$74.51
3	16 to 20	$345.48	$241.45	$559.62	$49.19
5	21 to 25	$634.68	$449.52	$668.21	$21.55
3	26 to 30	$337.25	$241.24	$540.33	$44.67
	30+	na	na	na	na
14-day Dry Down Period					
		With Existing Conditions (Without Diversion)			
3	1 to 5	$541.53	$362.89	$633.94	$35.70
3	6 to 10	$600.79	$422.04	$649.33	$23.24
3	11 to 15	$516.48	$254.96	$642.57	$61.73
3	16 to 20	$487.10	$251.36	$633.65	$69.83
5	21 to 25	$650.30	$472.22	$668.36	$19.01
5	26 to 30	$633.37	$463.48	$667.62	$24.20
	30+	na	na	na	na
		With Diversion			
3	1 to 5	$536.43	$354.65	$632.74	$36.73
3	6 to 10	$577.65	$381.51	$645.88	$29.76
3	11 to 15	$368.86	$242.49	$586.15	$62.59
3	16 to 20	$332.60	$241.27	$517.44	$41.53
5	21 to 25	$627.53	$440.86	$667.67	$23.04
5	26 to 30	$600.43	$420.05	$656.95	$22.99
	30+	na	na	na	na

Na=not applicable. There were no storage areas in those hydrology groups.
[a] Represents an average of all storage areas within the hydrology group. Revenues represent potential income based on planting conditions. Effects of crop growing conditions throughout the remainder of the season were not included.

Table 78. Gross Revenues Only in Years with Losses from Operation of Staging Area, Hydrology Groups Three and Five Delineated by Difference in Total Days between With and Without Diversion, Probabilistic Maximum Flood Event					
		Gross Revenues Per Acre[a]			
Hydrology Group	Difference in Total Days	Mean	Minimum	Maximum	Standard Deviation
10-day Dry Down Period					
		With Existing Conditions (Without Diversion)			
3	1 to 5	$563.58	$370.35	$640.15	$33.22
3	6 to 10	$611.96	$423.67	$663.77	$24.26
	11 to 15	na	na	na	na
	16 to 20	na	na	na	na
	21 to 25	na	na	na	na
	26 to 30	na	na	na	na
	30+	na	na	na	na
		With Diversion			
3	1 to 5	$558.75	$362.30	$639.12	$34.97
3	6 to 10	$584.48	$381.79	$658.48	$33.17
	11 to 15	na	na	na	na
	16 to 20	na	na	na	na
	21 to 25	na	na	na	na
	26 to 30	na	na	na	na
	30+	na	na	na	na
14-day Dry Down Period					
		With Existing Conditions (Without Diversion)			
3	1 to 5	$538.20	$336.04	$633.67	$41.03
3	6 to 10	$597.61	$398.48	$661.13	$28.56
	11 to 15	na	na	na	na
	16 to 20	na	na	na	na
	21 to 25	na	na	na	na
	26 to 30	na	na	na	na
	30+	na	na	na	na
		With Diversion			
3	1 to 5	$531.63	$324.40	$631.92	$43.29
3	6 to 10	$559.49	$344.08	$652.51	$41.44
	11 to 15	na	na	na	na
	16 to 20	na	na	na	na
	21 to 25	na	na	na	na
	26 to 30	na	na	na	na
	30+	na	na	na	na

Na=not applicable. There were no storage areas in those hydrology groups.
[a] Represents an average of all storage areas within the hydrology group. Revenues represent potential income based on planting conditions. Effects of crop growing conditions throughout the remainder of the season were not included.

Estimation of Potential Revenue Losses by Crop

Average revenues for storage areas can include situations where some crops experience a planting delay while other crops may not be delayed. This is most likely to occur when corn, wheat, or sugarbeets have planting delays but soybeans are not delayed. Identifying potential revenue losses by crop would be useful for producers. Data were not collected to identify the composition of land ownership within the staging area (or within individual storage areas). Information on how acreage within each storage area was distributed among producers also was not collected. Most storage areas are not likely farmed by one producer, and therefore for any year during a major flood event, one producer may intend to plant a different crop on his share of the storage area than the crop another producer may intend to plant. The potential revenue losses between those two producers in a flood event could be considerably different than the average revenue values (and losses) reported for the entire storage area.

Soybeans have the lowest frequency of revenue loss among the four crops (the frequency of per-acre losses for all crops is presented in Appendix E). Soybeans also have the lowest relative yield decline of the four crops. In other words, over the planting periods evaluated in this study, planting delays have less relative impact on soybeans than corn, wheat, or sugarbeets. Soybeans also are planted later in the spring, reducing the likelihood of planting delays due to the use of the staging area. Those factors contribute to soybeans having the lowest per-acre revenue losses. Soybeans also comprise the largest share of crops grown in the staging area, which further acts to reduce the average revenue loss when all crops are combined within an entire storage area.

Sugarbeets clearly have the largest average per-acre revenue losses of the four crops (Tables 79 to 82). However, those losses occur on relatively few acres. The small percentage of acres planted to sugarbeets Within the staging area acts to limit the influence of revenues losses when all crops are included in average losses for a storage area. Average per acre revenue losses for wheat generally exceeded the per acre losses for corn (Tables 79 through 82). While corn has a larger overall gross revenue per acre, the relative price per bushel ($3.37 for corn versus $5.56 for wheat) and the difference in the relative rate of yield decline in the first week after optimal planting has ended suggest greater revenue losses for wheat. Of lesser importance, the last day of optimal planting for wheat was one day earlier than corn, providing a slightly longer period of non-optimal planting than corn since prevent plant and switch dates were modeled to be the same for each crop.

The average of a revenue loss (i.e., only losses were averaged) was estimated for each crop (Tables 81 and 82). If a loss was incurred due to planting delays, sugarbeets clearly had the largest per acre revenue decline, followed by wheat, corn, and soybeans. The distinction between the values in Tables 79 and 80 versus Tables 81 and 82 is important because not all flood situations will result in losses for each crop; but if losses were to occur, it is helpful to understand how the effects of averaging no losses influence the overall values.

Prices will play an important role the amount of revenue loss. With wheat yield declining about 1 bushel per day after the optimal planting window has ended, revenue losses will be proportional with respect to price changes. Similar observations can be made for the other crops, because yield losses due to planting delays were modeled to be linear for soybeans and sugarbeets. The yield decline for corn was not linear; however, price changes will have similar effects on the revenue losses for corn as the other crops, especially in situations when delays result in planting near the end of the non-optimal period, as that is when the largest yield declines for corn are observed.

Table 79. Revenue Loss Averaged Over Entire Monte Carlo Simulation, by Crop, between With and Without Diversion, 10-year, 20-year, 25-year, 25-year Long, and 25-year Extra Long Flood Events, 10-day Dry Down Period

		Potential Revenue Losses Per Acre[a]				
Crop and Hydrology Group		10-Year	20-Year	25-Year	25-Year Long	25-Year Extra Long
	Difference in Total Days[b]	---------- average of 10,000 replications ----------				
Corn						
3	1 to 5	-0.20	-1.44	-1.60	-$1.81	-$4.33
3	6 to 10	na	-6.09	-5.39	-$6.24	-$8.22
5	11 to 15	-0.71	-0.76	na	-$1.61	na
5	16 to 20	na	na	-3.65	-$3.57	-$5.23
5	20 to 25	na	-11.10	-7.81	-$9.73	-$9.11
	26 to 30	na	na	na	na	na
3	30+	-390.70	-388.42	-387.71	-$381.04	-$370.17
Soybeans						
3	1 to 5	0.00	0.00	0.00	-$0.10	-$0.24
3	6 to 10	na	0.00	0.00	$0.00	-$0.01
5	11 to 15	0.00	0.00	na	$0.00	na
5	16 to 20	na	na	0.00	$0.00	-$0.00
5	20 to 25	na	-0.01	0.00	-$0.01	-$0.01
	26 to 30	na	na	na	na	na
3	30+	-161.72	-161.72	-161.72	-$161.71	-$161.65
Wheat						
3	1 to 5	-0.31	-1.21	-3.33	-$3.39	-$6.08
3	6 to 10	na	-10.22	-8.32	-$9.74	-$14.36
5	11 to 15	-1.81	-1.93	na	-$4.01	na
5	16 to 20	na	na	-7.83	-$7.20	-$9.68
5	20 to 25	na	-18.91	-14.20	-$17.38	-$17.10
	26 to 30	na	na	na	na	na
3	30+	-191.50	-186.45	-185.15	-$174.62	-$160.76
Sugarbeets						
3	1 to 5	-0.81	-6.27	-8.47	-$7.93	-$14.37
3	6 to 10	na	-29.67	-25.71	-$29.45	-$32.36
5	11 to 15	-4.53	-4.85	na	-$8.54	na
5	16 to 20	na	na	-18.90	-$20.94	-$26.93
5	20 to 25	na	-53.95	-40.13	-$35.32	-$43.25
	26 to 30	na	na	na	na	na
3	30+	-676.42	-662.88	-659.13	-$628.35	-$587.53

Na=not applicable. There were no storage areas in those hydrology groups.
[a] Represents an average of all storage areas Within the hydrology groups and includes replications With no revenue loss.
[b] Total days are defined as the sum of 1) days from staging activation until land becomes inundated, 2) days of inundation, and 3) 10-day dry-down. Zero days mean the storage areas do not flood With existing conditions, but zero days do not necessarily mean conditions in the region are suitable for planting.

Table 80. Revenue Loss Averaged Over Entire Monte Carlo Simulation, by Crop, between With and Without Diversion, 2009-like, 50-year, 100-year, 500-year, and Probabilistic Maximum Flood Events, 10-day Dry Down Period

		Potential Revenue Losses Per Acre[a]				
Crop and Hydrology Group		2009-like	50-Year	100-Year	500-Year	PMF
	Difference in Total Days[b]	----------------------------	average of 10,000 replications	----------------------------		
Corn						
3	1 to 5	-$3.61	-$2.45	-$3.63	-$5.57	-$7.38
3	6 to 10	-$43.02	-$5.65	-$8.42	-$22.94	-$44.41
5	11 to 15	-$38.67	na	-$0.99	-$197.99	na
5	16 to 20	-$4.13	-$4.30	-$4.55	-$220.42	na
5	20 to 25	-$9.66	-$8.04	-$10.35	-$11.22	na
5	26 to 30	na	na	na	-$323.08	na
3	30+	-$368.70	-$377.20	-$363.81	na	na
Soybeans						
3	1 to 5	-$0.12	-$0.00	-$6.07	-$1.60	-$0.94
3	6 to 10	-$1.54	-$0.00	-$13.06	-$0.90	-$5.13
5	11 to 15	-$0.72	na	-$1.93	-$95.78	na
5	16 to 20	$0.00	-$0.00	-$7.37	-$144.46	na
5	20 to 25	-$0.01	-$0.00	-$15.87	-$0.01	na
5	26 to 30	na	na	na	-$168.29	na
3	30+	-$156.61	-$165.62	-$155.40	na	na
Wheat						
3	1 to 5	-$4.22	-$4.19	-$0.02	-$4.04	-$5.95
3	6 to 10	-$39.26	-$10.58	-$0.01	-$27.65	-$32.48
5	11 to 15	-$41.65	na	$0.00	-$71.49	na
5	16 to 20	-$7.01	-$8.29	$0.00	-$71.02	na
5	20 to 25	-$16.19	-$15.58	-$0.01	-$18.27	na
5	26 to 30	na	na	na	-$122.11	na
3	30+	-$170.05	-$165.14	-$168.36	na	na
Sugarbeets						
3	1 to 5	-$13.52	-$11.25	-$14.71	-$12.23	-$14.89
3	6 to 10	-$114.96	-$22.29	-$35.01	-$57.73	-$91.93
5	11 to 15	-$136.20	na	-$5.94	-$237.12	na
5	16 to 20	-$22.69	-$24.15	-$21.34	-$325.34	na
5	20 to 25	-$48.05	-$38.70	-$50.52	-$54.21	na
5	26 to 30	na	na	na	-$496.14	na
3	30+	-$582.25	-$615.37	-$579.50	na	na

Na=not applicable. There were no storage areas in those hydrology groups.
PMF=probabilistic maximum flood.
[a] Represents an average of all storage areas Within the hydrology groups and includes replications With no revenue loss.
[b] Total days are defined as the sum of 1) days from staging activation until land becomes inundated, 2) days of inundation, and 3) 10-day dry-down. Zero days mean the storage areas do not flood With existing conditions, but zero days do not necessarily mean conditions in the region are suitable for planting.

Table 81. Revenue Loss Averaged Over Entire Monte Carlo Simulation, by Crop, between With and Without Diversion, 10-year, 20-year, 25-year, 25-year Long, and 25-year Extra Long Flood Events, 14-day Dry Down Period

Crop and Hydrology Group	Difference in Total Days[b]	10-Year	20-Year	25-Year	25-Year Long	25-Year Extra Long
		Potential Revenue Losses Per Acre[a]				
		--------------------------- average of 10,000 replications ---------------------------				
Corn						
3	1 to 5	-$0.46	-$2.71	-$3.23	-$3.36	-$7.15
3	6 to 10	na	-$12.28	-$10.79	-$12.83	-$15.87
5	11 to 15	-$1.72	na	na	na	na
5	16 to 20	-$3.87	-$2.49	-$6.60	-$6.51	na
5	20 to 25	na	na	-$11.02	-$10.23	-$12.93
5	26 to 30	na	-$23.05	na	-$20.68	-$21.45
3	30+	-$400.86	-$394.61	-$393.05	-$380.32	-$362.04
Soybeans						
3	1 to 5	$0.00	-$0.02	-0.01	-$0.08	-$0.48
3	6 to 10	na	-$0.04	-0.04	-$0.04	-$0.09
5	11 to 15	$0.00	na	na	na	na
5	16 to 20	$0.00	$0.00	0.00	$0.00	na
5	20 to 25	na	na	-0.01	-$0.01	-$0.02
5	26 to 30	na	-$0.10	na	-$0.07	-$0.08
3	30+	-$172.64	-$172.64	-172.64	-$172.57	-$172.19
Wheat						
3	1 to 5	-$0.56	-$1.99	-5.65	-$5.36	-$8.27
3	6 to 10	na	-$17.04	-14.30	-$16.76	-$22.14
5	11 to 15	-$3.49	na	na	na	na
5	16 to 20	-$7.31	-$4.89	-11.09	-$10.36	na
5	20 to 25	na	na	-17.11	-$16.38	-$20.09
5	26 to 30	na	-$32.84	na	-$30.87	-$34.96
3	30+	-$199.83	-$188.72	-186.35	-$169.82	-$151.23
Sugarbeets						
3	1 to 5	-$1.55	-$9.77	-14.23	-$12.70	-$20.09
3	6 to 10	na	-$50.30	-43.06	-$51.05	-$52.82
5	11 to 15	-$10.46	na	na	na	na
5	16 to 20	-$21.75	-$14.62	-32.32	-$22.03	na
5	20 to 25	na	na	-47.00	-$46.00	-$58.45
5	26 to 30	na	-$97.17	na	-$65.31	-$88.34
3	30+	-$737.04	-$703.91	-696.90	-$648.15	-$593.51

Na=not applicable. There were no storage areas in those hydrology groups.
[a] Represents an average of all storage areas Within the hydrology groups and includes replications With no revenue loss.
[b] Total days are defined as the sum of 1) days from staging activation until land becomes inundated, 2) days of inundation, and 3) 14-day dry-down. Zero days mean the storage areas do not flood With existing conditions, but zero days do not necessarily mean conditions in the region are suitable for planting.

Table 82. Revenue Loss Averaged Over Entire Monte Carlo Simulation, by Crop, between With and Without Diversion, 2009-like, 50-year, 100-year, 500-year, and Probabilistic Maximum Flood Events, 14-day Dry Down Period

Crop and Hydrology Group	Difference in Total Days[b]	Potential Revenue Losses Per Acre[a] 2009-like	50-Year	100-Year	500-Year	PMF
		---- average of 10,000 replications ----				
Corn						
3	1 to 5	-$6.59	-$4.76	-$6.64	-$6.93	-7.38
3	6 to 10	-$65.10	-$11.69	-$16.22	-$36.00	-44.41
5	11 to 15	-$70.13	na	na	-$176.82	na
5	16 to 20	-$5.87	-$6.57	-$4.04	-$160.60	na
5	20 to 25	-$11.26	-$13.36	-$13.06	-$17.22	na
5	26 to 30	-$20.54	-$24.49	-$24.89	-$41.72	na
3	30+	-$365.90	-$368.48	-$343.60	na	na
Soybeans						
3	1 to 5	-$0.37	-$0.03	-$0.08	-$2.16	-0.94
3	6 to 10	-$5.11	-$0.03	-$0.09	-$2.68	-5.13
5	11 to 15	-$3.01	na	na	-$117.16	na
5	16 to 20	$0.00	$0.00	$0.00	-$127.09	na
5	20 to 25	-$0.01	-$0.02	-$0.02	-$0.04	na
5	26 to 30	-$0.07	-$0.12	-$0.14	-$11.17	na
3	30+	-$170.69	-$173.43	-$173.07	na	na
Wheat						
3	1 to 5	-$7.12	-$6.51	-$9.26	-$4.82	-5.95
3	6 to 10	-$46.34	-$17.82	-$20.96	-$33.11	-32.48
5	11 to 15	-$63.88	na	na	-$56.25	na
5	16 to 20	-$10.60	-$11.08	-$10.09	-$47.35	na
5	20 to 25	-$17.05	-$20.76	-$17.76	-$26.10	na
5	26 to 30	-$30.03	-$35.22	-$34.68	-$38.68	na
3	30+	-$155.91	-$156.51	-$135.01	na	na
Sugarbeets						
3	1 to 5	-$20.65	-$17.94	-$22.26	-$14.32	-16.94
3	6 to 10	-$133.77	-$38.65	-$56.31	-$75.72	-106.89
5	11 to 15	-$186.70	na	na	-$234.02	na
5	16 to 20	-$30.89	-$31.84	-$23.25	-$305.13	na
5	20 to 25	-$53.64	-$60.66	-$52.76	-$77.31	na
5	26 to 30	-$88.86	-$74.47	-$102.59	-$126.75	na
3	30+	-$594.31	-$621.31	-$570.16	na	na

Na=not applicable. There were no storage areas in those hydrology groups.
PMF=probabilistic maximum flood.
[a] Represents an average of all storage areas Within the hydrology groups and includes replications With no revenue loss.
[b] Total days are defined as the sum of 1) days from staging activation until land becomes inundated, 2) days of inundation, and 3) 14-day dry-down. Zero days mean the storage areas do not flood With existing conditions, but zero days do not necessarily mean conditions in the region are suitable for planting.

Table 83. Average Value of a Revenue Loss, by Crop, between With and Without Diversion, (excludes replications With zero losses), 10-year, 20-year, 25-year, 25-year Long, and 25-year Extra Long Flood Events, 10-day Dry Down Period						
		Potential Revenue Losses Per Acre[a]				
Crop and Hydrology Group		10-Year	20-Year	25-Year	25-Year Long	25-Year Extra Long
	Difference in Total Days[b]	---------------------------- average of a revenue loss ----------------------------				
Corn						
3	1 to 5	-0.71	-2.43	-2.89	-$1.84	-$4.33
3	6 to 10	na	-13.67	-12.11	-$14.02	-$14.68
5	11 to 15	-3.89	-3.53	na	-$7.46	na
5	16 to 20	na	na	-9.05	-$8.85	-$12.95
5	20 to 25	na	-21.21	-17.54	-$20.02	-$16.27
5	26 to 30	na	na	na	na	na
3	30+	-390.70	-388.42	-387.71	-$381.04	-$370.17
Soybeans						
3	1 to 5	-0.10	-0.14	-0.20	-$0.12	-$0.27
3	6 to 10	na	-1.26	-1.18	-$1.17	-$0.79
5	11 to 15	na	na	na	-$0.12	na
5	16 to 20	na		-0.41	-$0.40	-$0.83
5	20 to 25	na	-1.20	-1.27	-$1.29	-$0.41
5	26 to 30	na	na	na	na	na
3	30+	-162.07	-162.07	-162.07	-$162.07	-$162.01
Wheat						
3	1 to 5	-1.05	-2.03	-6.37	-$3.64	-$6.08
3	6 to 10	na	-22.85	-18.59	-$21.77	-$25.60
5	11 to 15	-9.68	-8.73	na	-$18.03	na
5	16 to 20	na	na	-19.28	-$17.73	-$23.83
5	20 to 25	na	-36.03	-31.75	-$35.64	-$30.50
5	26 to 30	na	na	na	na	na
3	30+	-191.50	-186.45	-185.15	-$174.62	-$160.76
Sugarbeets						
3	1 to 5	-2.77	-10.52	-14.24	-$7.93	-$14.37
3	6 to 10	na	-66.35	-57.49	-$65.85	-$57.75
5	11 to 15	-24.17	-21.99	na	-$38.70	na
5	16 to 20	na	na	-46.51	-$51.51	-$66.25
5	20 to 25	na	-102.89	-89.73	-$72.48	-$77.17
5	26 to 30	na	na	na	na	na
3	30+	-676.42	-662.88	-659.13	-$628.35	-$587.53

Na=not applicable. There were no storage areas in those hydrology groups.

[a] Represents an average of all storage areas Within the hydrology groups and excludes replications With no revenue loss.

[b] Total days are defined as the sum of 1) days from staging activation until land becomes inundated, 2) days of inundation, and 3) 10-day dry-down. Zero days mean the storage areas do not flood With existing conditions, but zero days do not necessarily mean conditions in the region are suitable for planting.

Table 84. Average Value of a Revenue Loss, by Crop, between With and Without Diversion, (excludes replications With zero losses), 2009-like, 50-year, 100-year, 500-year, and Probabilistic Maximum Flood Events, 10-day Dry Down Period						
		Potential Revenue Losses Per Acre[a]				
Crop and Hydrology Group		2009-Year	50-Year	100-Year	500-Year	PMF
	Difference in Total Days[b]	---------------------------- average of a revenue loss ----------------------------				
Corn						
3	1 to 5	-$3.94	-$4.39	-$3.66	-$5.57	-$7.38
3	6 to 10	-$48.17	-$12.68	-$15.05	-$24.57	-$44.79
5	11 to 15	-$44.47	na	-$6.65	-$197.99	na
5	16 to 20	-$10.23	-$10.65	-$11.25	-$220.42	na
5	20 to 25	-$19.89	-$15.37	-$17.36	-$20.04	na
5	26 to 30	na	na	na	-$323.08	na
3	30+	-$368.70	-$377.20	-$363.81	na	na
Soybeans						
3	1 to 5	-$0.39	-$0.23	-$0.05	-$1.61	-$1.15
3	6 to 10	-$6.07	-$1.06	-$0.72	-$2.53	-$7.47
5	11 to 15	-$3.46	na	na	-$97.75	na
5	16 to 20	-$0.55	-$0.64	-$0.65	-$144.67	na
5	20 to 25	-$1.25	-$0.38	-$0.57	-$0.92	na
5	26 to 30	na	na	na	-$168.49	na
3	30+	-$157.09	-$165.92	-$168.60	na	na
Wheat						
3	1 to 5	-$4.61	-$7.48	-$6.13	-$4.04	-$5.95
3	6 to 10	-$43.96	-$23.65	-$23.28	-$29.61	-$32.75
5	11 to 15	-$47.90	na	-$12.55	-$71.49	na
5	16 to 20	-$17.27	-$20.42	-$18.15	-$71.02	na
5	20 to 25	-$33.20	-$29.69	-$26.61	-$32.58	na
5	26 to 30	na	na	na	-$122.11	na
3	30+	-$170.05	-$165.14	-$155.40	na	na
Sugarbeets						
3	1 to 5	-$13.52	-$20.07	-$14.84	-$12.23	-$14.89
3	6 to 10	-$114.96	-$49.85	-$62.47	-$61.81	-$92.72
5	11 to 15	-$136.20	na	-$38.41	-$237.12	na
5	16 to 20	-$22.69	-$59.42	-$52.50	-$325.34	na
5	20 to 25	-$48.05	-$73.79	-$84.72	-$96.73	na
5	26 to 30	na	na	na	-$496.14	na
3	30+	-$582.25	-$615.37	-$579.50	na	na

Na=not applicable. There were no storage areas in those hydrology groups.
PMF=probabilistic maximum flood.
[a] Represents an average of all storage areas Within the hydrology groups and excludes replications With no revenue loss.
[b] Total days are defined as the sum of 1) days from staging activation until land becomes inundated, 2) days of inundation, and 3) 10-day dry-down. Zero days mean the storage areas do not flood With existing conditions, but zero days do not necessarily mean conditions in the region are suitable for planting.

Table 85. Average Value of a Revenue Loss, by Crop, between With and Without Diversion, (excludes replications with zero losses), 10-year, 20-year, 25-year, 25-year Long, and 25-year Extra Long Flood Events, 14-day Dry Down Period

Crop and Hydrology Group		Potential Revenue Losses Per Acre[a]				
		10-Year	20-Year	25-Year	25-Year Long	25-Year Extra Long
	Difference in Total Days[b]	---------- average of a revenue loss ----------				
Corn						
3	1 to 5	-$1.02	-$3.65	-$4.45	-$3.44	-$7.15
3	6 to 10	na	-$20.61	-$18.10	-$21.53	-$22.34
5	11 to 15	-$7.96	na	na	na	na
5	16 to 20	-$11.87	-$6.86	-$16.34	-$16.12	na
5	20 to 25	na	na	-$18.49	-$18.28	-$21.70
5	26 to 30	na	-$34.27	na	-$32.58	-$30.20
3	30+	-$400.86	-$394.61	-$393.05	-$380.32	-$362.04
Soybeans						
3	1 to 5	-$0.14	-$0.27	-0.37	-$0.14	-$0.50
3	6 to 10	na	-$2.09	-1.97	-$1.97	-$1.58
5	11 to 15	-$0.13	na	na	na	na
5	16 to 20	-$1.39	-$0.25	-1.30	-$1.27	na
5	20 to 25	na	na	-0.66	-$0.71	-$0.93
5	26 to 30	na	-$2.39	na	-$2.52	-$1.35
3	30+	-$172.80	-$172.79	-172.79	-$172.73	-$172.34
Wheat						
3	1 to 5	-$1.25	-$2.68	-8.41	-$5.47	-$8.27
3	6 to 10	na	-$28.58	-23.99	-$28.10	-$31.15
5	11 to 15	-$15.73	na	na	na	na
5	16 to 20	-$22.26	-$13.43	-27.30	-$25.52	na
5	20 to 25	na	na	-28.70	-$29.21	-$33.70
5	26 to 30	na	-$48.81	na	-$48.63	-$49.20
3	30+	-$199.83	-$188.72	-186.35	-$169.82	-$151.23
Sugarbeets						
3	1 to 5	-$3.47	-$13.13	-19.14	-$12.70	-$20.09
3	6 to 10	na	-$84.36	-72.22	-$85.62	-$74.34
5	11 to 15	-$47.42	na	na	na	na
5	16 to 20	-$66.21	-$39.86	-79.51	-$60.07	na
5	20 to 25	na	na	-78.82	-$82.09	-$98.01
5	26 to 30	na	-$144.39	na	-$102.88	-$124.33
3	30+	-$737.04	-$703.91	-696.90	-$648.15	-$593.51

Na=not applicable. There were no storage areas in those hydrology groups.

[a] Represents an average of all storage areas Within the hydrology groups and excludes replications With no revenue loss.

[b] Total days are defined as the sum of 1) days from staging activation until land becomes inundated, 2) days of inundation, and 3) 14-day dry-down. Zero days mean the storage areas do not flood With existing conditions, but zero days do not necessarily mean conditions in the region are suitable for planting.

Table 86. Average Value of a Revenue Loss, by Crop, between With and Without Diversion, (excludes replications with zero losses), 2009-like, 50-year, 100-year, 500-year, and Probabilistic Maximum Flood Events, 14-day Dry Down Period						
		Potential Revenue Losses Per Acre[a]				
Crop and Hydrology Group		2009-Year	50-Year	100-Year	500-Year	PMF
	Difference in Total Days[b]	--------------------------- average of a revenue loss ---------------------------				
Corn						
3	1 to 5	-$6.77	-$6.71	-$6.65	-$6.93	-7.38
3	6 to 10	-$67.60	-$19.62	-$22.84	-$36.69	-44.79
5	11 to 15	-$73.79	na	na	-$178.48	na
5	16 to 20	-$14.53	-$16.26	-$10.00	-$162.11	na
5	20 to 25	-$20.11	-$22.42	-$21.91	-$28.90	na
5	26 to 30	-$32.36	-$36.40	-$33.46	-$41.72	na
3	30+	-$365.90	-$368.48	-$343.60	na	na
Soybeans						
3	1 to 5	-$0.69	-$0.48	-$0.13	-$2.16	-1.15
3	6 to 10	-$10.91	-$1.76	-$1.55	-$4.59	-7.47
5	11 to 15	-$7.29	na	na	-$119.87	na
5	16 to 20	-$1.15	-$1.30	-$0.50	-$129.46	na
5	20 to 25	-$0.93	-$1.13	-$1.09	-$2.14	na
5	26 to 30	-$2.44	-$2.87	-$1.69	-$11.18	na
3	30+	-$170.89	-$173.57	-$173.20	na	na
Wheat						
3	1 to 5	-$7.32	-$9.16	-$9.28	-$4.82	-5.95
3	6 to 10	-$48.12	-$29.88	-$29.50	-$33.74	-32.75
5	11 to 15	-$67.21	na	na	-$56.77	na
5	16 to 20	-$26.10	-$27.28	-$24.84	-$47.79	na
5	20 to 25	-$30.41	-$34.83	-$29.79	-$43.78	na
5	26 to 30	-$47.30	-$52.34	-$46.62	-$38.68	na
3	30+	-$155.91	-$156.51	-$135.01	na	na
Sugarbeets						
3	1 to 5	-$21.22	-$25.24	-$22.29	-$14.32	-16.94
3	6 to 10	-$138.91	-$64.82	-$79.25	-$77.17	-107.05
5	11 to 15	-$196.44	na	na	-$234.02	na
5	16 to 20	-$75.98	-$78.33	-$57.18	-$305.13	na
5	20 to 25	-$95.72	-$101.73	-$88.49	-$129.64	na
5	26 to 30	-$139.98	-$110.65	-$137.94	-$126.75	na
3	30+	-$594.31	-$621.31	-$570.16	na	na

Na=not applicable. There were no storage areas in those hydrology groups.
PMF=probabilistic maximum flood.
[a] Represents an average of all storage areas Within the hydrology groups and excludes replications With no revenue loss.
[b] Total days are defined as the sum of 1) days from staging activation until land becomes inundated, 2) days of inundation, and 3) 14-day dry-down. Zero days mean the storage areas do not flood With existing conditions, but zero days do not necessarily mean conditions in the region are suitable for planting.

Distribution of Revenue Losses

Revenue losses for all crops for all storage areas were summed, and sorted from lowest to highest over the 10,000 replications. The distribution of the revenue losses for storage areas in Hydrology Group 3 were compared among the ten flood events using a 10-day dry down period (Figures 31 and 36). Results for Hydrology Group 3 with a 14-day dry down periods are presented in Figures 37 and 40). Across all flood events, except the 10-year flood event, Hydrology Group 3 is indicative of a relative high frequency of modest overall revenue losses. By comparison, overall revenue losses for storage areas in Hydrology Group 5 are slightly less frequent, but produce some losses of greater magnitude (Figures 32 and 35 for 10-day dry down period and Figures 38 and 41 for 14-day dry down period).

Figures 33 and 36 show the revenues losses for Hydrology Groups 3 and 5 combined for the 10 flood events using a 10-day dry down. Results for combining Hydrology Groups 3 and 5 for the 10 flood events for a 14-day dry down are presented in Figures 39 and 42. Results for the two hydrology groups were first summed, and then sorted to show the distribution across the 10,000 replicates.

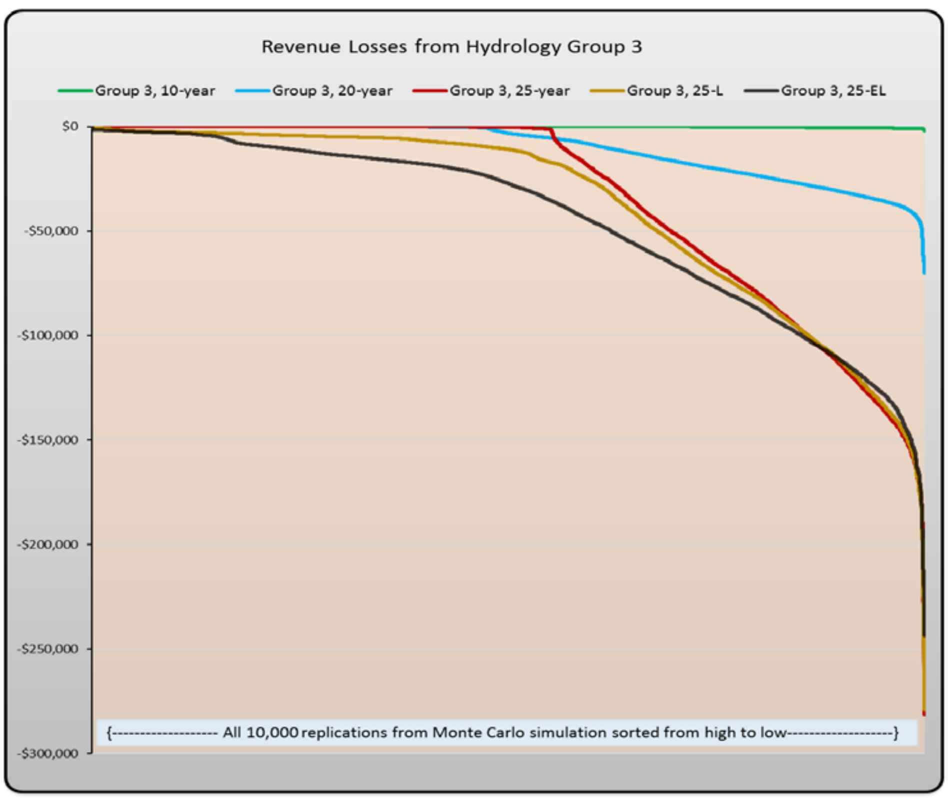

Figure 31. Sorted Distribution of Total Revenue Losses, Hydrology Group Three, 10-year, 20-year, 25-year, 25-year Long, 25-year Extra Long Flood Events, for All Monte Carlo Replications, 10-day Dry Down Period.

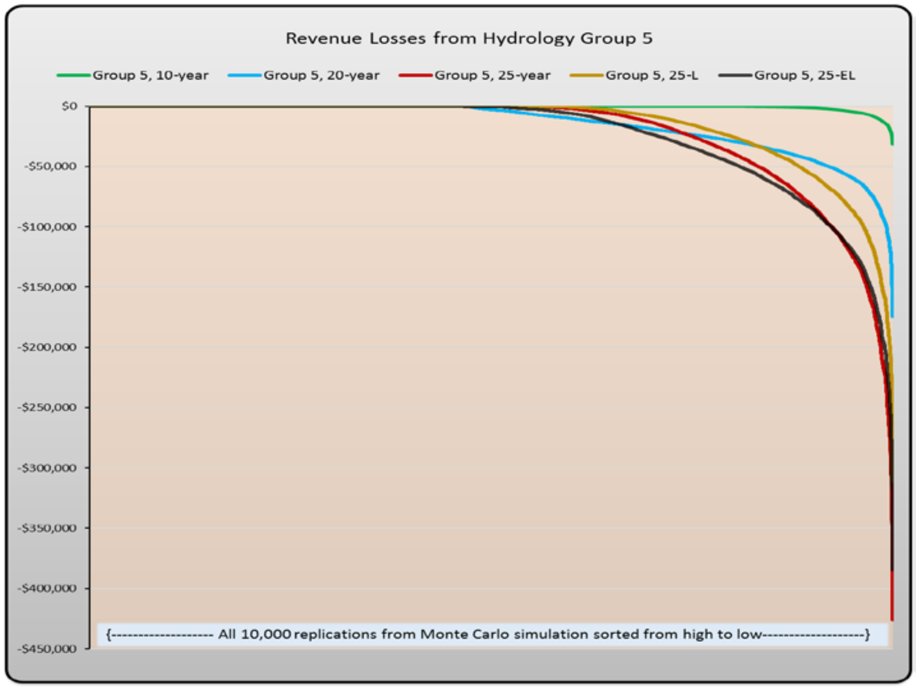

Figure 32. Sorted Distribution of Total Revenue Losses, Hydrology Group Five, 10-year, 20-year, 25-year, 25-year Long, 25-year Extra Long Flood Events, for All Monte Carlo Replications, 10-day Dry Down Period.

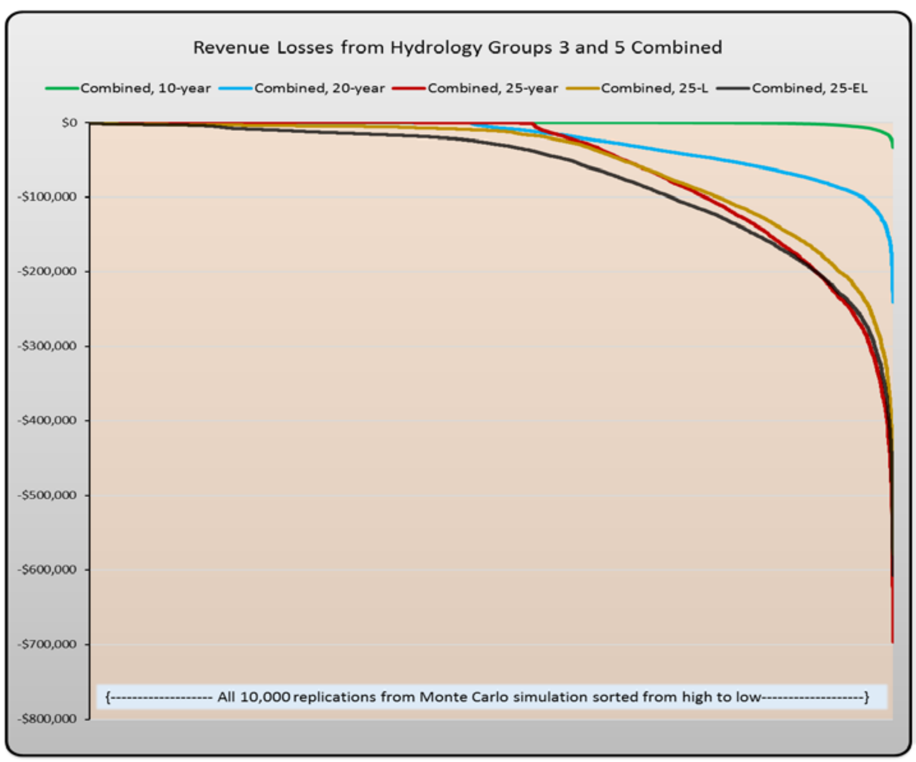

Figure 33. Sorted Distribution of Total Revenue Losses, Hydrology Groups Three and Five Combined, 10-year, 20-year, 25-year, 25-year Long, 25-year Extra Long Flood Events, for All Monte Carlo Replications, 10-day Dry Down Period.

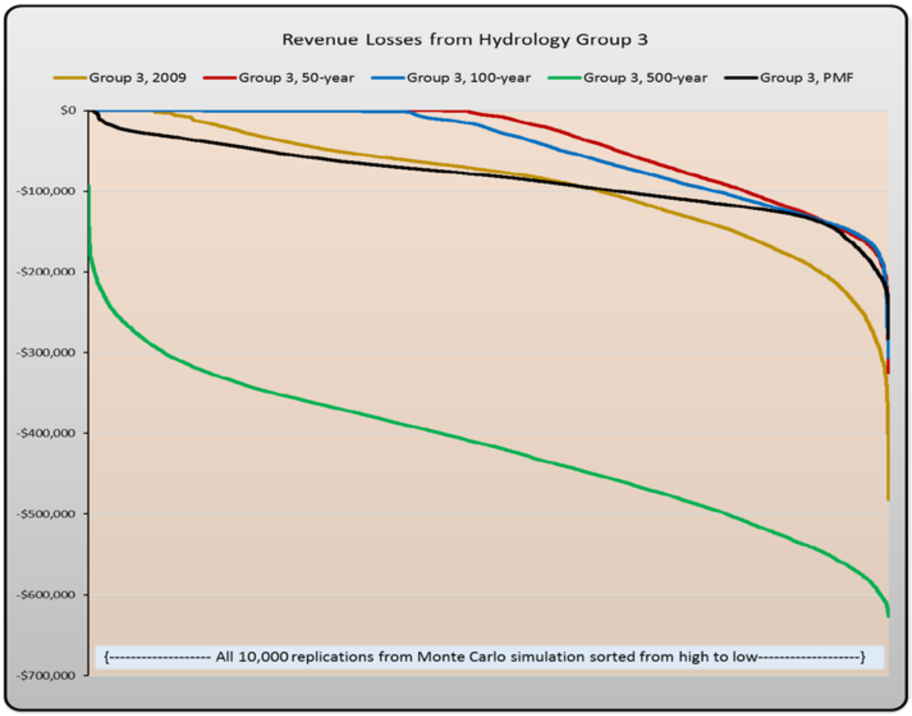

Figure 34. Sorted Distribution of Total Revenue Losses, Hydrology Group Three, 2009-like, 50-year, 100-year, 500-year, Probabilistic Maximum Flood Events, for All Monte Carlo Replications, 10-day Dry Down Period.

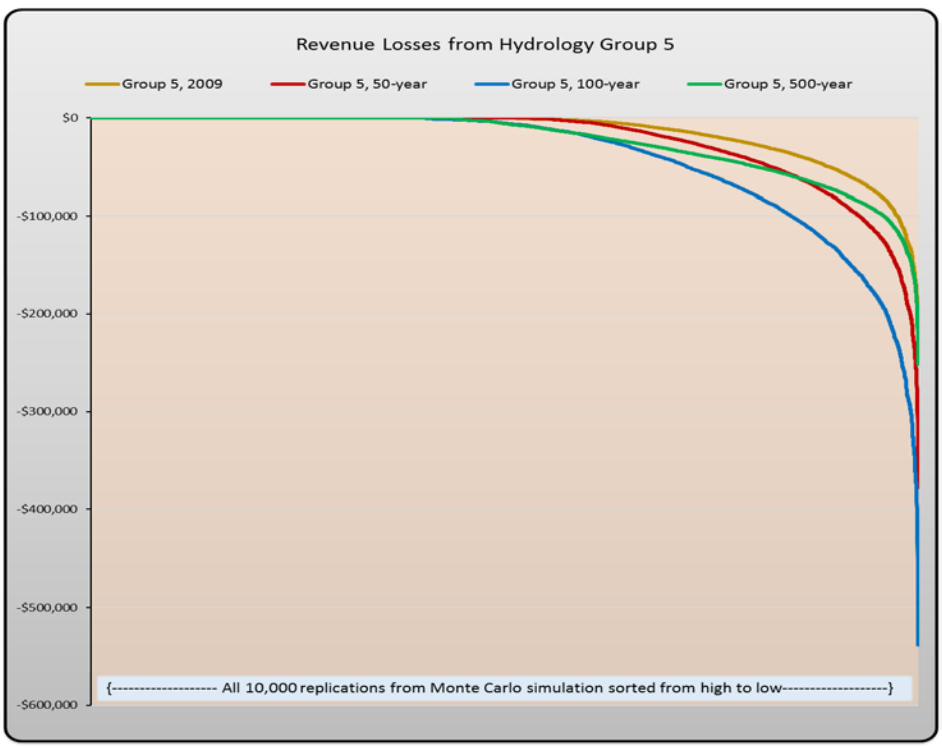

Figure 35. Sorted Distribution of Total Revenue Losses, Hydrology Group Five, 2009-like, 50-year, 100-year, 500-year, Probabilistic Maximum Flood Events, for All Monte Carlo Replications, 10-day Dry Down Period.

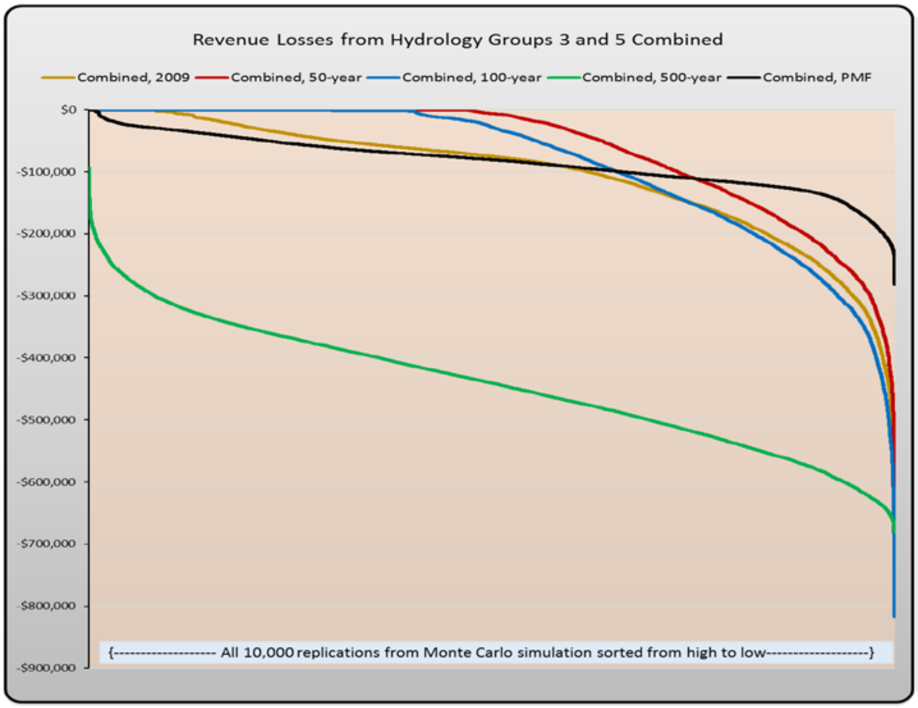

Figure 36. Sorted Distribution of Total Revenue Losses, Hydrology Groups Three and Five Combined, 2009-like, 50-year, 100-year, 500-year, Probabilistic Maximum Flood Events, for All Monte Carlo Replications, 10-day Dry Down Period.

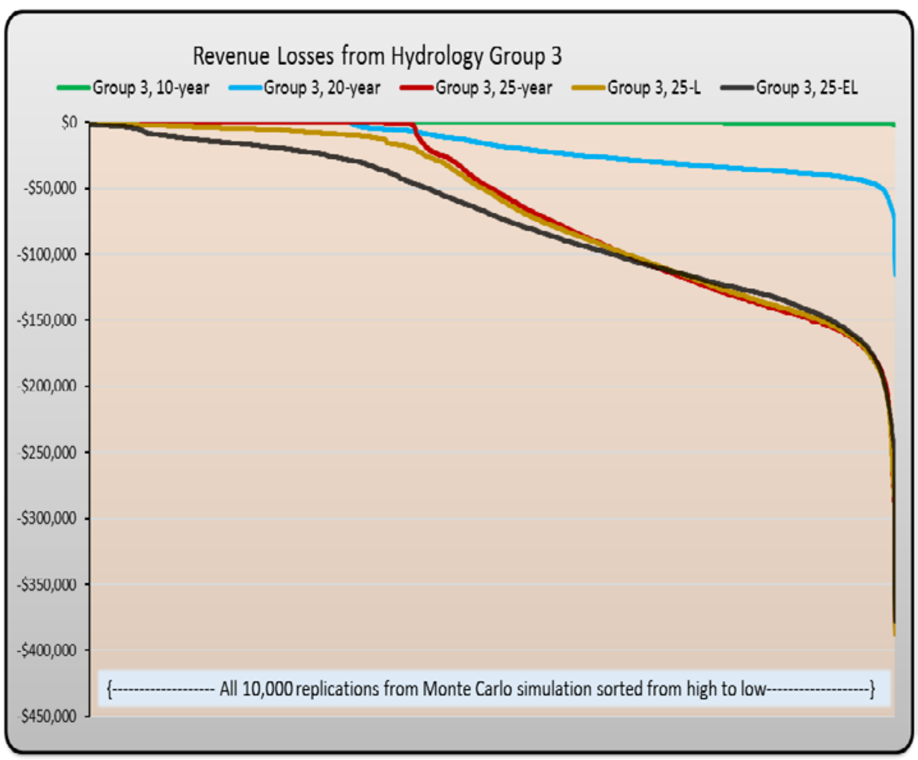

Figure 37. Sorted Distribution of Total Revenue Losses, Hydrology Group Three, 10-year, 20-year, 25-year, 25-year Long, 25-year Extra Long Flood Events, for All Monte Carlo Replications, 14-day Dry Down Period.

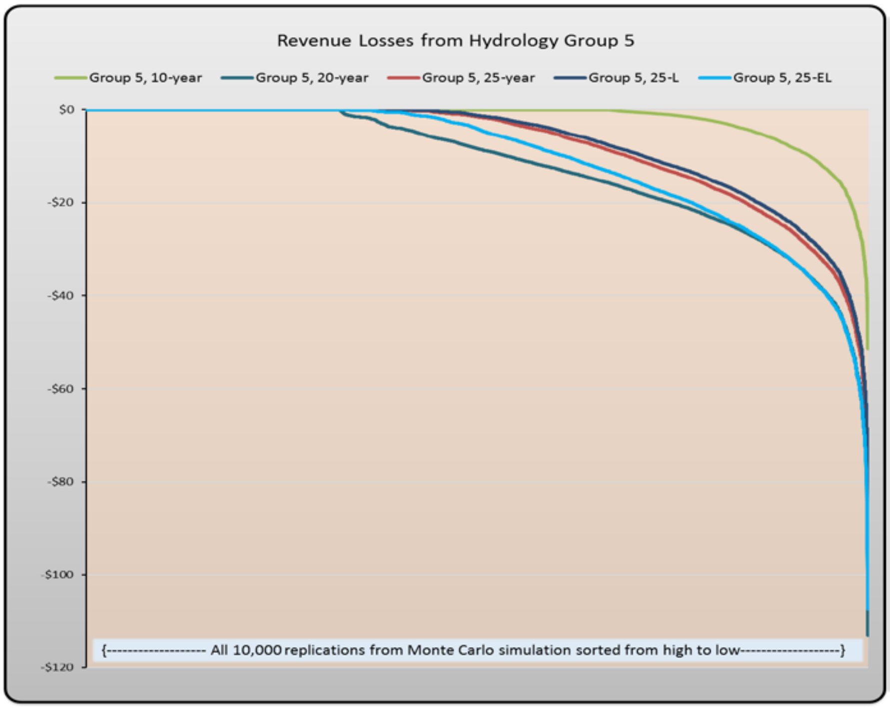

Figure 38. Sorted Distribution of Total Revenue Losses, Hydrology Group Five, 10-year, 20-year, 25-year, 25-year Long, 25-year Extra Long Flood Events, for All Monte Carlo Replications, 14-day Dry Down Period.

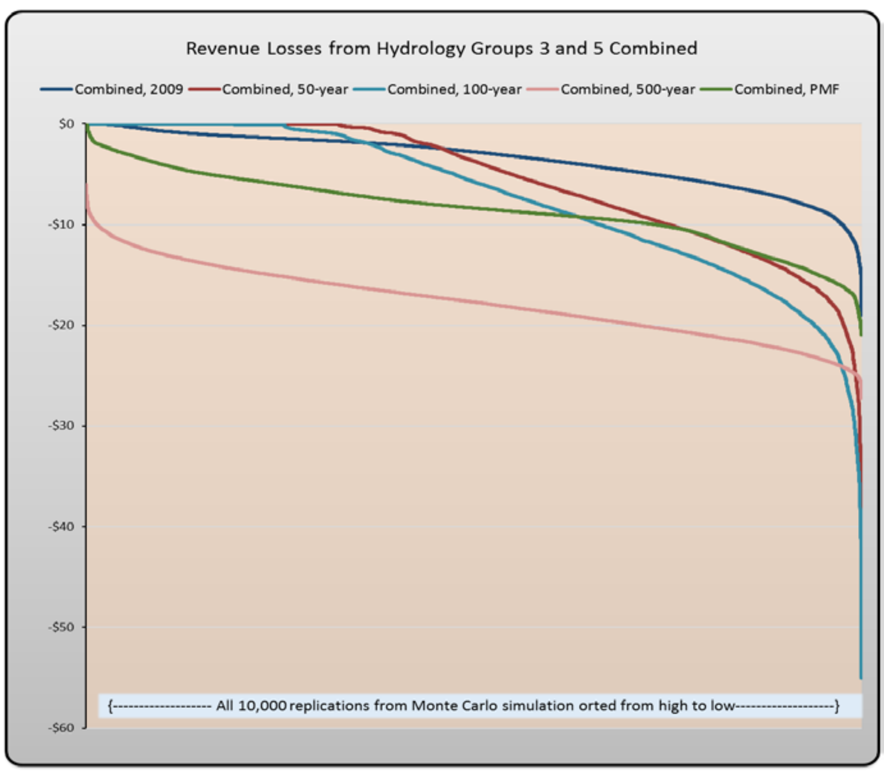

Figure 39. Sorted Distribution of Total Revenue Losses, Hydrology Groups Three and Five Combined, 10-year, 20-year, 25-year, 25-year Long, 25-year Extra Long Flood Events, for All Monte Carlo Replications, 14-day Dry Down Period.

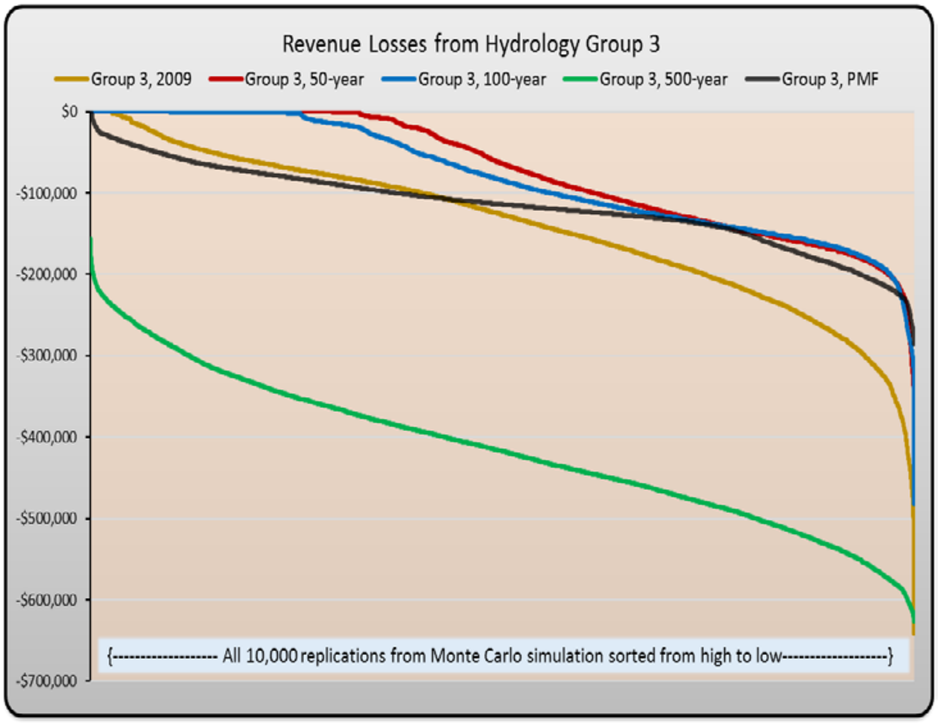

Figure 40. Sorted Distribution of Total Revenue Losses, Hydrology Group Three, 2009-like, 50-year, 100-year, 500-year, Probabilistic Maximum Flood Events, for All Monte Carlo Replications, 14-day Dry Down Period.

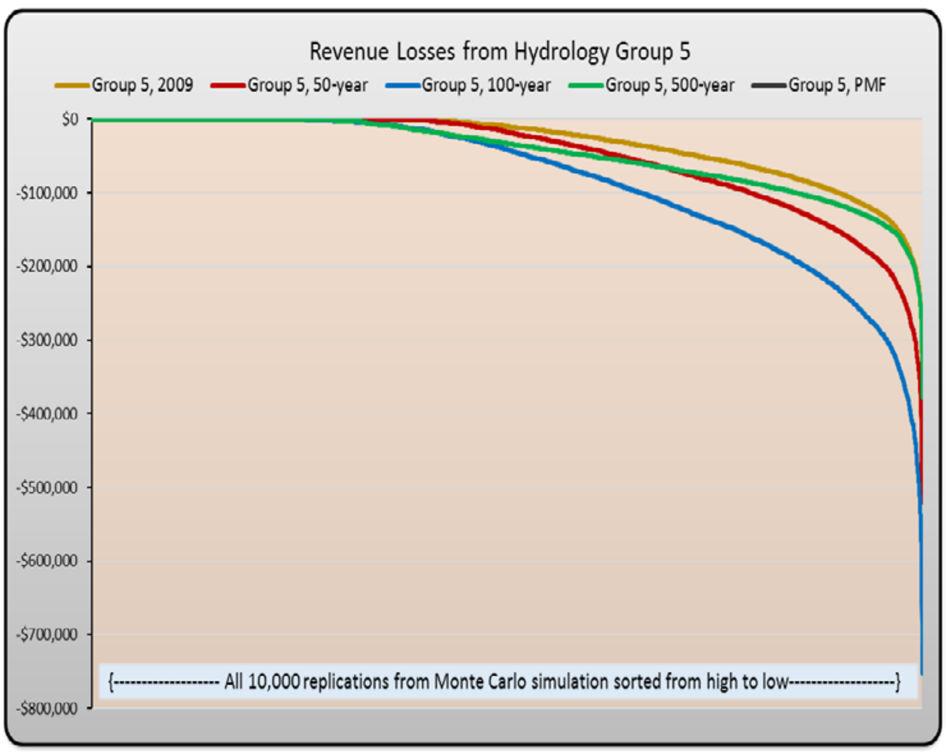

Figure 41. Sorted Distribution of Total Revenue Losses, Hydrology Group Five, 2009-like, 50-year, 100-year, 500-year, Probabilistic Maximum Flood Events, for All Monte Carlo Replications, 14-day Dry Down Period.

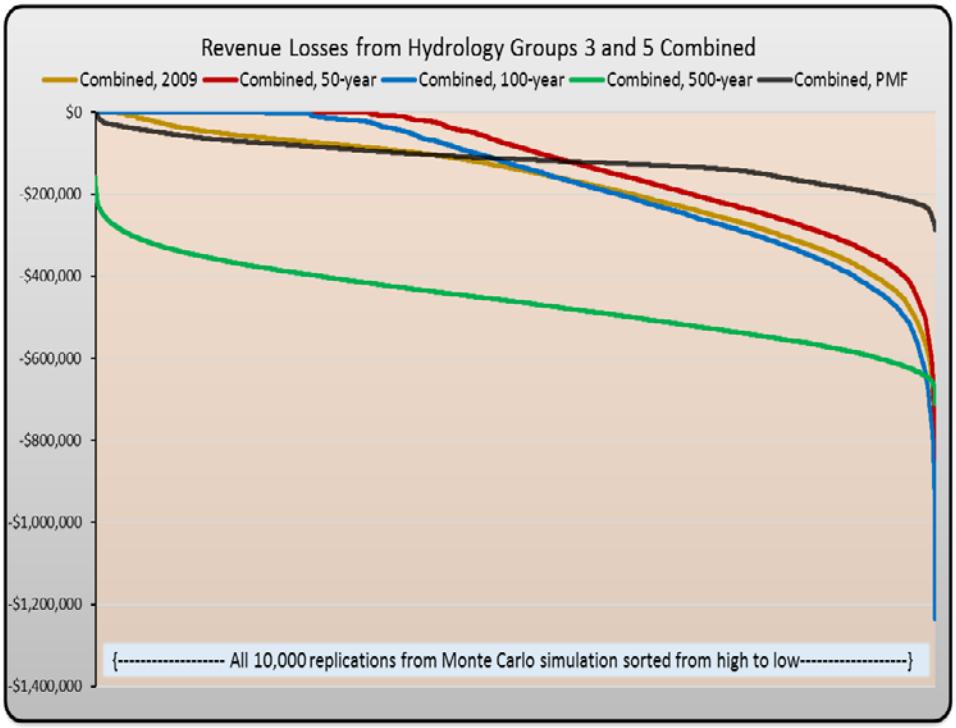

Figure 42. Sorted Distribution of Total Revenue Losses, Hydrology Groups Three and Five Combined, 2009-like, 50-year, 100-year, 500-year, Probabilistic Maximum Flood Events, for All Monte Carlo Replications, 14-day Dry Down Period.

Conclusions

Overall, the economic impact of Diversion Operations on planting delays in the 241 storage areas was modest. In evaluating the historical data and expected differences in flooding created by the Diversion, several reasons underpin this conclusion.

There are no recorded flows on the Red River due to rain that would have triggered the use of the Diversion during the crop growing season. Historically, the Diversion would have never been needed to protect against a summer flood. The Diversion is not expected to create losses after spring planting season.

Spring snow melt and runoff, in most cases, occur early relative to the regional planting season. During much of the flood-event, no planting occurs due to snow melt, cold temperaturs, and overall wet conditions. Statistical analysis of the historical data suggest there was limited overlap between spring runoff and planting.

The engineering data indicate that the combined capacity of the Red River and the Diversion channel, once the community is protected with dikes, will move extensive amounts of water around the community. The exact amount and timing will not be known until the Diversion Operating Manual is finalized by the U.S. Corps of Engineers, but the preliminary indications are that the Red River will handle 17,000 cfs through the community and the Diversion channel will handle an additional 22,000 cfs around the community. However, despite the stated capacities, the timing and flow of flood waters also will be based on the characteristics of the flood-event, and all floods are unique (e.g., compare the 1997 flood event to the 2009 flood event). The combined flow capacity of 39,000 cfs clearly exceeds the largest flow in Fargo of 29,800 cfs observed in 2009. Both the stated design capacity of the Diversion and the current hydrology data suggest that water will not be retained in the staging area for extensive periods, and it is highly likely that those lands will be planted in a flood year.

In the more modest flood events (e.g., 25-year and 50-year events), many storage areas are not adversely affected by the Diversion. About 20 percent to 40 percent of acreage in the staging area, most lying in relatively low elevations, would experience flooding Without the Diversion. Current hydrology modeling suggests that the majority of lands that would flood Without the Diversion will experience 1 to 10 days of additional time for the effects of flooding to be gone (Group 3). For those lands, the Diversion may contribute to a delayed planting but is not responsible for all of the delayed planting. Most lands that will experience new flooding With the Diversion (Group 5) would require up to 20 to 30 days from the date when the staging area is activated until the effects of flooding are gone, depending upon dry down assumptions. However, not all of those days translate directly into planting delays. For much of that period, general weather conditions, such as temperature and normal dry-down from snow melt, prevent spring planting.

The impacts of planting delays from Diversion operations on corn, wheat, and sugarbeets are likely to be substantially different than soybeans. Soybeans had the lowest frequency and magnitude of revenue loss of the four crops. Soybeans also have the lowest relative yield decline of the four crops when planted beyond the optimal period. Over the planting periods evaluated in this study, planting delays have less relative impact on soybeans than corn, wheat, or sugarbeets. Soybeans also are planted later in the spring, reducing the likelihood of planting delays due to the use of the staging area. This combination of factors is why soybeans have the lowest per-acre revenue losses. Soybeans also comprise the largest share of crops grown in the staging area, which further reduces the average revenue losses when all crop losses are combined within an entire storage area.

Operation of the Diversion creates a high likelihood of modest planting delays and subsequent revenue loss. The likelihood of incurring a planting delay increases as flood events increase in size and duration. Results are somewhat sensitive to the assumptions used for dry down periods, as adding four days to the 10-day dry down period increases both the likelihood and magnitude of losses from planting delays.

Due to the complexity of the hydrology, which varies by storage area for the flood events evaluated, generalized statements about how producers will be individually affected are difficult. Revenue losses across all acres and crops within a storage area and by hydrology group measures the potential cumulative losses in the staging area and identifies general risk. However, care should be exercised that generalities and averages mask substantial differences for individual crops and storage areas. The economic impacts on some agricultural producers are likely to be considerably different from the average values within the hydrology groups.

Total losses in this study were based on the assumption that if any portion of a storage area was inundated, all land within that storage area was equally affected. Given the lack of available data to refine that assumption, developing estimates using all acreage was the best approach. However, overall losses due to the use of the Diversion would be sensitive to that assumption. Finally, including the value of lost insurance indemnities would increase total losses.

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Appendix A

Hydrology Data for Storage Areas, With and Without Diversion Conditions, 10-year, 20-year, 25-year, 25 year Long, 25-year Extra Long, 2009-like, 50-year, 100-year, 500-year, and Probabilistic Maximum Flood Events

FM Diversion Staging Area

Appendix Table A1. Storage Area Data, FM Diversion Staging Area, Phase 9.1 HEC-RAS Modeling							
Storage Area	Section	Township	Range	County	State	Approximate Field Elevation[a]	Acres
BD1	2	137	49	Cass	ND	908	23.2
CHRSA01	26	137	49	Cass	ND	915	306.7
CHRSA02	25	137	49	Cass	ND	914.5	305.0
CHRSA03	35	137	49	Cass	ND	918	304.2
CHRSA04	36	137	49	Cass	ND	918	283.6
CHRSA05E	2	136	49	Richland	ND	920	174.9
CHRSA05W	2	136	49	Richland	ND	920	142.7
CHRSA06	2	136	49	Richland	ND	921	116.6
CHRSA07	2	136	49	Richland	ND	915	150.5
CHRSA08	2	136	49	Richland	ND	918.5	160.5
CHRSA09	11	136	49	Richland	ND	923	301.1
CHRSA10	11	136	49	Richland	ND	922	326.5
CHRSA100	8	135	48	Richland	ND	931	46.5
CHRSA101	8	135	48	Richland	ND	924	218.8
CHRSA102	5	135	48	Richland	ND	928	277.6
CHRSA103	29	136	48	Richland	ND	918	135.9
CHRSA104	29	136	48	Richland	ND	926.5	61.4
CHRSA105	32	136	48	Richland	ND	919	88.5
CHRSA106	32	136	48	Richland	ND	925	42.7
CHRSA107	32	136	48	Richland	ND	927.5	75.1
CHRSA108	20	136	48	Richland	ND	923	20.3
CHRSA109	12	136	49	Richland	ND	918	634.0
CHRSA11	14	136	49	Richland	ND	924.5	304.7
CHRSA110	18	136	48	Richland	ND	913.5	146.2
CHRSA111	7	136	48	Richland	ND	921	46.9
CHRSA112	7	136	48	Richland	ND	918	17.1
CHRSA113	7	136	48	Richland	ND	919.5	11.9
CHRSA114	36	137	49	Cass	ND	910.5	447.9
CHRSA115	25	137	49	Cass	ND	918	97.8
CHRSA116	25	137	49	Cass	ND	916.5	129.4
CHRSA117	1	136	49	Richland	ND	919.5	50.8
CHRSA118	1	136	49	Richland	ND	919.5	85.2
CHRSA119	1	136	49	Richland	ND	918.5	226.6
CHRSA12	14	136	49	Richland	ND	924	326.9
CHRSA120	25	137	49	Cass	ND	916	59.8
CHRSA13	13	136	49	Richland	ND	918	628.8
CHRSA14	23	136	49	Richland	ND	924	310.3

-continued-

Table A1. Continued							
Storage Area	Section	Township	Range	County	State	Approximate Field Elevation[a]	Acres
CHRSA17	18	136	48	Richland	ND	918	838.7
CHRSA18	26	136	49	Richland	ND	922	852.7
CHRSA18E	26	236	49	Richland	ND	922	252.6
CHRSA19	25	136	49	Richland	ND	921	807.2
CHRSA20	30	136	48	Richland	ND	921	631.2
CHRSA21	36	136	49	Richland	ND	927.5	268.8
CHRSA22	36	136	49	Richland	ND	927.5	354.0
CHRSA23	31	136	48	Richland	ND	920	635.3
CHRSA24	2	135	49	Richland	ND	927.5	632.4
CHRSA25	1	135	49	Richland	ND	928	631.4
CHRSA26	6	135	48	Richland	ND	928.5	80.4
CHRSA27	6	135	48	Richland	ND	924	547.7
DIVSA100	20	137	48	Clay	MN	913	560.0
DIVSA101	29	137	48	Clay	MN	914	566.7
DIVSA102	32	137	48	Clay	MN	915	585.0
DIVSA105	6	137	49	Cass	ND	915.5	472.5
DIVSA106E	1	137	50	Cass	ND	919	54.9
DIVSA107E	12	137	50	Cass	ND	919.5	508.9
DIVSA84	5	137	49	Cass	ND	913	690.7
DIVSA84E	32	138	49	Cass	ND	907.5	241.4
DIVSA85E	29	138	49	Cass	ND	904.5	150.1
DIVSA86S	28	138	49	Cass	ND	905.5	396.2
DIVSA87S	27	138	49	Cass	ND	908.5	273.3
DIVSA88W	34	138	49	Cass	ND	907	442.0
DIVSA89W	3	137	49	Cass	ND	910.5	453.0
DIVSA90S	2	137	49	Cass	ND	907.5	65.5
DIVSA93S	7	137	48	Cass	ND	908	120.1
DIVSA94	1	137	49	Cass	ND	908	156.2
DIVSA95	1	137	49	Cass	ND	908.5	119.8
DIVSA98W	8	137	48	Clay	MN	912.5	159.7
DIVSA99W	17	137	48	Clay	MN	910.5	439.8
DRAIN370	8	136	49	Richland	ND	922.5	157.7
DRAIN371	8	136	49	Richland	ND	921.5	160.3
DRAIN372	5	136	49	Richland	ND	920	318.8
DRAIN373	33	137	49	Cass	ND	919	331.6
DRAIN374	28	137	49	Cass	ND	915	240.7
RR10	18	137	48	Clay	MN	909	49.7
RR11	18	137	48	Cass	ND	909	77.8
RR14	19	137	48	Clay	MN	914	45.6
-continued-							

Table A1. Continued							
Storage Area	Section	Township	Range	County	State	Approximate Field Elevation[a]	Acres
RR15	19	137	48	Cass	ND	908	68.3
RR16	19	137	48	Clay	MN	916	38.5
RR17	25	137	48	Cass	ND	910	95.2
RR18	30	137	48	Clay	MN	913	72.4
RR19	30	137	48	Cass	ND	909	60.1
RR20	30	137	48	Clay	MN	919	34.1
RR21	31	137	48	Cass	ND	909	105.2
RR22	31	137	48	Clay	MN	917.5	55.7
RR23	31	137	48	Cass	ND	912.5	38.6
RR24	31	137	48	Clay	MN	921.5	134.9
RR25	1	136	48	Richland	ND	920	113.7
RR26	1	136	49	Wilkin	MN	913	95.5
RR27	1	136	48	Richland	ND	917	104.2
RR28	1	136	49	Wilkin	MN	923	98.1
RR29	7	136	48	Richland	ND	921	101.6
RR3	6	137	48	Cass	ND	910.5	19.2
RR30	7	136	48	Wilkin	MN	922.5	85.1
RR31	7	136	48	Richland	ND	916.5	59.8
RR32	7	136	48	Wilkin	MN	916	57.0
RR33	18	136	48	Richland	ND	913.5	64.2
RR34	18	136	48	Wilkin	MN	913	82.5
RR35	18	136	48	Richland	ND	914	47.4
RR36	17	136	48	Wilkin	MN	916.5	76.2
RR37	20	136	48	Richland	ND	914.5	174.5
RR38	20	136	48	Wilkin	MN	923.5	83.3
RR39	20	136	48	Richland	ND	915.5	98.8
RR4	6	137	48	Clay	MN	906.5	53.6
RR40	20	136	48	Wilkin	MN	925.5	77.1
RR41	29	136	48	Richland	ND	915.5	61.2
RR42	29	136	48	Wilkin	MN	916	51.6
RR43	29	136	48	Richland	ND	920	104.0
RR44	29	136	48	Wilkin	MN	924	110.0
RR45	32	136	48	Richland	ND	923	61.7
RR46	32	136	48	Wilkin	MN	932	64.1
RR47	32	136	48	Richland	ND	927.5	73.3
RR48	32	136	48	Wilkin	MN	928	96.9
RR49	5	135	48	Richland	ND	926.5	116.0
RR51	5	135	48	Richland	ND	919	96.1
RR52	5	135	48	Wilkin	MN	933	54.6
-continued-							

Table A1. Continued							
Storage Area	Section	Township	Range	County	State	Approximate Field Elevation[a]	Acres
RR53	8	135	48	Richland	ND	919	168.8
RR54	9	135	48	Wilkin	MN	932.5	37.7
RR55	8	135	48	Richland	ND	919	117.5
RR56	9	135	48	Wilkin	MN	918	45.5
RR57	17	135	48	Richland	ND	919	193.2
RR58	16	135	48	Wilkin	MN	914.5	69.1
RR59	17	135	48	Richland	ND	919	139.2
RR6	7	137	48	Clay	MN	910	39.3
RR60	16	135	48	Wilkin	MN	915	107.9
RR7	7	137	48	Cass	ND	907	47.3
RR8	7	137	48	Clay	MN	909.5	34.9
RR9	18	137	48	Cass	ND	900	90.2
WLVSA200	28	136	48	Wilkin	MN	918	105.4
WLVSA202	33	136	48	Wilkin	MN	928	357.6
WLVSA203	28	136	48	Wilkin	MN	927	13.9
WLVSA204	29	136	48	Wilkin	MN	918	103.5
WLVSA205	17	136	48	Wilkin	MN	924	46.6
WLVSA206	20	136	48	Wilkin	MN	924	110.8
WLVSA207	20	136	48	Wilkin	MN	925.5	139.0
WLVSA208	17	136	48	Wilkin	MN	923.5	26.7
WLVSA209	18	136	48	Wilkin	MN	915.5	51.3
WLVSA210	7	136	48	Wilkin	MN	920.5	90.3
WLVSA211	7	136	48	Wilkin	MN	923	160.7
WLVSA212	30	137	48	Clay	MN	919.5	29.2
WLVSA213	30	137	48	Clay	MN	920	45.9
WLVSA214	30	137	48	Clay	MN	919.5	75.3
WLVSA215	31	137	48	Clay	MN	911	92.9
WLVSA216	31	137	48	Clay	MN	914.5	42.4
WLVSA217	31	137	48	Clay	MN	922	62.4
WLVSA218	6	136	48	Wilkin	MN	921	242.3
WLVSA219	6	136	48	Wilkin	MN	922	188.3
WLVSA220	18	137	48	Clay	MN	908.5	33.6
WLVSA221	18	137	48	Clay	MN	908.5	31.5
WLVSA222	18	137	48	Clay	MN	913	68.8
WLVSA223	18	137	48	Clay	MN	910	56.2
WLVSA224	19	137	48	Clay	MN	912.5	81.1
WLVSA227	19	137	48	Clay	MN	915.5	37.6
WLVSA228	19	137	48	Clay	MN	911.5	35.8
WLVSA229	19	137	48	Clay	MN	910	65.7
-continued-							

Table A1. Continued							
Storage Area	Section	Township	Range	County	State	Approximate Field Elevation[a]	Acres
WLVSA230	19	137	48	Clay	MN	910	30.8
WLVSA231	19	137	48	Clay	MN	910.5	8.5
WLVSA232	19	137	48	Clay	MN	916	40.5
WLVSA233	30	137	48	Clay	MN	912	154.6
WLVSA234	30	137	48	Clay	MN	917.5	57.5
WLVSA235	7	137	48	Clay	MN	908.5	13.8
WLVSA236	7	137	48	Clay	MN	910	56.1
WLVSA237	7	137	48	Clay	MN	910	101.8
WLVSA57	5	136	48	Wilkin	MN	921	210.4
WLVSA64	8	136	48	Wilkin	MN	922	400.2
WLVSA65	17	136	48	Wilkin	MN	919.5	127.0
WLVSA66	17	136	48	Wilkin	MN	923	212.3
WRRND1	21	136	49	Richland	ND	920	423.4
WRRND10	34	137	49	Cass	ND	916.5	320.2
WRRND11	34	137	49	Cass	ND	919.5	197.0
WRRND12	21	137	49	Cass	ND	916	351.3
WRRND13	21	137	49	Cass	ND	913.5	288.0
WRRND14	22	137	49	Cass	ND	912.5	214.1
WRRND15	22	137	49	Cass	ND	911	172.9
WRRND16	15	137	49	Cass	ND	912.5	116.6
WRRND17	15	137	49	Cass	ND	911	75.9
WRRND18	10	137	49	Cass	ND	908.5	202.4
WRRND19	11	137	49	Cass	ND	906.5	16.3
WRRND2	21	136	49	Richland	ND	920	317.3
WRRND3	16	136	49	Richland	ND	919.5	341.0
WRRND4	16	136	49	Richland	ND	918.5	288.6
WRRND5	9	136	49	Richland	ND	918	322.0
WRRND6	9	136	49	Richland	ND	918.5	315.5
WRRND7	4	136	49	Richland	ND	917	303.6
WRRND8	4	136	49	Richland	ND	917	355.2
WRRND9	34	137	49	Cass	ND	917.5	146.2
WRSA273	20	136	49	Richland	ND	929.5	627.2
WRSA280	7	136	49	Richland	ND	925.5	583.0
WRSA284	6	136	49	Richland	ND	923	597.4
WRSA300	21	137	49	Cass	ND	909.5	626.3
WRSA302	23	137	49	Cass	ND	913	245.6
WRSA303	18	137	49	Cass	ND	919.5	639.6
WRSA304	17	137	49	Cass	ND	915	634.8
WRSA289	32	137	49	Cass	ND	923.5	629.3
-continued-							

Table A1. Continued							
Storage Area	Section	Township	Range	County	State	Approximate Field Elevation[a]	Acres
WRSA305A	9	137	49	Cass	ND	910.5	225.0
WRSA305B	9	137	49	Cass	ND	910.5	407.9
WRSA305C	15	137	49	Cass	ND	906	808.3
WRSA305D	10	137	49	Cass	ND	906	431.6
WRSA306	13	137	49	Cass	ND	908	495.9
WRSA307	13	137	49	Cass	ND	911	209.5
WRSA308	7	137	49	Cass	ND	917	637.9
WRSA309	8	137	49	Cass	ND	914.5	635.5
WRSA311	11	137	49	Cass	ND	907	305.2
WRSA312	12	137	49	Cass	ND	906.5	631.3
WRSA315	4	137	49	Cass	ND	909.5	613.4
WRSA321	33	138	49	Cass	ND	906.5	625.2
WRSA350	11	137	49	Cass	ND	910.5	274.3
WRSA351	14	137	49	Cass	ND	908.5	308.7
WRSA352	23	137	49	Cass	ND	911	296.9
WRSA353	26	137	49	Cass	ND	917.5	291.9
WRSA354	35	137	49	Cass	ND	919	295.3
WRSA355	3	136	49	Richland	ND	917.5	415.4
WRSA356	10	136	49	Richland	ND	920.5	622.2
WRSA357	15	136	49	Richland	ND	921.5	614.4
WRSA358	22	136	49	Richland	ND	923	491.6
WRSA359	27	136	49	Richland	ND	923	437.5
WRSA360	34	136	49	Richland	ND	924	242.3
WRSA363	15	137	49	Cass	ND	911.5	268.2
WRSA364	22	137	49	Cass	ND	913	251.8
WRSA373	17	136	49	Richland	ND	927.5	631.8
WRSA378	8	136	49	Richland	ND	926	156.1
WRSA383	5	136	49	Richland	ND	924	152.7
WRSA384	8	136	49	Richland	ND	925	155.0
WRSA389	5	136	49	Richland	ND	923	150.7
WRSA390	33	137	49	Cass	ND	917.5	268.9
WRSA501	18	137	48	Cass	ND	911	71.8
WRSA502	18	137	48	Cass	ND	913	13.2
WRSA504	18	137	48	Cass	ND	915	11.7
WRSA507	7	137	48	Cass	ND	902	29.1
WRSA907	28	137	49	Cass	ND	915	393.9

Appendix Table A2. Duration of Water Inundation, by Storage Area, by Flood Event Frequency for With and Without Diversion Conditions, FM Diversion Staging Area, Phase 9.1 HEC-RAS Modeling											
		Days of Water above Storage Area Elevation									
Storage Area	Approx. Field Elevation[a]	Existing Conditions					With Diversion Staging Area				
		10-yr	20-yr	25-yr	25-yr Long	25-yr ELong	10-yr	20-yr	25-yr	25-yr Long	25-yr ELong
BD1	908.00	5.5	9.5	10.5	17.5	23.0	5.5	10.5	11.0	17.5	23.0
CHRSA01	915.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.0	7.0	8.5
CHRSA02	914.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.0	7.0	9.0
CHRSA03	918.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CHRSA04	918.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CHRSA05E	920.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CHRSA05W	920.00	0.0	3.5	4.0	5.0	8.0	0.0	3.5	4.5	6.0	10.0
CHRSA06	921.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CHRSA07	915.00	0.0	0.0	0.0	6.0	11.5	0.0	0.0	6.0	8.5	13.0
CHRSA08	918.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.0	5.5
CHRSA09	923.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CHRSA10	922.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CHRSA100	931.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CHRSA101	924.00	0.0	0.0	1.0	7.5	15.0	0.0	0.0	1.5	8.5	15.0
CHRSA102	928.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CHRSA103	918.00	0.0	3.0	4.5	12.0	19.0	0.0	3.0	6.5	12.5	19.0
CHRSA104	926.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CHRSA105	919.00	0.0	3.5	4.5	12.0	19.0	0.0	3.5	7.0	12.5	19.0
CHRSA106	925.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CHRSA107	927.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CHRSA108	923.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CHRSA109	918.00	0.0	0.0	0.0	2.5	4.5	0.0	0.0	0.0	7.0	10.0
CHRSA11	924.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CHRSA110	913.50	0.0	6.0	7.5	15.0	21.5	0.0	6.0	9.0	15.0	21.5
CHRSA111	921.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CHRSA112	918.00	0.0	0.0	0.0	2.5	4.5	0.0	0.0	0.0	7.0	10.0
CHRSA113	919.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.5	7.0
CHRSA114	910.50	0.0	6.5	8.0	15.0	21.5	0.0	6.5	10.0	15.5	21.5
CHRSA115	918.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.0	7.0
CHRSA116	916.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.5	7.5
CHRSA117	919.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CHRSA118	919.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CHRSA119	918.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.0	5.5
CHRSA12	924.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CHRSA120	916.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	6.5	8.5
CHRSA13	918.00	0.0	0.0	0.0	7.0	14.0	0.0	0.0	4.0	8.5	14.0
CHRSA14	924.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CHRSA15	919.50	0.0	0.0	0.0	3.0	5.5	0.0	0.0	0.0	6.5	10.0
- continued -											

Appendix Table A2. Continued											
		Days of Water above Storage Area Elevation									
Storage Area	Approx. Field Elevation[a]	Existing Conditions					With Diversion Staging Area				
		10-yr	20-yr	25-yr	25-yr Long	25-yr ELong	10-yr	20-yr	25-yr	25-yr Long	25-yr ELong
CHRSA16	918.00	0.0	0.0	0.0	7.0	14.0	0.0	0.0	4.0	8.5	14.0
CHRSA17	918.00	0.0	0.0	2.5	9.0	16.5	0.0	0.0	5.5	10.0	16.5
CHRSA18	922.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CHRSA18E	922.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CHRSA19	921.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.0	6.0
CHRSA20	921.00	0.0	0.0	1.5	8.0	15.5	0.0	0.0	3.0	9.5	16.0
CHRSA21	927.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CHRSA22	927.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CHRSA23	920.00	0.0	2.0	3.5	10.0	17.5	0.0	2.0	5.0	11.0	18.0
CHRSA24	927.50	0.0	2.5	3.5	3.5	5.5	0.0	2.5	3.5	3.5	5.5
CHRSA25	928.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CHRSA26	928.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CHRSA27	924.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.0	6.5
DIVSA100	913.00	0.0	0.0	0.0	3.5	6.0	0.0	0.0	6.5	9.0	12.5
DIVSA101	914.00	0.0	0.0	0.0	5.5	8.0	0.0	0.0	6.5	10.0	13.0
DIVSA102	915.00	0.0	0.0	0.0	7.0	12.0	0.0	0.0	7.5	9.5	13.5
DIVSA105	915.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.0	6.0	7.5
DIVSA106E	919.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DIVSA107E	919.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DIVSA84	913.00	0.0	0.0	0.0	3.5	3.5	0.5	2.0	9.5	10.5	12.0
DIVSA84E	907.50	0.0	0.0	0.0	8.0	9.0	0.0	12.0	10.5	10.0	12.0
DIVSA85E	904.50	0.0	4.5	6.5	11.5	16.0	49.0	49.0	49.0	49.0	49.0
DIVSA86S	905.50	0.0	0.0	5.0	11.0	14.5	0.0	13.0	11.0	11.0	13.0
DIVSA87S	908.50	0.0	0.0	0.0	0.0	0.0	0.0	11.0	10.5	10.0	12.0
DIVSA88W	907.00	1.5	8.0	9.5	14.0	21.0	0.0	12.0	10.5	10.0	13.0
DIVSA89W	910.50	0.0	8.0	9.0	12.0	19.5	0.0	8.0	9.0	9.5	11.5
DIVSA90S	907.50	4.5	9.0	10.0	15.5	21.5	0.0	8.0	10.5	16.0	22.0
DIVSA93S	908.00	0.0	5.0	6.5	13.5	20.5	0.0	7.0	10.5	15.0	21.5
DIVSA94	908.00	2.0	9.0	10.0	14.5	21.0	0.0	7.0	10.5	15.0	21.5
DIVSA95	908.50	0.0	5.0	6.5	12.5	19.5	0.0	6.5	10.0	14.0	21.0
DIVSA98W	912.50	0.0	0.0	0.0	3.5	3.5	0.0	0.0	6.5	9.0	12.5
DIVSA99W	910.50	0.0	2.5	4.5	11.0	18.5	0.0	3.5	9.0	12.0	18.5
DRAIN370	922.50	0.5	2.0	2.0	3.5	3.5	0.5	2.0	2.0	3.5	3.5
DRAIN371	921.50	0.0	1.5	1.5	3.0	3.0	0.0	1.5	1.5	3.0	3.0
DRAIN372	920.00	0.0	0.0	0.0	2.0	2.5	0.0	0.0	0.0	2.5	2.5
DRAIN373	919.00	0.0	2.5	3.5	3.5	4.0	0.0	2.5	3.5	5.5	8.0
DRAIN374	915.00	3.5	7.0	8.0	12.0	19.0	3.5	7.0	9.0	12.0	19.0
RR10	909.00	0.0	5.5	7.0	14.0	20.5	0.0	6.0	10.0	14.5	21.0
RR11	909.00	0.0	6.0	8.0	14.5	21.0	0.0	6.5	10.0	15.0	21.5
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Appendix Table A2. Continued											
		Days of Water above Storage Area Elevation									
Storage Area	Approx. Field Elevation[a]	Existing Conditions					With Diversion Staging Area				
		10-yr	20-yr	25-yr	25-yr Long	25-yr ELong	10-yr	20-yr	25-yr	25-yr Long	25-yr ELong
RR11	909.00	0.0	6.0	8.0	14.5	21.0	0.0	6.5	10.0	15.0	21.5
RR12	909.00	0.0	6.0	8.0	14.5	21.0	0.0	6.5	10.0	15.0	21.5
RR13	911.50	0.0	2.0	4.5	11.0	18.5	0.0	3.0	8.5	12.0	18.5
RR14	914.00	0.0	0.0	0.0	4.0	6.5	0.0	0.0	6.0	9.0	12.5
RR15	908.00	3.5	8.5	9.5	17.0	23.5	3.5	8.5	11.0	17.0	23.5
RR16	916.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.0	7.0	9.0
RR17	910.00	0.0	6.0	7.5	14.5	21.5	0.0	6.5	10.0	15.0	21.5
RR18	913.00	0.0	0.0	2.5	9.0	16.0	0.0	0.0	7.0	11.0	17.0
RR19	909.00	2.0	8.0	9.0	16.5	23.0	2.5	8.0	10.5	16.5	23.0
RR20	919.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RR21	909.00	3.0	8.0	9.0	16.5	23.0	3.0	8.0	10.5	17.0	23.0
RR22	917.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.0	7.5
RR23	912.50	0.0	3.0	4.5	12.0	19.0	0.0	3.5	8.0	12.5	19.0
RR24	921.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RR25	920.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RR26	913.00	0.0	3.0	5.5	12.5	19.5	0.0	4.0	8.0	13.0	19.5
RR27	917.00	0.0	0.0	0.0	5.5	11.0	0.0	0.0	4.0	8.0	12.5
RR28	923.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RR29	921.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RR3	910.50	0.0	0.0	3.5	10.0	17.0	0.0	2.5	8.5	11.5	17.5
RR30	922.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RR31	916.50	0.0	0.0	2.0	9.0	16.5	0.0	0.0	6.0	10.0	16.5
RR32	916.00	0.0	1.5	3.5	10.5	18.0	0.0	2.0	6.5	11.0	18.0
RR33	913.50	0.0	6.0	7.5	15.5	21.5	0.0	6.0	9.0	15.5	21.5
RR34	913.00	2.0	7.0	8.0	16.0	22.0	2.0	7.0	9.5	16.0	22.0
RR35	914.00	0.0	6.0	7.5	15.0	21.5	0.0	6.0	9.0	15.0	21.5
RR36	916.50	0.0	3.0	4.5	11.5	19.0	0.0	3.0	7.0	12.0	19.0
RR37	914.50	1.0	6.5	7.5	15.5	21.5	1.5	6.5	9.0	15.5	22.0
RR38	923.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RR39	915.50	0.0	5.5	7.0	15.0	21.0	0.0	6.0	8.5	15.0	21.5
RR4	906.50	2.5	8.5	9.5	17.0	23.0	3.0	8.5	11.0	17.0	23.0
RR40	925.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RR41	915.50	2.5	6.5	7.5	16.0	22.0	2.5	7.0	9.0	16.0	22.0
RR42	916.00	1.0	6.0	7.0	15.0	21.5	1.0	6.5	8.5	15.5	21.5
RR43	920.00	0.0	1.0	3.0	9.5	17.0	0.0	1.0	5.0	10.0	17.0
RR44	924.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.5	4.5
RR45	923.00	0.0	0.0	0.0	4.5	9.0	0.0	0.0	0.0	6.0	10.5
RR46	932.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RR47	927.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
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Appendix Table A2. Continued											
		Days of Water above Storage Area Elevation									
Storage Area	Approx. Field Elevation[a]	Existing Conditions					With Diversion Staging Area				
		10-yr	20-yr	25-yr	25-yr Long	25-yr ELong	10-yr	20-yr	25-yr	25-yr Long	25-yr ELong
RR47	927.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RR48	928.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RR49	926.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RR5	904.00	7.0	10.5	11.5	19.5	26.0	7.0	11.0	12.5	20.0	26.0
RR50	933.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RR51	919.00	4.5	7.0	8.0	16.5	22.5	4.5	7.0	8.5	16.5	23.0
RR52	933.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RR53	919.00	5.0	7.5	8.5	17.0	23.5	5.0	7.5	9.0	17.0	23.5
RR54	932.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RR55	919.00	5.5	8.0	9.0	18.0	24.5	6.0	8.0	9.5	18.0	24.5
RR56	918.00	6.5	9.0	10.5	19.5	26.0	6.5	9.0	10.5	19.5	26.0
RR57	919.00	6.0	8.5	9.5	18.5	25.0	6.5	8.5	10.0	18.5	25.0
RR58	914.50	9.5	15.0	17.5	41.0	34.5	9.5	15.0	17.5	42.0	35.5
RR59	919.00	6.5	9.0	10.5	19.5	26.0	6.5	9.0	10.5	19.5	26.0
RR6	910.00	0.0	2.5	5.0	11.0	18.5	0.0	4.0	9.0	12.0	18.5
RR60	915.00	9.5	15.0	17.5	42.5	36.0	9.5	15.0	18.0	44.5	37.5
RR7	907.00	2.0	8.5	9.5	16.5	23.0	2.5	8.5	11.0	17.0	23.0
RR8	909.50	0.0	4.0	6.0	12.5	19.5	0.0	5.0	9.0	13.0	20.0
RR9	900.00	10.0	14.0	15.5	25.5	31.5	10.0	14.5	16.0	25.5	31.5
WLVSA200	918.00	0.0	4.0	5.0	12.5	19.5	0.0	4.0	7.5	13.0	19.5
WLVSA202	928.00	2.0	2.5	3.0	4.0	4.0	2.0	2.5	3.0	4.0	4.0
WLVSA203	927.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WLVSA204	918.00	0.0	3.5	4.5	12.5	19.5	0.0	4.0	7.0	12.5	19.5
WLVSA205	924.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WLVSA206	924.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WLVSA207	925.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WLVSA208	923.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WLVSA209	915.50	0.0	3.0	4.5	12.0	19.0	0.0	3.0	7.5	12.0	19.0
WLVSA210	920.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.0	6.5
WLVSA211	923.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WLVSA212	919.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WLVSA213	920.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WLVSA214	919.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WLVSA215	911.00	0.0	5.0	6.5	14.0	20.5	0.0	5.5	9.0	14.0	21.0
WLVSA216	914.50	0.0	0.0	0.5	8.0	14.0	0.0	0.0	7.5	10.0	15.0
WLVSA217	922.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WLVSA218	921.00	0.0	0.0	0.0	2.5	2.5	0.0	0.0	0.0	1.0	1.0
WLVSA219	922.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WLVSA220	908.50	0.0	6.5	8.0	14.5	21.5	0.0	6.5	10.0	15.0	21.5
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Appendix Table A2. Continued											
		Days of Water above Storage Area Elevation									
Storage Area	Approx. Field Elevation[a]	Existing Conditions					With Diversion Staging Area				
		10-yr	20-yr	25-yr	25-yr Long	25-yr ELong	10-yr	20-yr	25-yr	25-yr Long	25-yr ELong
WLVSA221	908.50	0.0	6.0	7.5	14.5	21.5	0.0	7.0	10.5	15.0	21.5
WLVSA222	913.00	0.0	0.0	0.0	3.5	5.5	0.0	0.0	6.5	9.5	12.5
WLVSA223	910.00	0.0	4.0	5.5	12.5	19.5	0.0	5.0	9.0	13.0	20.0
WLVSA224	912.50	0.0	0.0	0.0	6.5	13.0	0.0	0.0	6.5	10.0	15.0
WLVSA225	914.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.5	10.0	12.0
WLVSA226	917.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.0	6.5
WLVSA227	915.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.5	7.0	9.0
WLVSA228	911.50	0.0	1.0	3.5	11.0	18.0	0.0	2.5	8.0	12.0	18.0
WLVSA229	910.00	0.0	5.0	6.5	13.5	20.5	0.0	5.5	9.0	14.0	20.5
WLVSA230	910.00	0.0	5.0	6.5	13.5	20.5	0.0	5.5	9.0	14.0	20.5
WLVSA231	910.50	0.0	4.0	5.5	12.5	19.5	0.0	5.0	9.0	13.0	20.0
WLVSA232	916.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.0	7.0	9.0
WLVSA233	912.00	0.0	0.0	4.5	10.0	17.0	0.0	0.0	9.0	11.5	17.5
WLVSA234	917.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.5	6.0
WLVSA235	908.50	0.0	6.5	8.0	14.5	21.0	0.0	6.5	10.0	15.0	21.5
WLVSA236	910.00	0.0	3.0	5.0	11.5	19.0	0.0	4.0	9.0	12.5	19.0
WLVSA237	910.00	0.0	2.0	4.0	11.0	18.0	0.0	4.0	9.0	12.0	18.5
WLVSA57	921.00	0.0	0.0	0.0	3.0	3.0	0.0	0.0	0.0	2.5	2.5
WLVSA64	922.00	0.0	0.0	0.0	2.0	2.0	0.0	0.0	0.0	0.5	0.5
WLVSA65	919.50	0.0	0.0	0.0	1.0	1.5	0.0	0.0	0.0	6.0	8.5
WLVSA66	923.00	0.0	0.0	0.0	1.0	1.0	0.0	0.0	0.0	1.0	1.0
WRRND1	920.00	2.5	6.5	7.0	10.5	18.5	2.5	6.5	7.5	10.5	18.0
WRRND10	916.50	1.0	6.5	7.0	10.0	18.0	1.0	6.5	8.0	10.5	17.5
WRRND11	919.50	0.0	1.5	3.0	3.0	3.5	0.0	1.5	3.0	3.5	5.0
WRRND12	916.00	0.0	6.0	7.0	9.5	17.5	0.0	6.0	8.0	10.0	16.5
WRRND13	913.50	4.0	8.0	8.5	14.0	20.5	4.0	8.0	9.5	14.0	20.0
WRRND14	912.50	4.5	8.0	9.0	14.5	21.0	4.0	8.5	10.0	14.5	20.5
WRRND15	911.00	5.0	9.0	10.0	16.0	22.0	5.0	9.5	10.5	16.5	22.0
WRRND16	912.50	4.0	8.0	8.5	13.5	20.0	4.0	8.0	9.5	13.0	20.0
WRRND17	911.00	4.5	8.5	9.5	15.5	21.5	4.5	9.0	10.5	15.5	21.5
WRRND18	908.50	6.0	10.0	10.5	18.0	23.5	6.0	11.0	11.5	18.0	23.5
WRRND19	906.50	6.5	11.0	11.5	19.5	25.5	6.5	12.0	12.0	19.5	25.5
WRRND2	920.00	1.0	6.0	6.5	9.5	17.5	1.0	6.0	7.0	10.0	17.5
WRRND3	919.50	2.0	6.0	7.0	10.0	18.0	1.5	6.0	7.0	10.0	17.5
WRRND4	918.50	3.0	6.5	7.5	11.0	19.0	3.0	6.5	8.0	11.5	18.5
WRRND5	918.00	3.0	7.0	7.5	11.5	19.0	3.0	7.0	8.0	11.5	19.0
WRRND6	918.50	0.0	6.0	6.5	9.0	17.0	0.0	5.5	7.0	9.5	17.0
WRRND7	917.00	3.5	7.0	8.0	12.0	19.0	3.5	7.0	8.5	12.0	19.0
WRRND8	917.00	2.0	6.5	7.5	10.5	18.5	2.0	6.5	8.0	10.5	18.0
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Appendix Table A2. Continued											
		Days of Water above Storage Area Elevation									
		Existing Conditions					With Diversion Staging Area				
Storage Area	Approx. Field Elevation[a]	10-yr	20-yr	25-yr	25-yr Long	25-yr ELong	10-yr	20-yr	25-yr	25-yr Long	25-yr ELong
WRRND9	917.50	0.0	6.0	6.5	9.0	17.0	0.0	5.5	7.5	9.5	16.5
WRSA273	929.50	0.0	0.0	0.0	3.0	3.0	0.0	0.0	0.0	3.0	3.0
WRSA280	925.50	0.0	0.0	0.0	0.5	0.5	0.0	0.0	0.0	0.5	0.5
WRSA284	923.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WRSA289	923.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WRSA294	919.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WRSA299	912.50	0.0	7.0	8.0	11.0	19.0	0.0	7.0	9.5	11.0	18.0
WRSA300	909.50	5.5	9.0	10.0	16.5	22.5	5.5	10.0	11.0	16.5	22.5
WRSA302	913.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.0	9.0	11.5
WRSA303	919.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WRSA304	915.00	0.0	3.0	4.5	5.0	6.5	0.0	0.0	7.0	9.0	10.5
WRSA305A	910.50	4.5	8.5	9.5	15.0	21.5	4.5	9.0	10.5	15.0	21.0
WRSA305B	910.50	4.5	8.5	9.5	15.0	21.0	4.5	9.0	10.5	15.0	21.0
WRSA305C	906.00	7.5	12.0	13.0	21.5	28.0	7.5	13.0	13.0	21.5	28.0
WRSA305D	906.00	7.5	12.0	13.0	21.5	28.0	7.5	13.0	13.0	21.5	28.0
WRSA306	908.00	3.5	9.0	9.5	14.5	21.0	3.0	8.5	10.5	15.0	21.5
WRSA307	911.00	0.0	3.0	5.0	10.5	17.5	0.0	2.5	10.0	12.0	17.0
WRSA308	917.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.0	5.0
WRSA309	914.50	0.0	4.5	5.5	6.5	13.0	0.0	3.0	8.0	9.0	11.5
WRSA311	907.00	5.0	9.0	10.0	16.0	22.0	2.5	8.5	11.0	16.5	22.5
WRSA312	906.50	5.5	9.5	10.0	17.0	23.0	4.0	9.0	11.0	17.0	23.0
WRSA315	909.50	0.0	4.5	6.0	8.0	14.5	0.0	11.0	10.5	10.5	12.5
WRSA321	906.50	0.0	0.0	3.5	10.5	13.5	0.0	12.5	11.0	11.0	13.0
WRSA350	910.50	0.0	8.0	9.0	11.0	18.0	2.5	8.0	10.0	13.0	20.0
WRSA351	908.50	2.5	9.0	9.5	13.5	20.5	4.0	8.5	10.5	14.5	21.0
WRSA352	911.00	0.0	8.0	8.5	10.5	17.5	0.0	7.5	10.5	12.0	18.5
WRSA353	917.50	0.0	0.0	0.0	2.0	2.0	0.0	0.0	0.0	6.0	7.5
WRSA354	919.00	0.0	3.5	4.0	4.5	7.0	0.0	3.5	4.0	6.5	9.5
WRSA355	917.50	0.0	6.0	7.0	9.5	17.5	0.0	6.0	7.5	10.0	17.0
WRSA356	920.50	0.0	4.0	4.5	6.0	12.5	0.0	4.0	5.0	6.5	12.0
WRSA357	921.50	0.0	3.5	4.0	4.5	7.0	0.0	3.5	4.0	5.0	8.0
WRSA358	923.00	0.0	1.5	3.5	3.5	4.0	0.0	1.5	3.5	4.0	4.5
WRSA359	923.00	0.0	3.0	4.0	4.5	7.5	0.0	3.0	4.0	4.5	8.5
WRSA360	924.00	0.0	4.5	5.0	6.5	14.0	0.0	4.5	5.0	7.0	14.0
WRSA363	911.50	0.0	7.5	8.5	10.5	17.5	0.0	7.0	9.5	11.0	17.5
WRSA364	913.00	0.0	6.5	7.5	9.0	16.0	0.0	5.0	8.5	10.0	12.5
WRSA373	927.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WRSA378	926.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WRSA383	924.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

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Appendix Table A2. Continued											
		Days of Water above Storage Area Elevation									
Storage Area	Approx. Field Elevation[a]	Existing Conditions					With Diversion Staging Area				
		10-yr	20-yr	25-yr	25-yr Long	25-yr ELong	10-yr	20-yr	25-yr	25-yr Long	25-yr ELong
WRSA384	925.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WRSA389	923.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WRSA390	917.50	0.0	5.0	5.5	7.0	14.5	0.0	4.5	6.5	8.5	14.0
WRSA501	911.00	0.0	0.0	3.5	10.0	17.0	0.0	1.5	8.5	11.5	17.0
WRSA502	913.00	0.0	0.0	0.0	4.5	8.0	0.0	0.0	6.5	9.5	13.0
WRSA504	915.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.5	7.5	9.5
WRSA505	909.00	0.0	6.5	8.0	16.0	22.5	0.0	7.5	10.5	16.5	23.0
WRSA506	909.00	0.0	5.0	7.0	13.0	20.0	0.0	5.5	10.0	13.5	20.5
WRSA507	902.00	7.5	13.0	14.0	22.5	29.0	7.5	13.5	15.0	23.0	29.0
WRSA907	915.00	0.0	4.0	5.0	6.0	11.0	0.0	3.5	7.5	9.0	11.0

[a]Feet above mean seal level. Lowest estimated elevation for storage area.

Source: Houston-Moore Group (2019).

Appendix Table A2. Continued											
		Days of Water above Storage Area Elevation									
Storage Area	Approx. Field Elevation[a]	Existing Conditions					With Diversion Staging Area				
		2009-like	50-yr	100-yr	500-yr	PMF	2009-like	50-yr	100-yr	500-yr	PMF
BD1	908.00	20.0	17.0	20.0	30.5	48.5	20.0	17.0	20.0	31.0	48.0
CHRSA01	915.00	0.0	0.0	0.0	5.0	12.0	8.5	8.0	10.5	13.5	19.0
CHRSA02	914.50	0.0	0.0	0.0	13.5	19.0	10.0	9.0	13.0	16.5	21.0
CHRSA03	918.00	0.0	0.0	0.0	0.0	9.0	5.5	4.0	8.0	11.5	14.5
CHRSA04	918.00	0.0	0.0	0.0	9.0	14.5	7.5	4.0	10.0	14.0	17.0
CHRSA05E	920.00	1.5	0.0	2.0	9.5	19.5	4.0	0.0	7.0	11.5	20.0
CHRSA05W	920.00	8.5	9.5	11.5	14.5	31.5	8.5	10.0	11.5	14.5	31.5
CHRSA06	921.00	0.0	0.0	0.0	6.0	14.0	0.0	0.0	4.5	10.0	15.0
CHRSA07	915.00	5.0	3.0	7.5	29.5	29.5	9.0	8.5	11.5	30.0	30.5
CHRSA08	918.50	1.0	0.0	0.0	13.0	15.5	6.5	5.0	8.5	14.5	17.5
CHRSA09	923.00	0.0	0.0	0.0	7.0	15.5	0.0	0.0	0.0	9.0	16.0
CHRSA10	922.00	0.0	0.0	0.0	4.0	12.0	0.0	0.0	0.0	8.5	12.5
CHRSA100	931.00	1.0	0.0	0.0	11.5	14.0	1.0	0.0	0.0	12.5	14.5
CHRSA101	924.00	5.0	5.0	9.0	35.0	32.0	5.5	6.5	11.0	35.0	32.5
CHRSA102	928.00	2.5	0.0	1.5	17.0	16.0	2.5	0.0	3.0	17.0	16.5
CHRSA103	918.00	22.5	8.0	13.5	44.5	40.0	22.5	10.0	13.5	45.0	40.0
CHRSA104	926.50	1.0	0.0	0.0	12.0	14.5	1.5	0.0	0.0	13.0	15.0
CHRSA105	919.00	22.5	8.5	13.5	45.5	40.0	22.5	9.5	14.0	46.0	40.0
CHRSA106	925.00	3.5	0.0	4.0	20.5	49.5	4.0	0.0	6.5	20.5	49.5
CHRSA107	927.50	0.0	0.0	0.0	11.0	48.5	0.5	0.0	0.0	12.0	48.5
CHRSA108	923.00	1.0	0.0	0.0	13.5	15.0	2.5	0.0	4.5	14.0	16.0
CHRSA109	918.00	4.0	0.5	6.0	27.0	26.0	7.5	7.5	10.0	27.0	27.0
CHRSA11	924.50	0.0	0.0	0.0	5.0	13.0	0.0	0.0	0.0	5.5	13.0
CHRSA110	913.50	24.0	10.0	17.0	51.5	45.5	24.0	11.5	17.0	51.5	45.5
CHRSA111	921.00	1.0	0.0	0.0	13.5	15.5	4.5	0.0	6.5	14.0	16.5
CHRSA112	918.00	4.0	0.5	6.0	27.0	26.0	7.5	7.5	10.0	27.0	27.0
CHRSA113	919.50	3.0	0.0	3.0	20.0	18.5	6.0	5.0	8.5	19.5	20.0
CHRSA114	910.50	24.0	11.0	17.0	49.5	47.0	24.0	12.0	17.0	49.5	46.5
CHRSA115	918.00	2.0	0.0	0.5	15.0	16.0	6.5	5.5	9.0	15.5	18.0
CHRSA116	916.50	0.0	0.0	0.0	12.0	17.5	10.0	8.0	12.5	16.0	19.5
CHRSA117	919.50	0.0	0.0	0.0	10.5	14.0	5.0	1.0	7.5	13.0	16.0
CHRSA118	919.50	0.0	0.0	0.0	10.0	14.0	5.0	0.0	7.5	12.5	16.0
CHRSA119	918.50	1.0	0.0	0.0	12.5	15.5	6.5	5.0	8.5	14.5	18.0
CHRSA12	924.00	0.0	0.0	0.0	10.0	14.0	0.0	0.0	0.0	11.5	14.5
CHRSA120	916.00	2.0	0.0	1.5	16.0	17.0	7.5	7.5	9.5	19.0	23.0
CHRSA13	918.00	5.5	4.0	8.5	32.5	31.0	8.5	8.5	11.0	32.5	31.5
CHRSA14	924.00	0.0	0.0	0.0	6.0	14.0	0.0	0.0	0.0	7.5	14.0
CHRSA15	919.50	12.5	10.0	13.0	27.5	29.0	12.5	10.0	13.5	27.5	29.0
CHRSA16	918.00	5.5	4.0	8.5	32.5	31.0	8.5	8.5	11.0	32.5	31.5
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Appendix Table A2. Continued											
		Days of Water above Storage Area Elevation									
Storage Area	Approx. Field Elevation[a]	Existing Conditions					With Diversion Staging Area				
		2009-like	50-yr	100-yr	500-yr	PMF	2009-like	50-yr	100-yr	500-yr	PMF
CHRSA17	918.00	6.0	5.5	10.5	36.5	35.0	8.5	9.0	11.5	36.5	35.0
CHRSA18	922.00	12.5	11.0	14.0	18.5	30.0	12.5	11.0	14.5	19.0	30.0
CHRSA18E	922.00	2.5	0.0	2.5	17.0	17.5	4.0	0.0	7.0	17.0	18.5
CHRSA19	921.00	3.5	0.0	4.0	21.5	20.0	5.5	2.0	8.5	21.0	21.0
CHRSA20	921.00	5.5	5.0	9.5	35.5	33.0	7.0	7.5	11.0	36.0	33.5
CHRSA21	927.50	11.0	9.0	12.5	17.5	28.5	11.0	9.0	13.0	18.0	28.5
CHRSA22	927.50	5.0	0.0	6.5	14.0	24.5	5.0	0.0	7.0	14.5	24.5
CHRSA23	920.00	10.0	9.0	13.0	41.0	37.5	10.0	9.5	13.0	41.0	37.5
CHRSA24	927.50	10.0	8.0	12.0	15.5	27.5	10.0	8.5	12.0	16.0	27.5
CHRSA25	928.00	11.5	9.0	12.5	17.5	29.0	11.5	9.0	13.0	18.0	29.0
CHRSA26	928.50	5.0	2.0	6.0	12.5	22.0	5.0	2.0	6.0	13.5	22.0
CHRSA27	924.00	10.0	8.0	11.5	24.0	26.5	10.0	8.0	11.5	24.5	26.5
DIVSA100	913.00	5.0	2.0	6.5	25.5	28.0	9.0	9.5	11.0	26.5	30.0
DIVSA101	914.00	4.5	1.5	7.0	27.5	27.0	9.5	10.5	12.5	27.5	28.5
DIVSA102	915.00	5.0	5.0	8.5	29.5	29.0	8.5	10.5	12.5	30.0	29.5
DIVSA105	915.50	0.0	0.0	0.0	0.0	6.0	7.5	7.0	10.0	12.0	16.0
DIVSA106E	919.00	0.0	0.0	0.0	0.0	6.5	2.5	0.0	5.5	8.0	7.5
DIVSA107E	919.50	0.0	0.0	0.0	0.0	5.0	2.0	0.0	5.0	7.0	7.5
DIVSA84	913.00	4.5	4.5	8.0	13.0	32.5	20.5	11.5	13.5	16.0	23.0
DIVSA84E	907.50	10.5	10.0	14.5	19.5	46.5	9.5	10.5	12.0	16.0	31.0
DIVSA85E	904.50	13.5	14.0	17.5	24.0	50.0	47.5	50.0	50.5	51.5	51.0
DIVSA86S	905.50	12.5	13.0	17.0	22.5	49.0	11.0	12.5	14.0	19.0	41.5
DIVSA87S	908.50	11.5	0.0	16.0	24.0	45.5	9.5	10.5	11.5	16.5	32.0
DIVSA88W	907.00	15.0	15.0	18.5	30.5	49.0	9.5	11.0	12.5	19.0	35.5
DIVSA89W	910.50	14.0	15.0	17.5	22.5	48.5	8.5	10.0	11.5	15.0	29.0
DIVSA90S	907.50	15.5	16.0	19.0	30.0	49.5	23.5	13.5	18.5	45.5	47.5
DIVSA93S	908.00	10.5	11.0	15.5	37.5	46.5	23.0	12.5	17.0	43.0	47.0
DIVSA94	908.00	15.5	16.0	18.5	29.0	49.5	23.0	12.5	17.0	43.0	47.0
DIVSA95	908.50	11.5	11.0	15.0	35.5	46.5	12.0	12.0	16.0	41.0	46.0
DIVSA98W	912.50	4.5	0.0	5.0	19.0	25.0	9.0	9.5	11.5	25.0	30.0
DIVSA99W	910.50	8.5	8.0	13.0	35.0	40.0	10.5	11.0	14.0	36.0	40.5
DRAIN370	922.50	34.5	3.0	4.0	6.0	47.5	34.5	3.0	4.0	8.0	47.0
DRAIN371	921.50	1.5	3.0	3.5	5.5	47.5	1.5	3.0	3.5	9.0	47.0
DRAIN372	920.00	4.0	2.5	5.0	9.0	45.5	6.0	5.0	9.0	11.5	45.0
DRAIN373	919.00	7.5	7.5	10.5	13.0	38.0	8.0	9.0	11.0	13.0	36.5
DRAIN374	915.00	14.0	14.5	17.0	20.5	47.0	14.0	14.5	16.5	20.5	46.5
RR10	909.00	22.0	10.5	15.5	42.0	46.0	22.5	12.0	16.0	42.5	45.5
RR11	909.00	23.0	11.0	17.0	45.0	46.5	23.0	12.0	17.0	45.0	46.5
RR12	909.00	23.0	11.0	17.0	45.0	46.5	23.0	12.0	17.0	45.0	46.5
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Appendix Table A2. Continued											
		Days of Water above Storage Area Elevation									
		Existing Conditions					With Diversion Staging Area				
Storage Area	Existing Conditions	2009-like	50-yr	100-yr	500-yr	PMF	2009-like	50-yr	100-yr	500-yr	PMF
RR13	911.50	8.0	8.0	13.0	36.5	39.5	10.0	10.5	13.5	37.0	39.5
RR14	914.00	5.0	2.0	6.0	27.0	28.0	8.5	9.5	11.0	27.5	29.0
RR15	908.00	25.5	13.0	20.0	51.5	49.5	25.5	13.5	20.0	51.5	49.0
RR16	916.00	3.0	0.0	3.0	17.5	18.5	8.0	8.0	10.0	18.0	22.5
RR17	910.00	23.5	11.0	17.0	47.5	46.5	23.5	12.0	16.5	47.5	46.0
RR18	913.00	6.5	6.0	11.0	33.5	36.0	9.5	10.0	12.5	34.5	36.5
RR19	909.00	25.0	12.0	19.5	51.5	49.0	25.0	12.5	19.0	51.5	48.0
RR20	919.00	0.0	0.0	0.0	7.5	12.0	4.5	2.5	7.5	11.5	15.5
RR21	909.00	25.0	12.0	19.5	51.5	49.0	25.0	12.5	19.5	51.5	48.5
RR22	917.50	2.5	0.0	1.0	15.5	16.5	7.5	6.0	9.5	16.0	19.0
RR23	912.50	8.0	8.5	13.5	40.0	40.5	10.0	10.5	14.0	40.0	40.0
RR24	921.50	0.0	0.0	0.0	4.0	10.0	0.0	0.0	3.0	9.5	12.0
RR25	920.00	0.0	0.0	0.0	11.0	14.0	5.0	0.0	7.0	13.0	16.0
RR26	913.00	22.0	8.5	13.5	42.0	41.0	22.0	10.5	14.0	42.0	41.0
RR27	917.00	5.0	3.5	7.0	29.5	29.0	8.5	8.0	11.0	30.0	29.0
RR28	923.00	0.0	0.0	0.0	5.5	10.5	0.0	0.0	0.0	9.0	12.0
RR29	921.00	2.0	0.0	0.0	15.5	16.0	4.5	0.0	7.5	15.5	17.5
RR3	910.50	8.0	7.5	12.0	31.5	38.5	10.5	11.0	14.0	33.0	39.0
RR30	922.50	0.0	0.0	0.0	10.0	13.5	0.0	0.0	3.5	11.5	15.0
RR31	916.50	6.0	6.0	11.0	36.5	35.5	9.0	9.0	12.0	36.5	35.5
RR32	916.00	6.5	7.0	12.0	40.0	38.0	9.0	9.5	12.5	40.0	38.0
RR33	913.50	24.5	10.5	17.0	51.5	46.0	24.5	11.5	17.0	51.5	45.5
RR34	913.00	25.0	10.5	18.0	51.5	47.0	25.0	11.5	18.0	51.5	47.0
RR35	914.00	24.5	10.0	17.0	51.5	45.5	24.5	11.0	17.0	51.5	45.5
RR36	916.50	22.0	8.0	13.0	42.0	39.5	22.0	10.0	13.5	42.5	39.5
RR37	914.50	24.5	10.0	17.5	51.5	46.0	24.5	11.0	17.5	51.5	46.0
RR38	923.50	2.0	0.0	1.0	16.0	16.5	3.5	0.0	5.5	16.0	17.0
RR39	915.50	24.0	10.0	16.5	51.5	45.0	24.0	11.0	16.5	51.5	45.0
RR4	906.50	24.5	13.5	19.5	50.5	49.5	24.5	13.5	20.0	51.0	48.5
RR40	925.50	0.0	0.0	0.0	11.0	14.5	0.0	0.0	0.0	12.0	14.5
RR41	915.50	25.0	11.0	19.0	51.5	47.0	25.0	11.5	19.0	51.5	47.0
RR42	916.00	24.5	10.5	17.5	51.5	45.5	24.5	11.5	17.5	51.5	45.5
RR43	920.00	5.5	6.5	11.5	39.5	36.5	8.0	9.0	12.5	39.5	36.5
RR44	924.00	4.0	0.0	4.5	23.0	21.0	4.5	0.0	7.0	23.5	22.0
RR45	923.00	4.5	2.0	6.5	29.5	27.5	5.5	4.5	9.5	30.0	28.0
RR46	932.00	0.0	0.0	0.0	0.0	5.0	0.0	0.0	0.0	0.0	5.5
RR47	927.50	2.0	0.0	0.0	14.0	15.5	2.0	0.0	0.5	15.0	15.5
RR48	928.00	1.0	0.0	0.0	12.0	14.5	1.0	0.0	0.0	13.0	14.5
RR49	926.50	3.5	0.0	3.5	20.5	18.0	3.5	0.0	5.0	21.0	18.5
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Appendix Table A2. Continued											
		Days of Water above Storage Area Elevation									
Storage Area	Existing Conditions	Existing Conditions					With Diversion Staging Area				
		2009-like	50-yr	100-yr	500-yr	PMF	2009-like	50-yr	100-yr	500-yr	PMF
RR5	904.00	28.0	15.5	24.5	51.5	51.5	28.0	15.5	24.5	51.5	51.5
RR50	933.00	0.0	0.0	0.0	0.0	6.5	0.0	0.0	0.0	0.0	6.5
RR51	919.00	26.0	11.0	21.0	51.5	48.5	26.0	11.5	21.0	51.5	48.5
RR52	933.00	0.0	0.0	0.0	0.5	7.5	0.0	0.0	0.0	0.5	7.5
RR53	919.00	27.0	11.0	22.5	51.5	50.0	27.0	11.5	22.5	51.5	50.0
RR54	932.50	0.0	0.0	0.0	5.0	10.0	0.0	0.0	0.0	5.0	10.0
RR55	919.00	29.5	11.5	27.5	51.5	51.5	29.5	12.0	27.5	51.5	51.5
RR56	918.00	32.5	12.5	31.0	51.5	51.5	32.5	12.5	31.5	51.5	51.5
RR57	919.00	31.5	12.0	29.5	51.5	51.5	31.5	12.0	29.5	51.5	51.5
RR58	914.50	40.5	31.5	50.5	51.5	51.5	40.5	31.5	50.5	51.5	51.5
RR59	919.00	33.0	12.0	31.5	51.5	51.5	33.0	12.5	32.0	51.5	51.5
RR6	910.00	9.0	9.0	13.5	34.5	41.0	11.0	11.5	14.5	35.5	41.0
RR60	915.00	40.5	31.5	50.5	51.5	51.5	40.5	32.0	50.5	51.5	51.5
RR7	907.00	24.5	12.5	19.5	51.0	49.0	24.5	13.5	20.0	51.0	48.5
RR8	909.50	9.5	10.0	14.5	38.0	44.0	11.0	11.5	15.5	39.0	43.0
RR9	900.00	37.0	20.0	38.0	51.5	51.5	37.0	20.0	37.5	51.5	51.5
WLVSA200	918.00	22.5	8.5	14.0	46.5	40.5	22.5	10.0	14.0	47.0	41.0
WLVSA202	928.00	22.0	4.0	4.5	11.0	51.5	22.0	4.0	4.5	12.0	15.5
WLVSA203	927.00	0.0	0.0	0.0	10.5	13.5	0.0	0.0	0.0	11.5	13.5
WLVSA204	918.00	22.5	8.0	13.5	45.5	40.5	22.5	10.0	14.0	46.0	40.5
WLVSA205	924.00	1.0	0.0	0.0	13.0	15.0	1.5	0.0	2.5	13.5	15.5
WLVSA206	924.00	1.0	0.0	0.0	13.5	15.0	2.5	0.0	3.5	14.0	15.5
WLVSA207	925.50	0.5	0.0	0.0	12.0	14.5	1.0	0.0	0.0	13.0	15.0
WLVSA208	923.50	1.5	0.0	0.0	13.0	15.0	2.5	0.0	4.0	13.5	15.5
WLVSA209	915.50	22.0	7.5	13.0	42.0	39.5	22.0	9.5	13.5	42.0	39.5
WLVSA210	920.50	3.5	0.0	4.0	21.5	19.5	5.5	3.0	8.5	21.5	20.5
WLVSA211	923.00	0.0	0.0	0.0	9.5	13.0	0.0	0.0	0.0	11.0	14.0
WLVSA212	919.50	0.0	0.0	0.0	4.5	10.0	3.5	0.0	6.5	10.5	14.0
WLVSA213	920.00	0.0	0.0	0.0	5.0	10.5	3.0	0.0	6.0	11.0	14.0
WLVSA214	919.50	0.0	0.0	0.0	7.5	13.0	5.0	0.0	8.0	12.5	15.5
WLVSA215	911.00	23.0	10.0	15.5	45.0	44.5	23.0	11.5	16.0	45.0	44.0
WLVSA216	914.50	5.5	5.5	9.5	31.0	31.0	9.0	10.5	12.5	31.5	31.5
WLVSA217	922.00	0.0	0.0	0.0	3.0	9.5	0.0	0.0	0.0	8.5	11.0
WLVSA218	921.00	0.0	0.0	0.0	15.0	17.5	0.0	0.0	4.5	14.5	16.0
WLVSA219	922.00	0.0	0.0	0.0	9.5	14.5	0.0	0.0	2.5	12.5	15.5
WLVSA220	908.50	23.0	11.5	17.0	44.0	47.0	23.0	12.5	17.0	44.5	46.5
WLVSA221	908.50	23.0	11.5	16.5	44.0	47.0	23.0	12.5	17.0	44.5	46.0
WLVSA222	913.00	4.5	1.5	6.5	25.0	27.5	9.0	9.5	11.5	26.5	30.0
WLVSA223	910.00	9.5	9.5	14.5	39.0	43.0	11.0	11.5	15.0	39.5	42.5
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Appendix Table A2. Continued											
		Days of Water above Storage Area Elevation									
		Existing Conditions					With Diversion Staging Area				
Storage Area	Existing Conditions	2009-like	50-yr	100-yr	500-yr	PMF	2009-like	50-yr	100-yr	500-yr	PMF
WLVSA224	912.50	6.0	4.5	9.0	29.5	33.0	9.0	10.0	12.0	30.0	33.5
WLVSA225	914.50	5.0	0.0	4.5	18.5	20.5	11.0	10.5	12.5	19.0	26.5
WLVSA226	917.00	0.0	0.0	0.0	8.0	13.0	7.0	6.5	9.0	13.0	17.5
WLVSA227	915.50	2.5	0.0	2.5	16.5	17.5	8.0	8.0	10.0	17.0	23.0
WLVSA228	911.50	8.0	7.5	12.5	35.5	39.5	10.0	10.5	13.5	36.0	39.0
WLVSA229	910.00	22.0	10.0	15.0	42.0	44.5	22.5	12.0	15.5	42.0	44.0
WLVSA230	910.00	22.0	10.0	15.0	42.0	44.5	22.5	12.0	15.5	42.0	44.0
WLVSA231	910.50	9.0	9.5	14.5	40.0	42.5	11.0	11.5	15.0	40.0	42.0
WLVSA232	916.00	3.0	0.0	3.0	18.5	19.0	8.0	8.0	10.0	19.0	23.5
WLVSA233	912.00	7.0	8.0	12.5	34.0	37.5	11.0	12.5	14.0	34.5	37.5
WLVSA234	917.50	0.0	0.0	0.0	7.0	12.0	6.0	5.5	8.5	12.0	16.0
WLVSA235	908.50	23.0	11.5	17.0	43.5	47.0	23.0	12.5	17.0	43.5	46.5
WLVSA236	910.00	9.0	9.0	13.5	35.5	41.5	11.0	11.5	14.5	36.5	41.5
WLVSA237	910.00	9.0	8.5	12.5	33.5	40.5	11.0	11.5	14.5	35.0	40.5
WLVSA57	921.00	0.5	1.0	3.5	16.0	18.5	3.0	0.0	6.5	15.0	17.5
WLVSA64	922.00	1.0	0.0	0.0	15.0	16.5	0.0	0.0	3.0	14.0	16.0
WLVSA65	919.50	4.0	0.0	5.0	26.0	24.0	6.5	6.0	9.5	26.0	25.0
WLVSA66	923.00	2.0	0.0	0.0	15.0	16.0	2.5	0.0	5.0	15.5	16.0
WRRND1	920.00	13.5	14.0	16.0	19.0	36.5	13.0	14.0	16.0	19.0	36.5
WRRND10	916.50	13.0	13.5	16.0	19.0	46.0	12.5	13.0	15.5	19.0	46.0
WRRND11	919.50	6.5	6.5	9.5	12.0	31.0	7.5	8.0	10.0	12.5	30.5
WRRND12	916.00	12.5	13.0	15.5	18.5	46.5	12.0	12.5	15.0	18.5	46.0
WRRND13	913.50	15.0	15.5	18.0	22.0	47.5	14.5	15.5	17.5	22.5	47.0
WRRND14	912.50	15.0	16.0	18.0	23.0	47.5	15.0	15.5	18.0	23.5	47.5
WRRND15	911.00	16.5	16.5	19.5	25.5	48.0	16.5	16.5	19.0	26.5	47.5
WRRND16	912.50	14.5	15.0	17.5	22.0	47.5	14.5	15.0	17.5	23.0	47.0
WRRND17	911.00	16.0	16.0	19.0	25.0	48.0	15.5	16.0	18.5	26.5	47.5
WRRND18	908.50	20.5	17.5	20.5	30.0	49.0	20.5	17.5	20.5	30.5	48.5
WRRND19	906.50	21.5	18.5	22.0	35.0	49.5	21.5	18.5	22.0	36.0	49.0
WRRND2	920.00	12.5	13.0	15.5	18.5	36.0	12.5	13.0	15.5	18.0	36.0
WRRND3	919.50	13.0	13.5	16.0	18.5	37.0	13.0	13.5	15.5	18.5	36.5
WRRND4	918.50	13.5	14.0	16.5	19.5	41.0	13.5	14.0	16.5	19.5	39.0
WRRND5	918.00	14.0	14.5	16.5	19.5	45.5	13.5	14.5	16.5	19.5	43.0
WRRND6	918.50	12.5	13.0	15.5	18.0	39.0	12.0	12.5	15.0	18.0	38.0
WRRND7	917.00	14.0	14.5	17.0	20.0	46.0	14.0	14.5	16.5	20.0	46.0
WRRND8	917.00	13.5	14.0	16.0	19.0	46.0	13.0	13.5	16.0	19.0	46.0
WRRND9	917.50	12.5	12.5	15.0	18.0	45.5	12.0	12.5	15.0	18.0	45.5
WRSA273	929.50	0.0	0.0	0.0	4.0	11.0	0.0	0.0	0.0	4.0	11.0
WRSA280	925.50	0.0	0.0	0.0	1.0	46.5	0.0	0.0	0.0	1.0	46.5
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Appendix Table A2. Continued											
		Days of Water above Storage Area Elevation									
Storage Area	Existing Conditions	Existing Conditions					With Diversion Staging Area				
		2009-like	50-yr	100-yr	500-yr	PMF	2009-like	50-yr	100-yr	500-yr	PMF
WRSA284	923.00	0.0	0.0	0.0	0.0	42.5	0.0	0.0	0.0	0.0	42.5
WRSA289	923.50	0.0	0.0	0.0	0.0	3.5	0.0	0.0	0.0	0.0	4.0
WRSA294	919.50	30.5	5.0	7.5	9.5	46.5	44.0	5.0	7.5	10.0	46.5
WRSA299	912.50	35.0	14.0	17.0	21.5	48.0	35.0	13.5	16.0	22.0	47.5
WRSA300	909.50	38.0	17.0	19.5	28.0	48.5	38.0	16.5	19.5	28.0	48.5
WRSA302	913.00	4.0	0.0	3.5	13.0	23.5	9.0	9.5	11.5	17.0	31.0
WRSA303	919.50	4.0	0.0	0.0	0.0	44.5	30.0	0.0	5.0	7.5	44.5
WRSA304	915.00	8.5	8.5	11.5	14.0	42.5	8.0	10.0	11.5	14.0	35.0
WRSA305A	910.50	35.5	16.0	18.5	25.5	48.0	35.0	16.0	18.5	26.5	47.5
WRSA305B	910.50	15.5	16.0	18.5	25.5	48.0	15.0	15.5	18.5	26.5	47.5
WRSA305C	906.00	45.0	20.5	23.5	38.5	50.5	44.0	20.0	23.5	39.0	49.5
WRSA305D	906.00	34.5	20.5	23.5	38.5	50.5	34.0	20.0	23.5	39.0	49.5
WRSA306	908.00	15.0	15.5	18.5	29.5	49.5	23.0	15.0	18.0	43.0	47.5
WRSA307	911.00	9.5	9.0	13.0	33.0	42.5	11.5	11.5	13.5	32.5	39.0
WRSA308	917.00	0.0	0.0	0.0	0.0	43.5	6.0	5.5	8.0	10.5	44.0
WRSA309	914.50	10.0	10.5	13.0	16.0	46.0	9.0	10.5	12.0	15.5	45.5
WRSA311	907.00	16.0	16.0	19.5	31.5	49.5	24.0	14.0	19.0	48.5	48.0
WRSA312	906.50	20.0	16.5	20.0	33.0	49.5	24.5	14.5	20.0	50.5	48.5
WRSA315	909.50	10.5	11.5	14.0	18.0	46.0	10.5	12.0	13.5	16.5	45.0
WRSA321	906.50	12.0	12.5	16.5	21.5	47.5	10.5	12.5	14.0	17.5	34.0
WRSA350	910.50	13.5	14.5	17.0	27.0	49.0	14.0	14.5	17.0	26.0	47.0
WRSA351	908.50	15.0	15.5	18.5	29.5	49.5	14.5	15.0	18.0	41.0	47.5
WRSA352	911.00	13.5	14.5	16.5	25.5	48.5	13.0	13.5	16.5	25.0	47.0
WRSA353	917.50	3.5	2.0	4.5	9.0	24.5	6.5	6.5	9.5	11.5	24.0
WRSA354	919.00	8.5	9.0	11.5	14.0	35.5	8.5	9.5	11.5	14.0	34.0
WRSA355	917.50	12.5	13.0	15.5	18.5	45.5	12.5	13.0	15.5	18.5	45.5
WRSA356	920.50	10.0	10.5	12.5	15.5	32.5	10.0	10.5	12.5	15.5	32.5
WRSA357	921.50	9.0	9.0	11.5	14.5	29.5	9.0	9.5	11.5	14.5	29.5
WRSA358	923.00	7.5	7.0	10.0	13.0	26.5	8.0	7.5	10.5	13.5	26.5
WRSA359	923.00	9.5	9.5	12.0	15.5	29.0	9.5	10.0	12.0	15.5	29.0
WRSA360	924.00	10.5	11.0	13.0	16.0	31.0	10.5	11.0	13.0	16.0	31.0
WRSA363	911.50	13.0	14.0	16.5	22.5	48.5	12.0	13.0	15.5	24.0	46.5
WRSA364	913.00	12.0	13.0	15.5	19.0	47.5	10.0	11.5	13.5	17.5	39.0
WRSA373	927.50	0.0	0.0	0.0	0.0	6.0	0.0	0.0	0.0	0.0	6.0
WRSA378	926.00	0.0	0.0	0.0	2.0	10.5	0.0	0.0	0.0	2.5	10.5
WRSA383	924.00	0.0	0.0	0.0	0.0	4.0	0.0	0.0	0.0	0.0	4.0
WRSA384	925.00	0.0	0.0	0.0	4.0	14.5	0.0	0.0	0.0	5.0	14.5
WRSA389	923.00	0.0	0.0	0.0	0.0	6.5	0.0	0.0	0.0	0.0	6.5
WRSA390	917.50	11.0	11.5	14.0	17.0	45.5	10.5	11.5	13.5	16.5	45.5
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Appendix Table A2. Continued											
		Days of Water above Storage Area Elevation									
Storage Area	Existing Conditions	Existing Conditions					With Diversion Staging Area				
		2009-like	50-yr	100-yr	500-yr	PMF	2009-like	50-yr	100-yr	500-yr	PMF
WRSA501	911.00	7.5	7.5	12.0	32.0	38.5	10.5	10.5	13.5	32.5	38.5
WRSA502	913.00	5.0	2.0	6.5	26.0	28.0	9.0	9.5	11.5	27.5	30.5
WRSA504	915.00	3.5	0.0	4.5	20.0	21.0	8.0	8.5	10.0	16.5	24.0
WRSA505	909.00	25.0	12.0	18.0	48.0	51.0	25.0	13.0	18.0	48.0	51.0
WRSA506	909.00	10.0	10.5	15.0	39.0	45.5	11.5	12.0	15.5	40.0	44.5
WRSA507	902.00	33.5	17.5	30.0	51.5	51.5	33.5	17.5	30.0	51.5	51.5
WRSA907	915.00	47.5	10.5	13.0	15.5	48.5	47.5	10.5	12.5	15.0	48.5

PMF = Probabilistic Maximum Flood.
[a]Feet above mean seal level. Lowest estimated elevation for storage area.
Source: Houston-Moore Group (2019).

Appendix Table A3. Time from Activation of Staging Area to Inundation, by Storage Area, by Flood Event Frequency for With and Without Diversion Conditions, FM Diversion Staging Area, Phase 9.1 HEC-RAS Modeling											
		Days from Activation of Staging Area for Field to be Inundated									
	Approx. Field	Existing Conditions					With Diversion Staging Area				
Storage Area	Elevation[a]	10-yr	20-yr	25-yr	25-yr Long	25-yr EL	10-yr	20-yr	25-yr	25-yr Long	25-yr EL
BD1	908.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CHRSA01	915.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.0	1.5	1.5
CHRSA02	914.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.5	1.5	1.5
CHRSA03	918.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CHRSA04	918.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CHRSA05E	920.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CHRSA05W	920.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CHRSA06	921.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CHRSA07	915.00	0.0	0.0	0.0	1.5	1.5	0.0	0.0	1.5	1.0	1.0
CHRSA08	918.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.0	3.0
CHRSA09	923.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CHRSA10	922.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CHRSA100	931.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CHRSA101	924.00	0.0	0.0	1.0	0.5	0.5	0.0	0.0	1.0	0.5	0.5
CHRSA102	928.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CHRSA103	918.00	0.0	1.0	0.5	0.0	0.0	0.0	1.0	0.5	0.0	0.0
CHRSA104	926.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CHRSA105	919.00	0.0	0.5	0.5	0.0	0.0	0.0	0.5	0.0	0.0	0.0
CHRSA106	925.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CHRSA107	927.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CHRSA108	923.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CHRSA109	918.00	0.0	0.0	0.0	2.5	2.5	0.0	0.0	0.0	1.5	1.5
CHRSA11	924.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CHRSA110	913.50	0.0	0.5	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0
CHRSA111	921.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CHRSA112	918.00	0.0	0.0	0.0	2.5	2.5	0.0	0.0	0.0	1.5	1.5
CHRSA113	919.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.5	2.5
CHRSA114	910.50	0.0	0.5	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0
CHRSA115	918.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.5	2.5
CHRSA116	916.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.5	2.5
CHRSA117	919.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CHRSA118	919.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CHRSA119	918.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.0	3.0
CHRSA12	924.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CHRSA120	916.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.0	2.0	2.0
CHRSA13	918.00	0.0	0.0	0.0	1.0	1.0	0.0	0.0	1.5	1.0	1.0
CHRSA14	924.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
- continued -											

Appendix Table A3. Continued											
		Days from Activation of Staging Area for Field to be Inundated									
		Existing Conditions					With Diversion Staging Area				
Storage Area	Approx. Field Elevation[a]	10-yr	20-yr	25-yr	25-yr Long	25-yr EL	10-yr	20-yr	25-yr	25-yr Long	25-yr EL
CHRSA15	919.50	0.0	0.0	0.0	2.0	2.0	0.0	0.0	0.0	1.5	1.5
CHRSA16	918.00	0.0	0.0	0.0	1.0	1.0	0.0	0.0	1.5	1.0	1.0
CHRSA17	918.00	0.0	0.0	1.0	0.5	0.5	0.0	0.0	1.0	0.5	0.5
CHRSA18	922.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CHRSA18E	922.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CHRSA19	921.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.0	2.5
CHRSA20	921.00	0.0	0.0	1.0	0.5	0.5	0.0	0.0	1.0	0.5	0.5
CHRSA21	927.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CHRSA22	927.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CHRSA23	920.00	0.0	1.0	0.5	0.5	0.5	0.0	1.0	0.5	0.0	0.0
CHRSA24	927.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CHRSA25	928.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CHRSA26	928.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CHRSA27	924.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.5	2.0
DIVSA100	913.00	0.0	0.0	0.0	2.0	2.0	0.0	0.0	1.5	1.0	1.0
DIVSA101	914.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.5	0.0	0.0
DIVSA102	915.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DIVSA105	915.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.5	2.0	2.0
DIVSA106E	919.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DIVSA107E	919.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DIVSA84	913.00	0.0	0.0	0.0	0.5	0.5	0.0	0.0	0.0	0.0	0.0
DIVSA84E	907.50	0.0	0.0	0.0	1.5	1.5	0.0	0.0	0.0	0.0	0.0
DIVSA85E	904.50	0.0	1.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DIVSA86S	905.50	0.0	0.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DIVSA87S	908.50	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0
DIVSA88W	907.00	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DIVSA89W	910.50	0.0	0.0	0.0	0.0	0.0	0.0	1.5	1.0	0.0	0.0
DIVSA90S	907.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DIVSA93S	908.00	0.0	1.5	1.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0
DIVSA94	908.00	2.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0
DIVSA95	908.50	0.0	1.0	0.5	0.0	0.0	0.0	0.5	0.0	0.0	0.0
DIVSA98W	912.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.5	0.5	0.5
DIVSA99W	910.50	0.0	2.0	1.0	0.0	0.0	0.0	1.5	0.5	0.0	0.0
DRAIN370	922.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DRAIN371	921.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DRAIN372	920.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DRAIN373	919.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DRAIN374	915.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RR10	909.00	0.0	1.0	0.5	0.0	0.0	0.0	0.5	0.0	0.0	0.0
- continued -											

Appendix Table A3. Continued											
		Days from Activation of Staging Area for Field to be Inundated									
	Approx. Field	Existing Conditions					With Diversion Staging Area				
Storage Area	Elevation[a]	10-yr	20-yr	25-yr	25-yr Long	25-yr EL	10-yr	20-yr	25-yr	25-yr Long	25-yr EL
RR11	909.00	0.0	1.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0
RR12	909.00	0.0	1.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0
RR13	911.50	0.0	2.0	1.0	0.0	0.0	0.0	1.5	0.5	0.0	0.0
RR14	914.00	0.0	0.0	0.0	2.0	2.0	0.0	0.0	1.5	0.5	0.5
RR15	908.00	1.5	0.0	0.0	0.0	0.0	1.5	0.0	0.0	0.0	0.0
RR16	916.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.0	1.5	1.5
RR17	910.00	0.0	0.5	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0
RR18	913.00	0.0	0.0	1.5	0.5	0.5	0.0	0.0	1.0	0.0	0.0
RR19	909.00	2.0	0.0	0.0	0.0	0.0	2.0	0.0	0.0	0.0	0.0
RR20	919.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RR21	909.00	1.5	0.0	0.0	0.0	0.0	1.5	0.0	0.0	0.0	0.0
RR22	917.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	2.0
RR23	912.50	0.0	1.5	1.0	0.0	0.0	0.0	1.5	0.5	0.0	0.0
RR24	921.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RR25	920.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RR26	913.00	0.0	1.5	0.5	0.0	0.0	0.0	1.0	0.5	0.0	0.0
RR27	917.00	0.0	0.0	0.0	1.5	1.5	0.0	0.0	2.0	1.0	1.0
RR28	923.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RR29	921.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RR3	910.50	0.0	0.0	1.5	0.0	0.0	0.0	2.0	0.5	0.0	0.0
RR30	922.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RR31	916.50	0.0	0.0	1.5	0.5	0.5	0.0	0.0	1.0	0.5	0.5
RR32	916.00	0.0	1.5	1.0	0.5	0.5	0.0	1.5	1.0	0.5	0.5
RR33	913.50	0.0	0.5	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0
RR34	913.00	1.5	0.0	0.0	0.0	0.0	1.5	0.0	0.0	0.0	0.0
RR35	914.00	0.0	0.5	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0
RR36	916.50	0.0	1.0	0.5	0.0	0.0	0.0	1.0	0.5	0.0	0.0
RR37	914.50	1.5	0.0	0.0	0.0	0.0	1.5	0.0	0.0	0.0	0.0
RR38	923.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RR39	915.50	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RR4	906.50	2.0	0.0	0.0	0.0	0.0	2.0	0.0	0.0	0.0	0.0
RR40	925.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RR41	915.50	1.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0
RR42	916.00	1.5	0.0	0.0	0.0	0.0	1.5	0.0	0.0	0.0	0.0
RR43	920.00	0.0	1.5	0.5	0.5	0.5	0.0	1.5	0.5	0.5	0.5
RR44	924.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.0	3.0
RR45	923.00	0.0	0.0	0.0	1.5	1.5	0.0	0.0	0.0	1.5	1.5
RR46	932.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RR47	927.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
- continued -											

Appendix Table A3. Continued											
		Days from Activation of Staging Area for Field to be Inundated									
	Approx. Field	Existing Conditions					With Diversion Staging Area				
Storage Area	Elevation[a]	10-yr	20-yr	25-yr	25-yr Long	25-yr EL	10-yr	20-yr	25-yr	25-yr Long	25-yr EL
RR48	928.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RR49	926.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RR5	904.00	0.5	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0
RR50	933.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RR51	919.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RR52	933.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RR53	919.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RR54	932.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RR55	919.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RR56	918.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RR57	919.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RR58	914.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RR59	919.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RR6	910.00	0.0	2.0	1.0	0.0	0.0	0.0	1.5	0.5	0.0	0.0
RR60	915.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RR7	907.00	2.5	0.0	0.0	0.0	0.0	2.0	0.0	0.0	0.0	0.0
RR8	909.50	0.0	1.5	1.0	0.0	0.0	0.0	1.0	0.5	0.0	0.0
RR9	900.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WLVSA200	918.00	0.0	0.5	0.5	0.0	0.0	0.0	0.5	0.0	0.0	0.0
WLVSA202	928.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WLVSA203	927.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WLVSA204	918.00	0.0	0.5	0.5	0.0	0.0	0.0	0.5	0.5	0.0	0.0
WLVSA205	924.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WLVSA206	924.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WLVSA207	925.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WLVSA208	923.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WLVSA209	915.50	0.0	1.0	0.5	0.0	0.0	0.0	1.0	0.5	0.0	0.0
WLVSA210	920.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.5	2.5
WLVSA211	923.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WLVSA212	919.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WLVSA213	920.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WLVSA214	919.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WLVSA215	911.00	0.0	1.0	0.5	0.0	0.0	0.0	1.0	0.5	0.0	0.0
WLVSA216	914.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WLVSA217	922.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WLVSA218	921.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WLVSA219	922.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WLVSA220	908.50	0.0	0.5	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0
WLVSA221	908.50	0.0	1.0	0.5	0.0	0.0	0.0	0.5	0.0	0.0	0.0
- continued -											

Appendix Table A3. Continued											
		Days from Activation of Staging Area for Field to be Inundated									
	Approx. Field	Existing Conditions					With Diversion Staging Area				
Storage Area	Elevation[a]	10-yr	20-yr	25-yr	25-yr Long	25-yr EL	10-yr	20-yr	25-yr	25-yr Long	25-yr EL
WLVSA222	913.00	0.0	0.0	0.0	2.0	2.0	0.0	0.0	1.5	0.5	0.5
WLVSA223	910.00	0.0	1.5	1.0	0.0	0.0	0.0	1.0	0.5	0.0	0.0
WLVSA224	912.50	0.0	0.0	0.0	1.5	1.5	0.0	0.0	1.5	0.5	0.5
WLVSA225	914.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.0	1.5	1.5
WLVSA226	917.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.5	2.5
WLVSA227	915.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.0	1.5	1.5
WLVSA228	911.50	0.0	2.5	1.5	0.0	0.0	0.0	2.0	1.0	0.0	0.0
WLVSA229	910.00	0.0	1.0	0.5	0.0	0.0	0.0	1.0	0.5	0.0	0.0
WLVSA230	910.00	0.0	1.0	0.5	0.0	0.0	0.0	1.0	0.5	0.0	0.0
WLVSA231	910.50	0.0	1.5	1.0	0.0	0.0	0.0	1.0	0.5	0.0	0.0
WLVSA232	916.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.0	1.5	1.5
WLVSA233	912.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WLVSA234	917.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.5	2.5
WLVSA235	908.50	0.0	0.5	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0
WLVSA236	910.00	0.0	2.0	1.0	0.0	0.0	0.0	1.5	0.5	0.0	0.0
WLVSA237	910.00	0.0	2.5	1.5	0.0	0.0	0.0	1.5	0.5	0.0	0.0
WLVSA57	921.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WLVSA64	922.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WLVSA65	919.50	0.0	0.0	0.0	3.0	3.0	0.0	0.0	0.0	2.0	2.0
WLVSA66	923.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WRRND1	920.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WRRND10	916.50	1.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0
WRRND11	919.50	0.0	0.5	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0
WRRND12	916.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WRRND13	913.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WRRND14	912.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WRRND15	911.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WRRND16	912.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WRRND17	911.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WRRND18	908.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WRRND19	906.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WRRND2	920.00	1.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0
WRRND3	919.50	0.5	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0
WRRND4	918.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WRRND5	918.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WRRND6	918.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WRRND7	917.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WRRND8	917.00	0.5	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0
WRRND9	917.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
- continued -											

Appendix Table A3. Continued											
		Days from Activation of Staging Area for Field to be Inundated									
	Approx. Field	Existing Conditions					With Diversion Staging Area				
Storage Area	Elevation[a]	10-yr	20-yr	25-yr	25-yr Long	25-yr EL	10-yr	20-yr	25-yr	25-yr Long	25-yr EL
WRSA273	929.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WRSA280	925.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WRSA284	923.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WRSA289	923.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WRSA294	919.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WRSA299	912.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WRSA300	909.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WRSA302	913.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.5	0.5	0.5
WRSA303	919.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WRSA304	915.00	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0
WRSA305A	910.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WRSA305B	910.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WRSA305C	906.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WRSA305D	906.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WRSA306	908.00	0.5	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0
WRSA307	911.00	0.0	2.0	1.0	0.0	0.0	0.0	2.0	0.5	0.0	0.0
WRSA308	917.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.0	3.0
WRSA309	914.50	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0
WRSA311	907.00	0.0	0.0	0.0	0.0	0.0	1.5	0.0	0.0	0.0	0.0
WRSA312	906.50	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0
WRSA315	909.50	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WRSA321	906.50	0.0	0.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WRSA350	910.50	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0
WRSA351	908.50	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WRSA352	911.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WRSA353	917.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.5
WRSA354	919.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WRSA355	917.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WRSA356	920.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WRSA357	921.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WRSA358	923.00	0.0	1.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0
WRSA359	923.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WRSA360	924.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WRSA363	911.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WRSA364	913.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WRSA373	927.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WRSA378	926.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WRSA383	924.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WRSA384	925.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
- continued -											

Appendix Table A3. Continued											
		Days from Activation of Staging Area for Field to be Inundated									
	Approx. Field Elevation[a]	Existing Conditions					With Diversion Staging Area				
Storage Area		10-yr	20-yr	25-yr	25-yr Long	25-yr EL	10-yr	20-yr	25-yr	25-yr Long	25-yr EL
WRSA389	923.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WRSA390	917.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WRSA501	911.00	0.0	0.0	1.5	0.0	0.0	0.0	2.5	0.5	0.0	0.0
WRSA502	913.00	0.0	0.0	0.0	1.5	1.5	0.0	0.0	1.5	0.5	0.5
WRSA504	915.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.5	1.5	1.5
WRSA505	909.00	0.0	1.5	1.0	0.0	0.0	0.0	1.0	0.5	0.0	0.0
WRSA506	909.00	0.0	1.0	0.5	0.0	0.0	0.0	1.0	0.0	0.0	0.0
WRSA507	902.00	2.0	0.0	0.0	0.0	0.0	2.0	0.0	0.0	0.0	0.0
WRSA907	915.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

[a]Feet above mean seal level. Lowest estimated elevation for storage area.

Source: Houston-Moore Group (2019).

Appendix Table A3. Continued											
		Days from Activation of Staging Area for Field to be Inundated									
	Approx. Field	Existing Conditions					With Diversion Staging Area				
Storage Area	Elevation[a]	2009-yr	50-yr	100-yr	500-yr	PMF	2009-yr	50-yr	100-yr	500-yr	PMF
BD1	908.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CHRSA01	915.00	0.0	0.0	0.0	4.0	3.0	2.0	2.0	1.0	1.5	1.5
CHRSA02	914.50	0.0	0.0	0.0	3.0	2.5	2.0	2.0	1.5	1.5	1.5
CHRSA03	918.00	0.0	0.0	0.0	4.5	0.0	4.0	3.5	3.0	3.0	2.5
CHRSA04	918.00	0.0	0.0	0.0	3.5	2.5	5.0	3.0	2.0	2.5	2.0
CHRSA05E	920.00	0.0	3.0	3.0	2.5	2.0	0.0	2.5	2.0	2.0	2.0
CHRSA05W	920.00	0.0	0.5	0.5	0.5	0.5	0.0	0.5	0.5	0.5	0.5
CHRSA06	921.00	0.0	0.0	0.0	3.5	2.5	0.0	4.0	0.0	2.5	2.5
CHRSA07	915.00	2.0	1.5	0.5	1.0	1.0	1.5	1.0	0.0	1.0	1.0
CHRSA08	918.50	0.0	0.0	1.5	2.0	1.5	3.0	2.0	1.0	1.5	1.5
CHRSA09	923.00	0.0	0.0	0.0	3.0	2.5	0.0	0.0	0.0	3.0	2.5
CHRSA10	922.00	0.0	0.0	0.0	4.0	3.0	0.0	0.0	0.0	3.5	2.5
CHRSA100	931.00	0.0	0.0	1.0	2.5	1.5	0.0	0.0	1.0	2.0	1.5
CHRSA101	924.00	0.5	0.5	0.0	0.0	0.5	0.5	0.5	0.0	0.0	0.5
CHRSA102	928.00	0.0	2.0	0.5	1.5	1.0	0.0	2.0	0.5	1.5	1.0
CHRSA103	918.00	0.5	0.5	0.0	0.0	0.0	0.5	0.5	0.0	0.0	0.0
CHRSA104	926.50	0.0	0.0	1.0	2.0	1.5	0.0	0.0	1.0	2.0	1.5
CHRSA105	919.00	0.5	0.5	0.0	0.0	0.0	0.5	0.5	0.0	0.0	0.0
CHRSA106	925.00	0.0	2.0	0.5	2.0	1.0	0.0	1.5	0.5	2.0	1.0
CHRSA107	927.50	0.0	0.0	0.0	3.0	1.5	0.0	0.0	1.5	3.0	1.5
CHRSA108	923.00	0.0	0.0	1.5	2.5	2.0	0.0	3.0	1.5	2.0	1.5
CHRSA109	918.00	2.5	1.5	0.5	1.0	1.0	1.5	1.5	0.5	1.0	1.0
CHRSA11	924.50	0.0	0.0	0.0	3.5	2.5	0.0	0.0	0.0	3.5	2.5
CHRSA110	913.50	0.5	0.5	0.0	0.0	0.0	0.5	0.5	0.0	0.0	0.0
CHRSA111	921.00	0.0	0.0	1.5	2.0	1.5	0.0	2.5	1.0	2.0	1.5
CHRSA112	918.00	2.5	1.5	0.5	1.0	1.0	1.5	1.5	0.5	1.0	1.0
CHRSA113	919.50	0.0	2.5	1.0	1.5	1.5	2.5	2.0	1.0	1.5	1.5
CHRSA114	910.50	0.5	0.5	0.0	0.0	0.0	0.5	0.5	0.0	0.0	0.0
CHRSA115	918.00	0.0	3.0	1.5	2.5	2.0	3.0	2.0	1.0	2.0	1.5
CHRSA116	916.50	0.0	0.0	0.0	3.0	2.5	3.0	2.5	1.5	2.0	2.0
CHRSA117	919.50	0.0	0.0	0.0	2.5	2.0	4.5	2.5	1.5	2.0	1.5
CHRSA118	919.50	0.0	0.0	0.0	3.0	2.5	0.0	3.0	2.0	2.5	2.0
CHRSA119	918.50	0.0	0.0	1.5	2.0	2.0	3.0	2.0	1.0	1.5	1.5
CHRSA12	924.00	0.0	0.0	0.0	2.5	2.0	0.0	0.0	0.0	2.5	2.0
CHRSA120	916.00	0.0	3.0	1.5	2.0	1.5	2.0	2.0	1.0	1.5	1.5
CHRSA13	918.00	1.5	1.0	0.0	0.5	0.5	1.0	1.0	0.0	0.5	0.5
CHRSA14	924.00	0.0	0.0	0.0	3.0	2.5	1.0	1.0	0.0	1.0	1.0
CHRSA15	919.50	1.0	1.0	0.0	1.0	1.0	1.0	1.0	0.0	0.5	0.5
CHRSA16	918.00	1.5	1.0	0.0	0.5	0.5	1.0	1.0	0.0	0.5	0.5
- continued -											

Appendix Table A3. Continued											
		Days from Activation of Staging Area for Field to be Inundated									
		Existing Conditions					With Diversion Staging Area				
Storage Area	Approx. Field Elevation[a]	2009-yr	50-yr	100-yr	500-yr	PMF	2009-yr	50-yr	100-yr	500-yr	PMF
CHRSA17	918.00	1.0	1.0	0.0	0.5	0.5	0.0	0.0	0.0	0.0	0.0
CHRSA18	922.00	0.0	0.0	0.0	0.0	0.0	0.0	2.0	1.0	1.5	1.5
CHRSA18E	922.00	0.0	2.5	1.0	1.5	1.5	3.5	1.5	0.5	1.5	1.0
CHRSA19	921.00	0.0	2.0	0.5	1.5	1.0	1.0	1.0	0.0	0.5	0.5
CHRSA20	921.00	1.0	1.0	0.0	0.5	0.5	2.0	1.5	1.5	1.5	1.0
CHRSA21	927.50	2.0	1.5	1.5	1.5	1.0	0.0	2.0	2.0	2.0	1.5
CHRSA22	927.50	0.0	2.0	2.0	2.0	1.5	0.5	0.5	0.0	0.0	0.0
CHRSA23	920.00	0.5	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CHRSA24	927.50	0.0	0.0	0.0	0.0	0.0	2.0	1.5	1.0	1.0	1.0
CHRSA25	928.00	2.0	1.5	1.0	1.0	1.0	2.0	1.5	1.0	1.0	1.0
CHRSA26	928.50	2.0	1.5	1.0	1.0	1.0	1.5	1.0	0.0	1.0	1.0
CHRSA27	924.00	1.5	1.0	0.0	1.0	1.0	1.5	1.5	0.5	1.0	1.0
DIVSA100	913.00	2.5	2.0	1.0	1.5	1.5	0.5	0.5	0.5	1.0	0.5
DIVSA101	914.00	2.5	1.0	1.0	1.5	0.0	0.0	0.0	0.5	1.0	0.0
DIVSA102	915.00	0.0	0.0	0.5	1.0	0.0	2.5	2.0	1.5	2.0	2.0
DIVSA105	915.50	0.0	0.0	0.0	4.5	0.0	0.0	4.0	4.0	3.0	4.0
DIVSA106E	919.00	0.0	0.0	0.0	4.0	0.0	0.0	4.0	4.0	3.0	4.0
DIVSA107E	919.50	0.0	0.0	0.0	4.0	0.0	0.0	0.0	0.0	1.5	0.0
DIVSA84	913.00	2.0	2.0	2.5	1.5	1.5	0.5	0.5	0.5	0.5	1.0
DIVSA84E	907.50	3.0	2.5	3.0	1.5	2.0	0.0	0.0	0.0	0.5	0.0
DIVSA85E	904.50	1.0	1.0	1.5	1.0	1.0	0.0	0.0	0.0	0.5	0.5
DIVSA86S	905.50	1.5	1.5	2.0	1.0	1.5	0.5	1.0	0.5	1.0	1.0
DIVSA87S	908.50	0.0	3.0	3.5	2.0	2.0	0.5	0.5	0.5	0.5	0.5
DIVSA88W	907.00	0.0	0.0	0.0	0.0	0.0	1.0	1.0	1.0	1.0	1.0
DIVSA89W	910.50	0.0	0.0	0.5	0.0	0.5	0.0	0.0	0.0	0.0	0.0
DIVSA90S	907.50	0.0	0.0	0.0	0.0	0.0	0.5	0.5	0.0	0.0	0.0
DIVSA93S	908.00	1.0	1.0	0.5	0.5	0.5	0.5	0.5	0.0	0.0	0.0
DIVSA94	908.00	0.0	0.0	0.0	0.0	0.5	0.5	0.5	0.0	0.0	0.0
DIVSA95	908.50	1.0	1.0	0.0	0.5	0.5	1.0	1.0	0.5	1.0	1.0
DIVSA98W	912.50	0.0	2.5	1.5	1.5	1.0	1.0	1.0	0.0	0.5	0.5
DIVSA99W	910.50	1.5	1.5	0.0	1.0	0.5	0.0	0.0	0.0	0.0	0.0
DRAIN370	922.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5
DRAIN371	921.50	0.0	0.0	0.0	0.0	0.5	0.5	0.5	0.5	0.5	0.5
DRAIN372	920.00	0.5	0.5	0.5	0.5	0.5	1.0	1.0	0.0	1.0	1.0
DRAIN373	919.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DRAIN374	915.00	1.0	1.0	0.0	0.5	0.0	0.5	0.5	0.0	0.5	0.0
RR10	909.00	0.5	0.5	0.0	0.5	0.0	0.5	0.5	0.0	0.0	0.0
RR11	909.00	0.5	0.5	0.0	0.5	0.0	0.5	0.5	0.0	0.0	0.0
RR12	909.00	1.0	1.0	0.0	0.5	0.5	1.0	1.0	0.0	0.5	0.5
- continued -											

Appendix Table A3. Continued											
		Days from Activation of Staging Area for Field to be Inundated									
	Approx. Field	Existing Conditions					With Diversion Staging Area				
Storage Area	Elevation[a]	2009-yr	50-yr	100-yr	500-yr	PMF	2009-yr	50-yr	100-yr	500-yr	PMF
RR13	911.50	2.0	2.0	0.5	1.0	1.0	1.0	1.0	0.5	1.0	1.0
RR14	914.00	0.0	0.5	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0
RR15	908.00	0.0	2.5	1.0	1.5	1.5	1.5	1.5	0.5	1.0	1.0
RR16	916.00	0.5	0.5	0.0	0.5	0.0	0.5	0.5	0.0	0.0	0.0
RR17	910.00	1.5	1.5	0.0	1.0	1.0	1.0	1.0	0.0	0.5	0.5
RR18	913.00	0.5	0.5	0.0	0.0	0.0	0.5	0.5	0.0	0.0	0.0
RR19	909.00	0.0	0.0	0.0	3.5	2.5	4.0	2.5	2.0	2.0	2.0
RR20	919.00	0.5	0.5	0.0	0.0	0.0	0.5	0.5	0.0	0.0	0.0
RR21	909.00	0.0	3.0	1.0	2.0	1.5	2.5	1.5	0.5	1.5	1.5
RR22	917.50	1.0	1.0	0.0	0.5	0.5	1.0	1.0	0.0	0.5	0.5
RR23	912.50	0.0	0.0	0.0	4.0	3.0	0.0	4.5	0.0	3.0	2.5
RR24	921.50	0.0	0.0	0.0	2.5	2.0	0.0	2.5	1.0	2.0	1.5
RR25	920.00	1.0	1.0	0.0	0.5	0.5	1.0	1.0	0.0	0.5	0.5
RR26	913.00	1.5	1.5	0.0	1.0	1.0	1.5	1.0	0.0	1.0	1.0
RR27	917.00	0.0	0.0	0.0	4.0	2.5	0.0	0.0	0.0	3.0	2.5
RR28	923.00	0.0	0.0	1.0	2.0	1.5	0.0	2.0	1.0	1.5	1.5
RR29	921.00	1.5	1.5	0.5	1.0	0.5	0.5	0.5	0.0	0.5	0.5
RR3	910.50	0.0	0.0	0.0	2.5	2.0	0.0	3.5	0.0	2.0	2.0
RR30	922.50	1.0	1.0	0.0	0.5	0.5	1.0	1.0	0.0	0.5	0.5
RR31	916.50	1.0	1.0	0.0	0.5	0.5	1.0	1.0	0.0	0.5	0.5
RR32	916.00	0.5	0.5	0.0	0.0	0.0	0.5	0.5	0.0	0.0	0.0
RR33	913.50	0.5	0.5	0.0	0.0	0.0	0.5	0.5	0.0	0.0	0.0
RR34	913.00	0.5	0.5	0.0	0.0	0.0	0.5	0.5	0.0	0.0	0.0
RR35	914.00	0.5	0.5	0.0	0.0	0.5	0.5	0.5	0.0	0.0	0.5
RR36	916.50	0.5	0.5	0.0	0.0	0.0	0.5	0.5	0.0	0.0	0.0
RR37	914.50	0.0	2.5	1.0	1.5	1.5	0.0	2.0	0.5	1.5	1.5
RR38	923.50	0.5	0.5	0.0	0.0	0.0	0.5	0.5	0.0	0.0	0.0
RR39	915.50	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RR4	906.50	0.0	0.0	0.0	2.0	1.5	0.0	0.0	0.0	2.0	1.5
RR40	925.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RR41	915.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RR42	916.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RR43	920.00	0.5	0.5	0.0	0.0	0.5	0.5	0.5	0.0	0.0	0.5
RR44	924.00	0.0	1.5	0.0	1.0	1.0	0.0	1.5	0.0	1.0	1.0
RR45	923.00	1.5	1.0	0.0	0.5	0.5	1.5	1.0	0.0	0.5	0.5
RR46	932.00	0.0	0.0	0.0	4.5	0.0	0.0	0.0	0.0	4.5	0.0
RR47	927.50	0.0	0.0	0.5	1.5	1.5	0.0	2.5	0.5	1.5	1.0
RR48	928.00	0.0	0.0	1.0	2.0	1.5	0.0	0.0	1.0	2.0	1.5
RR49	926.50	0.0	1.5	0.0	1.0	1.0	0.0	1.5	0.0	1.0	1.0
- continued -											

Appendix Table A3. Continued											
		Days from Activation of Staging Area for Field to be Inundated									
	Approx. Field	Existing Conditions					With Diversion Staging Area				
Storage Area	Elevation[a]	2009-yr	50-yr	100-yr	500-yr	PMF	2009-yr	50-yr	100-yr	500-yr	PMF
RR5	904.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RR50	933.00	0.0	0.0	0.0	4.0	0.0	0.0	0.0	0.0	4.0	0.0
RR51	919.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RR52	933.00	0.0	0.0	0.0	4.0	3.0	0.0	0.0	0.0	4.0	3.0
RR53	919.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RR54	932.50	0.0	0.0	0.0	3.5	2.0	0.0	0.0	0.0	3.5	2.0
RR55	919.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RR56	918.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RR57	919.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RR58	914.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RR59	919.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RR6	910.00	1.0	1.0	0.0	0.5	0.5	0.5	0.5	0.0	0.5	0.5
RR60	915.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RR7	907.00	0.5	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RR8	909.50	1.0	1.0	0.0	0.5	0.5	0.5	0.5	0.0	0.5	0.0
RR9	900.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WLVSA200	918.00	0.5	0.5	0.0	0.0	0.0	0.5	0.5	0.0	0.0	0.0
WLVSA202	928.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WLVSA203	927.00	0.0	0.0	0.0	2.5	1.5	0.0	0.0	0.0	2.5	1.5
WLVSA204	918.00	0.5	0.5	0.0	0.0	0.0	0.5	0.5	0.0	0.0	0.0
WLVSA205	924.00	0.0	0.0	1.5	2.0	1.5	0.0	3.5	1.5	2.0	1.5
WLVSA206	924.00	0.0	0.0	1.5	2.0	1.5	0.0	3.0	1.0	2.0	1.5
WLVSA207	925.50	0.0	0.0	1.5	2.0	1.5	0.0	0.0	1.5	2.0	1.5
WLVSA208	923.50	0.0	0.0	1.0	2.0	1.5	0.0	2.5	1.0	2.0	1.5
WLVSA209	915.50	1.0	1.0	0.0	0.5	0.5	1.0	1.0	0.0	0.5	0.5
WLVSA210	920.50	0.0	2.0	0.5	1.5	1.0	3.0	1.5	0.5	1.5	1.0
WLVSA211	923.00	0.0	0.0	0.0	3.0	2.0	0.0	0.0	0.0	2.5	2.0
WLVSA212	919.50	0.0	0.0	0.0	4.5	3.0	0.0	3.0	2.5	2.5	2.5
WLVSA213	920.00	0.0	0.0	0.0	4.5	3.0	0.0	3.5	3.0	2.5	2.5
WLVSA214	919.50	0.0	0.0	0.0	3.5	2.5	0.0	3.0	2.0	2.5	2.0
WLVSA215	911.00	1.0	1.0	0.0	0.5	0.5	0.5	0.5	0.0	0.5	0.5
WLVSA216	914.50	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.5	1.0	0.0
WLVSA217	922.00	0.0	0.0	0.0	4.5	3.5	0.0	0.0	0.0	3.5	3.0
WLVSA218	921.00	0.0	0.0	0.0	2.5	1.0	0.0	4.0	0.0	2.5	1.0
WLVSA219	922.00	0.0	0.0	0.0	3.5	2.5	0.0	5.0	0.0	3.0	2.5
WLVSA220	908.50	0.5	0.5	0.0	0.5	0.0	0.5	0.5	0.0	0.0	0.0
WLVSA221	908.50	0.5	1.0	0.0	0.5	0.0	0.5	0.5	0.0	0.5	0.0
WLVSA222	913.00	2.5	2.0	1.0	1.5	1.5	1.0	1.0	0.5	1.0	1.0
WLVSA223	910.00	1.0	1.0	0.0	0.5	0.5	0.5	0.5	0.0	0.5	0.5
- continued -											

Appendix Table A3. Continued											
		Days from Activation of Staging Area for Field to be Inundated									
	Approx. Field	Existing Conditions					With Diversion Staging Area				
Storage Area	Elevation[a]	2009-yr	50-yr	100-yr	500-yr	PMF	2009-yr	50-yr	100-yr	500-yr	PMF
WLVSA224	912.50	2.0	2.0	0.5	1.5	1.0	1.0	1.0	0.5	1.0	1.0
WLVSA225	914.50	0.0	3.0	1.5	2.0	2.0	2.0	1.5	0.5	1.5	1.5
WLVSA226	917.00	0.0	0.0	0.0	3.0	2.5	2.5	2.0	1.0	1.5	1.5
WLVSA227	915.50	0.0	2.5	1.5	2.0	1.5	1.5	1.5	0.5	1.0	1.0
WLVSA228	911.50	1.5	1.0	0.0	0.5	0.5	1.0	1.0	0.0	0.5	0.5
WLVSA229	910.00	1.0	1.0	0.0	0.5	0.5	0.5	0.5	0.0	0.5	0.5
WLVSA230	910.00	1.0	1.0	0.0	0.5	0.5	0.5	0.5	0.0	0.5	0.5
WLVSA231	910.50	1.0	1.0	0.0	0.5	0.5	0.5	0.5	0.0	0.5	0.5
WLVSA232	916.00	0.0	2.5	1.0	1.5	1.5	1.5	1.5	0.5	1.0	1.0
WLVSA233	912.00	0.5	0.5	0.5	1.0	0.0	0.0	0.5	0.5	1.0	0.5
WLVSA234	917.50	0.0	0.0	0.0	3.5	2.5	3.0	2.0	1.5	2.0	2.0
WLVSA235	908.50	0.5	0.5	0.0	0.5	0.0	0.5	0.5	0.0	0.0	0.0
WLVSA236	910.00	1.0	1.0	0.0	0.5	0.5	0.5	0.5	0.0	0.5	0.5
WLVSA237	910.00	1.5	1.5	0.0	0.5	0.5	0.5	0.5	0.0	0.5	0.5
WLVSA57	921.00	0.0	0.0	2.0	1.5	0.0	0.0	2.0	1.0	1.5	0.5
WLVSA64	922.00	0.0	0.0	1.5	2.0	0.5	0.0	4.0	0.0	2.0	1.0
WLVSA65	919.50	0.0	2.0	0.5	1.5	1.0	2.0	1.5	0.5	1.5	1.0
WLVSA66	923.00	0.0	0.0	1.0	2.0	1.0	0.0	2.5	1.0	2.0	0.5
WRRND1	920.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WRRND10	916.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WRRND11	919.50	0.0	0.0	0.5	0.5	0.5	0.0	0.5	0.5	0.5	0.5
WRRND12	916.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WRRND13	913.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WRRND14	912.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WRRND15	911.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WRRND16	912.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WRRND17	911.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WRRND18	908.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WRRND19	906.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WRRND2	920.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WRRND3	919.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WRRND4	918.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WRRND5	918.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WRRND6	918.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WRRND7	917.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WRRND8	917.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WRRND9	917.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WRSA273	929.50	0.0	0.0	0.0	0.5	1.5	0.0	0.0	0.0	0.5	1.5
WRSA280	925.50	0.0	0.0	0.0	1.0	2.0	0.0	0.0	0.0	1.0	2.0
- continued -											

Appendix Table A3. Continued											
		Days from Activation of Staging Area for Field to be Inundated									
	Approx. Field Elevation[a]	Existing Conditions					With Diversion Staging Area				
Storage Area		2009-yr	50-yr	100-yr	500-yr	PMF	2009-yr	50-yr	100-yr	500-yr	PMF
WRSA284	923.00	0.0	0.0	0.0	3.0	0.0	0.0	0.0	0.0	3.0	0.0
WRSA289	923.50	0.0	0.0	0.0	4.0	0.0	0.0	0.0	0.0	4.0	0.0
WRSA294	919.50	2.5	2.5	16.5	0.5	3.0	2.5	2.5	3.0	0.5	2.5
WRSA299	912.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WRSA300	909.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WRSA302	913.00	0.0	2.5	1.5	1.5	1.5	1.0	1.0	0.5	1.0	1.0
WRSA303	919.50	0.0	0.0	30.5	2.5	0.0	0.0	4.0	4.0	2.5	4.0
WRSA304	915.00	0.5	0.5	1.0	0.5	1.0	0.5	0.5	1.0	0.5	1.0
WRSA305A	910.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WRSA305B	910.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WRSA305C	906.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WRSA305D	906.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WRSA306	908.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WRSA307	911.00	1.5	1.5	0.5	1.0	1.0	1.0	1.0	0.0	0.5	0.5
WRSA308	917.00	0.0	0.0	0.0	2.5	0.0	3.0	2.5	2.0	2.0	2.0
WRSA309	914.50	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
WRSA311	907.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WRSA312	906.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WRSA315	909.50	0.5	0.5	1.0	0.5	1.0	0.0	0.0	0.0	0.5	0.0
WRSA321	906.50	1.5	1.5	2.0	1.5	1.5	0.0	0.0	0.5	0.5	0.5
WRSA350	910.50	0.0	0.0	0.5	0.0	0.5	0.0	0.0	0.0	0.0	0.0
WRSA351	908.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WRSA352	911.00	0.0	0.5	0.5	0.5	0.5	0.0	0.0	0.0	0.0	0.5
WRSA353	917.50	1.5	1.5	1.5	1.0	1.5	2.0	1.5	1.5	1.0	1.5
WRSA354	919.00	0.0	0.0	0.5	0.0	0.5	0.0	0.0	0.5	0.5	0.5
WRSA355	917.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WRSA356	920.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WRSA357	921.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WRSA358	923.00	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
WRSA359	923.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WRSA360	924.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WRSA363	911.50	0.0	0.0	0.5	0.0	0.5	0.0	0.0	0.0	0.0	0.0
WRSA364	913.00	0.0	0.0	0.5	0.0	0.5	0.0	0.0	0.5	0.0	0.5
WRSA373	927.50	0.0	0.0	0.0	4.5	0.0	0.0	0.0	0.0	4.5	0.0
WRSA378	926.00	0.0	0.0	0.0	3.5	3.0	0.0	0.0	0.0	3.5	3.0
WRSA383	924.00	0.0	0.0	0.0	4.0	0.0	0.0	0.0	0.0	4.0	0.0
WRSA384	925.00	0.0	0.0	0.0	3.5	3.0	0.0	0.0	0.0	3.5	3.0
WRSA389	923.00	0.0	0.0	0.0	3.5	0.0	0.0	0.0	0.0	3.5	0.0
WRSA390	917.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
- continued -											

Appendix Table A3. Continued											
		Days from Activation of Staging Area for Field to be Inundated									
	Approx. Field Elevation[a]	Existing Conditions					With Diversion Staging Area				
Storage Area		2009-yr	50-yr	100-yr	500-yr	PMF	2009-yr	50-yr	100-yr	500-yr	PMF
WRSA501	911.00	1.5	1.5	0.5	1.0	1.0	1.0	1.0	0.0	0.5	0.5
WRSA502	913.00	2.5	2.0	1.0	1.5	1.5	1.0	1.0	0.5	1.0	1.0
WRSA504	915.00	0.0	2.0	1.0	1.5	1.5	1.5	1.5	0.5	1.0	1.0
WRSA505	909.00	1.0	1.0	0.0	0.5	0.5	0.5	1.0	0.0	0.5	0.5
WRSA506	909.00	1.0	1.0	0.0	0.5	0.5	0.5	0.5	0.0	0.5	0.0
WRSA507	902.00	0.5	0.5	0.0	0.0	0.0	0.5	0.5	0.0	0.0	0.0
WRSA907	915.00	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.5

PMF = Probabilistic Maximum Flood.
[a]Feet above mean seal level. Lowest estimated elevation for storage area.
Source: Houston-Moore Group (2019).

Appendix Table A4. Time from Activation of Staging Area to When Flood Water Leaves, by Storage Area, by Flood Event Frequency for With and Without Diversion Conditions, FM Diversion Staging Area, Phase 9.1 HEC-RAS Modeling											
		Days from Activation of Staging Area Until Flood Water Leaves the Storage Area									
	Approx. Field	Existing Conditions					With Diversion Staging Area				
Storage Area	Elevation[a]	10-yr	20-yr	25-yr	25-yr Long	25-yr EL	10-yr	20-yr	25-yr	25-yr Long	25-yr EL
BD1	908.0	5.5	9.5	10.5	17.5	23.0	5.5	10.5	11.0	17.5	23.0
CHRSA01	915.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.0	8.5	10.0
CHRSA02	914.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.5	8.5	10.5
CHRSA03	918.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CHRSA04	918.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CHRSA05E	920.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CHRSA05W	920.0	0.0	3.5	4.0	5.0	8.0	0.0	3.5	4.5	6.0	10.0
CHRSA06	921.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CHRSA07	915.0	0.0	0.0	0.0	7.5	13.0	0.0	0.0	7.5	9.5	14.0
CHRSA08	918.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.0	8.5
CHRSA09	923.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CHRSA10	922.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CHRSA100	931.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CHRSA101	924.0	0.0	0.0	2.0	8.0	15.5	0.0	0.0	2.5	9.0	15.5
CHRSA102	928.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CHRSA103	918.0	0.0	4.0	5.0	12.0	19.0	0.0	4.0	7.0	12.5	19.0
CHRSA104	926.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CHRSA105	919.0	0.0	4.0	5.0	12.0	19.0	0.0	4.0	7.0	12.5	19.0
CHRSA106	925.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CHRSA107	927.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CHRSA108	923.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CHRSA109	918.0	0.0	0.0	0.0	5.0	7.0	0.0	0.0	0.0	8.5	11.5
CHRSA11	924.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CHRSA110	913.5	0.0	6.5	7.5	15.0	21.5	0.0	6.5	9.0	15.0	21.5
CHRSA111	921.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CHRSA112	918.0	0.0	0.0	0.0	5.0	7.0	0.0	0.0	0.0	8.5	11.5
CHRSA113	919.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.0	9.5
CHRSA114	910.5	0.0	7.0	8.0	15.0	21.5	0.0	7.0	10.0	15.5	21.5
CHRSA115	918.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.5	9.5
CHRSA116	916.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.0	10.0
CHRSA117	919.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CHRSA118	919.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CHRSA119	918.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.0	8.5
CHRSA12	924.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CHRSA120	916.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.0	8.5	10.5
CHRSA13	918.0	0.0	0.0	0.0	8.0	15.0	0.0	0.0	5.5	9.5	15.0
CHRSA14	924.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
- continued –											

Appendix Table A4. Continued											
		Days from Activation of Staging Area Until Flood Water Leaves the Storage Area									
	Approx.	Existing Conditions					With Diversion Staging Area				
Storage Area	Field Elevation[a]	10-yr	20-yr	25-yr	25-yr Long	25-yr EL	10-yr	20-yr	25-yr	25-yr Long	25-yr EL
CHRSA15	919.5	0.0	0.0	0.0	5.0	7.5	0.0	0.0	0.0	8.0	11.5
CHRSA16	918.0	0.0	0.0	0.0	8.0	15.0	0.0	0.0	5.5	9.5	15.0
CHRSA17	918.0	0.0	0.0	3.5	9.5	17.0	0.0	0.0	6.5	10.5	17.0
CHRSA18	922.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CHRSA18E	922.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CHRSA19	921.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.0	8.5
CHRSA20	921.0	0.0	0.0	2.5	8.5	16.0	0.0	0.0	4.0	10.0	16.5
CHRSA21	927.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CHRSA22	927.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CHRSA23	920.0	0.0	3.0	4.0	10.5	18.0	0.0	3.0	5.5	11.0	18.0
CHRSA24	927.5	0.0	2.5	3.5	3.5	5.5	0.0	2.5	3.5	3.5	5.5
CHRSA25	928.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CHRSA26	928.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CHRSA27	924.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.5	8.5
DIVSA100	913.0	0.0	0.0	0.0	5.5	8.0	0.0	0.0	8.0	10.0	13.5
DIVSA101	914.0	0.0	0.0	0.0	5.5	8.0	0.0	0.0	8.0	10.0	13.0
DIVSA102	915.0	0.0	0.0	0.0	7.0	12.0	0.0	0.0	7.5	9.5	13.5
DIVSA105	915.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.5	8.0	9.5
DIVSA106E	919.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DIVSA107E	919.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DIVSA84	913.0	0.0	0.0	0.0	4.0	4.0	0.5	2.0	9.5	10.5	12.0
DIVSA84E	907.5	0.0	0.0	0.0	9.5	10.5	0.0	12.0	10.5	10.0	12.0
DIVSA85E	904.5	0.0	5.5	7.0	11.5	16.0	49.0	49.0	49.0	49.0	49.0
DIVSA86S	905.5	0.0	0.0	6.5	11.0	14.5	0.0	13.0	11.0	11.0	13.0
DIVSA87S	908.5	0.0	0.0	0.0	0.0	0.0	0.0	11.5	10.5	10.0	12.0
DIVSA88W	907.0	3.5	8.0	9.5	14.0	21.0	0.0	12.0	10.5	10.0	13.0
DIVSA89W	910.5	0.0	8.0	9.0	12.0	19.5	0.0	9.5	10.0	9.5	11.5
DIVSA90S	907.5	4.5	9.0	10.0	15.5	21.5	0.0	8.0	10.5	16.0	22.0
DIVSA93S	908.0	0.0	6.5	7.5	13.5	20.5	0.0	7.5	10.5	15.0	21.5
DIVSA94	908.0	4.0	9.0	10.0	14.5	21.0	0.0	7.5	10.5	15.0	21.5
DIVSA95	908.5	0.0	6.0	7.0	12.5	19.5	0.0	7.0	10.0	14.0	21.0
DIVSA98W	912.5	0.0	0.0	0.0	3.5	3.5	0.0	0.0	8.0	9.5	13.0
DIVSA99W	910.5	0.0	4.5	5.5	11.0	18.5	0.0	5.0	9.5	12.0	18.5
DRAIN370	922.5	0.5	2.0	2.0	3.5	3.5	0.5	2.0	2.0	3.5	3.5
DRAIN371	921.5	0.0	1.5	1.5	3.0	3.0	0.0	1.5	1.5	3.0	3.0
DRAIN372	920.0	0.0	0.0	0.0	2.0	2.5	0.0	0.0	0.0	2.5	2.5
DRAIN373	919.0	0.0	2.5	3.5	3.5	4.0	0.0	2.5	3.5	5.5	8.0
DRAIN374	915.0	3.5	7.0	8.0	12.0	19.0	3.5	7.0	9.0	12.0	19.0
RR10	909.0	0.0	6.5	7.5	14.0	20.5	0.0	6.5	10.0	14.5	21.0
- continued -											

Appendix Table A4. Continued											
		Days from Activation of Staging Area Until Flood Water Leaves the Storage Area									
	Approx. Field Elevation[a]	Existing Conditions					With Diversion Staging Area				
Storage Area		10-yr	20-yr	25-yr	25-yr Long	25-yr EL	10-yr	20-yr	25-yr	25-yr Long	25-yr EL
RR11	909.0	0.0	7.0	8.0	14.5	21.0	0.0	7.0	10.0	15.0	21.5
RR12	909.0	0.0	7.0	8.0	14.5	21.0	0.0	7.0	10.0	15.0	21.5
RR13	911.5	0.0	4.0	5.5	11.0	18.5	0.0	4.5	9.0	12.0	18.5
RR14	914.0	0.0	0.0	0.0	6.0	8.5	0.0	0.0	7.5	9.5	13.0
RR15	908.0	5.0	8.5	9.5	17.0	23.5	5.0	8.5	11.0	17.0	23.5
RR16	916.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.0	8.5	10.5
RR17	910.0	0.0	6.5	7.5	14.5	21.5	0.0	7.0	10.0	15.0	21.5
RR18	913.0	0.0	0.0	4.0	9.5	16.5	0.0	0.0	8.0	11.0	17.0
RR19	909.0	4.0	8.0	9.0	16.5	23.0	4.5	8.0	10.5	16.5	23.0
RR20	919.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RR21	909.0	4.5	8.0	9.0	16.5	23.0	4.5	8.0	10.5	17.0	23.0
RR22	917.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.0	9.5
RR23	912.5	0.0	4.5	5.5	12.0	19.0	0.0	5.0	8.5	12.5	19.0
RR24	921.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RR25	920.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RR26	913.0	0.0	4.5	6.0	12.5	19.5	0.0	5.0	8.5	13.0	19.5
RR27	917.0	0.0	0.0	0.0	7.0	12.5	0.0	0.0	6.0	9.0	13.5
RR28	923.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RR29	921.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RR3	910.5	0.0	0.0	5.0	10.0	17.0	0.0	4.5	9.0	11.5	17.5
RR30	922.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RR31	916.5	0.0	0.0	3.5	9.5	17.0	0.0	0.0	7.0	10.5	17.0
RR32	916.0	0.0	3.0	4.5	11.0	18.5	0.0	3.5	7.5	11.5	18.5
RR33	913.5	0.0	6.5	7.5	15.5	21.5	0.0	6.5	9.0	15.5	21.5
RR34	913.0	3.5	7.0	8.0	16.0	22.0	3.5	7.0	9.5	16.0	22.0
RR35	914.0	0.0	6.5	7.5	15.0	21.5	0.0	6.5	9.0	15.0	21.5
RR36	916.5	0.0	4.0	5.0	11.5	19.0	0.0	4.0	7.5	12.0	19.0
RR37	914.5	2.5	6.5	7.5	15.5	21.5	3.0	6.5	9.0	15.5	22.0
RR38	923.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RR39	915.5	0.0	6.0	7.0	15.0	21.0	0.0	6.0	8.5	15.0	21.5
RR4	906.5	4.5	8.5	9.5	17.0	23.0	5.0	8.5	11.0	17.0	23.0
RR40	925.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RR41	915.5	3.5	6.5	7.5	16.0	22.0	3.5	7.0	9.0	16.0	22.0
RR42	916.0	2.5	6.0	7.0	15.0	21.5	2.5	6.5	8.5	15.5	21.5
RR43	920.0	0.0	2.5	3.5	10.0	17.5	0.0	2.5	5.5	10.5	17.5
RR44	924.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.5	7.5
RR45	923.0	0.0	0.0	0.0	6.0	10.5	0.0	0.0	0.0	7.5	12.0
RR46	932.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RR47	927.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
- continued -											

Appendix Table A4. Continued											
		Days from Activation of Staging Area Until Flood Water Leaves the Storage Area									
	Approx.	Existing Conditions					With Diversion Staging Area				
Storage Area	Field Elevation[a]	10-yr	20-yr	25-yr	25-yr Long	25-yr EL	10-yr	20-yr	25-yr	25-yr Long	25-yr EL
RR48	928.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RR49	926.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RR5	904.0	7.5	10.5	11.5	19.5	26.0	7.5	11.0	12.5	20.0	26.0
RR50	933.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RR51	919.0	4.5	7.0	8.0	16.5	22.5	4.5	7.0	8.5	16.5	23.0
RR52	933.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RR53	919.0	5.0	7.5	8.5	17.0	23.5	5.0	7.5	9.0	17.0	23.5
RR54	932.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RR55	919.0	5.5	8.0	9.0	18.0	24.5	6.0	8.0	9.5	18.0	24.5
RR56	918.0	6.5	9.0	10.5	19.5	26.0	6.5	9.0	10.5	19.5	26.0
RR57	919.0	6.0	8.5	9.5	18.5	25.0	6.5	8.5	10.0	18.5	25.0
RR58	914.5	9.5	15.0	17.5	41.0	34.5	9.5	15.0	17.5	42.0	35.5
RR59	919.0	6.5	9.0	10.5	19.5	26.0	6.5	9.0	10.5	19.5	26.0
RR6	910.0	0.0	4.5	6.0	11.0	18.5	0.0	5.5	9.5	12.0	18.5
RR60	915.0	9.5	15.0	17.5	42.5	36.0	9.5	15.0	18.0	44.5	37.5
RR7	907.0	4.5	8.5	9.5	16.5	23.0	4.5	8.5	11.0	17.0	23.0
RR8	909.5	0.0	5.5	7.0	12.5	19.5	0.0	6.0	9.5	13.0	20.0
RR9	900.0	10.0	14.0	15.5	25.5	31.5	10.0	14.5	16.0	25.5	31.5
WLVSA200	918.0	0.0	4.5	5.5	12.5	19.5	0.0	4.5	7.5	13.0	19.5
WLVSA202	928.0	2.0	2.5	3.0	4.0	4.0	2.0	2.5	3.0	4.0	4.0
WLVSA203	927.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WLVSA204	918.0	0.0	4.0	5.0	12.5	19.5	0.0	4.5	7.5	12.5	19.5
WLVSA205	924.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WLVSA206	924.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WLVSA207	925.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WLVSA208	923.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WLVSA209	915.5	0.0	4.0	5.0	12.0	19.0	0.0	4.0	8.0	12.0	19.0
WLVSA210	920.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.5	9.0
WLVSA211	923.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WLVSA212	919.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WLVSA213	920.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WLVSA214	919.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WLVSA215	911.0	0.0	6.0	7.0	14.0	20.5	0.0	6.5	9.5	14.0	21.0
WLVSA216	914.5	0.0	0.0	0.5	8.0	14.0	0.0	0.0	7.5	10.0	15.0
WLVSA217	922.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WLVSA218	921.0	0.0	0.0	0.0	2.5	2.5	0.0	0.0	0.0	1.0	1.0
WLVSA219	922.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WLVSA220	908.5	0.0	7.0	8.0	14.5	21.5	0.0	7.0	10.0	15.0	21.5
WLVSA221	908.5	0.0	7.0	8.0	14.5	21.5	0.0	7.5	10.5	15.0	21.5
- continued -											

Appendix Table A4. Continued											
		Days from Activation of Staging Area Until Flood Water Leaves the Storage Area									
	Approx.	Existing Conditions					With Diversion Staging Area				
Storage Area	Field Elevation[a]	10-yr	20-yr	25-yr	25-yr Long	25-yr EL	10-yr	20-yr	25-yr	25-yr Long	25-yr EL
WLVSA222	913.0	0.0	0.0	0.0	5.5	7.5	0.0	0.0	8.0	10.0	13.0
WLVSA223	910.0	0.0	5.5	6.5	12.5	19.5	0.0	6.0	9.5	13.0	20.0
WLVSA224	912.5	0.0	0.0	0.0	8.0	14.5	0.0	0.0	8.0	10.5	15.5
WLVSA225	914.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.5	11.5	13.5
WLVSA226	917.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.5	9.0
WLVSA227	915.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.5	8.5	10.5
WLVSA228	911.5	0.0	3.5	5.0	11.0	18.0	0.0	4.5	9.0	12.0	18.0
WLVSA229	910.0	0.0	6.0	7.0	13.5	20.5	0.0	6.5	9.5	14.0	20.5
WLVSA230	910.0	0.0	6.0	7.0	13.5	20.5	0.0	6.5	9.5	14.0	20.5
WLVSA231	910.5	0.0	5.5	6.5	12.5	19.5	0.0	6.0	9.5	13.0	20.0
WLVSA232	916.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.0	8.5	10.5
WLVSA233	912.0	0.0	0.0	4.5	10.0	17.0	0.0	0.0	9.0	11.5	17.5
WLVSA234	917.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.0	8.5
WLVSA235	908.5	0.0	7.0	8.0	14.5	21.0	0.0	7.0	10.0	15.0	21.5
WLVSA236	910.0	0.0	5.0	6.0	11.5	19.0	0.0	5.5	9.5	12.5	19.0
WLVSA237	910.0	0.0	4.5	5.5	11.0	18.0	0.0	5.5	9.5	12.0	18.5
WLVSA57	921.0	0.0	0.0	0.0	3.0	3.0	0.0	0.0	0.0	2.5	2.5
WLVSA64	922.0	0.0	0.0	0.0	2.0	2.0	0.0	0.0	0.0	0.5	0.5
WLVSA65	919.5	0.0	0.0	0.0	4.0	4.5	0.0	0.0	0.0	8.0	10.5
WLVSA66	923.0	0.0	0.0	0.0	1.0	1.0	0.0	0.0	0.0	1.0	1.0
WRRND1	920.0	2.5	6.5	7.0	10.5	18.5	2.5	6.5	7.5	10.5	18.0
WRRND10	916.5	2.0	6.5	7.0	10.0	18.0	2.0	6.5	8.0	10.5	17.5
WRRND11	919.5	0.0	2.0	3.0	3.0	3.5	0.0	2.0	3.0	3.5	5.0
WRRND12	916.0	0.0	6.0	7.0	9.5	17.5	0.0	6.0	8.0	10.0	16.5
WRRND13	913.5	4.0	8.0	8.5	14.0	20.5	4.0	8.0	9.5	14.0	20.0
WRRND14	912.5	4.5	8.0	9.0	14.5	21.0	4.0	8.5	10.0	14.5	20.5
WRRND15	911.0	5.0	9.0	10.0	16.0	22.0	5.0	9.5	10.5	16.5	22.0
WRRND16	912.5	4.0	8.0	8.5	13.5	20.0	4.0	8.0	9.5	13.0	20.0
WRRND17	911.0	4.5	8.5	9.5	15.5	21.5	4.5	9.0	10.5	15.5	21.5
WRSA355	917.5	0.0	6.0	7.0	9.5	17.5	0.0	6.0	7.5	10.0	17.0
WRSA356	920.5	0.0	4.0	4.5	6.0	12.5	0.0	4.0	5.0	6.5	12.0
WRSA357	921.5	0.0	3.5	4.0	4.5	7.0	0.0	3.5	4.0	5.0	8.0
WRSA358	923.0	0.0	2.5	3.5	3.5	4.0	0.0	2.5	3.5	4.0	4.5
WRSA359	923.0	0.0	3.0	4.0	4.5	7.5	0.0	3.0	4.0	4.5	8.5
WRSA360	924.0	0.0	4.5	5.0	6.5	14.0	0.0	4.5	5.0	7.0	14.0
WRSA363	911.5	0.0	7.5	8.5	10.5	17.5	0.0	7.0	9.5	11.0	17.5
WRSA364	913.0	0.0	6.5	7.5	9.0	16.0	0.0	5.0	8.5	10.0	12.5
WRSA373	927.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WRSA378	926.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

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Appendix Table A4. Continued											
		Days from Activation of Staging Area Until Flood Water Leaves the Storage Area									
	Approx. Field	Existing Conditions					With Diversion Staging Area				
Storage Area	Elevation[a]	10-yr	20-yr	25-yr	25-yr Long	25-yr EL	10-yr	20-yr	25-yr	25-yr Long	25-yr EL
WRSA383	924.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WRSA384	925.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WRSA389	923.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WRSA390	917.5	0.0	5.0	5.5	7.0	14.5	0.0	4.5	6.5	8.5	14.0
WRSA501	911.0	0.0	0.0	5.0	10.0	17.0	0.0	4.0	9.0	11.5	17.0
WRSA502	913.0	0.0	0.0	0.0	6.0	9.5	0.0	0.0	8.0	10.0	13.5
WRSA504	915.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.0	9.0	11.0
WRSA505	909.0	0.0	8.0	9.0	16.0	22.5	0.0	8.5	11.0	16.5	23.0
WRSA506	909.0	0.0	6.0	7.5	13.0	20.0	0.0	6.5	10.0	13.5	20.5
WRSA507	902.0	9.5	13.0	14.0	22.5	29.0	9.5	13.5	15.0	23.0	29.0
WRSA907	915.0	0.0	4.0	5.0	6.0	11.0	0.0	3.5	7.5	9.0	11.0

[a]Feet above mean seal level. Lowest estimated elevation for storage area.
Source: Houston-Moore Group (2019).

Appendix Table A4. Continued											
		Days from Activation of Staging Area Until Flood Water Leaves the Storage Area									
		Existing Conditions					With Diversion Staging Area				
Storage Area	Approx. Field Elevation[a]	2009-yr	50-yr	100-yr	500-yr	PMF	2009-yr	50-yr	100-yr	500-yr	PMF
BD1	908.0	17.0	20.0	20.0	48.5	30.5	17.0	20.0	20.0	48.0	31.0
CHRSA01	915.0	0.0	0.0	0.0	16.0	8.0	10.0	12.5	9.5	20.5	15.0
CHRSA02	914.5	0.0	0.0	0.0	22.0	16.0	11.0	15.0	11.5	22.5	18.0
CHRSA03	918.0	0.0	0.0	0.0	13.5	0.0	8.0	11.5	8.5	17.5	14.0
CHRSA04	918.0	0.0	0.0	0.0	18.0	11.5	9.0	13.0	9.5	19.5	16.0
CHRSA05E	920.0	0.0	5.0	4.5	22.0	11.5	0.0	9.5	6.0	22.0	13.5
CHRSA05W	920.0	9.5	12.0	9.0	32.0	15.0	10.0	12.0	9.0	32.0	15.0
CHRSA06	921.0	0.0	0.0	0.0	17.5	8.5	0.0	8.5	0.0	17.5	12.5
CHRSA07	915.0	5.0	9.0	5.5	30.5	30.5	10.0	12.5	9.0	31.5	31.0
CHRSA08	918.5	0.0	0.0	2.5	17.5	14.5	8.0	10.5	7.5	19.0	16.0
CHRSA09	923.0	0.0	0.0	0.0	18.5	9.5	0.0	0.0	0.0	19.0	11.5
CHRSA10	922.0	0.0	0.0	0.0	16.0	7.0	0.0	0.0	0.0	16.0	11.0
CHRSA100	931.0	0.0	0.0	2.0	16.5	13.0	0.0	0.0	2.0	16.5	14.0
CHRSA101	924.0	5.5	9.5	5.0	32.0	35.5	7.0	11.5	5.5	32.5	35.5
CHRSA102	928.0	0.0	3.5	3.0	17.5	18.0	0.0	5.0	3.0	18.0	18.0
CHRSA103	918.0	8.5	14.0	22.5	40.0	44.5	10.5	14.0	22.5	40.0	45.0
CHRSA104	926.5	0.0	0.0	2.0	16.5	13.5	0.0	0.0	2.5	17.0	14.5
CHRSA105	919.0	9.0	14.0	22.5	40.0	45.5	10.0	14.5	22.5	40.0	46.0
CHRSA106	925.0	0.0	6.0	4.0	51.5	21.5	0.0	8.0	4.5	51.5	21.5
CHRSA107	927.5	0.0	0.0	0.0	51.5	12.5	0.0	0.0	2.0	51.5	13.5
CHRSA108	923.0	0.0	0.0	2.5	17.5	15.5	0.0	7.5	4.0	18.0	15.5
CHRSA109	918.0	3.0	7.5	4.5	27.0	28.0	9.0	11.5	8.0	28.0	28.0
CHRSA11	924.5	0.0	0.0	0.0	16.5	7.5	0.0	0.0	0.0	16.5	8.0
CHRSA110	913.5	10.5	17.5	24.0	45.5	51.5	12.0	17.5	24.0	45.5	51.5
CHRSA111	921.0	0.0	0.0	2.5	17.5	15.0	0.0	9.0	5.5	18.5	15.5
CHRSA112	918.0	3.0	7.5	4.5	27.0	28.0	9.0	11.5	8.0	28.0	28.0
CHRSA113	919.5	0.0	5.5	4.0	20.0	21.5	7.5	10.5	7.0	21.5	21.0
CHRSA114	910.5	11.5	17.5	24.0	47.0	49.5	12.5	17.5	24.0	46.5	49.5
CHRSA115	918.0	0.0	3.5	3.5	18.5	17.0	8.5	11.0	7.5	20.0	17.0
CHRSA116	916.5	0.0	0.0	0.0	20.5	14.5	11.0	15.0	11.5	21.5	18.0
CHRSA117	919.5	0.0	0.0	0.0	16.5	12.5	5.5	10.0	6.5	18.0	14.5
CHRSA118	919.5	0.0	0.0	0.0	17.0	12.5	0.0	10.5	7.0	18.5	14.5
CHRSA119	918.5	0.0	0.0	2.5	17.5	14.5	8.0	10.5	7.5	19.5	16.0
CHRSA12	924.0	0.0	0.0	0.0	16.5	12.0	0.0	0.0	0.0	17.0	13.5
CHRSA120	916.0	0.0	4.5	3.5	19.0	17.5	9.5	11.5	8.5	24.5	20.5
CHRSA13	918.0	5.5	9.5	5.5	31.5	33.0	9.5	12.0	8.5	32.0	33.0
CHRSA14	924.0	0.0	0.0	0.0	17.0	8.5	0.0	0.0	0.0	17.0	10.0

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Appendix Table A4. Continued											
		Days from Activation of Staging Area Until Flood Water Leaves the Storage Area									
	Approx. Field	Existing Conditions					With Diversion Staging Area				
Storage Area	Elevation[a]	2009-yr	50-yr	100-yr	500-yr	PMF	2009-yr	50-yr	100-yr	500-yr	PMF
CHRSA15	919.5	11.0	14.0	12.5	30.0	28.5	11.0	14.5	12.5	30.0	28.5
CHRSA16	918.0	5.5	9.5	5.5	31.5	33.0	9.5	12.0	8.5	32.0	33.0
CHRSA17	918.0	6.5	11.5	6.0	35.5	37.0	10.0	12.5	8.5	35.5	37.0
CHRSA18	922.0	11.0	14.0	12.5	30.0	18.5	11.0	14.5	12.5	30.0	19.0
CHRSA18E	922.0	0.0	5.0	3.5	19.0	18.5	0.0	9.0	5.0	20.0	18.5
CHRSA19	921.0	0.0	6.0	4.0	21.5	22.5	5.5	10.0	6.0	22.5	22.0
CHRSA20	921.0	6.0	10.5	5.5	33.5	36.0	8.5	12.0	7.0	34.0	36.5
CHRSA21	927.5	11.0	14.0	12.5	30.0	18.5	11.0	14.5	12.5	30.0	19.0
CHRSA22	927.5	0.0	8.5	7.0	26.5	15.5	0.0	9.0	7.0	26.5	16.0
CHRSA23	920.0	9.5	13.5	10.0	37.5	41.0	10.0	13.5	10.0	37.5	41.0
CHRSA24	927.5	8.0	12.0	10.0	27.5	15.5	8.5	12.0	10.0	27.5	16.0
CHRSA25	928.0	11.0	14.0	12.5	30.0	18.5	11.0	14.5	12.5	30.0	19.0
CHRSA26	928.5	4.0	7.5	6.0	23.0	13.5	4.0	7.5	6.0	23.0	14.5
CHRSA27	924.0	9.5	12.5	10.0	27.5	25.0	9.5	12.5	10.0	27.5	25.5
DIVSA100	913.0	4.5	8.5	6.0	29.5	27.0	11.0	12.5	9.5	31.0	27.5
DIVSA101	914.0	4.0	8.0	5.5	28.5	27.5	11.0	13.0	10.0	29.5	28.0
DIVSA102	915.0	5.0	8.5	5.5	30.0	29.5	10.5	12.5	9.0	30.5	30.0
DIVSA105	915.5	0.0	0.0	0.0	10.5	0.0	9.5	12.0	9.0	18.0	14.0
DIVSA106E	919.0	0.0	0.0	0.0	10.5	0.0	0.0	9.5	6.5	10.5	12.0
DIVSA107E	919.5	0.0	0.0	0.0	9.0	0.0	0.0	9.0	6.0	10.5	11.0
DIVSA84	913.0	6.5	10.0	7.0	34.0	14.5	11.5	13.5	20.5	24.5	16.0
DIVSA84E	907.5	13.0	17.0	13.5	48.0	21.5	11.0	12.5	10.0	31.5	17.0
DIVSA85E	904.5	15.0	18.5	15.0	51.0	25.0	50.0	50.5	47.5	51.5	51.5
DIVSA86S	905.5	14.5	18.5	14.5	50.0	24.0	12.5	14.0	11.0	42.0	19.5
DIVSA87S	908.5	0.0	19.0	15.0	47.5	26.0	11.0	12.5	10.0	33.0	17.5
DIVSA88W	907.0	15.0	18.5	15.0	49.0	30.5	11.5	13.0	10.0	36.0	19.5
DIVSA89W	910.5	15.0	17.5	14.5	48.5	23.0	11.0	12.5	9.5	30.0	16.0
DIVSA90S	907.5	16.0	19.0	15.5	49.5	30.0	13.5	18.5	23.5	47.5	45.5
DIVSA93S	908.0	12.0	16.5	11.0	47.0	38.0	13.0	17.5	23.0	47.0	43.0
DIVSA94	908.0	16.0	18.5	15.5	49.5	29.5	13.0	17.5	23.0	47.0	43.0
DIVSA95	908.5	12.0	16.0	11.5	47.0	36.0	12.5	16.5	12.0	46.0	41.0
DIVSA98W	912.5	0.0	7.5	6.0	26.5	20.0	10.5	12.5	9.5	31.0	26.0
DIVSA99W	910.5	9.5	14.5	8.5	41.0	35.5	12.0	15.0	10.5	41.0	36.5
DRAIN370	922.5	3.0	4.0	34.5	47.5	6.0	3.0	4.0	34.5	47.0	8.0
DRAIN371	921.5	3.0	3.5	1.5	47.5	6.0	3.0	3.5	1.5	47.0	9.5
DRAIN372	920.0	3.0	5.5	4.5	46.0	9.5	5.5	9.5	6.5	45.5	12.0
DRAIN373	919.0	7.5	10.5	8.0	38.0	13.5	9.0	11.0	8.5	36.5	13.5
DRAIN374	915.0	14.5	17.0	14.0	47.0	20.5	14.5	16.5	14.0	46.5	20.5
RR10	909.0	11.5	16.5	22.0	46.5	42.0	12.5	16.5	22.5	46.0	42.5
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Appendix Table A4. Continued											
		Days from Activation of Staging Area Until Flood Water Leaves the Storage Area									
	Approx.	Existing Conditions					With Diversion Staging Area				
Storage Area	Field Elevation[a]	2009-yr	50-yr	100-yr	500-yr	PMF	2009-yr	50-yr	100-yr	500-yr	PMF
RR11	909.0	11.5	17.5	23.0	47.0	45.0	12.5	17.5	23.0	46.5	45.0
RR12	909.0	11.5	17.5	23.0	47.0	45.0	12.5	17.5	23.0	46.5	45.0
RR13	911.5	9.0	14.0	8.0	40.0	37.0	11.5	14.5	10.0	40.0	37.5
RR14	914.0	4.0	8.0	5.5	29.0	28.0	10.5	12.0	9.0	30.0	28.5
RR15	908.0	13.0	20.5	25.5	49.5	51.5	13.5	20.5	25.5	49.0	51.5
RR16	916.0	0.0	5.5	4.0	20.0	19.0	9.5	11.5	8.5	23.5	19.0
RR17	910.0	11.5	17.5	23.5	47.0	47.5	12.5	17.0	23.5	46.0	47.5
RR18	913.0	7.5	12.5	6.5	37.0	34.5	11.0	13.5	9.5	37.0	35.0
RR19	909.0	12.5	20.0	25.0	49.0	51.5	13.0	19.5	25.0	48.0	51.5
RR20	919.0	0.0	0.0	0.0	15.5	10.0	6.5	10.0	6.5	17.5	13.5
RR21	909.0	12.5	20.0	25.0	49.0	51.5	13.0	20.0	25.0	48.5	51.5
RR22	917.5	0.0	4.0	3.5	18.5	17.0	8.5	11.0	8.0	20.5	17.5
RR23	912.5	9.5	14.5	8.0	41.0	40.5	11.5	15.0	10.0	40.5	40.5
RR24	921.5	0.0	0.0	0.0	14.0	7.0	0.0	7.5	0.0	15.0	12.0
RR25	920.0	0.0	0.0	0.0	16.5	13.0	0.0	9.5	6.0	18.0	14.5
RR26	913.0	9.5	14.5	22.0	41.5	42.5	11.5	15.0	22.0	41.5	42.5
RR27	917.0	5.0	8.5	5.0	30.0	30.5	9.5	12.0	8.5	30.0	31.0
RR28	923.0	0.0	0.0	0.0	14.5	8.0	0.0	0.0	0.0	15.0	11.5
RR29	921.0	0.0	0.0	3.0	18.0	17.0	0.0	9.5	5.5	19.0	17.0
RR3	910.5	9.0	13.5	8.5	39.5	32.0	11.5	14.5	10.5	39.5	33.5
RR30	922.5	0.0	0.0	0.0	16.0	12.0	0.0	7.0	0.0	17.0	13.5
RR31	916.5	7.0	12.0	6.0	36.0	37.0	10.0	13.0	9.0	36.0	37.0
RR32	916.0	8.0	13.0	6.5	38.5	40.5	10.5	13.5	9.0	38.5	40.5
RR33	913.5	11.0	17.5	24.5	46.0	51.5	12.0	17.5	24.5	45.5	51.5
RR34	913.0	11.0	18.5	25.0	47.0	51.5	12.0	18.5	25.0	47.0	51.5
RR35	914.0	10.5	17.5	24.5	45.5	51.5	11.5	17.5	24.5	45.5	51.5
RR36	916.5	8.5	13.5	22.0	39.5	42.5	10.5	14.0	22.0	39.5	43.0
RR37	914.5	10.5	18.0	24.5	46.0	51.5	11.5	18.0	24.5	46.0	51.5
RR38	923.5	0.0	3.5	3.0	18.0	17.5	0.0	7.5	4.0	18.5	17.5
RR39	915.5	10.5	17.0	24.0	45.0	51.5	11.5	17.0	24.0	45.0	51.5
RR4	906.5	13.5	20.0	24.5	49.5	50.5	13.5	20.0	24.5	48.5	51.0
RR40	925.5	0.0	0.0	0.0	16.5	12.5	0.0	0.0	0.0	16.5	13.5
RR41	915.5	11.0	19.0	25.0	47.0	51.5	11.5	19.0	25.0	47.0	51.5
RR42	916.0	10.5	17.5	24.5	45.5	51.5	11.5	17.5	24.5	45.5	51.5
RR43	920.0	7.0	12.0	5.5	36.5	40.0	9.5	13.0	8.0	36.5	40.0
RR44	924.0	0.0	6.0	4.0	22.0	24.0	0.0	8.5	4.5	23.0	24.5
RR45	923.0	3.5	7.5	4.5	28.0	30.0	6.0	10.5	5.5	28.5	30.5
RR46	932.0	0.0	0.0	0.0	9.5	0.0	0.0	0.0	0.0	10.0	0.0
RR47	927.5	0.0	0.0	2.5	17.0	15.5	0.0	3.0	2.5	17.0	16.0

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Appendix Table A4. Continued											
		Days from Activation of Staging Area Until Flood Water Leaves the Storage Area									
	Approx.	Existing Conditions					With Diversion Staging Area				
Storage Area	Field Elevation[a]	2009-yr	50-yr	100-yr	500-yr	PMF	2009-yr	50-yr	100-yr	500-yr	PMF
RR48	928.0	0.0	0.0	2.0	16.5	13.5	0.0	0.0	2.0	16.5	14.5
RR49	926.5	0.0	5.0	3.5	19.0	21.5	0.0	6.5	3.5	19.5	22.0
RR5	904.0	15.5	24.5	28.0	51.5	51.5	15.5	24.5	28.0	51.5	51.5
RR50	933.0	0.0	0.0	0.0	10.5	0.0	0.0	0.0	0.0	10.5	0.0
RR51	919.0	11.0	21.0	26.0	48.5	51.5	11.5	21.0	26.0	48.5	51.5
RR52	933.0	0.0	0.0	0.0	11.5	3.5	0.0	0.0	0.0	11.5	3.5
RR53	919.0	11.0	22.5	27.0	50.0	51.5	11.5	22.5	27.0	50.0	51.5
RR54	932.5	0.0	0.0	0.0	13.5	7.0	0.0	0.0	0.0	13.5	7.0
RR55	919.0	11.5	27.5	29.5	51.5	51.5	12.0	27.5	29.5	51.5	51.5
RR56	918.0	12.5	31.0	32.5	51.5	51.5	12.5	31.5	32.5	51.5	51.5
RR57	919.0	12.0	29.5	31.5	51.5	51.5	12.0	29.5	31.5	51.5	51.5
RR58	914.5	31.5	50.5	40.5	51.5	51.5	31.5	50.5	40.5	51.5	51.5
RR59	919.0	12.0	31.5	33.0	51.5	51.5	12.5	32.0	33.0	51.5	51.5
RR6	910.0	10.0	14.5	9.0	41.5	35.0	12.0	15.0	11.0	41.5	36.0
RR60	915.0	31.5	50.5	40.5	51.5	51.5	32.0	50.5	40.5	51.5	51.5
RR7	907.0	13.0	20.0	24.5	49.0	51.0	13.5	20.0	24.5	48.5	51.0
RR8	909.5	11.0	15.5	9.5	44.5	38.5	12.0	16.0	11.0	43.5	39.0
RR9	900.0	20.0	38.0	37.0	51.5	51.5	20.0	37.5	37.0	51.5	51.5
WLVSA200	918.0	9.0	14.5	22.5	40.5	46.5	10.5	14.5	22.5	41.0	47.0
WLVSA202	928.0	4.0	4.5	22.0	51.5	11.0	4.0	4.5	22.0	15.5	12.0
WLVSA203	927.0	0.0	0.0	0.0	16.0	12.0	0.0	0.0	0.0	16.0	13.0
WLVSA204	918.0	8.5	14.0	22.5	40.5	45.5	10.5	14.5	22.5	40.5	46.0
WLVSA205	924.0	0.0	0.0	2.5	17.0	14.5	0.0	6.0	3.0	17.5	15.0
WLVSA206	924.0	0.0	0.0	2.5	17.0	15.0	0.0	6.5	3.5	17.5	15.5
WLVSA207	925.5	0.0	0.0	2.0	16.5	13.5	0.0	0.0	2.5	17.0	14.5
WLVSA208	923.5	0.0	0.0	2.5	17.0	14.5	0.0	6.5	3.5	17.5	15.0
WLVSA209	915.5	8.5	14.0	22.0	40.0	42.5	10.5	14.5	22.0	40.0	42.5
WLVSA210	920.5	0.0	6.0	4.0	21.0	22.5	6.0	10.0	6.0	22.0	22.5
WLVSA211	923.0	0.0	0.0	0.0	16.0	11.5	0.0	0.0	0.0	16.5	13.0
WLVSA212	919.5	0.0	0.0	0.0	14.5	7.5	0.0	9.5	6.0	16.5	13.0
WLVSA213	920.0	0.0	0.0	0.0	15.0	8.0	0.0	9.5	6.0	16.5	13.5
WLVSA214	919.5	0.0	0.0	0.0	16.5	10.0	0.0	11.0	7.0	18.0	14.5
WLVSA215	911.0	11.0	16.5	23.0	45.0	45.5	12.0	16.5	23.0	44.5	45.5
WLVSA216	914.5	5.5	9.5	5.5	32.0	31.0	10.5	12.5	9.5	32.5	31.5
WLVSA217	922.0	0.0	0.0	0.0	14.0	6.5	0.0	0.0	0.0	14.5	11.5
WLVSA218	921.0	0.0	0.0	0.0	20.0	16.0	0.0	8.5	0.0	18.5	15.5
WLVSA219	922.0	0.0	0.0	0.0	18.0	12.0	0.0	7.5	0.0	18.5	15.0
WLVSA220	908.5	12.0	17.5	23.0	47.5	44.0	13.0	17.5	23.0	46.5	44.5
WLVSA221	908.5	12.0	17.5	23.0	47.5	44.0	13.0	17.5	23.0	46.5	44.5

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Appendix Table A4. Continued											
		Days from Activation of Staging Area Until Flood Water Leaves the Storage Area									
	Approx.	Existing Conditions					With Diversion Staging Area				
Storage Area	Field Elevation[a]	2009-yr	50-yr	100-yr	500-yr	PMF	2009-yr	50-yr	100-yr	500-yr	PMF
WLVSA222	913.0	4.0	8.5	5.5	29.0	26.5	10.5	12.5	9.5	31.0	27.5
WLVSA223	910.0	10.5	15.5	9.5	43.5	39.5	12.0	15.5	11.0	43.0	40.0
WLVSA224	912.5	6.5	11.0	6.5	34.5	30.5	11.0	13.0	9.5	34.5	31.0
WLVSA225	914.5	0.0	7.5	6.5	22.5	20.5	12.5	14.0	11.5	28.0	20.5
WLVSA226	917.0	0.0	0.0	0.0	16.0	10.5	9.0	11.0	8.0	19.0	14.5
WLVSA227	915.5	0.0	5.0	4.0	19.5	18.0	9.5	11.5	8.5	24.0	18.0
WLVSA228	911.5	9.0	13.5	8.0	40.0	36.0	11.5	14.5	10.0	39.5	36.5
WLVSA229	910.0	11.0	16.0	22.0	45.0	42.5	12.5	16.0	22.5	44.5	42.5
WLVSA230	910.0	11.0	16.0	22.0	45.0	42.5	12.5	16.0	22.5	44.5	42.5
WLVSA231	910.5	10.5	15.5	9.0	43.0	40.5	12.0	15.5	11.0	42.5	40.5
WLVSA232	916.0	0.0	5.5	4.0	20.5	20.0	9.5	11.5	8.5	24.5	20.0
WLVSA233	912.0	8.5	13.0	7.5	38.5	34.0	12.5	14.5	11.5	38.5	35.0
WLVSA234	917.5	0.0	0.0	0.0	15.5	9.5	8.5	10.5	7.5	18.0	14.0
WLVSA235	908.5	12.0	17.5	23.0	47.5	43.5	13.0	17.5	23.0	46.5	43.5
WLVSA236	910.0	10.0	14.5	9.0	42.0	36.0	12.0	15.0	11.0	42.0	37.0
WLVSA237	910.0	10.0	14.0	9.0	41.0	34.0	12.0	15.0	11.0	41.0	35.5
WLVSA57	921.0	1.0	3.5	2.5	20.0	16.0	0.0	8.5	4.0	19.0	15.5
WLVSA64	922.0	0.0	0.0	2.5	18.5	15.5	0.0	7.0	0.0	18.0	15.0
WLVSA65	919.5	0.0	7.0	4.5	25.5	27.0	8.0	11.0	7.0	26.5	27.0
WLVSA66	923.0	0.0	0.0	3.0	18.0	16.0	0.0	7.5	3.5	18.0	16.0
WRRND1	920.0	14.0	16.0	13.5	36.5	19.0	14.0	16.0	13.0	36.5	19.0
WRRND10	916.5	13.5	16.0	13.0	46.0	19.0	13.0	15.5	12.5	46.0	19.0
WRRND11	919.5	6.5	9.5	7.0	31.5	12.5	8.0	10.5	8.0	31.0	13.0
WRRND12	916.0	13.0	15.5	12.5	46.5	18.5	12.5	15.0	12.0	46.0	18.5
WRRND13	913.5	15.5	18.0	15.0	47.5	22.0	15.5	17.5	14.5	47.0	22.5
WRRND14	912.5	16.0	18.0	15.0	47.5	23.0	15.5	18.0	15.0	47.5	23.5
WRRND15	911.0	16.5	19.5	16.5	48.0	25.5	16.5	19.0	16.5	47.5	26.5
WRRND16	912.5	15.0	17.5	14.5	47.5	22.0	15.0	17.5	14.5	47.0	23.0
WRRND17	911.0	16.0	19.0	16.0	48.0	25.0	16.0	18.5	15.5	47.5	26.5
WRRND18	908.5	17.5	20.5	20.5	49.0	30.0	17.5	20.5	20.5	48.5	30.5
WRRND19	906.5	18.5	22.0	21.5	49.5	35.0	18.5	22.0	21.5	49.0	36.0
WRRND2	920.0	13.0	15.5	12.5	36.0	18.5	13.0	15.5	12.5	36.0	18.0
WRRND3	919.5	13.5	16.0	13.0	37.0	18.5	13.5	15.5	13.0	36.5	18.5
WRRND4	918.5	14.0	16.5	13.5	41.0	19.5	14.0	16.5	13.5	39.0	19.5
WRRND5	918.0	14.5	16.5	14.0	45.5	19.5	14.5	16.5	13.5	43.0	19.5
WRRND6	918.5	13.0	15.5	12.5	39.0	18.0	12.5	15.0	12.0	38.0	18.0
WRRND7	917.0	14.5	17.0	14.0	46.0	20.0	14.5	16.5	14.0	46.0	20.0
WRRND8	917.0	14.0	16.0	13.5	46.0	19.0	13.5	16.0	13.0	46.0	19.0
WRRND9	917.5	12.5	15.0	12.5	45.5	18.0	12.5	15.0	12.0	45.5	18.0
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Appendix Table A4. Continued											
		Days from Activation of Staging Area Until Flood Water Leaves the Storage Area									
	Approx.	Existing Conditions					With Diversion Staging Area				
Storage Area	Field Elevation[a]	2009-yr	50-yr	100-yr	500-yr	PMF	2009-yr	50-yr	100-yr	500-yr	PMF
WRSA273	929.5	0.0	0.0	0.0	11.5	5.5	0.0	0.0	0.0	11.5	5.5
WRSA280	925.5	0.0	0.0	0.0	47.5	3.0	0.0	0.0	0.0	47.5	3.0
WRSA284	923.0	0.0	0.0	0.0	45.5	0.0	0.0	0.0	0.0	45.5	0.0
WRSA289	923.5	0.0	0.0	0.0	7.5	0.0	0.0	0.0	0.0	8.0	0.0
WRSA294	919.5	7.5	10.0	47.0	47.0	12.5	7.5	10.0	47.0	47.0	12.5
WRSA299	912.5	14.0	17.0	35.0	48.0	21.5	13.5	16.0	35.0	47.5	22.0
WRSA300	909.5	17.0	19.5	38.0	48.5	28.0	16.5	19.5	38.0	48.5	28.0
WRSA302	913.0	0.0	6.0	5.5	25.0	14.5	10.5	12.5	9.5	32.0	18.0
WRSA303	919.5	0.0	0.0	34.5	47.0	0.0	0.0	9.0	34.0	47.0	11.5
WRSA304	915.0	9.0	12.0	9.5	43.0	15.0	10.5	12.0	9.0	35.5	15.0
WRSA305A	910.5	16.0	18.5	35.5	48.0	25.5	16.0	18.5	35.0	47.5	26.5
WRSA305B	910.5	16.0	18.5	15.5	48.0	25.5	15.5	18.5	15.0	47.5	26.5
WRSA305C	906.0	20.5	23.5	45.0	50.5	38.5	20.0	23.5	44.0	49.5	39.0
WRSA305D	906.0	20.5	23.5	34.5	50.5	38.5	20.0	23.5	34.0	49.5	39.0
WRSA306	908.0	15.5	18.5	15.0	49.5	29.5	15.0	18.0	23.0	47.5	43.0
WRSA307	911.0	10.5	14.5	10.0	43.5	34.0	12.5	14.5	11.5	39.5	33.0
WRSA308	917.0	0.0	0.0	0.0	46.0	0.0	8.5	10.5	8.0	46.0	12.5
WRSA309	914.5	11.0	13.5	10.5	46.5	16.5	11.0	12.5	9.5	46.0	16.0
WRSA311	907.0	16.0	19.5	16.0	49.5	31.5	14.0	19.0	24.0	48.0	48.5
WRSA312	906.5	16.5	20.0	20.0	49.5	33.0	14.5	20.0	24.5	48.5	50.5
WRSA315	909.5	12.0	14.5	11.5	46.5	19.0	12.0	13.5	10.5	45.5	16.5
WRSA321	906.5	14.0	18.0	14.0	49.0	23.0	12.5	14.0	11.0	34.5	18.0
WRSA350	910.5	14.5	17.0	14.0	49.0	27.5	14.5	17.0	14.0	47.0	26.0
WRSA351	908.5	15.5	18.5	15.0	49.5	29.5	15.0	18.0	14.5	47.5	41.0
WRSA352	911.0	14.5	17.0	14.0	49.0	26.0	13.5	16.5	13.0	47.0	25.5
WRSA353	917.5	3.5	6.0	5.0	25.5	10.5	8.5	11.0	8.0	25.0	13.0
WRSA354	919.0	9.0	11.5	9.0	35.5	14.5	9.5	11.5	9.0	34.5	14.5
WRSA355	917.5	13.0	15.5	12.5	45.5	18.5	13.0	15.5	12.5	45.5	18.5
WRSA356	920.5	10.5	12.5	10.0	32.5	15.5	10.5	12.5	10.0	32.5	15.5
WRSA357	921.5	9.0	11.5	9.0	29.5	14.5	9.5	11.5	9.0	29.5	14.5
WRSA358	923.0	7.5	10.5	8.0	27.0	13.5	8.0	11.0	8.5	27.0	14.0
WRSA359	923.0	9.5	12.0	9.5	29.0	15.5	10.0	12.0	9.5	29.0	15.5
WRSA360	924.0	11.0	13.0	10.5	31.0	16.0	11.0	13.0	10.5	31.0	16.0
WRSA363	911.5	14.0	16.5	13.5	48.5	23.0	13.0	15.5	12.0	46.5	24.0
WRSA364	913.0	13.0	15.5	12.5	47.5	19.5	11.5	13.5	10.5	39.0	18.0
WRSA373	927.5	0.0	0.0	0.0	10.5	0.0	0.0	0.0	0.0	10.5	0.0
WRSA378	926.0	0.0	0.0	0.0	14.0	5.0	0.0	0.0	0.0	14.0	5.5
WRSA383	924.0	0.0	0.0	0.0	8.0	0.0	0.0	0.0	0.0	8.0	0.0
WRSA384	925.0	0.0	0.0	0.0	18.0	7.0	0.0	0.0	0.0	18.0	8.0
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Appendix Table A4. Continued											
		Days from Activation of Staging Area Until Flood Water Leaves the Storage Area									
		Existing Conditions					With Diversion Staging Area				
Storage Area	Approx. Field Elevation[a]	2009-yr	50-yr	100-yr	500-yr	PMF	2009-yr	50-yr	100-yr	500-yr	PMF
WRSA389	923.0	0.0	0.0	0.0	10.0	0.0	0.0	0.0	0.0	10.0	0.0
WRSA390	917.5	11.5	14.0	11.0	45.5	17.0	11.5	13.5	10.5	45.5	16.5
WRSA501	911.0	9.0	13.5	8.0	39.5	33.0	11.5	14.5	10.5	39.0	33.0
WRSA502	913.0	4.5	8.5	6.0	29.5	27.5	10.5	12.5	9.5	31.5	28.5
WRSA504	915.0	0.0	6.5	4.5	22.5	21.5	10.0	11.5	8.5	25.0	17.5
WRSA505	909.0	13.0	19.0	25.0	51.5	48.5	13.5	19.0	25.0	51.5	48.5
WRSA506	909.0	11.5	16.0	10.0	46.0	39.5	12.5	16.0	11.5	45.0	40.0
WRSA507	902.0	18.0	30.5	33.5	51.5	51.5	18.0	30.5	33.5	51.5	51.5
WRSA907	915.0	10.5	13.0	47.5	48.5	16.0	10.5	12.5	47.5	48.5	15.5

PMF = Probabilistic Maximum Flood.
[a]Feet above mean seal level. Lowest estimated elevation for storage area.
Source: Houston-Moore Group (2019).

Appendix Table A5. Difference in Total Days between Without Diversion and With Diversion Conditions, by Storage Area, by Flood Event Frequency, FM Diversion Staging Area, Phase 9.1 HEC-RAS Modeling, 10-day and 14-day Dry Down Periods											
		Difference in Total Days Between With and Without Diversion Conditions									
	Approx.	With a 10-day Dry Down Period					With a 14-day Dry Down Period				
Storage Area	Field Elevation[a]	10-yr	20-yr	25-yr	25-yr Long	25-yr EL	10-yr	20-yr	25-yr	25-yr Long	25-yr EL
BD1	908.0	0	1	0.5	0	0	0	1	0.5	0	0
CHRSA01	915.0	0	0	17	18.5	20	0	0	21	22.5	24
CHRSA02	914.5	0	0	17.5	18.5	20.5	0	0	21.5	22.5	24.5
CHRSA03	918.0	0	0	0	0	0	0	0	0	0	0
CHRSA04	918.0	0	0	0	0	0	0	0	0	0	0
CHRSA05E	920.0	0	0	0	0	0	0	0	0	0	0
CHRSA05W	920.0	0	0	0.5	1	2	0	0	0.5	1	2
CHRSA06	921.0	0	0	0	0	0	0	0	0	0	0
CHRSA07	915.0	0	0	17.5	2	1	0	0	21.5	2	1
CHRSA08	918.5	0	0	0	17	18.5	0	0	0	21	22.5
CHRSA09	923.0	0	0	0	0	0	0	0	0	0	0
CHRSA10	922.0	0	0	0	0	0	0	0	0	0	0
CHRSA100	931.0	0	0	0	0	0	0	0	0	0	0
CHRSA101	924.0	0	0	0.5	1	0	0	0	0.5	1	0
CHRSA102	928.0	0	0	0	0	0	0	0	0	0	0
CHRSA103	918.0	0	0	2	0.5	0	0	0	2	0.5	0
CHRSA104	926.5	0	0	0	0	0	0	0	0	0	0
CHRSA105	919.0	0	0	2	0.5	0	0	0	2	0.5	0
CHRSA106	925.0	0	0	0	0	0	0	0	0	0	0
CHRSA107	927.5	0	0	0	0	0	0	0	0	0	0
CHRSA108	923.0	0	0	0	0	0	0	0	0	0	0
CHRSA109	918.0	0	0	0	3.5	4.5	0	0	0	3.5	4.5
CHRSA11	924.5	0	0	0	0	0	0	0	0	0	0
CHRSA110	913.5	0	0	1.5	0	0	0	0	1.5	0	0
CHRSA111	921.0	0	0	0	0	0	0	0	0	0	0
CHRSA112	918.0	0	0	0	3.5	4.5	0	0	0	3.5	4.5
CHRSA113	919.5	0	0	0	17	19.5	0	0	0	21	23.5
CHRSA114	910.5	0	0	2	0.5	0	0	0	2	0.5	0
CHRSA115	918.0	0	0	0	17.5	19.5	0	0	0	21.5	23.5
CHRSA116	916.5	0	0	0	18	20	0	0	0	22	24
CHRSA117	919.5	0	0	0	0	0	0	0	0	0	0
CHRSA118	919.5	0	0	0	0	0	0	0	0	0	0
CHRSA119	918.5	0	0	0	17	18.5	0	0	0	21	22.5
CHRSA12	924.0	0	0	0	0	0	0	0	0	0	0
CHRSA120	916.0	0	0	16	18.5	20.5	0	0	20	22.5	24.5

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Appendix Table A5. Continued											
		Difference in Total Days Between With and Without Diversion Conditions									
	Approx.	With a 10-day Dry Down Period					With a 14-day Dry Down Period				
Storage Area	Field Elevation[a]	10-yr	20-yr	25-yr	25-yr Long	25-yr EL	10-yr	20-yr	25-yr	25-yr Long	25-yr EL
CHRSA13	918.0	0	0	15.5	1.5	0	0	0	19.5	1.5	0
CHRSA14	924.0	0	0	0	0	0	0	0	0	0	0
CHRSA15	919.5	0	0	0	3	4	0	0	0	3	4
CHRSA16	918.0	0	0	15.5	1.5	0	0	0	19.5	1.5	0
CHRSA17	918.0	0	0	3	1	0	0	0	3	1	0
CHRSA18	922.0	0	0	0	0	0	0	0	0	0	0
CHRSA18E	922.0	0	0	0	0	0	0	0	0	0	0
CHRSA19	921.0	0	0	0	16	18.5	0	0	0	20	22.5
CHRSA20	921.0	0	0	1.5	1.5	0.5	0	0	1.5	1.5	0.5
CHRSA21	927.5	0	0	0	0	0	0	0	0	0	0
CHRSA22	927.5	0	0	0	0	0	0	0	0	0	0
CHRSA23	920.0	0	0	1.5	0.5	0	0	0	1.5	0.5	0
CHRSA24	927.5	0	0	0	0	0	0	0	0	0	0
CHRSA25	928.0	0	0	0	0	0	0	0	0	0	0
CHRSA26	928.5	0	0	0	0	0	0	0	0	0	0
CHRSA27	924.0	0	0	0	15.5	18.5	0	0	0	19.5	22.5
DIVSA100	913.0	0	0	18	4.5	5.5	0	0	22	4.5	5.5
DIVSA101	914.0	0	0	18	4.5	5	0	0	22	4.5	5
DIVSA102	915.0	0	0	17.5	2.5	1.5	0	0	21.5	2.5	1.5
DIVSA105	915.5	0	0	16.5	18	19.5	0	0	20.5	22	23.5
DIVSA106E	919.0	0	0	0	0	0	0	0	0	0	0
DIVSA107E	919.5	0	0	0	0	0	0	0	0	0	0
DIVSA84	913.0	10.5	12	19.5	6.5	8	14.5	16	23.5	6.5	8
DIVSA84E	907.5	0	22	20.5	0.5	1.5	0	26	24.5	0.5	1.5
DIVSA85E	904.5	59	43.5	42	37.5	33	63	43.5	42	37.5	33
DIVSA86S	905.5	0	23	4.5	0	-1.5	0	27	4.5	0	-1.5
DIVSA87S	908.5	0	21.5	20.5	20	22	0	25.5	24.5	24	26
DIVSA88W	907.0	-13.5	4	1	-4	-8	-17.5	4	1	-4	-8
DIVSA89W	910.5	0	1.5	1	-2.5	-8	0	1.5	1	-2.5	-8
DIVSA90S	907.5	-14.5	-1	0.5	0.5	0.5	-18.5	-1	0.5	0.5	0.5
DIVSA93S	908.0	0	1	3	1.5	1	0	1	3	1.5	1
DIVSA94	908.0	-14	-1.5	0.5	0.5	0.5	-18	-1.5	0.5	0.5	0.5
DIVSA95	908.5	0	1	3	1.5	1.5	0	1	3	1.5	1.5
DIVSA98W	912.5	0	0	18	6	9.5	0	0	22	6	9.5
DIVSA99W	910.5	0	0.5	4	1	0	0	0.5	4	1	0
DRAIN370	922.5	0	0	0	0	0	0	0	0	0	0
DRAIN371	921.5	0	0	0	0	0	0	0	0	0	0
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Appendix Table A5. Continued											
		Difference in Total Days Between With and Without Diversion Conditions									
		With a 10-day Dry Down Period					With a 14-day Dry Down Period				
Storage Area	Approx. Field Elevation[a]	10-yr	20-yr	25-yr	25-yr Long	25-yr EL	10-yr	20-yr	25-yr	25-yr Long	25-yr EL
DRAIN372	920.0	0	0	0	0.5	0	0	0	0	0.5	0
DRAIN373	919.0	0	0	0	2	4	0	0	0	2	4
DRAIN374	915.0	0	0	1	0	0	0	0	1	0	0
RR10	909.0	0	0	2.5	0.5	0.5	0	0	2.5	0.5	0.5
RR11	909.0	0	0	2	0.5	0.5	0	0	2	0.5	0.5
RR12	909.0	0	0	2	0.5	0.5	0	0	2	0.5	0.5
RR13	911.5	0	0.5	3.5	1	0	0	0.5	3.5	1	0
RR14	914.0	0	0	17.5	3.5	4.5	0	0	21.5	3.5	4.5
RR15	908.0	0	0	1.5	0	0	0	0	1.5	0	0
RR16	916.0	0	0	16	18.5	20.5	0	0	20	22.5	24.5
RR17	910.0	0	0.5	2.5	0.5	0	0	0.5	2.5	0.5	0
RR18	913.0	0	0	4	1.5	0.5	0	0	4	1.5	0.5
RR19	909.0	0.5	0	1.5	0	0	0.5	0	1.5	0	0
RR20	919.0	0	0	0	0	0	0	0	0	0	0
RR21	909.0	0	0	1.5	0.5	0	0	0	1.5	0.5	0
RR22	917.5	0	0	0	18	19.5	0	0	0	22	23.5
RR23	912.5	0	0.5	3	0.5	0	0	0.5	3	0.5	0
RR24	921.5	0	0	0	0	0	0	0	0	0	0
RR25	920.0	0	0	0	0	0	0	0	0	0	0
RR26	913.0	0	0.5	2.5	0.5	0	0	0.5	2.5	0.5	0
RR27	917.0	0	0	16	2	1	0	0	20	2	1
RR28	923.0	0	0	0	0	0	0	0	0	0	0
RR29	921.0	0	0	0	0	0	0	0	0	0	0
RR3	910.5	0	14.5	4	1.5	0.5	0	18.5	4	1.5	0.5
RR30	922.5	0	0	0	0	0	0	0	0	0	0
RR31	916.5	0	0	3.5	1	0	0	0	3.5	1	0
RR32	916.0	0	0.5	3	0.5	0	0	0.5	3	0.5	0
RR33	913.5	0	0	1.5	0	0	0	0	1.5	0	0
RR34	913.0	0	0	1.5	0	0	0	0	1.5	0	0
RR35	914.0	0	0	1.5	0	0	0	0	1.5	0	0
RR36	916.5	0	0	2.5	0.5	0	0	0	2.5	0.5	0
RR37	914.5	0.5	0	1.5	0	0.5	0.5	0	1.5	0	0.5
RR38	923.5	0	0	0	0	0	0	0	0	0	0
RR39	915.5	0	0	1.5	0	0.5	0	0	1.5	0	0.5
RR4	906.5	0.5	0	1.5	0	0	0.5	0	1.5	0	0
RR40	925.5	0	0	0	0	0	0	0	0	0	0
RR41	915.5	0	0.5	1.5	0	0	0	0.5	1.5	0	0
- continued –											

Appendix Table A5. Continued											
		Difference in Total Days Between With and Without Diversion Conditions									
		With a 10-day Dry Down Period					With a 14-day Dry Down Period				
Storage Area	Approx. Field Elevation[a]	10-yr	20-yr	25-yr	25-yr Long	25-yr EL	10-yr	20-yr	25-yr	25-yr Long	25-yr EL
RR42	916.0	0	0.5	1.5	0.5	0	0	0.5	1.5	0.5	0
RR43	920.0	0	0	2	0.5	0	0	0	2	0.5	0
RR44	924.0	0	0	0	14.5	17.5	0	0	0	18.5	21.5
RR45	923.0	0	0	0	1.5	1.5	0	0	0	1.5	1.5
RR46	932.0	0	0	0	0	0	0	0	0	0	0
RR47	927.5	0	0	0	0	0	0	0	0	0	0
RR48	928.0	0	0	0	0	0	0	0	0	0	0
RR49	926.5	0	0	0	0	0	0	0	0	0	0
RR5	904.0	0	0.5	1	0.5	0	0	0.5	1	0.5	0
RR50	933.0	0	0	0	0	0	0	0	0	0	0
RR51	919.0	0	0	0.5	0	0.5	0	0	0.5	0	0.5
RR52	933.0	0	0	0	0	0	0	0	0	0	0
RR53	919.0	0	0	0.5	0	0	0	0	0.5	0	0
RR54	932.5	0	0	0	0	0	0	0	0	0	0
RR55	919.0	0.5	0	0.5	0	0	0.5	0	0.5	0	0
RR56	918.0	0	0	0	0	0	0	0	0	0	0
RR57	919.0	0.5	0	0.5	0	0	0.5	0	0.5	0	0
RR58	914.5	0	0	0	1	1	0	0	0	1	1
RR59	919.0	0	0	0	0	0	0	0	0	0	0
RR6	910.0	0	1	3.5	1	0	0	1	3.5	1	0
RR60	915.0	0	0	0.5	2	1.5	0	0	0.5	2	1.5
RR7	907.0	0	0	1.5	0.5	0	0	0	1.5	0.5	0
RR8	909.5	0	0.5	2.5	0.5	0.5	0	0.5	2.5	0.5	0.5
RR9	900.0	0	0.5	0.5	0	0	0	0.5	0.5	0	0
WLVSA200	918.0	0	0	2	0.5	0	0	0	2	0.5	0
WLVSA202	928.0	0	0	0	0	0	0	0	0	0	0
WLVSA203	927.0	0	0	0	0	0	0	0	0	0	0
WLVSA204	918.0	0	0.5	2.5	0	0	0	0.5	2.5	0	0
WLVSA205	924.0	0	0	0	0	0	0	0	0	0	0
WLVSA206	924.0	0	0	0	0	0	0	0	0	0	0
WLVSA207	925.5	0	0	0	0	0	0	0	0	0	0
WLVSA208	923.5	0	0	0	0	0	0	0	0	0	0
WLVSA209	915.5	0	0	3	0	0	0	0	3	0	0
WLVSA210	920.5	0	0	0	16.5	19	0	0	0	20.5	23
WLVSA211	923.0	0	0	0	0	0	0	0	0	0	0
WLVSA212	919.5	0	0	0	0	0	0	0	0	0	0
WLVSA213	920.0	0	0	0	0	0	0	0	0	0	0
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Appendix Table A5. Continued											
		Difference in Total Days Between With and Without Diversion Conditions									
	Approx.	With a 10-day Dry Down Period					With a 14-day Dry Down Period				
Storage Area	Field Elevation[a]	10-yr	20-yr	25-yr	25-yr Long	25-yr EL	10-yr	20-yr	25-yr	25-yr Long	25-yr EL
WLVSA214	919.5	0	0	0	0	0	0	0	0	0	0
WLVSA215	911.0	0	0.5	2.5	0	0.5	0	0.5	2.5	0	0.5
WLVSA216	914.5	0	0	7	2	1	0	0	7	2	1
WLVSA217	922.0	0	0	0	0	0	0	0	0	0	0
WLVSA218	921.0	0	0	0	-1.5	-1.5	0	0	0	-1.5	-1.5
WLVSA219	922.0	0	0	0	0	0	0	0	0	0	0
WLVSA220	908.5	0	0	2	0.5	0	0	0	2	0.5	0
WLVSA221	908.5	0	0.5	2.5	0.5	0	0	0.5	2.5	0.5	0
WLVSA222	913.0	0	0	18	4.5	5.5	0	0	22	4.5	5.5
WLVSA223	910.0	0	0.5	3	0.5	0.5	0	0.5	3	0.5	0.5
WLVSA224	912.5	0	0	18	2.5	1	0	0	22	2.5	1
WLVSA225	914.5	0	0	19.5	21.5	23.5	0	0	23.5	25.5	27.5
WLVSA226	917.0	0	0	0	17.5	19	0	0	0	21.5	23
WLVSA227	915.5	0	0	16.5	18.5	20.5	0	0	20.5	22.5	24.5
WLVSA228	911.5	0	1	4	1	0	0	1	4	1	0
WLVSA229	910.0	0	0.5	2.5	0.5	0	0	0.5	2.5	0.5	0
WLVSA230	910.0	0	0.5	2.5	0.5	0	0	0.5	2.5	0.5	0
WLVSA231	910.5	0	0.5	3	0.5	0.5	0	0.5	3	0.5	0.5
WLVSA232	916.0	0	0	16	18.5	20.5	0	0	20	22.5	24.5
WLVSA233	912.0	0	0	4.5	1.5	0.5	0	0	4.5	1.5	0.5
WLVSA234	917.5	0	0	0	17	18.5	0	0	0	21	22.5
WLVSA235	908.5	0	0	2	0.5	0.5	0	0	2	0.5	0.5
WLVSA236	910.0	0	0.5	3.5	1	0	0	0.5	3.5	1	0
WLVSA237	910.0	0	1	4	1	0.5	0	1	4	1	0.5
WLVSA57	921.0	0	0	0	-0.5	-0.5	0	0	0	-0.5	-0.5
WLVSA64	922.0	0	0	0	-1.5	-1.5	0	0	0	-1.5	-1.5
WLVSA65	919.5	0	0	0	4	6	0	0	0	4	6
WLVSA66	923.0	0	0	0	0	0	0	0	0	0	0
WRRND1	920.0	0	0	0.5	0	-0.5	0	0	0.5	0	-0.5
WRRND10	916.5	0	0	1	0.5	-0.5	0	0	1	0.5	-0.5
WRRND11	919.5	0	0	0	0.5	1.5	0	0	0	0.5	1.5
WRRND12	916.0	0	0	1	0.5	-1	0	0	1	0.5	-1
WRRND13	913.5	0	0	1	0	-0.5	0	0	1	0	-0.5
WRRND14	912.5	-0.5	0.5	1	0	-0.5	-0.5	0.5	1	0	-0.5
WRRND15	911.0	0	0.5	0.5	0.5	0	0	0.5	0.5	0.5	0
WRRND16	912.5	0	0	1	-0.5	0	0	0	1	-0.5	0
WRRND17	911.0	0	0.5	1	0	0	0	0.5	1	0	0

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Appendix Table A5. Continued											
		Difference in Total Days Between With and Without Diversion Conditions									
	Approx.	With a 10-day Dry Down Period					With a 14-day Dry Down Period				
Storage Area	Field Elevation[a]	10-yr	20-yr	25-yr	25-yr Long	25-yr EL	10-yr	20-yr	25-yr	25-yr Long	25-yr EL
WRRND18	908.5	0	1	1	0	0	0	1	1	0	0
WRRND19	906.5	0	1	0.5	0	0	0	1	0.5	0	0
WRRND2	920	0	0	0.5	0.5	0	0	0	0.5	0.5	0
WRRND3	919.5	-0.5	0	0	0	-0.5	-0.5	0	0	0	-0.5
WRRND4	918.5	0	0	0.5	0.5	-0.5	0	0	0.5	0.5	-0.5
WRRND5	918	0	0	0.5	0	0	0	0	0.5	0	0
WRRND6	918.5	0	-0.5	0.5	0.5	0	0	-0.5	0.5	0.5	0
WRRND7	917	0	0	0.5	0	0	0	0	0.5	0	0
WRRND8	917	0	0	0.5	0	-0.5	0	0	0.5	0	-0.5
WRRND9	917.5	0	-0.5	1	0.5	-0.5	0	-0.5	1	0.5	-0.5
WRSA273	929.5	0	0	0	0	0	0	0	0	0	0
WRSA280	925.5	0	0	0	0	0	0	0	0	0	0
WRSA284	923	0	0	0	0	0	0	0	0	0	0
WRSA289	923.5	0	0	0	0	0	0	0	0	0	0
WRSA294	919.5	0	0	0	0	0	0	0	0	0	0
WRSA299	912.5	0	0	1.5	0	-1	0	0	1.5	0	-1
WRSA300	909.5	0	1	1	0	0	0	1	1	0	0
WRSA302	913	0	0	18.5	19.5	22	0	0	22.5	23.5	26
WRSA303	919.5	0	0	0	0	0	0	0	0	0	0
WRSA304	915	0	-13.5	3	4	4	0	-17.5	3	4	4
WRSA305A	910.5	0	0.5	1	0	-0.5	0	0.5	1	0	-0.5
WRSA305B	910.5	0	0.5	1	0	0	0	0.5	1	0	0
WRSA305C	906	0	1	0	0	0	0	1	0	0	0
WRSA305D	906	0	1	0	0	0	0	1	0	0	0
WRSA306	908	0	-0.5	1	0.5	0.5	0	-0.5	1	0.5	0.5
WRSA307	911	0	-0.5	4.5	1.5	-0.5	0	-0.5	4.5	1.5	-0.5
WRSA308	917	0	0	0	17	18	0	0	0	21	22
WRSA309	914.5	0	-1	2.5	2.5	-1.5	0	-1	2.5	2.5	-1.5
WRSA311	907	-1	-0.5	1	0.5	0.5	-1	-0.5	1	0.5	0.5
WRSA312	906.5	-0.5	-0.5	1	0	0	-0.5	-0.5	1	0	0
WRSA315	909.5	0	6	4.5	2.5	-2	0	6	4.5	2.5	-2
WRSA321	906.5	0	22.5	5.5	0.5	-0.5	0	26.5	5.5	0.5	-0.5
WRSA350	910.5	13.5	0	1	2	2	17.5	0	1	2	2
WRSA351	908.5	0.5	-0.5	1	1	0.5	0.5	-0.5	1	1	0.5
WRSA352	911	0	-0.5	2	1.5	1	0	-0.5	2	1.5	1
WRSA353	917.5	0	0	0	4.5	6	0	0	0	4.5	6
WRSA354	919	0	0	0	2	2.5	0	0	0	2	2.5
Continued											

Appendix Table A5. Continued											
		Difference in Total Days Between With and Without Diversion Conditions									
	Approx.	With a 10-day Dry Down Period					With a 14-day Dry Down Period				
Storage Area	Field Elevation[a]	10-yr	20-yr	25-yr	25-yr Long	25-yr EL	10-yr	20-yr	25-yr	25-yr Long	25-yr EL
WRSA355	917.5	0	0	0.5	0.5	-0.5	0	0	0.5	0.5	-0.5
WRSA356	920.5	0	0	0.5	0.5	-0.5	0	0	0.5	0.5	-0.5
WRSA357	921.5	0	0	0	0.5	1	0	0	0	0.5	1
WRSA358	923.0	0	0	0	0.5	0.5	0	0	0	0.5	0.5
WRSA359	923.0	0	0	0	0	1	0	0	0	0	1
WRSA360	924.0	0	0	0	0.5	0	0	0	0	0.5	0
WRSA363	911.5	0	-0.5	1	0.5	0	0	-0.5	1	0.5	0
WRSA364	913.0	0	-1.5	1	1	-3.5	0	-1.5	1	1	-3.5
WRSA373	927.5	0	0	0	0	0	0	0	0	0	0
WRSA378	926.0	0	0	0	0	0	0	0	0	0	0
WRSA383	924.0	0	0	0	0	0	0	0	0	0	0
WRSA384	925.0	0	0	0	0	0	0	0	0	0	0
WRSA389	923.0	0	0	0	0	0	0	0	0	0	0
WRSA390	917.5	0	-0.5	1	1.5	-0.5	0	-0.5	1	1.5	-0.5
WRSA501	911.0	0	14	4	1.5	0	0	18	4	1.5	0
WRSA502	913.0	0	0	18	4	4	0	0	22	4	4
WRSA504	915.0	0	0	17	19	21	0	0	21	23	25
WRSA505	909.0	0	0.5	2	0.5	0.5	0	0.5	2	0.5	0.5
WRSA506	909.0	0	0.5	2.5	0.5	0.5	0	0.5	2.5	0.5	0.5
WRSA507	902.0	0	0.5	1	0.5	0	0	0.5	1	0.5	0
WRSA907	915.0	0	-0.5	2.5	3	0	0	-0.5	2.5	3	0

[a]Feet above mean seal level. Lowest estimated elevation for storage area.

Source: Houston-Moore Group (2019).

Appendix Table A5. Continued											
		Difference in Total Days Between With and Without Diversion Conditions									
		With a 10-day Dry Down Period					With a 14-day Dry Down Period				
Storage Area	Approx. Field Elevation[a]	2009-like	50-yr	100-yr	500-yr	PMF	2009-like	50-yr	100-yr	500-yr	PMF
BD1	908.0	0	0	0.5	0	-0.5	0	0	0.5	0	-0.5
CHRSA01	915.0	20	22.5	7	19.5	4.5	24	26.5	7	23.5	4.5
CHRSA02	914.5	21	25	2	21.5	0.5	25	29	2	25.5	0.5
CHRSA03	918.0	18	21.5	24	18.5	4	22	25.5	28	22.5	4
CHRSA04	918.0	19	23	4.5	19.5	1.5	23	27	4.5	23.5	1.5
CHRSA05E	920.0	0	4.5	2	1.5	0	0	4.5	2	1.5	0
CHRSA05W	920.0	0.5	0	0	0	0	0.5	0	0	0	0
CHRSA06	921.0	0	18.5	4	0	0	0	22.5	4	0	0
CHRSA07	915.0	5	3.5	0.5	3.5	1	5	3.5	0.5	3.5	1
CHRSA08	918.5	18	20.5	1.5	5	1.5	22	24.5	1.5	5	1.5
CHRSA09	923.0	0	0	2	0	0.5	0	0	2	0	0.5
CHRSA10	922.0	0	0	4	0	0	0	0	4	0	0
CHRSA100	931.0	0	0	1	0	0	0	0	1	0	0
CHRSA101	924.0	1.5	2	0	0.5	0.5	1.5	2	0	0.5	0.5
CHRSA102	928.0	0	1.5	0	0	0.5	0	1.5	0	0	0.5
CHRSA103	918.0	2	0	0.5	0	0	2	0	0.5	0	0
CHRSA104	926.5	0	0	1	0.5	0.5	0	0	1	0.5	0.5
CHRSA105	919.0	1	0.5	0.5	0	0	1	0.5	0.5	0	0
CHRSA106	925.0	0	2	0	0.5	0	0	2	0	0.5	0
CHRSA107	927.5	0	0	1	12	0	0	0	1	16	0
CHRSA108	923.0	0	17.5	0	1.5	0.5	0	21.5	0	1.5	0.5
CHRSA109	918.0	6	4	0	3.5	1	6	4	0	3.5	1
CHRSA11	924.5	0	0	0.5	0	0	0	0	0.5	0	0
CHRSA110	913.5	1.5	0	0	0	0	1.5	0	0	0	0
CHRSA111	921.0	0	19	0.5	3	1	0	23	0.5	3	1
CHRSA112	918.0	6	4	0	3.5	1	6	4	0	3.5	1
CHRSA113	919.5	17.5	5	-0.5	3	1.5	21.5	5	-0.5	3	1.5
CHRSA114	910.5	1	0	0	0	-0.5	1	0	0	0	-0.5
CHRSA115	918.0	18.5	7.5	0	4	1.5	22.5	7.5	0	4	1.5
CHRSA116	916.5	21	25	3.5	21.5	1	25	29	3.5	25.5	1
CHRSA117	919.5	15.5	20	2	16.5	1.5	19.5	24	2	20.5	1.5
CHRSA118	919.5	0	20.5	2	17	1.5	0	24.5	2	21	1.5
CHRSA119	918.5	18	20.5	1.5	5	2	22	24.5	1.5	5	2
CHRSA12	924.0	0	0	1.5	0	0.5	0	0	1.5	0	0.5
CHRSA120	916.0	19.5	7	3	5	5.5	23.5	7	3	5	5.5

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Appendix Table A5. Continued											
		Difference in Total Days Between With and Without Diversion Conditions									
	Approx.	With a 10-day Dry Down Period					With a 14-day Dry Down Period				
Storage Area	Field Elevation[a]	2009-like	50-yr	100-yr	500-yr	PMF	2009-like	50-yr	100-yr	500-yr	PMF
CHRSA13	918.0	4	2.5	0	3	0.5	4	2.5	0	3	0.5
CHRSA14	924.0	0	0	1.5	0	0	0	0	1.5	0	0
CHRSA15	919.5	0	0.5	0	0	0	0	0.5	0	0	0
CHRSA16	918.0	4	2.5	0	3	0.5	4	2.5	0	3	0.5
CHRSA17	918.0	3.5	1	0	2.5	0	3.5	1	0	2.5	0
CHRSA18	922.0	0	0.5	0.5	0	0	0	0.5	0.5	0	0
CHRSA18E	922.0	0	4	0	1.5	1	0	4	0	1.5	1
CHRSA19	921.0	15.5	4	-0.5	2	1	19.5	4	-0.5	2	1
CHRSA20	921.0	2.5	1.5	0.5	1.5	0.5	2.5	1.5	0.5	1.5	0.5
CHRSA21	927.5	0	0.5	0.5	0	0	0	0.5	0.5	0	0
CHRSA22	927.5	0	0.5	0.5	0	0	0	0.5	0.5	0	0
CHRSA23	920.0	0.5	0	0	0	0	0.5	0	0	0	0
CHRSA24	927.5	0.5	0	0.5	0	0	0.5	0	0.5	0	0
CHRSA25	928.0	0	0.5	0.5	0	0	0	0.5	0.5	0	0
CHRSA26	928.5	0	0	1	0	0	0	0	1	0	0
CHRSA27	924.0	0	0	0.5	0	0	0	0	0.5	0	0
DIVSA100	913.0	6.5	4	0.5	3.5	1.5	6.5	4	0.5	3.5	1.5
DIVSA101	914.0	7	5	0.5	4.5	1	7	5	0.5	4.5	1
DIVSA102	915.0	5.5	4	0.5	3.5	0.5	5.5	4	0.5	3.5	0.5
DIVSA105	915.5	19.5	22	24	19	7.5	23.5	26	28	23	7.5
DIVSA106E	919.0	0	19.5	22	16.5	0	0	23.5	26	20.5	0
DIVSA107E	919.5	0	19	21	16	1.5	0	23	25	20	1.5
DIVSA84	913.0	5	3.5	1.5	13.5	-9.5	5	3.5	1.5	13.5	-9.5
DIVSA84E	907.5	-2	-4.5	-4.5	-3.5	-16.5	-2	-4.5	-4.5	-3.5	-16.5
DIVSA85E	904.5	35	32	26.5	32.5	0.5	35	32	26.5	32.5	0.5
DIVSA86S	905.5	-2	-4.5	-4.5	-3.5	-8	-2	-4.5	-4.5	-3.5	-8
DIVSA87S	908.5	21	-6.5	-8.5	-5	-14.5	25	-6.5	-8.5	-5	-14.5
DIVSA88W	907.0	-3.5	-5.5	-11	-5	-13	-3.5	-5.5	-11	-5	-13
DIVSA89W	910.5	-4	-5	-7	-5	-18.5	-4	-5	-7	-5	-18.5
DIVSA90S	907.5	-2.5	-0.5	15.5	8	-2	-2.5	-0.5	15.5	8	-2
DIVSA93S	908.0	1	1	5	12	0	1	1	5	12	0
DIVSA94	908.0	-3	-1	13.5	7.5	-2.5	-3	-1	13.5	7.5	-2.5
DIVSA95	908.5	0.5	0.5	5	0.5	-1	0.5	0.5	5	0.5	-1
DIVSA98W	912.5	20.5	5	6	3.5	4.5	24.5	5	6	3.5	4.5
DIVSA99W	910.5	2.5	0.5	1	2	0	2.5	0.5	1	2	0
DRAIN370	922.5	0	0	2	0	-0.5	0	0	2	0	-0.5
DRAIN371	921.5	0	0	3.5	0	-0.5	0	0	3.5	0	-0.5
- continued -											

Appendix Table A5. Continued											
		Difference in Total Days Between With and Without Diversion Conditions									
		With a 10-day Dry Down Period					With a 14-day Dry Down Period				
Storage Area	Approx. Field Elevation[a]	2009-like	50-yr	100-yr	500-yr	PMF	2009-like	50-yr	100-yr	500-yr	PMF
DRAIN372	920.0	2.5	4	2.5	2	-0.5	2.5	4	2.5	2	-0.5
DRAIN373	919.0	1.5	0.5	0	0.5	-1.5	1.5	0.5	0	0.5	-1.5
DRAIN374	915.0	0	-0.5	0	0	-0.5	0	-0.5	0	0	-0.5
RR10	909.0	1	0	0.5	0.5	-0.5	1	0	0.5	0.5	-0.5
RR11	909.0	1	0	0	0	-0.5	1	0	0	0	-0.5
RR12	909.0	1	0	0	0	-0.5	1	0	0	0	-0.5
RR13	911.5	2.5	0.5	0.5	2	0	2.5	0.5	0.5	2	0
RR14	914.0	6.5	4	0.5	3.5	1	6.5	4	0.5	3.5	1
RR15	908.0	0.5	0	0	0	-0.5	0.5	0	0	0	-0.5
RR16	916.0	19.5	6	0	4.5	3.5	23.5	6	0	4.5	3.5
RR17	910.0	1	-0.5	0	0	-1	1	-0.5	0	0	-1
RR18	913.0	3.5	1	0.5	3	0	3.5	1	0.5	3	0
RR19	909.0	0.5	-0.5	0	0	-1	0.5	-0.5	0	0	-1
RR20	919.0	16.5	20	3.5	16.5	2	20.5	24	3.5	20.5	2
RR21	909.0	0.5	0	0	0	-0.5	0.5	0	0	0	-0.5
RR22	917.5	18.5	7	0.5	4.5	2	22.5	7	0.5	4.5	2
RR23	912.5	2	0.5	0	2	-0.5	2	0.5	0	2	-0.5
RR24	921.5	0	17.5	5	0	1	0	21.5	5	0	1
RR25	920.0	0	19.5	1.5	16	1.5	0	23.5	1.5	20	1.5
RR26	913.0	2	0.5	0	0	0	2	0.5	0	0	0
RR27	917.0	4.5	3.5	0.5	3.5	0	4.5	3.5	0.5	3.5	0
RR28	923.0	0	0	3.5	0	0.5	0	0	3.5	0	0.5
RR29	921.0	0	19.5	0	2.5	1	0	23.5	0	2.5	1
RR3	910.5	2.5	1	1.5	2	0	2.5	1	1.5	2	0
RR30	922.5	0	17	1.5	0	1	0	21	1.5	0	1
RR31	916.5	3	1	0	3	0	3	1	0	3	0
RR32	916.0	2.5	0.5	0	2.5	0	2.5	0.5	0	2.5	0
RR33	913.5	1	0	0	0	-0.5	1	0	0	0	-0.5
RR34	913.0	1	0	0	0	0	1	0	0	0	0
RR35	914.0	1	0	0	0	0	1	0	0	0	0
RR36	916.5	2	0.5	0.5	0	0	2	0.5	0.5	0	0
RR37	914.5	1	0	0	0	0	1	0	0	0	0
RR38	923.5	0	4	0	1	0.5	0	4	0	1	0.5
RR39	915.5	1	0	0	0	0	1	0	0	0	0
RR4	906.5	0	0	0.5	0	-1	0	0	0.5	0	-1
RR40	925.5	0	0	1	0	0	0	0	1	0	0
RR41	915.5	0.5	0	0	0	0	0.5	0	0	0	0
- continued –											

Appendix Table A5. Continued											
		Difference in Total Days Between With and Without Diversion Conditions									
		With a 10-day Dry Down Period					With a 14-day Dry Down Period				
Storage Area	Approx. Field Elevation[a]	2009-like	50-yr	100-yr	500-yr	PMF	2009-like	50-yr	100-yr	500-yr	PMF
RR42	916.0	1	0	0	0	0	1	0	0	0	0
RR43	920.0	2.5	1	0	2.5	0	2.5	1	0	2.5	0
RR44	924.0	0	2.5	0.5	0.5	1	0	2.5	0.5	0.5	1
RR45	923.0	2.5	3	0.5	1	0.5	2.5	3	0.5	1	0.5
RR46	932.0	0	0	0	0	0.5	0	0	0	0	0.5
RR47	927.5	0	13	0.5	0	0	0	17	0.5	0	0
RR48	928.0	0	0	1	0	0	0	0	1	0	0
RR49	926.5	0	1.5	0.5	0	0.5	0	1.5	0.5	0	0.5
RR5	904.0	0	0	0	0	0	0	0	0	0	0
RR50	933.0	0	0	0	0	0	0	0	0	0	0
RR51	919.0	0.5	0	0	0	0	0.5	0	0	0	0
RR52	933.0	0	0	0	0	0	0	0	0	0	0
RR53	919.0	0.5	0	0	0	0	0.5	0	0	0	0
RR54	932.5	0	0	0	0	0	0	0	0	0	0
RR55	919.0	0.5	0	0	0	0	0.5	0	0	0	0
RR56	918.0	0	0.5	0	0	0	0	0.5	0	0	0
RR57	919.0	0	0	0	0	0	0	0	0	0	0
RR58	914.5	0	0	0	0	0	0	0	0	0	0
RR59	919.0	0.5	0.5	0	0	0	0.5	0.5	0	0	0
RR6	910.0	2	0.5	1	2	0	2	0.5	1	2	0
RR60	915.0	0.5	0	0	0	0	0.5	0	0	0	0
RR7	907.0	0.5	0	0	0	-0.5	0.5	0	0	0	-0.5
RR8	909.5	1	0.5	0.5	1.5	-1	1	0.5	0.5	1.5	-1
RR9	900.0	0	-0.5	0	0	0	0	-0.5	0	0	0
WLVSA200	918.0	1.5	0	0.5	0	0.5	1.5	0	0.5	0	0.5
WLVSA202	928.0	0	0	1	0	-36	0	0	1	0	-36
WLVSA203	927.0	0	0	1	0	0	0	0	1	0	0
WLVSA204	918.0	2	0.5	0.5	0	0	2	0.5	0.5	0	0
WLVSA205	924.0	0	16	0.5	0.5	0.5	0	20	0.5	0.5	0.5
WLVSA206	924.0	0	16.5	0.5	1	0.5	0	20.5	0.5	1	0.5
WLVSA207	925.5	0	0	1	0.5	0.5	0	0	1	0.5	0.5
WLVSA208	923.5	0	16.5	0.5	1	0.5	0	20.5	0.5	1	0.5
WLVSA209	915.5	2	0.5	0	0	0	2	0.5	0	0	0
WLVSA210	920.5	16	4	0	2	1	20	4	0	2	1
WLVSA211	923.0	0	0	1.5	0	0.5	0	0	1.5	0	0.5
WLVSA212	919.5	0	19.5	5.5	16	2	0	23.5	5.5	20	2
WLVSA213	920.0	0	19.5	5.5	16	1.5	0	23.5	5.5	20	1.5
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Appendix Table A5. Continued											
		Difference in Total Days Between With and Without Diversion Conditions									
	Approx.	With a 10-day Dry Down Period					With a 14-day Dry Down Period				
Storage Area	Field Elevation[a]	2009-like	50-yr	100-yr	500-yr	PMF	2009-like	50-yr	100-yr	500-yr	PMF
WLVSA214	919.5	0	21	4.5	17	1.5	0	25	4.5	21	1.5
WLVSA215	911.0	1	0	0	0	-0.5	1	0	0	0	-0.5
WLVSA216	914.5	5	3	0.5	4	0.5	5	3	0.5	4	0.5
WLVSA217	922.0	0	0	5	0	0.5	0	0	5	0	0.5
WLVSA218	921.0	0	18.5	-0.5	0	-1.5	0	22.5	-0.5	0	-1.5
WLVSA219	922.0	0	17.5	3	0	0.5	0	21.5	3	0	0.5
WLVSA220	908.5	1	0	0.5	0	-1	1	0	0.5	0	-1
WLVSA221	908.5	1	0	0.5	0	-1	1	0	0.5	0	-1
WLVSA222	913.0	6.5	4	1	4	2	6.5	4	1	4	2
WLVSA223	910.0	1.5	0	0.5	1.5	-0.5	1.5	0	0.5	1.5	-0.5
WLVSA224	912.5	4.5	2	0.5	3	0	4.5	2	0.5	3	0
WLVSA225	914.5	22.5	6.5	0	5	5.5	26.5	6.5	0	5	5.5
WLVSA226	917.0	19	21	4	18	3	23	25	4	22	3
WLVSA227	915.5	19.5	6.5	0	4.5	4.5	23.5	6.5	0	4.5	4.5
WLVSA228	911.5	2.5	1	0.5	2	-0.5	2.5	1	0.5	2	-0.5
WLVSA229	910.0	1.5	0	0	0.5	-0.5	1.5	0	0	0.5	-0.5
WLVSA230	910.0	1.5	0	0	0.5	-0.5	1.5	0	0	0.5	-0.5
WLVSA231	910.5	1.5	0	0	2	-0.5	1.5	0	0	2	-0.5
WLVSA232	916.0	19.5	6	0	4.5	4	23.5	6	0	4.5	4
WLVSA233	912.0	4	1.5	1	4	0	4	1.5	1	4	0
WLVSA234	917.5	18.5	20.5	4.5	17.5	2.5	22.5	24.5	4.5	21.5	2.5
WLVSA235	908.5	1	0	0	0	-1	1	0	0	0	-1
WLVSA236	910.0	2	0.5	1	2	0	2	0.5	1	2	0
WLVSA237	910.0	2	1	1.5	2	0	2	1	1.5	2	0
WLVSA57	921.0	-11	5	-0.5	1.5	-1	-15	5	-0.5	1.5	-1
WLVSA64	922.0	0	17	-0.5	-12.5	-0.5	0	21	-0.5	-16.5	-0.5
WLVSA65	919.5	18	4	0	2.5	1	22	4	0	2.5	1
WLVSA66	923.0	0	17.5	0	0.5	0	0	21.5	0	0.5	0
WRRND1	920.0	0	0	0	-0.5	0	0	0	0	-0.5	0
WRRND10	916.5	-0.5	-0.5	0	-0.5	0	-0.5	-0.5	0	-0.5	0
WRRND11	919.5	1.5	1	0.5	1	-0.5	1.5	1	0.5	1	-0.5
WRRND12	916.0	-0.5	-0.5	0	-0.5	-0.5	-0.5	-0.5	0	-0.5	-0.5
WRRND13	913.5	0	-0.5	0.5	-0.5	-0.5	0	-0.5	0.5	-0.5	-0.5
WRRND14	912.5	-0.5	0	0.5	0	0	-0.5	0	0.5	0	0
WRRND15	911.0	0	-0.5	1	0	-0.5	0	-0.5	1	0	-0.5
WRRND16	912.5	0	0	1	0	-0.5	0	0	1	0	-0.5
WRRND17	911.0	0	-0.5	1.5	-0.5	-0.5	0	-0.5	1.5	-0.5	-0.5
- continued –											

Appendix Table A5. Continued											
		Difference in Total Days Between With and Without Diversion Conditions									
		With a 10-day Dry Down Period					With a 14-day Dry Down Period				
Storage Area	Approx. Field Elevation[a]	2009-like	50-yr	100-yr	500-yr	PMF	2009-like	50-yr	100-yr	500-yr	PMF
WRRND18	908.5	0	0	0.5	0	-0.5	0	0	0.5	0	-0.5
WRRND19	906.5	0	0	1	0	-0.5	0	0	1	0	-0.5
WRRND2	920	0	0	-0.5	0	0	0	0	-0.5	0	0
WRRND3	919.5	0	-0.5	0	0	-0.5	0	-0.5	0	0	-0.5
WRRND4	918.5	0	0	0	0	-2	0	0	0	0	-2
WRRND5	918	0	0	0	-0.5	-2.5	0	0	0	-0.5	-2.5
WRRND6	918.5	-0.5	-0.5	0	-0.5	-1	-0.5	-0.5	0	-0.5	-1
WRRND7	917	0	-0.5	0	0	0	0	-0.5	0	0	0
WRRND8	917	-0.5	0	0	-0.5	0	-0.5	0	0	-0.5	0
WRRND9	917.5	0	0	0	-0.5	0	0	0	0	-0.5	0
WRSA273	929.5	0	0	0	0	0	0	0	0	0	0
WRSA280	925.5	0	0	0	0	0	0	0	0	0	0
WRSA284	923	0	0	0	0	0	0	0	0	0	0
WRSA289	923.5	0	0	0	0	0.5	0	0	0	0	0.5
WRSA294	919.5	0	0	0	0	0	0	0	0	0	0
WRSA299	912.5	-0.5	-1	0.5	0	-0.5	-0.5	-1	0.5	0	-0.5
WRSA300	909.5	-0.5	0	0	0	0	-0.5	0	0	0	0
WRSA302	913	20.5	6.5	3.5	4	7	24.5	6.5	3.5	4	7
WRSA303	919.5	0	19	21.5	-0.5	0	0	23	25.5	-0.5	0
WRSA304	915	1.5	0	0	-0.5	-7.5	1.5	0	0	-0.5	-7.5
WRSA305A	910.5	0	0	1	-0.5	-0.5	0	0	1	-0.5	-0.5
WRSA305B	910.5	-0.5	0	1	-0.5	-0.5	-0.5	0	1	-0.5	-0.5
WRSA305C	906	-0.5	0	0.5	-1	-1	-0.5	0	0.5	-1	-1
WRSA305D	906	-0.5	0	0.5	-0.5	-1	-0.5	0	0.5	-0.5	-1
WRSA306	908	-0.5	-0.5	13.5	8	-2	-0.5	-0.5	13.5	8	-2
WRSA307	911	2	0	-1	1.5	-4	2	0	-1	1.5	-4
WRSA308	917	18.5	20.5	22.5	18	0	22.5	24.5	26.5	22	0
WRSA309	914.5	0	-1	-0.5	-1	-0.5	0	-1	-0.5	-1	-0.5
WRSA311	907	-2	-0.5	17	8	-1.5	-2	-0.5	17	8	-1.5
WRSA312	906.5	-2	0	17.5	4.5	-1	-2	0	17.5	4.5	-1
WRSA315	909.5	0	-1	-2.5	-1	-1	0	-1	-2.5	-1	-1
WRSA321	906.5	-1.5	-4	-5	-3	-14.5	-1.5	-4	-5	-3	-14.5
WRSA350	910.5	0	0	-1.5	0	-2	0	0	-1.5	0	-2
WRSA351	908.5	-0.5	-0.5	11.5	-0.5	-2	-0.5	-0.5	11.5	-0.5	-2
WRSA352	911	-1	-0.5	-0.5	-1	-2	-1	-0.5	-0.5	-1	-2
WRSA353	917.5	5	5	2.5	3	-0.5	5	5	2.5	3	-0.5
WRSA354	919	0.5	0	0	0	-1	0.5	0	0	0	-1
continued											

Appendix Table A5. Continued											
		Difference in Total Days Between With and Without Diversion Conditions									
		With a 10-day Dry Down Period					With a 14-day Dry Down Period				
Storage Area	Approx. Field Elevation[a]	2009-like	50-yr	100-yr	500-yr	PMF	2009-like	50-yr	100-yr	500-yr	PMF
WRSA355	917.5	0	0	0	0	0	0	0	0	0	0
WRSA356	920.5	0	0	0	0	0	0	0	0	0	0
WRSA357	921.5	0.5	0	0	0	0	0.5	0	0	0	0
WRSA358	923.0	0.5	0.5	0.5	0.5	0	0.5	0.5	0.5	0.5	0
WRSA359	923.0	0.5	0	0	0	0	0.5	0	0	0	0
WRSA360	924.0	0	0	0	0	0	0	0	0	0	0
WRSA363	911.5	-1	-1	1	-1.5	-2	-1	-1	1	-1.5	-2
WRSA364	913.0	-1.5	-2	-1.5	-2	-8.5	-1.5	-2	-1.5	-2	-8.5
WRSA373	927.5	0	0	0	0	0	0	0	0	0	0
WRSA378	926.0	0	0	0.5	0	0	0	0	0.5	0	0
WRSA383	924.0	0	0	0	0	0	0	0	0	0	0
WRSA384	925.0	0	0	1	0	0	0	0	1	0	0
WRSA389	923.0	0	0	0	0	0	0	0	0	0	0
WRSA390	917.5	0	-0.5	-0.5	-0.5	0	0	-0.5	-0.5	-0.5	0
WRSA501	911.0	2.5	1	0	2.5	-0.5	2.5	1	0	2.5	-0.5
WRSA502	913.0	6	4	1	3.5	2	6	4	1	3.5	2
WRSA504	915.0	20	5	-4	4	2.5	24	5	-4	4	2.5
WRSA505	909.0	0.5	0	0	0	0	0.5	0	0	0	0
WRSA506	909.0	1	0	0.5	1.5	-1	1	0	0.5	1.5	-1
WRSA507	902.0	0	0	0	0	0	0	0	0	0	0
WRSA907	915.0	0	-0.5	-0.5	0	0	0	-0.5	-0.5	0	0

PMF = Probabilistic Maximum Flood.
[a]Feet above mean seal level. Lowest estimated elevation for storage area.
Source: Houston-Moore Group (2019).

Appendix Table A6. Acreage of Storage Areas That Do Not Flood in Either the With or Without Diversion Conditions, by Storage Area, by Flood Event Frequency (Hydrology Group One)

Storage Area	Approx. Field Elevation[a]	Flood Event Size				
		10-yr	20-yr	25-yr	25-yr Long	25-yr EL
		------------------------- acres -----------------------------				
BD1	908.0	0.0	0.0	0.0	0.0	0.0
CHRSA01	915.0	306.7	306.7	0.0	0.0	0.0
CHRSA02	914.5	305.0	305.0	0.0	0.0	0.0
CHRSA03	918.0	304.2	304.2	304.2	304.2	304.2
CHRSA04	918.0	283.6	283.6	283.6	283.6	283.6
CHRSA05	920.0	174.9	174.9	174.9	174.9	174.9
CHRSA06	920.0	142.7	0.0	0.0	0.0	0.0
CHRSA07	921.0	116.6	116.6	116.6	116.6	116.6
CHRSA08	915.0	150.5	150.5	0.0	0.0	0.0
CHRSA09	918.5	160.5	160.5	160.5	0.0	0.0
CHRSA10	923.0	301.1	301.1	301.1	301.1	301.1
CHRSA103	922.0	326.5	326.5	326.5	326.5	326.5
CHRSA104	931.0	46.5	46.5	46.5	46.5	46.5
CHRSA105	924.0	218.8	218.8	0.0	0.0	0.0
CHRSA106	928.0	277.6	277.6	277.6	277.6	277.6
CHRSA107	918.0	135.9	0.0	0.0	0.0	0.0
CHRSA108	926.5	61.4	61.4	61.4	61.4	61.4
CHRSA109	919.0	88.5	0.0	0.0	0.0	0.0
CHRSA11	925.0	42.7	42.7	42.7	42.7	42.7
CHRSA110	927.5	75.1	75.1	75.1	75.1	75.1
CHRSA111	923.0	20.3	20.3	20.3	20.3	20.3
CHRSA112	918.0	634.0	634.0	634.0	0.0	0.0
CHRSA113	924.5	304.7	304.7	304.7	304.7	304.7
CHRSA114	913.5	146.2	0.0	0.0	0.0	0.0
CHRSA115	921.0	46.9	46.9	46.9	46.9	46.9
CHRSA116	918.0	17.1	17.1	17.1	0.0	0.0
CHRSA117	919.5	11.9	11.9	11.9	0.0	0.0
CHRSA118	910.5	447.9	0.0	0.0	0.0	0.0
CHRSA119	918.0	97.8	97.8	97.8	0.0	0.0
CHRSA12	916.5	129.4	129.4	129.4	0.0	0.0
CHRSA120	919.5	50.8	50.8	50.8	50.8	50.8
CHRSA13	919.5	85.2	85.2	85.2	85.2	85.2
CHRSA14	918.5	226.6	226.6	226.6	0.0	0.0
CHRSA15	924.0	326.9	326.9	326.9	326.9	326.9
CHRSA16	916.0	59.8	59.8	0.0	0.0	0.0
CHRSA17	918.0	628.8	628.8	0.0	0.0	0.0
CHRSA18	924.0	310.3	310.3	310.3	310.3	310.3
CHRSA19	919.5	323.7	323.7	323.7	0.0	0.0
- continued -						

Appendix Table A6. Continued						
Storage Area	Approx. Field Elevation[a]	Flood Event Size				
		10-yr	20-yr	25-yr	25-yr Long	25-yr EL
		------------------------- acres -----------------------------				
CHRSA20	918.0	629.0	629.0	0.0	0.0	0.0
CHRSA23	918.0	838.7	838.7	0.0	0.0	0.0
DIVSA86E	922.0	852.7	852.7	852.7	852.7	852.7
DIVSA89	922.0	252.6	252.6	252.6	252.6	252.6
DIVSA91	921.0	807.2	807.2	807.2	0.0	0.0
DIVSA93	921.0	631.2	631.2	0.0	0.0	0.0
DIVSA95	927.5	268.8	268.8	268.8	268.8	268.8
DIVSA97	927.5	354.0	354.0	354.0	354.0	354.0
DIVSA99	920.0	635.3	0.0	0.0	0.0	0.0
DRAIN371	927.5	632.4	0.0	0.0	0.0	0.0
DRAIN372	928.0	631.4	631.4	631.4	631.4	631.4
DRAIN373	928.5	80.4	80.4	80.4	80.4	80.4
DRAIN374	924.0	547.7	547.7	547.7	0.0	0.0
RR1	913.0	560.0	560.0	0.0	0.0	0.0
RR10	914.0	566.7	566.7	0.0	0.0	0.0
RR11	915.0	585.0	585.0	0.0	0.0	0.0
RR12	915.5	472.5	472.5	0.0	0.0	0.0
RR13	919.0	54.9	54.9	54.9	54.9	54.9
RR14	919.5	508.9	508.9	508.9	508.9	508.9
RR15	913.0	0.0	0.0	0.0	0.0	0.0
RR16	907.5	241.4	0.0	0.0	0.0	0.0
RR17	904.5	0.0	0.0	0.0	0.0	0.0
RR18	905.5	396.2	0.0	0.0	0.0	0.0
RR19	908.5	273.3	0.0	0.0	0.0	0.0
RR2	907.0	0.0	0.0	0.0	0.0	0.0
RR20	910.5	453.0	0.0	0.0	0.0	0.0
RR21	907.5	0.0	0.0	0.0	0.0	0.0
RR22	908.0	120.1	0.0	0.0	0.0	0.0
RR23	908.0	0.0	0.0	0.0	0.0	0.0
RR24	908.5	119.8	0.0	0.0	0.0	0.0
RR25	912.5	159.7	159.7	0.0	0.0	0.0
RR26	910.5	439.8	0.0	0.0	0.0	0.0
RR27	922.5	0.0	0.0	0.0	0.0	0.0
RR28	921.5	160.3	0.0	0.0	0.0	0.0
RR29	920.0	318.8	318.8	318.8	0.0	0.0
RR3	919.0	331.6	0.0	0.0	0.0	0.0
RR30	915.0	0.0	0.0	0.0	0.0	0.0
RR31	909.0	49.7	0.0	0.0	0.0	0.0
RR32	909.0	77.8	0.0	0.0	0.0	0.0
- continued -						

Appendix Table A6. Continued						
Storage Area	Approx. Field Elevation[a]	Flood Event Size				
		10-yr	20-yr	25-yr	25-yr Long	25-yr EL
		------------------------- acres -----------------------------				
RR33	909.0	111.5	0.0	0.0	0.0	0.0
RR34	911.5	56.4	0.0	0.0	0.0	0.0
RR35	914.0	45.6	45.6	0.0	0.0	0.0
RR36	908.0	0.0	0.0	0.0	0.0	0.0
RR37	916.0	38.5	38.5	0.0	0.0	0.0
RR38	910.0	95.2	0.0	0.0	0.0	0.0
RR39	913.0	72.4	72.4	0.0	0.0	0.0
RR4	909.0	0.0	0.0	0.0	0.0	0.0
RR40	919.0	34.1	34.1	34.1	34.1	34.1
RR41	909.0	0.0	0.0	0.0	0.0	0.0
RR42	917.5	55.7	55.7	55.7	0.0	0.0
RR43	912.5	38.6	0.0	0.0	0.0	0.0
RR44	921.5	134.9	134.9	134.9	134.9	134.9
RR45	920.0	113.7	113.7	113.7	113.7	113.7
RR46	913.0	95.5	0.0	0.0	0.0	0.0
RR47	917.0	104.2	104.2	0.0	0.0	0.0
RR48	923.0	98.1	98.1	98.1	98.1	98.1
RR5	921.0	101.6	101.6	101.6	101.6	101.6
RR6	910.5	19.2	0.0	0.0	0.0	0.0
RR7	922.5	85.1	85.1	85.1	85.1	85.1
RR8	916.5	59.8	59.8	0.0	0.0	0.0
RR9	916.0	57.0	0.0	0.0	0.0	0.0
WLVSA100	913.5	64.2	0.0	0.0	0.0	0.0
WLVSA101	913.0	0.0	0.0	0.0	0.0	0.0
WLVSA102	914.0	47.4	0.0	0.0	0.0	0.0
WLVSA103	916.5	76.2	0.0	0.0	0.0	0.0
WLVSA104	914.5	0.0	0.0	0.0	0.0	0.0
WLVSA200	923.5	83.3	83.3	83.3	83.3	83.3
WLVSA202	915.5	98.8	0.0	0.0	0.0	0.0
WLVSA203	906.5	0.0	0.0	0.0	0.0	0.0
WLVSA204	925.5	77.1	77.1	77.1	77.1	77.1
WLVSA205	915.5	0.0	0.0	0.0	0.0	0.0
WLVSA206	916.0	0.0	0.0	0.0	0.0	0.0
WLVSA207	920.0	104.0	0.0	0.0	0.0	0.0
WLVSA208	924.0	110.0	110.0	110.0	0.0	0.0
WLVSA209	923.0	61.7	61.7	61.7	0.0	0.0
WLVSA210	932.0	64.1	64.1	64.1	64.1	64.1
WLVSA211	927.5	73.3	73.3	73.3	73.3	73.3
WLVSA212	928.0	96.9	96.9	96.9	96.9	96.9
- continued -						

Appendix Table A6. Continued						
Storage Area	Approx. Field Elevation[a]	Flood Event Size				
		10-yr	20-yr	25-yr	25-yr Long	25-yr EL
		------------------------- acres -----------------------------				
WLVSA213	926.5	116.0	116.0	116.0	116.0	116.0
WLVSA214	904.0	0.0	0.0	0.0	0.0	0.0
WLVSA215	933.0	76.2	76.2	76.2	76.2	76.2
WLVSA216	919.0	0.0	0.0	0.0	0.0	0.0
WLVSA217	933.0	54.6	54.6	54.6	54.6	54.6
WLVSA218	919.0	0.0	0.0	0.0	0.0	0.0
WLVSA219	932.5	37.7	37.7	37.7	37.7	37.7
WLVSA220	919.0	0.0	0.0	0.0	0.0	0.0
WLVSA221	918.0	0.0	0.0	0.0	0.0	0.0
WLVSA222	919.0	0.0	0.0	0.0	0.0	0.0
WLVSA223	914.5	0.0	0.0	0.0	0.0	0.0
WLVSA224	919.0	0.0	0.0	0.0	0.0	0.0
WLVSA225	910.0	39.3	0.0	0.0	0.0	0.0
WLVSA226	915.0	0.0	0.0	0.0	0.0	0.0
WLVSA227	907.0	0.0	0.0	0.0	0.0	0.0
WLVSA228	909.5	34.9	0.0	0.0	0.0	0.0
WLVSA229	900.0	0.0	0.0	0.0	0.0	0.0
WLVSA230	918.0	105.4	0.0	0.0	0.0	0.0
WLVSA231	928.0	0.0	0.0	0.0	0.0	0.0
WLVSA232	927.0	13.9	13.9	13.9	13.9	13.9
WLVSA233	918.0	103.5	0.0	0.0	0.0	0.0
WLVSA234	924.0	46.6	46.6	46.6	46.6	46.6
WLVSA235	924.0	110.8	110.8	110.8	110.8	110.8
WLVSA236	925.5	139.0	139.0	139.0	139.0	139.0
WLVSA237	923.5	26.7	26.7	26.7	26.7	26.7
WLVSA238	915.5	51.3	0.0	0.0	0.0	0.0
WLVSA239	920.5	90.3	90.3	90.3	0.0	0.0
WLVSA27S	923.0	160.7	160.7	160.7	160.7	160.7
WLVSA28S	919.5	29.2	29.2	29.2	29.2	29.2
WLVSA29S	920.0	45.9	45.9	45.9	45.9	45.9
WLVSA30S	919.5	75.3	75.3	75.3	75.3	75.3
WLVSA31S	911.0	92.9	0.0	0.0	0.0	0.0
WLVSA32	914.5	42.4	42.4	0.0	0.0	0.0
WLVSA33	922.0	62.4	62.4	62.4	62.4	62.4
WLVSA34	921.0	242.3	242.3	242.3	0.0	0.0
WLVSA34A	922.0	188.3	188.3	188.3	188.3	188.3
WLVSA35	908.5	33.6	0.0	0.0	0.0	0.0
WLVSA36	908.5	31.5	0.0	0.0	0.0	0.0
WLVSA37	913.0	68.8	68.8	0.0	0.0	0.0
- continued -						

Appendix Table A6. Continued						
Storage Area	Approx. Field Elevation[a]	Flood Event Size				
		10-yr	20-yr	25-yr	25-yr Long	25-yr EL
		------------------------- acres -----------------------------				
WLVSA38	910.0	56.2	0.0	0.0	0.0	0.0
WLVSA39	912.5	81.1	81.1	0.0	0.0	0.0
WLVSA40	914.5	65.0	65.0	0.0	0.0	0.0
WLVSA41	917.0	46.7	46.7	46.7	0.0	0.0
WLVSA42	915.5	37.6	37.6	0.0	0.0	0.0
WLVSA42A	911.5	35.8	0.0	0.0	0.0	0.0
WLVSA43	910.0	65.7	0.0	0.0	0.0	0.0
WLVSA44	910.0	30.8	0.0	0.0	0.0	0.0
WLVSA45	910.5	8.5	0.0	0.0	0.0	0.0
WLVSA46	916.0	40.5	40.5	0.0	0.0	0.0
WLVSA47	912.0	154.6	154.6	0.0	0.0	0.0
WLVSA48	917.5	57.5	57.5	57.5	0.0	0.0
WLVSA49	908.5	13.8	0.0	0.0	0.0	0.0
WLVSA50	910.0	56.1	0.0	0.0	0.0	0.0
WLVSA51	910.0	101.8	0.0	0.0	0.0	0.0
WLVSA51A	921.0	210.4	210.4	210.4	0.0	0.0
WLVSA53	922.0	400.2	400.2	400.2	0.0	0.0
WLVSA54	919.5	127.0	127.0	127.0	0.0	0.0
WLVSA55	923.0	212.3	212.3	212.3	0.0	0.0
WLVSA56	920.0	0.0	0.0	0.0	0.0	0.0
WLVSA57	916.5	0.0	0.0	0.0	0.0	0.0
WLVSA58	919.5	197.0	0.0	0.0	0.0	0.0
WLVSA59	916.0	351.3	0.0	0.0	0.0	0.0
WLVSA63	913.5	0.0	0.0	0.0	0.0	0.0
WLVSA64	912.5	0.0	0.0	0.0	0.0	0.0
WLVSA65	911.0	0.0	0.0	0.0	0.0	0.0
WLVSA66	912.5	0.0	0.0	0.0	0.0	0.0
WLVSA67	911.0	0.0	0.0	0.0	0.0	0.0
WLVSA72	908.5	0.0	0.0	0.0	0.0	0.0
WOLVC1	906.5	0.0	0.0	0.0	0.0	0.0
WOLVC10	920.0	0.0	0.0	0.0	0.0	0.0
WOLVC11	919.5	0.0	0.0	0.0	0.0	0.0
WOLVC12	918.5	0.0	0.0	0.0	0.0	0.0
WOLVC2	918.0	0.0	0.0	0.0	0.0	0.0
WOLVC3	918.5	315.5	0.0	0.0	0.0	0.0
WOLVC4	917.0	0.0	0.0	0.0	0.0	0.0
WOLVC5	917.0	0.0	0.0	0.0	0.0	0.0
WOLVC6	917.5	146.2	0.0	0.0	0.0	0.0
WOLVC7	929.5	627.2	627.2	627.2	0.0	0.0
- continued -						

Appendix Table A6. Continued						
Storage Area	Approx. Field Elevation[a]	Flood Event Size				
		10-yr	20-yr	25-yr	25-yr Long	25-yr EL
		------------------------- acres -----------------------------				
WOLVC8	925.5	583.0	583.0	583.0	0.0	0.0
WOLVC9	923.0	597.4	597.4	597.4	597.4	597.4
WRRND1	923.5	629.3	629.3	629.3	629.3	629.3
WRRND10	919.5	625.3	625.3	625.3	625.3	625.3
WRRND11	912.5	626.9	0.0	0.0	0.0	0.0
WRRND12	909.5	0.0	0.0	0.0	0.0	0.0
WRRND2	913.0	245.6	245.6	0.0	0.0	0.0
WRRND3	919.5	639.6	639.6	639.6	639.6	639.6
WRRND4	915.0	634.8	0.0	0.0	0.0	0.0
WRRND5	910.5	0.0	0.0	0.0	0.0	0.0
WRRND6	910.5	0.0	0.0	0.0	0.0	0.0
WRRND7	906.0	0.0	0.0	0.0	0.0	0.0
WRRND8	906.0	0.0	0.0	0.0	0.0	0.0
WRRND9	908.0	0.0	0.0	0.0	0.0	0.0
WRSA284	911.0	209.5	0.0	0.0	0.0	0.0
WRSA289	917.0	637.9	637.9	637.9	0.0	0.0
WRSA294	914.5	635.5	0.0	0.0	0.0	0.0
WRSA299E	907.0	0.0	0.0	0.0	0.0	0.0
WRSA300	906.5	0.0	0.0	0.0	0.0	0.0
WRSA302	909.5	613.4	0.0	0.0	0.0	0.0
WRSA304E	906.5	625.2	0.0	0.0	0.0	0.0
WRSA305A	910.5	0.0	0.0	0.0	0.0	0.0
WRSA305B	908.5	0.0	0.0	0.0	0.0	0.0
WRSA305C	911.0	296.9	0.0	0.0	0.0	0.0
WRSA305D	917.5	291.9	291.9	291.9	0.0	0.0
WRSA306	919.0	295.3	0.0	0.0	0.0	0.0
WRSA307	917.5	415.4	0.0	0.0	0.0	0.0
WRSA309E	920.5	622.2	0.0	0.0	0.0	0.0
WRSA311	921.5	614.4	0.0	0.0	0.0	0.0
WRSA312	923.0	491.6	0.0	0.0	0.0	0.0
WRSA350	923.0	437.5	0.0	0.0	0.0	0.0
WRSA351	924.0	242.3	0.0	0.0	0.0	0.0
WRSA352	911.5	268.2	0.0	0.0	0.0	0.0
WRSA353	913.0	251.8	0.0	0.0	0.0	0.0
WRSA354	927.5	631.8	631.8	631.8	631.8	631.8
WRSA355	926.0	156.1	156.1	156.1	156.1	156.1
WRSA356	924.0	152.7	152.7	152.7	152.7	152.7
WRSA357	925.0	155.0	155.0	155.0	155.0	155.0
WRSA358	923.0	150.7	150.7	150.7	150.7	150.7
- continued -						

Appendix Table A6. Continued						
		Flood Event Size				
Storage Area	Approx. Field Elevation[a]	10-yr	20-yr	25-yr	25-yr Long	25-yr EL
		------------------------- acres ------------------------------				
WRSA363	917.5	268.9	0.0	0.0	0.0	0.0
WRSA364	911.0	71.8	0.0	0.0	0.0	0.0
WRSA373	913.0	13.2	13.2	0.0	0.0	0.0
WRSA378	915.0	11.7	11.7	0.0	0.0	0.0
WRSA383	909.0	55.5	0.0	0.0	0.0	0.0
WRSA384	909.0	130.9	0.0	0.0	0.0	0.0
WRSA389	902.0	0.0	0.0	0.0	0.0	0.0
WRSA390	915.0	393.9	0.0	0.0	0.0	0.0

[a]Feet above mean seal level. Lowest estimated elevation for storage area.

Source: Houston-Moore Group (2019).

Appendix Table A6. Continued						
Storage Area	Approx. Field Elevation[a]	Flood Event Size				
		2009-yr	50-yr	100-yr	500-yr	PMF
		------------------------- acres -----------------------------				
BD1	908.0	0.0	0.0	0.0	0.0	0.0
CHRSA01	915.0	0.0	0.0	0.0	0.0	0.0
CHRSA02	914.5	0.0	0.0	0.0	0.0	0.0
CHRSA03	918.0	0.0	0.0	0.0	0.0	0.0
CHRSA04	918.0	0.0	0.0	0.0	0.0	0.0
CHRSA05	920.0	0.0	174.9	0.0	0.0	0.0
CHRSA06	920.0	0.0	0.0	0.0	0.0	0.0
CHRSA07	921.0	116.6	116.6	0.0	0.0	0.0
CHRSA08	915.0	0.0	0.0	0.0	0.0	0.0
CHRSA09	918.5	0.0	0.0	0.0	0.0	0.0
CHRSA10	923.0	301.1	301.1	301.1	0.0	0.0
CHRSA103	922.0	326.5	326.5	326.5	0.0	0.0
CHRSA104	931.0	0.0	46.5	46.5	0.0	0.0
CHRSA105	924.0	0.0	0.0	0.0	0.0	0.0
CHRSA106	928.0	0.0	277.6	0.0	0.0	0.0
CHRSA107	918.0	0.0	0.0	0.0	0.0	0.0
CHRSA108	926.5	0.0	61.4	61.4	0.0	0.0
CHRSA109	919.0	0.0	0.0	0.0	0.0	0.0
CHRSA11	925.0	0.0	42.7	0.0	0.0	0.0
CHRSA110	927.5	0.0	75.1	75.1	0.0	0.0
CHRSA111	923.0	0.0	20.3	0.0	0.0	0.0
CHRSA112	918.0	0.0	0.0	0.0	0.0	0.0
CHRSA113	924.5	304.7	304.7	304.7	0.0	0.0
CHRSA114	913.5	0.0	0.0	0.0	0.0	0.0
CHRSA115	921.0	0.0	46.9	0.0	0.0	0.0
CHRSA116	918.0	0.0	0.0	0.0	0.0	0.0
CHRSA117	919.5	0.0	0.0	0.0	0.0	0.0
CHRSA118	910.5	0.0	0.0	0.0	0.0	0.0
CHRSA119	918.0	0.0	0.0	0.0	0.0	0.0
CHRSA12	916.5	0.0	0.0	0.0	0.0	0.0
CHRSA120	919.5	0.0	0.0	0.0	0.0	0.0
CHRSA13	919.5	0.0	85.2	0.0	0.0	0.0
CHRSA14	918.5	0.0	0.0	0.0	0.0	0.0
CHRSA15	924.0	326.9	326.9	326.9	0.0	0.0
CHRSA16	916.0	0.0	0.0	0.0	0.0	0.0
CHRSA17	918.0	0.0	0.0	0.0	0.0	0.0
CHRSA18	924.0	310.3	310.3	310.3	0.0	0.0
CHRSA19	919.5	0.0	0.0	0.0	0.0	0.0

- continued -

Appendix Table A6. Continued						
Storage Area	Approx. Field Elevation[a]	Flood Event Size				
		2009-yr	50-yr	100-yr	500-yr	PMF
		------------------------- acres -----------------------------				
CHRSA20	918.0	0.0	0.0	0.0	0.0	0.0
CHRSA23	918.0	0.0	0.0	0.0	0.0	0.0
DIVSA86E	922.0	0.0	0.0	0.0	0.0	0.0
DIVSA89	922.0	0.0	252.6	0.0	0.0	0.0
DIVSA91	921.0	0.0	0.0	0.0	0.0	0.0
DIVSA93	921.0	0.0	0.0	0.0	0.0	0.0
DIVSA95	927.5	0.0	0.0	0.0	0.0	0.0
DIVSA97	927.5	0.0	354.0	0.0	0.0	0.0
DIVSA99	920.0	0.0	0.0	0.0	0.0	0.0
DRAIN371	927.5	0.0	0.0	0.0	0.0	0.0
DRAIN372	928.0	0.0	0.0	0.0	0.0	0.0
DRAIN373	928.5	0.0	0.0	0.0	0.0	0.0
DRAIN374	924.0	0.0	0.0	0.0	0.0	0.0
RR1	913.0	0.0	0.0	0.0	0.0	0.0
RR10	914.0	0.0	0.0	0.0	0.0	0.0
RR11	915.0	0.0	0.0	0.0	0.0	0.0
RR12	915.5	0.0	0.0	0.0	0.0	0.0
RR13	919.0	0.0	54.9	0.0	0.0	0.0
RR14	919.5	0.0	508.9	0.0	0.0	0.0
RR15	913.0	0.0	0.0	0.0	0.0	0.0
RR16	907.5	0.0	0.0	0.0	0.0	0.0
RR17	904.5	0.0	0.0	0.0	0.0	0.0
RR18	905.5	0.0	0.0	0.0	0.0	0.0
RR19	908.5	0.0	0.0	0.0	0.0	0.0
RR2	907.0	0.0	0.0	0.0	0.0	0.0
RR20	910.5	0.0	0.0	0.0	0.0	0.0
RR21	907.5	0.0	0.0	0.0	0.0	0.0
RR22	908.0	0.0	0.0	0.0	0.0	0.0
RR23	908.0	0.0	0.0	0.0	0.0	0.0
RR24	908.5	0.0	0.0	0.0	0.0	0.0
RR25	912.5	0.0	0.0	0.0	0.0	0.0
RR26	910.5	0.0	0.0	0.0	0.0	0.0
RR27	922.5	0.0	0.0	0.0	0.0	0.0
RR28	921.5	0.0	0.0	0.0	0.0	0.0
RR29	920.0	0.0	0.0	0.0	0.0	0.0
RR3	919.0	0.0	0.0	0.0	0.0	0.0
RR30	915.0	0.0	0.0	0.0	0.0	0.0
RR31	909.0	0.0	0.0	0.0	0.0	0.0
RR32	909.0	0.0	0.0	0.0	0.0	0.0
- continued -						

Appendix Table A6. Continued						
Storage Area	Approx. Field Elevation[a]	Flood Event Size				
		2009-yr	50-yr	100-yr	500-yr	PMF
		------------------------- acres -----------------------------				
RR33	909.0	0.0	0.0	0.0	0.0	0.0
RR34	911.5	0.0	0.0	0.0	0.0	0.0
RR35	914.0	0.0	0.0	0.0	0.0	0.0
RR36	908.0	0.0	0.0	0.0	0.0	0.0
RR37	916.0	0.0	0.0	0.0	0.0	0.0
RR38	910.0	0.0	0.0	0.0	0.0	0.0
RR39	913.0	0.0	0.0	0.0	0.0	0.0
RR4	909.0	0.0	0.0	0.0	0.0	0.0
RR40	919.0	0.0	0.0	0.0	0.0	0.0
RR41	909.0	0.0	0.0	0.0	0.0	0.0
RR42	917.5	0.0	0.0	0.0	0.0	0.0
RR43	912.5	0.0	0.0	0.0	0.0	0.0
RR44	921.5	134.9	134.9	0.0	0.0	0.0
RR45	920.0	0.0	113.7	0.0	0.0	0.0
RR46	913.0	0.0	0.0	0.0	0.0	0.0
RR47	917.0	0.0	0.0	0.0	0.0	0.0
RR48	923.0	98.1	98.1	98.1	0.0	0.0
RR5	921.0	0.0	101.6	0.0	0.0	0.0
RR6	910.5	0.0	0.0	0.0	0.0	0.0
RR7	922.5	85.1	85.1	0.0	0.0	0.0
RR8	916.5	0.0	0.0	0.0	0.0	0.0
RR9	916.0	0.0	0.0	0.0	0.0	0.0
WLVSA100	913.5	0.0	0.0	0.0	0.0	0.0
WLVSA101	913.0	0.0	0.0	0.0	0.0	0.0
WLVSA102	914.0	0.0	0.0	0.0	0.0	0.0
WLVSA103	916.5	0.0	0.0	0.0	0.0	0.0
WLVSA104	914.5	0.0	0.0	0.0	0.0	0.0
WLVSA200	923.5	0.0	83.3	0.0	0.0	0.0
WLVSA202	915.5	0.0	0.0	0.0	0.0	0.0
WLVSA203	906.5	0.0	0.0	0.0	0.0	0.0
WLVSA204	925.5	77.1	77.1	77.1	0.0	0.0
WLVSA205	915.5	0.0	0.0	0.0	0.0	0.0
WLVSA206	916.0	0.0	0.0	0.0	0.0	0.0
WLVSA207	920.0	0.0	0.0	0.0	0.0	0.0
WLVSA208	924.0	0.0	110.0	0.0	0.0	0.0
WLVSA209	923.0	0.0	0.0	0.0	0.0	0.0
WLVSA210	932.0	64.1	64.1	64.1	64.1	0.0
WLVSA211	927.5	0.0	73.3	0.0	0.0	0.0
WLVSA212	928.0	0.0	96.9	96.9	0.0	0.0
- continued -						

Appendix Table A6. Continued						
		Flood Event Size				
Storage Area	Approx. Field Elevation[a]	2009-yr	50-yr	100-yr	500-yr	PMF
		------------------------- acres ------------------------------				
WLVSA213	926.5	0.0	116.0	0.0	0.0	0.0
WLVSA214	904.0	0.0	0.0	0.0	0.0	0.0
WLVSA215	933.0	76.2	76.2	76.2	76.2	0.0
WLVSA216	919.0	0.0	0.0	0.0	0.0	0.0
WLVSA217	933.0	54.6	54.6	54.6	0.0	0.0
WLVSA218	919.0	0.0	0.0	0.0	0.0	0.0
WLVSA219	932.5	37.7	37.7	37.7	0.0	0.0
WLVSA220	919.0	0.0	0.0	0.0	0.0	0.0
WLVSA221	918.0	0.0	0.0	0.0	0.0	0.0
WLVSA222	919.0	0.0	0.0	0.0	0.0	0.0
WLVSA223	914.5	0.0	0.0	0.0	0.0	0.0
WLVSA224	919.0	0.0	0.0	0.0	0.0	0.0
WLVSA225	910.0	0.0	0.0	0.0	0.0	0.0
WLVSA226	915.0	0.0	0.0	0.0	0.0	0.0
WLVSA227	907.0	0.0	0.0	0.0	0.0	0.0
WLVSA228	909.5	0.0	0.0	0.0	0.0	0.0
WLVSA229	900.0	0.0	0.0	0.0	0.0	0.0
WLVSA230	918.0	0.0	0.0	0.0	0.0	0.0
WLVSA231	928.0	0.0	0.0	0.0	0.0	0.0
WLVSA232	927.0	13.9	13.9	13.9	0.0	0.0
WLVSA233	918.0	0.0	0.0	0.0	0.0	0.0
WLVSA234	924.0	0.0	46.6	0.0	0.0	0.0
WLVSA235	924.0	0.0	110.8	0.0	0.0	0.0
WLVSA236	925.5	0.0	139.0	139.0	0.0	0.0
WLVSA237	923.5	0.0	26.7	0.0	0.0	0.0
WLVSA238	915.5	0.0	0.0	0.0	0.0	0.0
WLVSA239	920.5	0.0	0.0	0.0	0.0	0.0
WLVSA27S	923.0	160.7	160.7	160.7	0.0	0.0
WLVSA28S	919.5	0.0	29.2	0.0	0.0	0.0
WLVSA29S	920.0	0.0	45.9	0.0	0.0	0.0
WLVSA30S	919.5	0.0	75.3	0.0	0.0	0.0
WLVSA31S	911.0	0.0	0.0	0.0	0.0	0.0
WLVSA32	914.5	0.0	0.0	0.0	0.0	0.0
WLVSA33	922.0	62.4	62.4	62.4	0.0	0.0
WLVSA34	921.0	242.3	242.3	0.0	0.0	0.0
WLVSA34A	922.0	188.3	188.3	0.0	0.0	0.0
WLVSA35	908.5	0.0	0.0	0.0	0.0	0.0
WLVSA36	908.5	0.0	0.0	0.0	0.0	0.0
WLVSA37	913.0	0.0	0.0	0.0	0.0	0.0
- continued -						

Appendix Table A6. Continued						
Storage Area	Approx. Field Elevation[a]	Flood Event Size				
		2009-yr	50-yr	100-yr	500-yr	PMF
		------------------------- acres -----------------------------				
WLVSA38	910.0	0.0	0.0	0.0	0.0	0.0
WLVSA39	912.5	0.0	0.0	0.0	0.0	0.0
WLVSA40	914.5	0.0	0.0	0.0	0.0	0.0
WLVSA41	917.0	0.0	0.0	0.0	0.0	0.0
WLVSA42	915.5	0.0	0.0	0.0	0.0	0.0
WLVSA42A	911.5	0.0	0.0	0.0	0.0	0.0
WLVSA43	910.0	0.0	0.0	0.0	0.0	0.0
WLVSA44	910.0	0.0	0.0	0.0	0.0	0.0
WLVSA45	910.5	0.0	0.0	0.0	0.0	0.0
WLVSA46	916.0	0.0	0.0	0.0	0.0	0.0
WLVSA47	912.0	0.0	0.0	0.0	0.0	0.0
WLVSA48	917.5	0.0	0.0	0.0	0.0	0.0
WLVSA49	908.5	0.0	0.0	0.0	0.0	0.0
WLVSA50	910.0	0.0	0.0	0.0	0.0	0.0
WLVSA51	910.0	0.0	0.0	0.0	0.0	0.0
WLVSA51A	921.0	0.0	0.0	0.0	0.0	0.0
WLVSA53	922.0	0.0	400.2	0.0	0.0	0.0
WLVSA54	919.5	0.0	0.0	0.0	0.0	0.0
WLVSA55	923.0	0.0	212.3	0.0	0.0	0.0
WLVSA56	920.0	0.0	0.0	0.0	0.0	0.0
WLVSA57	916.5	0.0	0.0	0.0	0.0	0.0
WLVSA58	919.5	0.0	0.0	0.0	0.0	0.0
WLVSA59	916.0	0.0	0.0	0.0	0.0	0.0
WLVSA63	913.5	0.0	0.0	0.0	0.0	0.0
WLVSA64	912.5	0.0	0.0	0.0	0.0	0.0
WLVSA65	911.0	0.0	0.0	0.0	0.0	0.0
WLVSA66	912.5	0.0	0.0	0.0	0.0	0.0
WLVSA67	911.0	0.0	0.0	0.0	0.0	0.0
WLVSA72	908.5	0.0	0.0	0.0	0.0	0.0
WOLVC1	906.5	0.0	0.0	0.0	0.0	0.0
WOLVC10	920.0	0.0	0.0	0.0	0.0	0.0
WOLVC11	919.5	0.0	0.0	0.0	0.0	0.0
WOLVC12	918.5	0.0	0.0	0.0	0.0	0.0
WOLVC2	918.0	0.0	0.0	0.0	0.0	0.0
WOLVC3	918.5	0.0	0.0	0.0	0.0	0.0
WOLVC4	917.0	0.0	0.0	0.0	0.0	0.0
WOLVC5	917.0	0.0	0.0	0.0	0.0	0.0
WOLVC6	917.5	0.0	0.0	0.0	0.0	0.0
WOLVC7	929.5	627.2	627.2	627.2	0.0	0.0
- continued -						

Appendix Table A6. Continued						
Storage Area	Approx. Field Elevation[a]	Flood Event Size				
		2009-yr	50-yr	100-yr	500-yr	PMF
		------------------------- acres -----------------------------				
WOLVC8	925.5	583.0	583.0	583.0	0.0	0.0
WOLVC9	923.0	597.4	597.4	597.4	597.4	0.0
WRRND1	923.5	629.3	629.3	629.3	629.3	0.0
WRRND10	919.5	0.0	0.0	0.0	0.0	0.0
WRRND11	912.5	0.0	0.0	0.0	0.0	0.0
WRRND12	909.5	0.0	0.0	0.0	0.0	0.0
WRRND2	913.0	0.0	0.0	0.0	0.0	0.0
WRRND3	919.5	0.0	639.6	0.0	0.0	0.0
WRRND4	915.0	0.0	0.0	0.0	0.0	0.0
WRRND5	910.5	0.0	0.0	0.0	0.0	0.0
WRRND6	910.5	0.0	0.0	0.0	0.0	0.0
WRRND7	906.0	0.0	0.0	0.0	0.0	0.0
WRRND8	906.0	0.0	0.0	0.0	0.0	0.0
WRRND9	908.0	0.0	0.0	0.0	0.0	0.0
WRSA284	911.0	0.0	0.0	0.0	0.0	0.0
WRSA289	917.0	0.0	0.0	0.0	0.0	0.0
WRSA294	914.5	0.0	0.0	0.0	0.0	0.0
WRSA299E	907.0	0.0	0.0	0.0	0.0	0.0
WRSA300	906.5	0.0	0.0	0.0	0.0	0.0
WRSA302	909.5	0.0	0.0	0.0	0.0	0.0
WRSA304E	906.5	0.0	0.0	0.0	0.0	0.0
WRSA305A	910.5	0.0	0.0	0.0	0.0	0.0
WRSA305B	908.5	0.0	0.0	0.0	0.0	0.0
WRSA305C	911.0	0.0	0.0	0.0	0.0	0.0
WRSA305D	917.5	0.0	0.0	0.0	0.0	0.0
WRSA306	919.0	0.0	0.0	0.0	0.0	0.0
WRSA307	917.5	0.0	0.0	0.0	0.0	0.0
WRSA309E	920.5	0.0	0.0	0.0	0.0	0.0
WRSA311	921.5	0.0	0.0	0.0	0.0	0.0
WRSA312	923.0	0.0	0.0	0.0	0.0	0.0
WRSA350	923.0	0.0	0.0	0.0	0.0	0.0
WRSA351	924.0	0.0	0.0	0.0	0.0	0.0
WRSA352	911.5	0.0	0.0	0.0	0.0	0.0
WRSA353	913.0	0.0	0.0	0.0	0.0	0.0
WRSA354	927.5	631.8	631.8	631.8	631.8	0.0
WRSA355	926.0	156.1	156.1	156.1	0.0	0.0
WRSA356	924.0	152.7	152.7	152.7	152.7	0.0
WRSA357	925.0	155.0	155.0	155.0	0.0	0.0
WRSA358	923.0	150.7	150.7	150.7	150.7	0.0
- continued -						

Appendix Table A6. Continued						
		Flood Event Size				
Storage Area	Approx. Field Elevation[a]	2009-yr	50-yr	100-yr	500-yr	PMF
		------------------------- acres ------------------------------				
WRSA363	917.5	0.0	0.0	0.0	0.0	0.0
WRSA364	911.0	0.0	0.0	0.0	0.0	0.0
WRSA373	913.0	0.0	0.0	0.0	0.0	0.0
WRSA378	915.0	0.0	0.0	0.0	0.0	0.0
WRSA383	909.0	0.0	0.0	0.0	0.0	0.0
WRSA384	909.0	0.0	0.0	0.0	0.0	0.0
WRSA389	902.0	0.0	0.0	0.0	0.0	0.0
WRSA390	915.0	0.0	0.0	0.0	0.0	0.0

PMF = Probabilistic Maximum Flood.
[a]Feet above mean seal level. Lowest estimated elevation for storage area.
Source: Houston-Moore Group (2019).

Appendix Table A7. Acreage of Storage Areas That Flood With and Without Diversion, but Inundation is the Same Duration With and Without Diversion Conditions, by Storage Area, by Flood Event Frequency (Hydrology Group Two)						
Storage Area	Approx. Field Elevation[a]	Flood Event Size				
		10-yr	20-yr	25-yr	25-yr Long	25-yr EL
		------------------------- acres -----------------------------				
BD1	908.0	23.2	0.0	0.0	23.2	23.2
CHRSA01	915.0	0.0	0.0	0.0	0.0	0.0
CHRSA02	914.5	0.0	0.0	0.0	0.0	0.0
CHRSA03	918.0	0.0	0.0	0.0	0.0	0.0
CHRSA04	918.0	0.0	0.0	0.0	0.0	0.0
CHRSA05	920.0	0.0	0.0	0.0	0.0	0.0
CHRSA06	920.0	0.0	142.7	0.0	0.0	0.0
CHRSA07	921.0	0.0	0.0	0.0	0.0	0.0
CHRSA08	915.0	0.0	0.0	0.0	0.0	0.0
CHRSA09	918.5	0.0	0.0	0.0	0.0	0.0
CHRSA10	923.0	0.0	0.0	0.0	0.0	0.0
CHRSA103	922.0	0.0	0.0	0.0	0.0	0.0
CHRSA104	931.0	0.0	0.0	0.0	0.0	0.0
CHRSA105	924.0	0.0	0.0	0.0	0.0	218.8
CHRSA106	928.0	0.0	0.0	0.0	0.0	0.0
CHRSA107	918.0	0.0	135.9	0.0	0.0	135.9
CHRSA108	926.5	0.0	0.0	0.0	0.0	0.0
CHRSA109	919.0	0.0	88.5	0.0	0.0	88.5
CHRSA11	925.0	0.0	0.0	0.0	0.0	0.0
CHRSA110	927.5	0.0	0.0	0.0	0.0	0.0
CHRSA111	923.0	0.0	0.0	0.0	0.0	0.0
CHRSA112	918.0	0.0	0.0	0.0	0.0	0.0
CHRSA113	924.5	0.0	0.0	0.0	0.0	0.0
CHRSA114	913.5	0.0	146.2	0.0	146.2	146.2
CHRSA115	921.0	0.0	0.0	0.0	0.0	0.0
CHRSA116	918.0	0.0	0.0	0.0	0.0	0.0
CHRSA117	919.5	0.0	0.0	0.0	0.0	0.0
CHRSA118	910.5	0.0	447.9	0.0	0.0	447.9
CHRSA119	918.0	0.0	0.0	0.0	0.0	0.0
CHRSA12	916.5	0.0	0.0	0.0	0.0	0.0
CHRSA120	919.5	0.0	0.0	0.0	0.0	0.0
CHRSA13	919.5	0.0	0.0	0.0	0.0	0.0
CHRSA14	918.5	0.0	0.0	0.0	0.0	0.0
CHRSA15	924.0	0.0	0.0	0.0	0.0	0.0
CHRSA16	916.0	0.0	0.0	0.0	0.0	0.0
CHRSA17	918.0	0.0	0.0	0.0	0.0	628.8
CHRSA18	924.0	0.0	0.0	0.0	0.0	0.0
CHRSA19	919.5	0.0	0.0	0.0	0.0	0.0
- continued -						

Appendix Table A7. Continued						
Storage Area	Approx. Field Elevation[a]	Flood Event Size				
		10-yr	20-yr	25-yr	25-yr Long	25-yr EL
		------------------------ acres -----------------------------				
CHRSA20	918.0	0.0	0.0	0.0	0.0	629.0
CHRSA23	918.0	0.0	0.0	0.0	0.0	838.7
DIVSA86E	922.0	0.0	0.0	0.0	0.0	0.0
DIVSA89	922.0	0.0	0.0	0.0	0.0	0.0
DIVSA91	921.0	0.0	0.0	0.0	0.0	0.0
DIVSA93	921.0	0.0	0.0	0.0	0.0	0.0
DIVSA95	927.5	0.0	0.0	0.0	0.0	0.0
DIVSA97	927.5	0.0	0.0	0.0	0.0	0.0
DIVSA99	920.0	0.0	635.3	0.0	0.0	635.3
DRAIN371	927.5	0.0	632.4	632.4	632.4	632.4
DRAIN372	928.0	0.0	0.0	0.0	0.0	0.0
DRAIN373	928.5	0.0	0.0	0.0	0.0	0.0
DRAIN374	924.0	0.0	0.0	0.0	0.0	0.0
RR1	913.0	0.0	0.0	0.0	0.0	0.0
RR10	914.0	0.0	0.0	0.0	0.0	0.0
RR11	915.0	0.0	0.0	0.0	0.0	0.0
RR12	915.5	0.0	0.0	0.0	0.0	0.0
RR13	919.0	0.0	0.0	0.0	0.0	0.0
RR14	919.5	0.0	0.0	0.0	0.0	0.0
RR15	913.0	0.0	0.0	0.0	0.0	0.0
RR16	907.5	0.0	0.0	0.0	0.0	0.0
RR17	904.5	0.0	0.0	0.0	0.0	0.0
RR18	905.5	0.0	0.0	0.0	396.2	0.0
RR19	908.5	0.0	0.0	0.0	0.0	0.0
RR2	907.0	0.0	0.0	0.0	0.0	0.0
RR20	910.5	0.0	0.0	0.0	0.0	0.0
RR21	907.5	0.0	0.0	0.0	0.0	0.0
RR22	908.0	0.0	0.0	0.0	0.0	0.0
RR23	908.0	0.0	0.0	0.0	0.0	0.0
RR24	908.5	0.0	0.0	0.0	0.0	0.0
RR25	912.5	0.0	0.0	0.0	0.0	0.0
RR26	910.5	0.0	0.0	0.0	0.0	439.8
RR27	922.5	157.7	157.7	157.7	157.7	157.7
RR28	921.5	0.0	160.3	160.3	160.3	160.3
RR29	920.0	0.0	0.0	0.0	0.0	318.8
RR3	919.0	0.0	331.6	331.6	0.0	0.0
RR30	915.0	240.7	240.7	0.0	240.7	240.7
RR31	909.0	0.0	49.7	0.0	0.0	0.0
RR32	909.0	0.0	77.8	0.0	0.0	0.0
- continued -						

Appendix Table A7. Continued						
Storage Area	Approx. Field Elevation[a]	Flood Event Size				
		10-yr	20-yr	25-yr	25-yr Long	25-yr EL
		------------------------- acres -----------------------------				
RR33	909.0	0.0	111.5	0.0	0.0	0.0
RR34	911.5	0.0	0.0	0.0	0.0	56.4
RR35	914.0	0.0	0.0	0.0	0.0	0.0
RR36	908.0	68.3	68.3	0.0	68.3	68.3
RR37	916.0	0.0	0.0	0.0	0.0	0.0
RR38	910.0	0.0	0.0	0.0	0.0	95.2
RR39	913.0	0.0	0.0	0.0	0.0	0.0
RR4	909.0	0.0	60.1	0.0	60.1	60.1
RR40	919.0	0.0	0.0	0.0	0.0	0.0
RR41	909.0	105.2	105.2	0.0	0.0	105.2
RR42	917.5	0.0	0.0	0.0	0.0	0.0
RR43	912.5	0.0	0.0	0.0	0.0	38.6
RR44	921.5	0.0	0.0	0.0	0.0	0.0
RR45	920.0	0.0	0.0	0.0	0.0	0.0
RR46	913.0	0.0	0.0	0.0	0.0	95.5
RR47	917.0	0.0	0.0	0.0	0.0	0.0
RR48	923.0	0.0	0.0	0.0	0.0	0.0
RR5	921.0	0.0	0.0	0.0	0.0	0.0
RR6	910.5	0.0	0.0	0.0	0.0	0.0
RR7	922.5	0.0	0.0	0.0	0.0	0.0
RR8	916.5	0.0	0.0	0.0	0.0	59.8
RR9	916.0	0.0	0.0	0.0	0.0	57.0
WLVSA100	913.5	0.0	64.2	0.0	64.2	64.2
WLVSA101	913.0	82.5	82.5	0.0	82.5	82.5
WLVSA102	914.0	0.0	47.4	0.0	47.4	47.4
WLVSA103	916.5	0.0	76.2	0.0	0.0	76.2
WLVSA104	914.5	0.0	174.5	0.0	174.5	0.0
WLVSA200	923.5	0.0	0.0	0.0	0.0	0.0
WLVSA202	915.5	0.0	98.8	0.0	98.8	0.0
WLVSA203	906.5	0.0	53.6	0.0	53.6	53.6
WLVSA204	925.5	0.0	0.0	0.0	0.0	0.0
WLVSA205	915.5	61.2	0.0	0.0	61.2	61.2
WLVSA206	916.0	51.6	0.0	0.0	0.0	51.6
WLVSA207	920.0	0.0	104.0	0.0	0.0	104.0
WLVSA208	924.0	0.0	0.0	0.0	0.0	0.0
WLVSA209	923.0	0.0	0.0	0.0	0.0	0.0
WLVSA210	932.0	0.0	0.0	0.0	0.0	0.0
WLVSA211	927.5	0.0	0.0	0.0	0.0	0.0
WLVSA212	928.0	0.0	0.0	0.0	0.0	0.0
- continued -						

Appendix Table A7. Continued						
Storage Area	Approx. Field Elevation[a]	Flood Event Size				
		10-yr	20-yr	25-yr	25-yr Long	25-yr EL
		------------------------ acres -----------------------------				
WLVSA213	926.5	0.0	0.0	0.0	0.0	0.0
WLVSA214	904.0	72.0	0.0	0.0	0.0	72.0
WLVSA215	933.0	0.0	0.0	0.0	0.0	0.0
WLVSA216	919.0	96.1	96.1	0.0	96.1	0.0
WLVSA217	933.0	0.0	0.0	0.0	0.0	0.0
WLVSA218	919.0	168.8	168.8	0.0	168.8	168.8
WLVSA219	932.5	0.0	0.0	0.0	0.0	0.0
WLVSA220	919.0	0.0	117.5	0.0	117.5	117.5
WLVSA221	918.0	45.5	45.5	45.5	45.5	45.5
WLVSA222	919.0	0.0	193.2	0.0	193.2	193.2
WLVSA223	914.5	69.1	69.1	69.1	0.0	0.0
WLVSA224	919.0	139.2	139.2	139.2	139.2	139.2
WLVSA225	910.0	0.0	0.0	0.0	0.0	39.3
WLVSA226	915.0	107.9	107.9	0.0	0.0	0.0
WLVSA227	907.0	47.3	47.3	0.0	0.0	47.3
WLVSA228	909.5	0.0	0.0	0.0	0.0	0.0
WLVSA229	900.0	90.2	0.0	0.0	90.2	90.2
WLVSA230	918.0	0.0	105.4	0.0	0.0	105.4
WLVSA231	928.0	357.6	357.6	357.6	357.6	357.6
WLVSA232	927.0	0.0	0.0	0.0	0.0	0.0
WLVSA233	918.0	0.0	0.0	0.0	103.5	103.5
WLVSA234	924.0	0.0	0.0	0.0	0.0	0.0
WLVSA235	924.0	0.0	0.0	0.0	0.0	0.0
WLVSA236	925.5	0.0	0.0	0.0	0.0	0.0
WLVSA237	923.5	0.0	0.0	0.0	0.0	0.0
WLVSA238	915.5	0.0	51.3	0.0	51.3	51.3
WLVSA239	920.5	0.0	0.0	0.0	0.0	0.0
WLVSA27S	923.0	0.0	0.0	0.0	0.0	0.0
WLVSA28S	919.5	0.0	0.0	0.0	0.0	0.0
WLVSA29S	920.0	0.0	0.0	0.0	0.0	0.0
WLVSA30S	919.5	0.0	0.0	0.0	0.0	0.0
WLVSA31S	911.0	0.0	0.0	0.0	92.9	0.0
WLVSA32	914.5	0.0	0.0	0.0	0.0	0.0
WLVSA33	922.0	0.0	0.0	0.0	0.0	0.0
WLVSA34	921.0	0.0	0.0	0.0	0.0	0.0
WLVSA34A	922.0	0.0	0.0	0.0	0.0	0.0
WLVSA35	908.5	0.0	33.6	0.0	0.0	33.6
WLVSA36	908.5	0.0	0.0	0.0	0.0	31.5
WLVSA37	913.0	0.0	0.0	0.0	0.0	0.0
- continued -						

Appendix Table A7. Continued						
Storage Area	Approx. Field Elevation[a]	Flood Event Size				
		10-yr	20-yr	25-yr	25-yr Long	25-yr EL
		------------------------- acres -----------------------------				
WLVSA38	910.0	0.0	0.0	0.0	0.0	0.0
WLVSA39	912.5	0.0	0.0	0.0	0.0	0.0
WLVSA40	914.5	0.0	0.0	0.0	0.0	0.0
WLVSA41	917.0	0.0	0.0	0.0	0.0	0.0
WLVSA42	915.5	0.0	0.0	0.0	0.0	0.0
WLVSA42A	911.5	0.0	0.0	0.0	0.0	35.8
WLVSA43	910.0	0.0	0.0	0.0	0.0	65.7
WLVSA44	910.0	0.0	0.0	0.0	0.0	30.8
WLVSA45	910.5	0.0	0.0	0.0	0.0	0.0
WLVSA46	916.0	0.0	0.0	0.0	0.0	0.0
WLVSA47	912.0	0.0	0.0	0.0	0.0	0.0
WLVSA48	917.5	0.0	0.0	0.0	0.0	0.0
WLVSA49	908.5	0.0	13.8	0.0	0.0	0.0
WLVSA50	910.0	0.0	0.0	0.0	0.0	56.1
WLVSA51	910.0	0.0	0.0	0.0	0.0	0.0
WLVSA51A	921.0	0.0	0.0	0.0	0.0	0.0
WLVSA53	922.0	0.0	0.0	0.0	0.0	0.0
WLVSA54	919.5	0.0	0.0	0.0	0.0	0.0
WLVSA55	923.0	0.0	0.0	0.0	212.3	212.3
WLVSA56	920.0	423.4	423.4	0.0	423.4	0.0
WLVSA57	916.5	320.2	320.2	0.0	0.0	0.0
WLVSA58	919.5	0.0	197.0	197.0	0.0	0.0
WLVSA59	916.0	0.0	351.3	0.0	0.0	0.0
WLVSA63	913.5	288.0	288.0	0.0	288.0	0.0
WLVSA64	912.5	0.0	0.0	0.0	214.1	0.0
WLVSA65	911.0	172.9	0.0	0.0	0.0	172.9
WLVSA66	912.5	116.6	116.6	0.0	0.0	116.6
WLVSA67	911.0	75.9	0.0	0.0	75.9	75.9
WLVSA72	908.5	202.4	0.0	0.0	202.4	202.4
WOLVC1	906.5	16.3	0.0	0.0	16.3	16.3
WOLVC10	920.0	317.3	317.3	0.0	0.0	317.3
WOLVC11	919.5	0.0	341.0	341.0	341.0	0.0
WOLVC12	918.5	288.6	288.6	0.0	0.0	0.0
WOLVC2	918.0	322.0	322.0	0.0	322.0	322.0
WOLVC3	918.5	0.0	0.0	0.0	0.0	315.5
WOLVC4	917.0	303.6	303.6	0.0	303.6	303.6
WOLVC5	917.0	355.2	355.2	0.0	355.2	0.0
WOLVC6	917.5	0.0	0.0	0.0	0.0	0.0
WOLVC7	929.5	0.0	0.0	0.0	627.2	627.2
- continued -						

Appendix Table A7. Continued						
Storage Area	Approx. Field Elevation[a]	Flood Event Size				
		10-yr	20-yr	25-yr	25-yr Long	25-yr EL
		------------------------- acres -----------------------------				
WOLVC8	925.5	0.0	0.0	0.0	583.0	583.0
WOLVC9	923.0	0.0	0.0	0.0	0.0	0.0
WRRND1	923.5	0.0	0.0	0.0	0.0	0.0
WRRND10	919.5	0.0	0.0	0.0	0.0	0.0
WRRND11	912.5	0.0	626.9	0.0	626.9	0.0
WRRND12	909.5	626.3	0.0	0.0	626.3	626.3
WRRND2	913.0	0.0	0.0	0.0	0.0	0.0
WRRND3	919.5	0.0	0.0	0.0	0.0	0.0
WRRND4	915.0	0.0	0.0	0.0	0.0	0.0
WRRND5	910.5	225.0	0.0	0.0	225.0	0.0
WRRND6	910.5	407.9	0.0	0.0	407.9	407.9
WRRND7	906.0	808.3	0.0	808.3	808.3	808.3
WRRND8	906.0	431.6	0.0	431.6	431.6	431.6
WRRND9	908.0	495.9	0.0	0.0	0.0	0.0
WRSA284	911.0	0.0	0.0	0.0	0.0	0.0
WRSA289	917.0	0.0	0.0	0.0	0.0	0.0
WRSA294	914.5	0.0	0.0	0.0	0.0	0.0
WRSA299E	907.0	0.0	0.0	0.0	0.0	0.0
WRSA300	906.5	0.0	0.0	0.0	631.3	631.3
WRSA302	909.5	0.0	0.0	0.0	0.0	0.0
WRSA304E	906.5	0.0	0.0	0.0	0.0	0.0
WRSA305A	910.5	0.0	274.3	0.0	0.0	0.0
WRSA305B	908.5	0.0	0.0	0.0	0.0	0.0
WRSA305C	911.0	0.0	0.0	0.0	0.0	0.0
WRSA305D	917.5	0.0	0.0	0.0	0.0	0.0
WRSA306	919.0	0.0	295.3	295.3	0.0	0.0
WRSA307	917.5	0.0	415.4	0.0	0.0	0.0
WRSA309E	920.5	0.0	622.2	0.0	0.0	0.0
WRSA311	921.5	0.0	614.4	614.4	0.0	0.0
WRSA312	923.0	0.0	491.6	491.6	0.0	0.0
WRSA350	923.0	0.0	437.5	437.5	437.5	0.0
WRSA351	924.0	0.0	242.3	242.3	0.0	242.3
WRSA352	911.5	0.0	0.0	0.0	0.0	268.2
WRSA353	913.0	0.0	0.0	0.0	0.0	0.0
WRSA354	927.5	0.0	0.0	0.0	0.0	0.0
WRSA355	926.0	0.0	0.0	0.0	0.0	0.0
WRSA356	924.0	0.0	0.0	0.0	0.0	0.0
WRSA357	925.0	0.0	0.0	0.0	0.0	0.0
WRSA358	923.0	0.0	0.0	0.0	0.0	0.0
- continued -						

Appendix Table A7. Continued						
Storage Area	Approx. Field Elevation[a]	Flood Event Size				
		10-yr	20-yr	25-yr	25-yr Long	25-yr EL
		------------------------- acres ------------------------------				
WRSA363	917.5	0.0	0.0	0.0	0.0	0.0
WRSA364	911.0	0.0	0.0	0.0	0.0	71.8
WRSA373	913.0	0.0	0.0	0.0	0.0	0.0
WRSA378	915.0	0.0	0.0	0.0	0.0	0.0
WRSA383	909.0	0.0	0.0	0.0	0.0	0.0
WRSA384	909.0	0.0	0.0	0.0	0.0	0.0
WRSA389	902.0	29.1	0.0	0.0	0.0	29.1
WRSA390	915.0	0.0	0.0	0.0	0.0	393.9

[a]Feet above mean seal level. Lowest estimated elevation for storage area.

Source: Houston-Moore Group (2019).

Appendix Table A7. Continued						
Storage Area	Approx. Field Elevation[a]	Flood Event Size				
		2009-yr	50-yr	100-yr	500-yr	PMF
		------------------------- acres ------------------------------				
BD1	908.0	23.2	23.2	23.2	0.0	0.0
CHRSA01	915.0	0.0	0.0	0.0	0.0	0.0
CHRSA02	914.5	0.0	0.0	0.0	0.0	0.0
CHRSA03	918.0	0.0	0.0	0.0	0.0	0.0
CHRSA04	918.0	0.0	0.0	0.0	0.0	0.0
CHRSA05	920.0	0.0	0.0	0.0	0.0	174.9
CHRSA06	920.0	142.7	0.0	142.7	142.7	142.7
CHRSA07	921.0	0.0	0.0	0.0	0.0	116.6
CHRSA08	915.0	0.0	0.0	0.0	0.0	0.0
CHRSA09	918.5	0.0	0.0	0.0	0.0	0.0
CHRSA10	923.0	0.0	0.0	0.0	0.0	0.0
CHRSA103	922.0	0.0	0.0	0.0	0.0	326.5
CHRSA104	931.0	46.5	0.0	0.0	0.0	46.5
CHRSA105	924.0	0.0	0.0	0.0	218.8	0.0
CHRSA106	928.0	277.6	0.0	0.0	277.6	0.0
CHRSA107	918.0	135.9	0.0	135.9	0.0	135.9
CHRSA108	926.5	0.0	0.0	0.0	0.0	0.0
CHRSA109	919.0	88.5	0.0	0.0	0.0	88.5
CHRSA11	925.0	0.0	0.0	0.0	42.7	42.7
CHRSA110	927.5	0.0	0.0	0.0	0.0	75.1
CHRSA111	923.0	0.0	0.0	0.0	20.3	0.0
CHRSA112	918.0	0.0	0.0	0.0	634.0	0.0
CHRSA113	924.5	0.0	0.0	0.0	0.0	304.7
CHRSA114	913.5	146.2	0.0	146.2	146.2	146.2
CHRSA115	921.0	0.0	0.0	0.0	0.0	0.0
CHRSA116	918.0	0.0	0.0	0.0	17.1	0.0
CHRSA117	919.5	0.0	0.0	0.0	0.0	0.0
CHRSA118	910.5	447.9	0.0	447.9	447.9	0.0
CHRSA119	918.0	0.0	0.0	0.0	97.8	0.0
CHRSA12	916.5	0.0	0.0	0.0	0.0	0.0
CHRSA120	919.5	0.0	0.0	0.0	0.0	0.0
CHRSA13	919.5	0.0	0.0	0.0	0.0	0.0
CHRSA14	918.5	0.0	0.0	0.0	0.0	0.0
CHRSA15	924.0	0.0	0.0	0.0	0.0	0.0
CHRSA16	916.0	0.0	0.0	0.0	0.0	0.0
CHRSA17	918.0	0.0	0.0	0.0	628.8	0.0
CHRSA18	924.0	0.0	0.0	0.0	0.0	310.3
CHRSA19	919.5	323.7	323.7	0.0	323.7	323.7
CHRSA20	918.0	0.0	0.0	0.0	629.0	0.0
- continued -						

Appendix Table A7. Continued						
Storage Area	Approx. Field Elevation[a]	Flood Event Size				
		2009-yr	50-yr	100-yr	500-yr	PMF
		------------------------- acres ------------------------------				
CHRSA23	918.0	0.0	0.0	0.0	838.7	838.7
DIVSA86E	922.0	852.7	852.7	0.0	0.0	852.7
DIVSA89	922.0	0.0	0.0	0.0	252.6	0.0
DIVSA91	921.0	0.0	0.0	0.0	0.0	0.0
DIVSA93	921.0	0.0	0.0	0.0	0.0	0.0
DIVSA95	927.5	268.8	268.8	0.0	0.0	268.8
DIVSA97	927.5	354.0	0.0	0.0	0.0	354.0
DIVSA99	920.0	635.3	0.0	635.3	635.3	635.3
DRAIN371	927.5	632.4	0.0	632.4	0.0	632.4
DRAIN372	928.0	631.4	631.4	0.0	0.0	631.4
DRAIN373	928.5	80.4	80.4	80.4	0.0	80.4
DRAIN374	924.0	547.7	547.7	547.7	0.0	547.7
RR1	913.0	0.0	0.0	0.0	0.0	0.0
RR10	914.0	0.0	0.0	0.0	0.0	0.0
RR11	915.0	0.0	0.0	0.0	0.0	0.0
RR12	915.5	0.0	0.0	0.0	0.0	0.0
RR13	919.0	0.0	0.0	0.0	0.0	54.9
RR14	919.5	0.0	0.0	0.0	0.0	0.0
RR15	913.0	0.0	0.0	0.0	0.0	0.0
RR16	907.5	0.0	0.0	0.0	0.0	0.0
RR17	904.5	0.0	0.0	0.0	0.0	0.0
RR18	905.5	0.0	0.0	0.0	0.0	0.0
RR19	908.5	0.0	0.0	0.0	0.0	0.0
RR2	907.0	0.0	0.0	0.0	0.0	0.0
RR20	910.5	0.0	0.0	0.0	0.0	0.0
RR21	907.5	0.0	0.0	0.0	0.0	0.0
RR22	908.0	0.0	0.0	0.0	0.0	120.1
RR23	908.0	0.0	0.0	0.0	0.0	0.0
RR24	908.5	0.0	0.0	0.0	0.0	0.0
RR25	912.5	0.0	0.0	0.0	0.0	0.0
RR26	910.5	0.0	0.0	0.0	0.0	439.8
RR27	922.5	157.7	157.7	157.7	0.0	0.0
RR28	921.5	160.3	160.3	160.3	0.0	0.0
RR29	920.0	0.0	0.0	0.0	0.0	0.0
RR3	919.0	0.0	0.0	0.0	331.6	0.0
RR30	915.0	240.7	240.7	0.0	240.7	0.0
RR31	909.0	0.0	0.0	49.7	0.0	0.0
RR32	909.0	77.8	0.0	77.8	77.8	0.0
RR33	909.0	111.5	0.0	111.5	111.5	0.0
- continued -						

Appendix Table A7. Continued						
Storage Area	Approx. Field Elevation[a]	Flood Event Size				
		2009-yr	50-yr	100-yr	500-yr	PMF
		------------------------- acres -----------------------------				
RR34	911.5	0.0	0.0	0.0	0.0	56.4
RR35	914.0	0.0	0.0	0.0	0.0	0.0
RR36	908.0	68.3	0.0	68.3	68.3	0.0
RR37	916.0	0.0	0.0	0.0	38.5	0.0
RR38	910.0	95.2	0.0	0.0	95.2	0.0
RR39	913.0	0.0	0.0	0.0	0.0	72.4
RR4	909.0	60.1	0.0	0.0	60.1	0.0
RR40	919.0	0.0	0.0	0.0	0.0	0.0
RR41	909.0	105.2	0.0	105.2	105.2	0.0
RR42	917.5	0.0	0.0	0.0	0.0	0.0
RR43	912.5	0.0	0.0	0.0	38.6	0.0
RR44	921.5	0.0	0.0	0.0	0.0	0.0
RR45	920.0	0.0	0.0	0.0	0.0	0.0
RR46	913.0	95.5	0.0	0.0	95.5	95.5
RR47	917.0	0.0	0.0	0.0	0.0	104.2
RR48	923.0	0.0	0.0	0.0	0.0	0.0
RR5	921.0	0.0	0.0	0.0	101.6	0.0
RR6	910.5	0.0	0.0	0.0	0.0	19.2
RR7	922.5	0.0	0.0	0.0	0.0	0.0
RR8	916.5	0.0	0.0	0.0	59.8	59.8
RR9	916.0	0.0	0.0	0.0	57.0	57.0
WLVSA100	913.5	64.2	0.0	64.2	64.2	0.0
WLVSA101	913.0	82.5	0.0	82.5	82.5	82.5
WLVSA102	914.0	47.4	0.0	47.4	47.4	47.4
WLVSA103	916.5	76.2	0.0	0.0	0.0	76.2
WLVSA104	914.5	174.5	0.0	174.5	174.5	174.5
WLVSA200	923.5	0.0	0.0	0.0	83.3	0.0
WLVSA202	915.5	98.8	0.0	98.8	98.8	98.8
WLVSA203	906.5	53.6	53.6	53.6	0.0	0.0
WLVSA204	925.5	0.0	0.0	0.0	0.0	77.1
WLVSA205	915.5	61.2	0.0	61.2	61.2	61.2
WLVSA206	916.0	51.6	0.0	51.6	51.6	51.6
WLVSA207	920.0	0.0	0.0	0.0	104.0	104.0
WLVSA208	924.0	0.0	0.0	0.0	0.0	0.0
WLVSA209	923.0	0.0	0.0	0.0	0.0	0.0
WLVSA210	932.0	0.0	0.0	0.0	0.0	0.0
WLVSA211	927.5	73.3	0.0	0.0	0.0	73.3
WLVSA212	928.0	96.9	0.0	0.0	0.0	96.9
WLVSA213	926.5	116.0	0.0	0.0	0.0	0.0
- continued -						

Appendix Table A7. Continued						
Storage Area	Approx. Field Elevation[a]	Flood Event Size				
		2009-yr	50-yr	100-yr	500-yr	PMF
		------------------------ acres ----------------------------				
WLVSA214	904.0	72.0	72.0	72.0	72.0	72.0
WLVSA215	933.0	0.0	0.0	0.0	0.0	76.2
WLVSA216	919.0	96.1	0.0	96.1	96.1	96.1
WLVSA217	933.0	0.0	0.0	0.0	54.6	54.6
WLVSA218	919.0	168.8	0.0	168.8	168.8	168.8
WLVSA219	932.5	0.0	0.0	0.0	37.7	37.7
WLVSA220	919.0	117.5	0.0	117.5	117.5	117.5
WLVSA221	918.0	45.5	45.5	0.0	45.5	45.5
WLVSA222	919.0	193.2	193.2	193.2	193.2	193.2
WLVSA223	914.5	69.1	69.1	69.1	69.1	69.1
WLVSA224	919.0	139.2	0.0	0.0	139.2	139.2
WLVSA225	910.0	0.0	0.0	0.0	0.0	39.3
WLVSA226	915.0	107.9	0.0	107.9	107.9	107.9
WLVSA227	907.0	47.3	0.0	47.3	47.3	0.0
WLVSA228	909.5	0.0	0.0	0.0	0.0	0.0
WLVSA229	900.0	90.2	90.2	0.0	90.2	90.2
WLVSA230	918.0	105.4	0.0	105.4	0.0	0.0
WLVSA231	928.0	357.6	357.6	357.6	0.0	0.0
WLVSA232	927.0	0.0	0.0	0.0	0.0	13.9
WLVSA233	918.0	103.5	0.0	0.0	0.0	103.5
WLVSA234	924.0	0.0	0.0	0.0	0.0	0.0
WLVSA235	924.0	0.0	0.0	0.0	0.0	0.0
WLVSA236	925.5	0.0	0.0	0.0	0.0	0.0
WLVSA237	923.5	0.0	0.0	0.0	0.0	0.0
WLVSA238	915.5	51.3	0.0	0.0	51.3	51.3
WLVSA239	920.5	0.0	0.0	0.0	90.3	0.0
WLVSA27S	923.0	0.0	0.0	0.0	0.0	0.0
WLVSA28S	919.5	0.0	0.0	0.0	0.0	0.0
WLVSA29S	920.0	0.0	0.0	0.0	0.0	0.0
WLVSA30S	919.5	0.0	0.0	0.0	0.0	0.0
WLVSA31S	911.0	92.9	0.0	92.9	92.9	0.0
WLVSA32	914.5	0.0	0.0	0.0	0.0	0.0
WLVSA33	922.0	0.0	0.0	0.0	0.0	0.0
WLVSA34	921.0	0.0	0.0	0.0	0.0	0.0
WLVSA34A	922.0	0.0	0.0	0.0	0.0	0.0
WLVSA35	908.5	33.6	0.0	33.6	0.0	0.0
WLVSA36	908.5	31.5	0.0	31.5	0.0	0.0
WLVSA37	913.0	0.0	0.0	0.0	0.0	0.0
WLVSA38	910.0	0.0	0.0	56.2	0.0	0.0
- continued -						

Appendix Table A7. Continued						
Storage Area	Approx. Field Elevation[a]	Flood Event Size				
		2009-yr	50-yr	100-yr	500-yr	PMF
		------------------------- acres -----------------------------				
WLVSA39	912.5	0.0	0.0	0.0	0.0	81.1
WLVSA40	914.5	0.0	0.0	0.0	65.0	0.0
WLVSA41	917.0	0.0	0.0	0.0	0.0	0.0
WLVSA42	915.5	0.0	0.0	0.0	37.6	0.0
WLVSA42A	911.5	0.0	0.0	0.0	0.0	0.0
WLVSA43	910.0	0.0	0.0	65.7	65.7	0.0
WLVSA44	910.0	0.0	0.0	30.8	30.8	0.0
WLVSA45	910.5	0.0	0.0	8.5	8.5	0.0
WLVSA46	916.0	0.0	0.0	0.0	40.5	0.0
WLVSA47	912.0	0.0	0.0	0.0	0.0	154.6
WLVSA48	917.5	0.0	0.0	0.0	0.0	0.0
WLVSA49	908.5	13.8	0.0	13.8	13.8	0.0
WLVSA50	910.0	0.0	0.0	0.0	0.0	56.1
WLVSA51	910.0	0.0	0.0	0.0	0.0	101.8
WLVSA51A	921.0	0.0	0.0	0.0	0.0	0.0
WLVSA53	922.0	0.0	0.0	0.0	0.0	0.0
WLVSA54	919.5	0.0	0.0	0.0	127.0	0.0
WLVSA55	923.0	0.0	0.0	0.0	212.3	212.3
WLVSA56	920.0	0.0	423.4	423.4	423.4	423.4
WLVSA57	916.5	0.0	0.0	0.0	320.2	320.2
WLVSA58	919.5	0.0	0.0	0.0	0.0	0.0
WLVSA59	916.0	0.0	0.0	0.0	351.3	0.0
WLVSA63	913.5	0.0	288.0	0.0	0.0	0.0
WLVSA64	912.5	214.1	0.0	214.1	0.0	214.1
WLVSA65	911.0	172.9	172.9	0.0	0.0	0.0
WLVSA66	912.5	116.6	116.6	116.6	0.0	0.0
WLVSA67	911.0	0.0	75.9	0.0	0.0	0.0
WLVSA72	908.5	202.4	202.4	202.4	0.0	0.0
WOLVC1	906.5	16.3	16.3	16.3	0.0	0.0
WOLVC10	920.0	317.3	317.3	317.3	0.0	317.3
WOLVC11	919.5	341.0	341.0	0.0	341.0	0.0
WOLVC12	918.5	288.6	288.6	288.6	288.6	0.0
WOLVC2	918.0	0.0	322.0	322.0	322.0	0.0
WOLVC3	918.5	0.0	0.0	0.0	315.5	0.0
WOLVC4	917.0	303.6	303.6	0.0	303.6	303.6
WOLVC5	917.0	0.0	0.0	355.2	355.2	355.2
WOLVC6	917.5	0.0	146.2	146.2	146.2	146.2
WOLVC7	929.5	0.0	0.0	0.0	627.2	627.2
WOLVC8	925.5	0.0	0.0	0.0	583.0	583.0
- continued -						

Appendix Table A7. Continued						
Storage Area	Approx. Field Elevation[a]	Flood Event Size				
		2009-yr	50-yr	100-yr	500-yr	PMF
		------------------------- acres -----------------------------				
WOLVC9	923.0	0.0	0.0	0.0	0.0	597.4
WRRND1	923.5	0.0	0.0	0.0	0.0	0.0
WRRND10	919.5	625.3	625.3	625.3	625.3	625.3
WRRND11	912.5	626.9	0.0	0.0	0.0	0.0
WRRND12	909.5	626.3	0.0	626.3	626.3	626.3
WRRND2	913.0	0.0	0.0	0.0	0.0	0.0
WRRND3	919.5	0.0	0.0	0.0	0.0	639.6
WRRND4	915.0	0.0	0.0	634.8	634.8	0.0
WRRND5	910.5	0.0	225.0	225.0	0.0	0.0
WRRND6	910.5	0.0	0.0	407.9	0.0	0.0
WRRND7	906.0	0.0	0.0	808.3	0.0	0.0
WRRND8	906.0	0.0	0.0	431.6	0.0	0.0
WRRND9	908.0	0.0	0.0	0.0	0.0	0.0
WRSA284	911.0	0.0	0.0	209.5	0.0	0.0
WRSA289	917.0	0.0	0.0	0.0	0.0	637.9
WRSA294	914.5	0.0	635.5	0.0	0.0	0.0
WRSA299E	907.0	0.0	0.0	0.0	0.0	0.0
WRSA300	906.5	0.0	0.0	631.3	0.0	0.0
WRSA302	909.5	0.0	613.4	0.0	0.0	0.0
WRSA304E	906.5	0.0	0.0	0.0	0.0	0.0
WRSA305A	910.5	274.3	274.3	274.3	0.0	0.0
WRSA305B	908.5	0.0	0.0	0.0	0.0	0.0
WRSA305C	911.0	0.0	0.0	0.0	0.0	0.0
WRSA305D	917.5	0.0	0.0	0.0	0.0	0.0
WRSA306	919.0	295.3	0.0	295.3	295.3	0.0
WRSA307	917.5	415.4	415.4	415.4	415.4	415.4
WRSA309E	920.5	622.2	622.2	622.2	622.2	622.2
WRSA311	921.5	614.4	0.0	614.4	614.4	614.4
WRSA312	923.0	0.0	0.0	0.0	0.0	491.6
WRSA350	923.0	437.5	0.0	437.5	437.5	437.5
WRSA351	924.0	242.3	242.3	242.3	242.3	242.3
WRSA352	911.5	0.0	0.0	0.0	0.0	0.0
WRSA353	913.0	0.0	0.0	0.0	0.0	0.0
WRSA354	927.5	0.0	0.0	0.0	0.0	631.8
WRSA355	926.0	0.0	0.0	0.0	0.0	156.1
WRSA356	924.0	0.0	0.0	0.0	0.0	152.7
WRSA357	925.0	0.0	0.0	0.0	0.0	155.0
WRSA358	923.0	0.0	0.0	0.0	0.0	150.7
WRSA363	917.5	0.0	268.9	0.0	0.0	268.9
- continued -						

Appendix Table A7. Continued						
Storage Area	Approx. Field Elevation[a]	Flood Event Size				
		2009-yr	50-yr	100-yr	500-yr	PMF
		------------------------- acres ------------------------------				
WRSA364	911.0	0.0	0.0	0.0	71.8	0.0
WRSA373	913.0	0.0	0.0	0.0	0.0	0.0
WRSA378	915.0	0.0	0.0	0.0	0.0	0.0
WRSA383	909.0	55.5	0.0	55.5	55.5	55.5
WRSA384	909.0	0.0	0.0	130.9	0.0	0.0
WRSA389	902.0	29.1	29.1	29.1	29.1	29.1
WRSA390	915.0	393.9	393.9	0.0	0.0	393.9

PMF = Probabilistic Maximum Flood.
[a]Feet above mean seal level. Lowest estimated elevation for storage area.
Source: Houston-Moore Group (2019).

Appendix Table A8. Acreage of Storage Areas That Flood in Both the With and Without Diversion Conditions but Inundation Is Longer With Diversion, by Storage Area, by Flood Event Frequency (Hydrology Group Three)						
		Flood Event Size				
Storage Area	Approx. Field Elevation[a]	10-yr	20-yr	25-yr	25-yr Long	25-yr EL
		------------------------- acres -----------------------------				
BD1	908.0	0.0	23.2	23.2	0.0	0.0
CHRSA01	915.0	0.0	0.0	0.0	0.0	0.0
CHRSA02	914.5	0.0	0.0	0.0	0.0	0.0
CHRSA03	918.0	0.0	0.0	0.0	0.0	0.0
CHRSA04	918.0	0.0	0.0	0.0	0.0	0.0
CHRSA05	920.0	0.0	0.0	0.0	0.0	0.0
CHRSA06	920.0	0.0	0.0	142.7	142.7	142.7
CHRSA07	921.0	0.0	0.0	0.0	0.0	0.0
CHRSA08	915.0	0.0	0.0	0.0	150.5	150.5
CHRSA09	918.5	0.0	0.0	0.0	0.0	0.0
CHRSA10	923.0	0.0	0.0	0.0	0.0	0.0
CHRSA103	922.0	0.0	0.0	0.0	0.0	0.0
CHRSA104	931.0	0.0	0.0	0.0	0.0	0.0
CHRSA105	924.0	0.0	0.0	218.8	218.8	0.0
CHRSA106	928.0	0.0	0.0	0.0	0.0	0.0
CHRSA107	918.0	0.0	0.0	135.9	135.9	0.0
CHRSA108	926.5	0.0	0.0	0.0	0.0	0.0
CHRSA109	919.0	0.0	0.0	88.5	88.5	0.0
CHRSA11	925.0	0.0	0.0	0.0	0.0	0.0
CHRSA110	927.5	0.0	0.0	0.0	0.0	0.0
CHRSA111	923.0	0.0	0.0	0.0	0.0	0.0
CHRSA112	918.0	0.0	0.0	0.0	634.0	634.0
CHRSA113	924.5	0.0	0.0	0.0	0.0	0.0
CHRSA114	913.5	0.0	0.0	146.2	0.0	0.0
CHRSA115	921.0	0.0	0.0	0.0	0.0	0.0
CHRSA116	918.0	0.0	0.0	0.0	17.1	17.1
CHRSA117	919.5	0.0	0.0	0.0	0.0	0.0
CHRSA118	910.5	0.0	0.0	447.9	447.9	0.0
CHRSA119	918.0	0.0	0.0	0.0	0.0	0.0
CHRSA12	916.5	0.0	0.0	0.0	0.0	0.0
CHRSA120	919.5	0.0	0.0	0.0	0.0	0.0
CHRSA13	919.5	0.0	0.0	0.0	0.0	0.0
CHRSA14	918.5	0.0	0.0	0.0	0.0	0.0
CHRSA15	924.0	0.0	0.0	0.0	0.0	0.0
CHRSA16	916.0	0.0	0.0	0.0	0.0	0.0
CHRSA17	918.0	0.0	0.0	0.0	628.8	0.0
CHRSA18	924.0	0.0	0.0	0.0	0.0	0.0
CHRSA19	919.5	0.0	0.0	0.0	323.7	323.7
- continued -						

Appendix Table A8. Continued						
		Flood Event Size				
Storage Area	Approx. Field Elevation[a]	10-yr	20-yr	25-yr	25-yr Long	25-yr EL
		------------------------- acres -----------------------------				
CHRSA20	918.0	0.0	0.0	0.0	629.0	0.0
CHRSA23	918.0	0.0	0.0	838.7	838.7	0.0
DIVSA86E	922.0	0.0	0.0	0.0	0.0	0.0
DIVSA89	922.0	0.0	0.0	0.0	0.0	0.0
DIVSA91	921.0	0.0	0.0	0.0	0.0	0.0
DIVSA93	921.0	0.0	0.0	631.2	631.2	631.2
DIVSA95	927.5	0.0	0.0	0.0	0.0	0.0
DIVSA97	927.5	0.0	0.0	0.0	0.0	0.0
DIVSA99	920.0	0.0	0.0	635.3	635.3	0.0
DRAIN371	927.5	0.0	0.0	0.0	0.0	0.0
DRAIN372	928.0	0.0	0.0	0.0	0.0	0.0
DRAIN373	928.5	0.0	0.0	0.0	0.0	0.0
DRAIN374	924.0	0.0	0.0	0.0	0.0	0.0
RR1	913.0	0.0	0.0	0.0	560.0	560.0
RR10	914.0	0.0	0.0	0.0	566.7	566.7
RR11	915.0	0.0	0.0	0.0	585.0	585.0
RR12	915.5	0.0	0.0	0.0	0.0	0.0
RR13	919.0	0.0	0.0	0.0	0.0	0.0
RR14	919.5	0.0	0.0	0.0	0.0	0.0
RR15	913.0	0.0	0.0	0.0	690.7	690.7
RR16	907.5	0.0	0.0	0.0	241.4	241.4
RR17	904.5	0.0	150.1	150.1	150.1	150.1
RR18	905.5	0.0	0.0	396.2	0.0	0.0
RR19	908.5	0.0	0.0	0.0	0.0	0.0
RR2	907.0	0.0	442.0	442.0	0.0	0.0
RR20	910.5	0.0	453.0	453.0	0.0	0.0
RR21	907.5	0.0	0.0	65.5	65.5	65.5
RR22	908.0	0.0	120.1	120.1	120.1	120.1
RR23	908.0	0.0	0.0	156.2	156.2	156.2
RR24	908.5	0.0	119.8	119.8	119.8	119.8
RR25	912.5	0.0	0.0	0.0	159.7	159.7
RR26	910.5	0.0	439.8	439.8	439.8	0.0
RR27	922.5	0.0	0.0	0.0	0.0	0.0
RR28	921.5	0.0	0.0	0.0	0.0	0.0
RR29	920.0	0.0	0.0	0.0	318.8	0.0
RR3	919.0	0.0	0.0	0.0	331.6	331.6
RR30	915.0	0.0	0.0	240.7	0.0	0.0
RR31	909.0	0.0	0.0	49.7	49.7	49.7
RR32	909.0	0.0	0.0	77.8	77.8	77.8
- continued -						

Appendix Table A8. Continued						
Storage Area	Approx. Field Elevation[a]	Flood Event Size				
		10-yr	20-yr	25-yr	25-yr Long	25-yr EL
		------------------------- acres -----------------------------				
RR33	909.0	0.0	0.0	111.5	111.5	111.5
RR34	911.5	0.0	56.4	56.4	56.4	0.0
RR35	914.0	0.0	0.0	0.0	45.6	45.6
RR36	908.0	0.0	0.0	68.3	0.0	0.0
RR37	916.0	0.0	0.0	0.0	0.0	0.0
RR38	910.0	0.0	95.2	95.2	95.2	0.0
RR39	913.0	0.0	0.0	72.4	72.4	72.4
RR4	909.0	60.1	0.0	60.1	0.0	0.0
RR40	919.0	0.0	0.0	0.0	0.0	0.0
RR41	909.0	0.0	0.0	105.2	105.2	0.0
RR42	917.5	0.0	0.0	0.0	0.0	0.0
RR43	912.5	0.0	38.6	38.6	38.6	0.0
RR44	921.5	0.0	0.0	0.0	0.0	0.0
RR45	920.0	0.0	0.0	0.0	0.0	0.0
RR46	913.0	0.0	95.5	95.5	95.5	0.0
RR47	917.0	0.0	0.0	0.0	104.2	104.2
RR48	923.0	0.0	0.0	0.0	0.0	0.0
RR5	921.0	0.0	0.0	0.0	0.0	0.0
RR6	910.5	0.0	0.0	19.2	19.2	19.2
RR7	922.5	0.0	0.0	0.0	0.0	0.0
RR8	916.5	0.0	0.0	59.8	59.8	0.0
RR9	916.0	0.0	57.0	57.0	57.0	0.0
WLVSA100	913.5	0.0	0.0	64.2	0.0	0.0
WLVSA101	913.0	0.0	0.0	82.5	0.0	0.0
WLVSA102	914.0	0.0	0.0	47.4	0.0	0.0
WLVSA103	916.5	0.0	0.0	76.2	76.2	0.0
WLVSA104	914.5	174.5	0.0	174.5	0.0	174.5
WLVSA200	923.5	0.0	0.0	0.0	0.0	0.0
WLVSA202	915.5	0.0	0.0	98.8	0.0	98.8
WLVSA203	906.5	53.6	0.0	53.6	0.0	0.0
WLVSA204	925.5	0.0	0.0	0.0	0.0	0.0
WLVSA205	915.5	0.0	61.2	61.2	0.0	0.0
WLVSA206	916.0	0.0	51.6	51.6	51.6	0.0
WLVSA207	920.0	0.0	0.0	104.0	104.0	0.0
WLVSA208	924.0	0.0	0.0	0.0	0.0	0.0
WLVSA209	923.0	0.0	0.0	0.0	61.7	61.7
WLVSA210	932.0	0.0	0.0	0.0	0.0	0.0
WLVSA211	927.5	0.0	0.0	0.0	0.0	0.0
WLVSA212	928.0	0.0	0.0	0.0	0.0	0.0
- continued -						

Appendix Table A8. Continued						
Storage Area	Approx. Field Elevation[a]	Flood Event Size				
		10-yr	20-yr	25-yr	25-yr Long	25-yr EL
		------------------------- acres -----------------------------				
WLVSA213	926.5	0.0	0.0	0.0	0.0	0.0
WLVSA214	904.0	0.0	72.0	72.0	72.0	0.0
WLVSA215	933.0	0.0	0.0	0.0	0.0	0.0
WLVSA216	919.0	0.0	0.0	96.1	0.0	96.1
WLVSA217	933.0	0.0	0.0	0.0	0.0	0.0
WLVSA218	919.0	0.0	0.0	168.8	0.0	0.0
WLVSA219	932.5	0.0	0.0	0.0	0.0	0.0
WLVSA220	919.0	117.5	0.0	117.5	0.0	0.0
WLVSA221	918.0	0.0	0.0	0.0	0.0	0.0
WLVSA222	919.0	193.2	0.0	193.2	0.0	0.0
WLVSA223	914.5	0.0	0.0	0.0	69.1	69.1
WLVSA224	919.0	0.0	0.0	0.0	0.0	0.0
WLVSA225	910.0	0.0	39.3	39.3	39.3	0.0
WLVSA226	915.0	0.0	0.0	107.9	107.9	107.9
WLVSA227	907.0	0.0	0.0	47.3	47.3	0.0
WLVSA228	909.5	0.0	34.9	34.9	34.9	34.9
WLVSA229	900.0	0.0	90.2	90.2	0.0	0.0
WLVSA230	918.0	0.0	0.0	105.4	105.4	0.0
WLVSA231	928.0	0.0	0.0	0.0	0.0	0.0
WLVSA232	927.0	0.0	0.0	0.0	0.0	0.0
WLVSA233	918.0	0.0	103.5	103.5	0.0	0.0
WLVSA234	924.0	0.0	0.0	0.0	0.0	0.0
WLVSA235	924.0	0.0	0.0	0.0	0.0	0.0
WLVSA236	925.5	0.0	0.0	0.0	0.0	0.0
WLVSA237	923.5	0.0	0.0	0.0	0.0	0.0
WLVSA238	915.5	0.0	0.0	51.3	0.0	0.0
WLVSA239	920.5	0.0	0.0	0.0	0.0	0.0
WLVSA27S	923.0	0.0	0.0	0.0	0.0	0.0
WLVSA28S	919.5	0.0	0.0	0.0	0.0	0.0
WLVSA29S	920.0	0.0	0.0	0.0	0.0	0.0
WLVSA30S	919.5	0.0	0.0	0.0	0.0	0.0
WLVSA31S	911.0	0.0	92.9	92.9	0.0	92.9
WLVSA32	914.5	0.0	0.0	42.4	42.4	42.4
WLVSA33	922.0	0.0	0.0	0.0	0.0	0.0
WLVSA34	921.0	0.0	0.0	0.0	0.0	0.0
WLVSA34A	922.0	0.0	0.0	0.0	0.0	0.0
WLVSA35	908.5	0.0	0.0	33.6	33.6	0.0
WLVSA36	908.5	0.0	31.5	31.5	31.5	0.0
WLVSA37	913.0	0.0	0.0	0.0	68.8	68.8
- continued -						

Appendix Table A8. Continued						
Storage Area	Approx. Field Elevation[a]	Flood Event Size				
		10-yr	20-yr	25-yr	25-yr Long	25-yr EL
		------------------------- acres -----------------------------				
WLVSA38	910.0	0.0	56.2	56.2	56.2	56.2
WLVSA39	912.5	0.0	0.0	0.0	81.1	81.1
WLVSA40	914.5	0.0	0.0	0.0	0.0	0.0
WLVSA41	917.0	0.0	0.0	0.0	0.0	0.0
WLVSA42	915.5	0.0	0.0	0.0	0.0	0.0
WLVSA42A	911.5	0.0	35.8	35.8	35.8	0.0
WLVSA43	910.0	0.0	65.7	65.7	65.7	0.0
WLVSA44	910.0	0.0	30.8	30.8	30.8	0.0
WLVSA45	910.5	0.0	8.5	8.5	8.5	8.5
WLVSA46	916.0	0.0	0.0	0.0	0.0	0.0
WLVSA47	912.0	0.0	0.0	154.6	154.6	154.6
WLVSA48	917.5	0.0	0.0	0.0	0.0	0.0
WLVSA49	908.5	0.0	0.0	13.8	13.8	13.8
WLVSA50	910.0	0.0	56.1	56.1	56.1	0.0
WLVSA51	910.0	0.0	101.8	101.8	101.8	101.8
WLVSA51A	921.0	0.0	0.0	0.0	0.0	0.0
WLVSA53	922.0	0.0	0.0	0.0	0.0	0.0
WLVSA54	919.5	0.0	0.0	0.0	127.0	127.0
WLVSA55	923.0	0.0	0.0	0.0	0.0	0.0
WLVSA56	920.0	0.0	0.0	423.4	0.0	0.0
WLVSA57	916.5	0.0	0.0	320.2	320.2	0.0
WLVSA58	919.5	0.0	0.0	0.0	197.0	197.0
WLVSA59	916.0	0.0	0.0	351.3	351.3	0.0
WLVSA63	913.5	0.0	0.0	288.0	0.0	0.0
WLVSA64	912.5	0.0	214.1	214.1	0.0	0.0
WLVSA65	911.0	0.0	172.9	172.9	172.9	0.0
WLVSA66	912.5	0.0	0.0	116.6	0.0	0.0
WLVSA67	911.0	0.0	75.9	75.9	0.0	0.0
WLVSA72	908.5	0.0	202.4	202.4	0.0	0.0
WOLVC1	906.5	0.0	16.3	16.3	0.0	0.0
WOLVC10	920.0	0.0	0.0	317.3	317.3	0.0
WOLVC11	919.5	0.0	0.0	0.0	0.0	0.0
WOLVC12	918.5	0.0	0.0	288.6	288.6	0.0
WOLVC2	918.0	0.0	0.0	322.0	0.0	0.0
WOLVC3	918.5	0.0	0.0	315.5	315.5	0.0
WOLVC4	917.0	0.0	0.0	303.6	0.0	0.0
WOLVC5	917.0	0.0	0.0	355.2	0.0	0.0
WOLVC6	917.5	0.0	0.0	146.2	146.2	0.0
WOLVC7	929.5	0.0	0.0	0.0	0.0	0.0

- continued -

Appendix Table A8. Continued						
Storage Area	Approx. Field Elevation[a]	Flood Event Size				
		10-yr	20-yr	25-yr	25-yr Long	25-yr EL
		------------------------- acres -----------------------------				
WOLVC8	925.5	0.0	0.0	0.0	0.0	0.0
WOLVC9	923.0	0.0	0.0	0.0	0.0	0.0
WRRND1	923.5	0.0	0.0	0.0	0.0	0.0
WRRND10	919.5	0.0	0.0	0.0	0.0	0.0
WRRND11	912.5	0.0	0.0	626.9	0.0	0.0
WRRND12	909.5	0.0	626.3	626.3	0.0	0.0
WRRND2	913.0	0.0	0.0	0.0	0.0	0.0
WRRND3	919.5	0.0	0.0	0.0	0.0	0.0
WRRND4	915.0	0.0	0.0	634.8	634.8	634.8
WRRND5	910.5	0.0	225.0	225.0	0.0	0.0
WRRND6	910.5	0.0	407.9	407.9	0.0	0.0
WRRND7	906.0	0.0	808.3	0.0	0.0	0.0
WRRND8	906.0	0.0	431.6	0.0	0.0	0.0
WRRND9	908.0	0.0	0.0	495.9	495.9	495.9
WRSA284	911.0	0.0	0.0	209.5	209.5	0.0
WRSA289	917.0	0.0	0.0	0.0	0.0	0.0
WRSA294	914.5	0.0	0.0	635.5	635.5	0.0
WRSA299E	907.0	0.0	0.0	305.2	305.2	305.2
WRSA300	906.5	0.0	0.0	631.3	0.0	0.0
WRSA302	909.5	0.0	613.4	613.4	613.4	0.0
WRSA304E	906.5	0.0	0.0	625.2	625.2	0.0
WRSA305A	910.5	0.0	0.0	274.3	274.3	274.3
WRSA305B	908.5	308.7	0.0	308.7	308.7	308.7
WRSA305C	911.0	0.0	0.0	296.9	296.9	296.9
WRSA305D	917.5	0.0	0.0	0.0	291.9	291.9
WRSA306	919.0	0.0	0.0	0.0	295.3	295.3
WRSA307	917.5	0.0	0.0	415.4	415.4	0.0
WRSA309E	920.5	0.0	0.0	622.2	622.2	0.0
WRSA311	921.5	0.0	0.0	0.0	614.4	614.4
WRSA312	923.0	0.0	0.0	0.0	491.6	491.6
WRSA350	923.0	0.0	0.0	0.0	0.0	437.5
WRSA351	924.0	0.0	0.0	0.0	242.3	0.0
WRSA352	911.5	0.0	0.0	268.2	268.2	0.0
WRSA353	913.0	0.0	0.0	251.8	251.8	0.0
WRSA354	927.5	0.0	0.0	0.0	0.0	0.0
WRSA355	926.0	0.0	0.0	0.0	0.0	0.0
WRSA356	924.0	0.0	0.0	0.0	0.0	0.0
WRSA357	925.0	0.0	0.0	0.0	0.0	0.0
WRSA358	923.0	0.0	0.0	0.0	0.0	0.0
- continued -						

Appendix Table A8. Continued						
Storage Area	Approx. Field Elevation[a]	Flood Event Size				
		10-yr	20-yr	25-yr	25-yr Long	25-yr EL
		------------------------- acres ------------------------------				
WRSA363	917.5	0.0	0.0	268.9	268.9	0.0
WRSA364	911.0	0.0	0.0	71.8	71.8	0.0
WRSA373	913.0	0.0	0.0	0.0	13.2	13.2
WRSA378	915.0	0.0	0.0	0.0	0.0	0.0
WRSA383	909.0	0.0	55.5	55.5	55.5	55.5
WRSA384	909.0	0.0	130.9	130.9	130.9	130.9
WRSA389	902.0	0.0	29.1	29.1	29.1	0.0
WRSA390	915.0	0.0	0.0	393.9	393.9	0.0

[a]Feet above mean seal level. Lowest estimated elevation for storage area.

Source: Houston-Moore Group (2019).

Appendix Table A8.						
		Flood Event Size				
Storage Area	Approx. Field Elevation[a]	2009-yr	50-yr	100-yr	500-yr	PMF
		------------------------ acres -----------------------------				
BD1	908.0	0.0	0.0	0.0	23.2	0.0
CHRSA01	915.0	0.0	0.0	0.0	306.7	306.7
CHRSA02	914.5	0.0	0.0	0.0	305.0	305.0
CHRSA03	918.0	0.0	0.0	0.0	0.0	304.2
CHRSA04	918.0	0.0	0.0	0.0	283.6	283.6
CHRSA05	920.0	174.9	0.0	174.9	174.9	0.0
CHRSA06	920.0	0.0	142.7	0.0	0.0	0.0
CHRSA07	921.0	0.0	0.0	0.0	116.6	0.0
CHRSA08	915.0	150.5	150.5	150.5	150.5	150.5
CHRSA09	918.5	160.5	0.0	0.0	160.5	160.5
CHRSA10	923.0	0.0	0.0	0.0	301.1	301.1
CHRSA103	922.0	0.0	0.0	0.0	326.5	0.0
CHRSA104	931.0	0.0	0.0	0.0	46.5	0.0
CHRSA105	924.0	218.8	218.8	218.8	0.0	218.8
CHRSA106	928.0	0.0	0.0	277.6	0.0	277.6
CHRSA107	918.0	0.0	135.9	0.0	135.9	0.0
CHRSA108	926.5	61.4	0.0	0.0	61.4	61.4
CHRSA109	919.0	0.0	88.5	88.5	88.5	0.0
CHRSA11	925.0	42.7	0.0	42.7	0.0	0.0
CHRSA110	927.5	0.0	0.0	0.0	75.1	0.0
CHRSA111	923.0	20.3	0.0	0.0	0.0	20.3
CHRSA112	918.0	634.0	634.0	634.0	0.0	634.0
CHRSA113	924.5	0.0	0.0	0.0	304.7	0.0
CHRSA114	913.5	0.0	146.2	0.0	0.0	0.0
CHRSA115	921.0	46.9	0.0	0.0	46.9	46.9
CHRSA116	918.0	17.1	17.1	17.1	0.0	17.1
CHRSA117	919.5	11.9	0.0	11.9	0.0	11.9
CHRSA118	910.5	0.0	447.9	0.0	0.0	0.0
CHRSA119	918.0	97.8	0.0	97.8	0.0	97.8
CHRSA12	916.5	0.0	0.0	0.0	129.4	129.4
CHRSA120	919.5	0.0	0.0	0.0	50.8	50.8
CHRSA13	919.5	0.0	0.0	0.0	85.2	85.2
CHRSA14	918.5	226.6	0.0	0.0	226.6	226.6
CHRSA15	924.0	0.0	0.0	0.0	326.9	326.9
CHRSA16	916.0	59.8	0.0	59.8	59.8	59.8
CHRSA17	918.0	628.8	628.8	628.8	0.0	628.8
CHRSA18	924.0	0.0	0.0	0.0	310.3	0.0
CHRSA19	919.5	0.0	0.0	323.7	0.0	0.0
CHRSA20	918.0	629.0	629.0	629.0	0.0	629.0
- continued -						

Appendix Table A8. Continued						
Storage Area	Approx. Field Elevation[a]	Flood Event Size				
		2009-yr	50-yr	100-yr	500-yr	PMF
		------------------------- acres -----------------------------				
CHRSA23	918.0	838.7	838.7	838.7	0.0	0.0
DIVSA86E	922.0	0.0	0.0	852.7	852.7	0.0
DIVSA89	922.0	252.6	0.0	252.6	0.0	252.6
DIVSA91	921.0	807.2	0.0	807.2	0.0	807.2
DIVSA93	921.0	631.2	631.2	631.2	631.2	631.2
DIVSA95	927.5	0.0	0.0	268.8	268.8	0.0
DIVSA97	927.5	0.0	0.0	354.0	354.0	0.0
DIVSA99	920.0	0.0	635.3	0.0	0.0	0.0
DRAIN371	927.5	0.0	632.4	0.0	632.4	0.0
DRAIN372	928.0	0.0	0.0	631.4	631.4	0.0
DRAIN373	928.5	0.0	0.0	0.0	80.4	0.0
DRAIN374	924.0	0.0	0.0	0.0	547.7	0.0
RR1	913.0	560.0	560.0	560.0	560.0	560.0
RR10	914.0	566.7	566.7	566.7	566.7	566.7
RR11	915.0	585.0	585.0	585.0	585.0	585.0
RR12	915.5	0.0	0.0	0.0	0.0	472.5
RR13	919.0	0.0	0.0	0.0	0.0	0.0
RR14	919.5	0.0	0.0	0.0	0.0	508.9
RR15	913.0	690.7	690.7	690.7	690.7	0.0
RR16	907.5	0.0	0.0	0.0	0.0	0.0
RR17	904.5	150.1	150.1	150.1	150.1	150.1
RR18	905.5	0.0	0.0	0.0	0.0	0.0
RR19	908.5	0.0	0.0	0.0	0.0	0.0
RR2	907.0	0.0	0.0	0.0	0.0	0.0
RR20	910.5	0.0	0.0	0.0	0.0	0.0
RR21	907.5	65.5	0.0	0.0	65.5	0.0
RR22	908.0	120.1	120.1	120.1	120.1	0.0
RR23	908.0	156.2	0.0	0.0	156.2	0.0
RR24	908.5	119.8	119.8	119.8	119.8	0.0
RR25	912.5	159.7	0.0	159.7	159.7	159.7
RR26	910.5	439.8	439.8	439.8	439.8	0.0
RR27	922.5	0.0	0.0	0.0	157.7	0.0
RR28	921.5	0.0	0.0	0.0	160.3	0.0
RR29	920.0	318.8	318.8	318.8	318.8	0.0
RR3	919.0	331.6	331.6	331.6	0.0	0.0
RR30	915.0	0.0	0.0	0.0	0.0	0.0
RR31	909.0	49.7	49.7	0.0	49.7	0.0
RR32	909.0	0.0	77.8	0.0	0.0	0.0
RR33	909.0	0.0	111.5	0.0	0.0	0.0
- continued -						

Appendix Table A8. Continued						
Storage Area	Approx. Field Elevation[a]	Flood Event Size				
		2009-yr	50-yr	100-yr	500-yr	PMF
		------------------------- acres -----------------------------				
RR34	911.5	56.4	56.4	56.4	56.4	0.0
RR35	914.0	45.6	45.6	45.6	45.6	45.6
RR36	908.0	0.0	68.3	0.0	0.0	0.0
RR37	916.0	38.5	0.0	38.5	0.0	38.5
RR38	910.0	0.0	95.2	0.0	0.0	0.0
RR39	913.0	72.4	72.4	72.4	72.4	0.0
RR4	909.0	0.0	60.1	0.0	0.0	0.0
RR40	919.0	0.0	0.0	0.0	34.1	34.1
RR41	909.0	0.0	105.2	0.0	0.0	0.0
RR42	917.5	55.7	0.0	55.7	55.7	55.7
RR43	912.5	38.6	38.6	38.6	0.0	0.0
RR44	921.5	0.0	0.0	0.0	134.9	134.9
RR45	920.0	0.0	0.0	0.0	113.7	113.7
RR46	913.0	0.0	95.5	95.5	0.0	0.0
RR47	917.0	104.2	104.2	104.2	104.2	0.0
RR48	923.0	0.0	0.0	0.0	98.1	98.1
RR5	921.0	101.6	0.0	0.0	0.0	101.6
RR6	910.5	19.2	19.2	19.2	19.2	0.0
RR7	922.5	0.0	0.0	0.0	85.1	85.1
RR8	916.5	59.8	59.8	59.8	0.0	0.0
RR9	916.0	57.0	57.0	57.0	0.0	0.0
WLVSA100	913.5	0.0	64.2	0.0	0.0	0.0
WLVSA101	913.0	0.0	82.5	0.0	0.0	0.0
WLVSA102	914.0	0.0	47.4	0.0	0.0	0.0
WLVSA103	916.5	0.0	76.2	76.2	76.2	0.0
WLVSA104	914.5	0.0	174.5	0.0	0.0	0.0
WLVSA200	923.5	83.3	0.0	83.3	0.0	83.3
WLVSA202	915.5	0.0	98.8	0.0	0.0	0.0
WLVSA203	906.5	0.0	0.0	0.0	53.6	0.0
WLVSA204	925.5	0.0	0.0	0.0	77.1	0.0
WLVSA205	915.5	0.0	61.2	0.0	0.0	0.0
WLVSA206	916.0	0.0	51.6	0.0	0.0	0.0
WLVSA207	920.0	104.0	104.0	104.0	0.0	0.0
WLVSA208	924.0	110.0	0.0	110.0	110.0	110.0
WLVSA209	923.0	61.7	61.7	61.7	61.7	61.7
WLVSA210	932.0	0.0	0.0	0.0	0.0	64.1
WLVSA211	927.5	0.0	0.0	0.0	73.3	0.0
WLVSA212	928.0	0.0	0.0	0.0	96.9	0.0
WLVSA213	926.5	0.0	0.0	116.0	116.0	116.0
- continued -						

Appendix Table A8. Continued						
Storage Area	Approx. Field Elevation[a]	Flood Event Size				
		2009-yr	50-yr	100-yr	500-yr	PMF
		------------------------- acres -----------------------------				
WLVSA214	904.0	0.0	0.0	0.0	0.0	0.0
WLVSA215	933.0	0.0	0.0	0.0	0.0	0.0
WLVSA216	919.0	0.0	96.1	0.0	0.0	0.0
WLVSA217	933.0	0.0	0.0	0.0	0.0	0.0
WLVSA218	919.0	0.0	168.8	0.0	0.0	0.0
WLVSA219	932.5	0.0	0.0	0.0	0.0	0.0
WLVSA220	919.0	0.0	117.5	0.0	0.0	0.0
WLVSA221	918.0	0.0	0.0	45.5	0.0	0.0
WLVSA222	919.0	0.0	0.0	0.0	0.0	0.0
WLVSA223	914.5	0.0	0.0	0.0	0.0	0.0
WLVSA224	919.0	0.0	139.2	139.2	0.0	0.0
WLVSA225	910.0	39.3	39.3	39.3	39.3	0.0
WLVSA226	915.0	0.0	107.9	0.0	0.0	0.0
WLVSA227	907.0	0.0	47.3	0.0	0.0	0.0
WLVSA228	909.5	34.9	34.9	34.9	34.9	0.0
WLVSA229	900.0	0.0	0.0	0.0	0.0	0.0
WLVSA230	918.0	0.0	105.4	0.0	105.4	105.4
WLVSA231	928.0	0.0	0.0	0.0	357.6	0.0
WLVSA232	927.0	0.0	0.0	0.0	13.9	0.0
WLVSA233	918.0	0.0	103.5	103.5	103.5	0.0
WLVSA234	924.0	46.6	0.0	0.0	46.6	46.6
WLVSA235	924.0	110.8	0.0	0.0	110.8	110.8
WLVSA236	925.5	139.0	0.0	0.0	139.0	139.0
WLVSA237	923.5	26.7	0.0	0.0	26.7	26.7
WLVSA238	915.5	0.0	51.3	51.3	0.0	0.0
WLVSA239	920.5	90.3	0.0	90.3	0.0	90.3
WLVSA27S	923.0	0.0	0.0	0.0	160.7	160.7
WLVSA28S	919.5	0.0	0.0	0.0	29.2	29.2
WLVSA29S	920.0	0.0	0.0	0.0	45.9	45.9
WLVSA30S	919.5	0.0	0.0	0.0	75.3	75.3
WLVSA31S	911.0	0.0	92.9	0.0	0.0	0.0
WLVSA32	914.5	42.4	42.4	42.4	42.4	42.4
WLVSA33	922.0	0.0	0.0	0.0	62.4	62.4
WLVSA34	921.0	0.0	0.0	0.0	0.0	0.0
WLVSA34A	922.0	0.0	0.0	0.0	188.3	188.3
WLVSA35	908.5	0.0	33.6	0.0	33.6	0.0
WLVSA36	908.5	0.0	31.5	0.0	31.5	0.0
WLVSA37	913.0	68.8	68.8	68.8	68.8	68.8
WLVSA38	910.0	56.2	56.2	0.0	56.2	0.0
- continued -						

Appendix Table A8. Continued						
		Flood Event Size				
Storage Area	Approx. Field Elevation[a]	2009-yr	50-yr	100-yr	500-yr	PMF
		------------------------- acres -----------------------------				
WLVSA39	912.5	81.1	81.1	81.1	81.1	0.0
WLVSA40	914.5	65.0	0.0	65.0	0.0	65.0
WLVSA41	917.0	0.0	0.0	0.0	46.7	46.7
WLVSA42	915.5	37.6	0.0	37.6	0.0	37.6
WLVSA42A	911.5	35.8	35.8	35.8	35.8	0.0
WLVSA43	910.0	65.7	65.7	0.0	0.0	0.0
WLVSA44	910.0	30.8	30.8	0.0	0.0	0.0
WLVSA45	910.5	8.5	8.5	0.0	0.0	0.0
WLVSA46	916.0	40.5	0.0	40.5	0.0	40.5
WLVSA47	912.0	154.6	154.6	154.6	154.6	0.0
WLVSA48	917.5	0.0	0.0	0.0	57.5	57.5
WLVSA49	908.5	0.0	13.8	0.0	0.0	0.0
WLVSA50	910.0	56.1	56.1	56.1	56.1	0.0
WLVSA51	910.0	101.8	101.8	101.8	101.8	0.0
WLVSA51A	921.0	210.4	0.0	210.4	0.0	0.0
WLVSA53	922.0	0.0	0.0	0.0	0.0	0.0
WLVSA54	919.5	127.0	0.0	127.0	0.0	127.0
WLVSA55	923.0	212.3	0.0	0.0	0.0	0.0
WLVSA56	920.0	0.0	0.0	0.0	0.0	0.0
WLVSA57	916.5	0.0	0.0	0.0	0.0	0.0
WLVSA58	919.5	197.0	197.0	197.0	197.0	0.0
WLVSA59	916.0	0.0	0.0	0.0	0.0	0.0
WLVSA63	913.5	0.0	0.0	0.0	288.0	0.0
WLVSA64	912.5	0.0	0.0	0.0	214.1	0.0
WLVSA65	911.0	0.0	0.0	0.0	172.9	0.0
WLVSA66	912.5	0.0	0.0	0.0	116.6	0.0
WLVSA67	911.0	0.0	0.0	0.0	75.9	0.0
WLVSA72	908.5	0.0	0.0	0.0	202.4	0.0
WOLVC1	906.5	0.0	0.0	0.0	16.3	0.0
WOLVC10	920.0	0.0	0.0	0.0	0.0	0.0
WOLVC11	919.5	0.0	0.0	0.0	0.0	0.0
WOLVC12	918.5	0.0	0.0	0.0	0.0	0.0
WOLVC2	918.0	0.0	0.0	0.0	0.0	0.0
WOLVC3	918.5	0.0	0.0	0.0	0.0	0.0
WOLVC4	917.0	0.0	0.0	0.0	0.0	0.0
WOLVC5	917.0	0.0	0.0	0.0	0.0	0.0
WOLVC6	917.5	0.0	0.0	0.0	0.0	0.0
WOLVC7	929.5	0.0	0.0	0.0	0.0	0.0
WOLVC8	925.5	0.0	0.0	0.0	0.0	0.0

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Appendix Table A8. Continued						
	Approx.	Flood Event Size				
Storage	Field	2009-yr	50-yr	100-yr	500-yr	PMF
Area	Elevation[a]	------------------------- acres -----------------------------				
WOLVC9	923.0	0.0	0.0	0.0	0.0	0.0
WRRND1	923.5	0.0	0.0	0.0	0.0	629.3
WRRND10	919.5	0.0	0.0	0.0	0.0	0.0
WRRND11	912.5	0.0	0.0	0.0	626.9	0.0
WRRND12	909.5	0.0	0.0	0.0	0.0	0.0
WRRND2	913.0	245.6	0.0	245.6	245.6	245.6
WRRND3	919.5	0.0	0.0	0.0	0.0	0.0
WRRND4	915.0	0.0	634.8	0.0	0.0	0.0
WRRND5	910.5	0.0	0.0	0.0	225.0	0.0
WRRND6	910.5	0.0	0.0	0.0	407.9	0.0
WRRND7	906.0	0.0	0.0	0.0	808.3	0.0
WRRND8	906.0	0.0	0.0	0.0	431.6	0.0
WRRND9	908.0	495.9	0.0	0.0	495.9	0.0
WRSA284	911.0	209.5	209.5	0.0	0.0	0.0
WRSA289	917.0	0.0	0.0	0.0	0.0	0.0
WRSA294	914.5	0.0	0.0	0.0	0.0	0.0
WRSA299E	907.0	305.2	0.0	0.0	305.2	0.0
WRSA300	906.5	631.3	0.0	0.0	631.3	0.0
WRSA302	909.5	0.0	0.0	0.0	0.0	0.0
WRSA304E	906.5	0.0	0.0	0.0	0.0	0.0
WRSA305A	910.5	0.0	0.0	0.0	0.0	0.0
WRSA305B	908.5	0.0	0.0	0.0	308.7	0.0
WRSA305C	911.0	0.0	0.0	0.0	0.0	0.0
WRSA305D	917.5	291.9	291.9	291.9	291.9	0.0
WRSA306	919.0	0.0	295.3	0.0	0.0	0.0
WRSA307	917.5	0.0	0.0	0.0	0.0	0.0
WRSA309E	920.5	0.0	0.0	0.0	0.0	0.0
WRSA311	921.5	0.0	614.4	0.0	0.0	0.0
WRSA312	923.0	491.6	491.6	491.6	491.6	0.0
WRSA350	923.0	0.0	437.5	0.0	0.0	0.0
WRSA351	924.0	0.0	0.0	0.0	0.0	0.0
WRSA352	911.5	0.0	0.0	0.0	268.2	0.0
WRSA353	913.0	0.0	0.0	0.0	0.0	0.0
WRSA354	927.5	0.0	0.0	0.0	0.0	0.0
WRSA355	926.0	0.0	0.0	0.0	156.1	0.0
WRSA356	924.0	0.0	0.0	0.0	0.0	0.0
WRSA357	925.0	0.0	0.0	0.0	155.0	0.0
WRSA358	923.0	0.0	0.0	0.0	0.0	0.0
WRSA363	917.5	0.0	0.0	0.0	0.0	0.0
- continued -						

Appendix Table A8. Continued						
Storage Area	Approx. Field Elevation[a]	Flood Event Size				
		2009-yr	50-yr	100-yr	500-yr	PMF
		------------------------- acres ------------------------------				
WRSA364	911.0	71.8	71.8	71.8	0.0	0.0
WRSA373	913.0	13.2	13.2	13.2	13.2	13.2
WRSA378	915.0	11.7	0.0	11.7	0.0	11.7
WRSA383	909.0	0.0	55.5	0.0	0.0	0.0
WRSA384	909.0	130.9	130.9	0.0	130.9	0.0
WRSA389	902.0	0.0	0.0	0.0	0.0	0.0
WRSA390	915.0	0.0	0.0	0.0	0.0	0.0

PMF = Probabilistic Maximum Flood.
[a]Feet above mean seal level. Lowest estimated elevation for storage area.
Source: Houston-Moore Group (2019).

Appendix Table A9. Acreage of Storage Areas That Flood With and Without Diversion, but Inundation is Shorter With Diversion Conditions, by Storage Area, by Flood Event Frequency (Hydrology Group Four)						
Storage Area	Approx. Field Elevation[a]	Flood Event Size				
		10-yr	20-yr	25-yr	25-yr Long	25-yr EL
		------------------------- acres -----------------------------				
BD1	908.0	0.0	0.0	0.0	0.0	0.0
CHRSA01	915.0	0.0	0.0	0.0	0.0	0.0
CHRSA02	914.5	0.0	0.0	0.0	0.0	0.0
CHRSA03	918.0	0.0	0.0	0.0	0.0	0.0
CHRSA04	918.0	0.0	0.0	0.0	0.0	0.0
CHRSA05	920.0	0.0	0.0	0.0	0.0	0.0
CHRSA06	920.0	0.0	0.0	0.0	0.0	0.0
CHRSA07	921.0	0.0	0.0	0.0	0.0	0.0
CHRSA08	915.0	0.0	0.0	0.0	0.0	0.0
CHRSA09	918.5	0.0	0.0	0.0	0.0	0.0
CHRSA10	923.0	0.0	0.0	0.0	0.0	0.0
CHRSA103	922.0	0.0	0.0	0.0	0.0	0.0
CHRSA104	931.0	0.0	0.0	0.0	0.0	0.0
CHRSA105	924.0	0.0	0.0	0.0	0.0	0.0
CHRSA106	928.0	0.0	0.0	0.0	0.0	0.0
CHRSA107	918.0	0.0	0.0	0.0	0.0	0.0
CHRSA108	926.5	0.0	0.0	0.0	0.0	0.0
CHRSA109	919.0	0.0	0.0	0.0	0.0	0.0
CHRSA11	925.0	0.0	0.0	0.0	0.0	0.0
CHRSA110	927.5	0.0	0.0	0.0	0.0	0.0
CHRSA111	923.0	0.0	0.0	0.0	0.0	0.0
CHRSA112	918.0	0.0	0.0	0.0	0.0	0.0
CHRSA113	924.5	0.0	0.0	0.0	0.0	0.0
CHRSA114	913.5	0.0	0.0	0.0	0.0	0.0
CHRSA115	921.0	0.0	0.0	0.0	0.0	0.0
CHRSA116	918.0	0.0	0.0	0.0	0.0	0.0
CHRSA117	919.5	0.0	0.0	0.0	0.0	0.0
CHRSA118	910.5	0.0	0.0	0.0	0.0	0.0
CHRSA119	918.0	0.0	0.0	0.0	0.0	0.0
CHRSA12	916.5	0.0	0.0	0.0	0.0	0.0
CHRSA120	919.5	0.0	0.0	0.0	0.0	0.0
CHRSA13	919.5	0.0	0.0	0.0	0.0	0.0
CHRSA14	918.5	0.0	0.0	0.0	0.0	0.0
CHRSA15	924.0	0.0	0.0	0.0	0.0	0.0
CHRSA16	916.0	0.0	0.0	0.0	0.0	0.0
CHRSA17	918.0	0.0	0.0	0.0	0.0	0.0
CHRSA18	924.0	0.0	0.0	0.0	0.0	0.0
CHRSA19	919.5	0.0	0.0	0.0	0.0	0.0
- continued -						

Appendix Table A9. Continued						
Storage Area	Approx. Field Elevation[a]	Flood Event Size				
		10-yr	20-yr	25-yr	25-yr Long	25-yr EL
		------------------------- acres ------------------------------				
CHRSA20	918.0	0.0	0.0	0.0	0.0	0.0
CHRSA23	918.0	0.0	0.0	0.0	0.0	0.0
DIVSA86E	922.0	0.0	0.0	0.0	0.0	0.0
DIVSA89	922.0	0.0	0.0	0.0	0.0	0.0
DIVSA91	921.0	0.0	0.0	0.0	0.0	0.0
DIVSA93	921.0	0.0	0.0	0.0	0.0	0.0
DIVSA95	927.5	0.0	0.0	0.0	0.0	0.0
DIVSA97	927.5	0.0	0.0	0.0	0.0	0.0
DIVSA99	920.0	0.0	0.0	0.0	0.0	0.0
DRAIN371	927.5	0.0	0.0	0.0	0.0	0.0
DRAIN372	928.0	0.0	0.0	0.0	0.0	0.0
DRAIN373	928.5	0.0	0.0	0.0	0.0	0.0
DRAIN374	924.0	0.0	0.0	0.0	0.0	0.0
RR1	913.0	0.0	0.0	0.0	0.0	0.0
RR10	914.0	0.0	0.0	0.0	0.0	0.0
RR11	915.0	0.0	0.0	0.0	0.0	0.0
RR12	915.5	0.0	0.0	0.0	0.0	0.0
RR13	919.0	0.0	0.0	0.0	0.0	0.0
RR14	919.5	0.0	0.0	0.0	0.0	0.0
RR15	913.0	0.0	0.0	0.0	0.0	0.0
RR16	907.5	0.0	0.0	0.0	0.0	0.0
RR17	904.5	0.0	0.0	0.0	0.0	0.0
RR18	905.5	0.0	0.0	0.0	0.0	396.2
RR19	908.5	0.0	0.0	0.0	0.0	0.0
RR2	907.0	442.0	0.0	0.0	442.0	442.0
RR20	910.5	0.0	0.0	0.0	453.0	453.0
RR21	907.5	65.5	65.5	0.0	0.0	0.0
RR22	908.0	0.0	0.0	0.0	0.0	0.0
RR23	908.0	156.2	156.2	0.0	0.0	0.0
RR24	908.5	0.0	0.0	0.0	0.0	0.0
RR25	912.5	0.0	0.0	0.0	0.0	0.0
RR26	910.5	0.0	0.0	0.0	0.0	0.0
RR27	922.5	0.0	0.0	0.0	0.0	0.0
RR28	921.5	0.0	0.0	0.0	0.0	0.0
RR29	920.0	0.0	0.0	0.0	0.0	0.0
RR3	919.0	0.0	0.0	0.0	0.0	0.0
RR30	915.0	0.0	0.0	0.0	0.0	0.0
RR31	909.0	0.0	0.0	0.0	0.0	0.0
RR32	909.0	0.0	0.0	0.0	0.0	0.0

- continued -

Appendix Table A9. Continued						
		Flood Event Size				
Storage Area	Approx. Field Elevation[a]	10-yr	20-yr	25-yr	25-yr Long	25-yr EL
		------------------------- acres -----------------------------				
RR33	909.0	0.0	0.0	0.0	0.0	0.0
RR34	911.5	0.0	0.0	0.0	0.0	0.0
RR35	914.0	0.0	0.0	0.0	0.0	0.0
RR36	908.0	0.0	0.0	0.0	0.0	0.0
RR37	916.0	0.0	0.0	0.0	0.0	0.0
RR38	910.0	0.0	0.0	0.0	0.0	0.0
RR39	913.0	0.0	0.0	0.0	0.0	0.0
RR4	909.0	0.0	0.0	0.0	0.0	0.0
RR40	919.0	0.0	0.0	0.0	0.0	0.0
RR41	909.0	0.0	0.0	0.0	0.0	0.0
RR42	917.5	0.0	0.0	0.0	0.0	0.0
RR43	912.5	0.0	0.0	0.0	0.0	0.0
RR44	921.5	0.0	0.0	0.0	0.0	0.0
RR45	920.0	0.0	0.0	0.0	0.0	0.0
RR46	913.0	0.0	0.0	0.0	0.0	0.0
RR47	917.0	0.0	0.0	0.0	0.0	0.0
RR48	923.0	0.0	0.0	0.0	0.0	0.0
RR5	921.0	0.0	0.0	0.0	0.0	0.0
RR6	910.5	0.0	0.0	0.0	0.0	0.0
RR7	922.5	0.0	0.0	0.0	0.0	0.0
RR8	916.5	0.0	0.0	0.0	0.0	0.0
RR9	916.0	0.0	0.0	0.0	0.0	0.0
WLVSA100	913.5	0.0	0.0	0.0	0.0	0.0
WLVSA101	913.0	0.0	0.0	0.0	0.0	0.0
WLVSA102	914.0	0.0	0.0	0.0	0.0	0.0
WLVSA103	916.5	0.0	0.0	0.0	0.0	0.0
WLVSA104	914.5	0.0	0.0	0.0	0.0	0.0
WLVSA200	923.5	0.0	0.0	0.0	0.0	0.0
WLVSA202	915.5	0.0	0.0	0.0	0.0	0.0
WLVSA203	906.5	0.0	0.0	0.0	0.0	0.0
WLVSA204	925.5	0.0	0.0	0.0	0.0	0.0
WLVSA205	915.5	0.0	0.0	0.0	0.0	0.0
WLVSA206	916.0	0.0	0.0	0.0	0.0	0.0
WLVSA207	920.0	0.0	0.0	0.0	0.0	0.0
WLVSA208	924.0	0.0	0.0	0.0	0.0	0.0
WLVSA209	923.0	0.0	0.0	0.0	0.0	0.0
WLVSA210	932.0	0.0	0.0	0.0	0.0	0.0
WLVSA211	927.5	0.0	0.0	0.0	0.0	0.0
WLVSA212	928.0	0.0	0.0	0.0	0.0	0.0
- continued -						

Appendix Table A9. Continued						
Storage Area	Approx. Field Elevation[a]	Flood Event Size				
		10-yr	20-yr	25-yr	25-yr Long	25-yr EL
		------------------------- acres ------------------------------				
WLVSA213	926.5	0.0	0.0	0.0	0.0	0.0
WLVSA214	904.0	0.0	0.0	0.0	0.0	0.0
WLVSA215	933.0	0.0	0.0	0.0	0.0	0.0
WLVSA216	919.0	0.0	0.0	0.0	0.0	0.0
WLVSA217	933.0	0.0	0.0	0.0	0.0	0.0
WLVSA218	919.0	0.0	0.0	0.0	0.0	0.0
WLVSA219	932.5	0.0	0.0	0.0	0.0	0.0
WLVSA220	919.0	0.0	0.0	0.0	0.0	0.0
WLVSA221	918.0	0.0	0.0	0.0	0.0	0.0
WLVSA222	919.0	0.0	0.0	0.0	0.0	0.0
WLVSA223	914.5	0.0	0.0	0.0	0.0	0.0
WLVSA224	919.0	0.0	0.0	0.0	0.0	0.0
WLVSA225	910.0	0.0	0.0	0.0	0.0	0.0
WLVSA226	915.0	0.0	0.0	0.0	0.0	0.0
WLVSA227	907.0	0.0	0.0	0.0	0.0	0.0
WLVSA228	909.5	0.0	0.0	0.0	0.0	0.0
WLVSA229	900.0	0.0	0.0	0.0	0.0	0.0
WLVSA230	918.0	0.0	0.0	0.0	0.0	0.0
WLVSA231	928.0	0.0	0.0	0.0	0.0	0.0
WLVSA232	927.0	0.0	0.0	0.0	0.0	0.0
WLVSA233	918.0	0.0	0.0	0.0	0.0	0.0
WLVSA234	924.0	0.0	0.0	0.0	0.0	0.0
WLVSA235	924.0	0.0	0.0	0.0	0.0	0.0
WLVSA236	925.5	0.0	0.0	0.0	0.0	0.0
WLVSA237	923.5	0.0	0.0	0.0	0.0	0.0
WLVSA238	915.5	0.0	0.0	0.0	0.0	0.0
WLVSA239	920.5	0.0	0.0	0.0	0.0	0.0
WLVSA27S	923.0	0.0	0.0	0.0	0.0	0.0
WLVSA28S	919.5	0.0	0.0	0.0	0.0	0.0
WLVSA29S	920.0	0.0	0.0	0.0	0.0	0.0
WLVSA30S	919.5	0.0	0.0	0.0	0.0	0.0
WLVSA31S	911.0	0.0	0.0	0.0	0.0	0.0
WLVSA32	914.5	0.0	0.0	0.0	0.0	0.0
WLVSA33	922.0	0.0	0.0	0.0	0.0	0.0
WLVSA34	921.0	0.0	0.0	0.0	242.3	242.3
WLVSA34A	922.0	0.0	0.0	0.0	0.0	0.0
WLVSA35	908.5	0.0	0.0	0.0	0.0	0.0
WLVSA36	908.5	0.0	0.0	0.0	0.0	0.0
WLVSA37	913.0	0.0	0.0	0.0	0.0	0.0
- continued -						

Appendix Table A9. Continued						
Storage Area	Approx. Field Elevation[a]	Flood Event Size				
		10-yr	20-yr	25-yr	25-yr Long	25-yr EL
		------------------------- acres -----------------------------				
WLVSA38	910.0	0.0	0.0	0.0	0.0	0.0
WLVSA39	912.5	0.0	0.0	0.0	0.0	0.0
WLVSA40	914.5	0.0	0.0	0.0	0.0	0.0
WLVSA41	917.0	0.0	0.0	0.0	0.0	0.0
WLVSA42	915.5	0.0	0.0	0.0	0.0	0.0
WLVSA42A	911.5	0.0	0.0	0.0	0.0	0.0
WLVSA43	910.0	0.0	0.0	0.0	0.0	0.0
WLVSA44	910.0	0.0	0.0	0.0	0.0	0.0
WLVSA45	910.5	0.0	0.0	0.0	0.0	0.0
WLVSA46	916.0	0.0	0.0	0.0	0.0	0.0
WLVSA47	912.0	0.0	0.0	0.0	0.0	0.0
WLVSA48	917.5	0.0	0.0	0.0	0.0	0.0
WLVSA49	908.5	0.0	0.0	0.0	0.0	0.0
WLVSA50	910.0	0.0	0.0	0.0	0.0	0.0
WLVSA51	910.0	0.0	0.0	0.0	0.0	0.0
WLVSA51A	921.0	0.0	0.0	0.0	210.4	210.4
WLVSA53	922.0	0.0	0.0	0.0	400.2	400.2
WLVSA54	919.5	0.0	0.0	0.0	0.0	0.0
WLVSA55	923.0	0.0	0.0	0.0	0.0	0.0
WLVSA56	920.0	0.0	0.0	0.0	0.0	423.4
WLVSA57	916.5	0.0	0.0	0.0	0.0	320.2
WLVSA58	919.5	0.0	0.0	0.0	0.0	0.0
WLVSA59	916.0	0.0	0.0	0.0	0.0	351.3
WLVSA63	913.5	0.0	0.0	0.0	0.0	288.0
WLVSA64	912.5	214.1	0.0	0.0	0.0	214.1
WLVSA65	911.0	0.0	0.0	0.0	0.0	0.0
WLVSA66	912.5	0.0	0.0	0.0	116.6	0.0
WLVSA67	911.0	0.0	0.0	0.0	0.0	0.0
WLVSA72	908.5	0.0	0.0	0.0	0.0	0.0
WOLVC1	906.5	0.0	0.0	0.0	0.0	0.0
WOLVC10	920.0	0.0	0.0	0.0	0.0	0.0
WOLVC11	919.5	341.0	0.0	0.0	0.0	341.0
WOLVC12	918.5	0.0	0.0	0.0	0.0	288.6
WOLVC2	918.0	0.0	0.0	0.0	0.0	0.0
WOLVC3	918.5	0.0	315.5	0.0	0.0	0.0
WOLVC4	917.0	0.0	0.0	0.0	0.0	0.0
WOLVC5	917.0	0.0	0.0	0.0	0.0	355.2
WOLVC6	917.5	0.0	146.2	0.0	0.0	146.2
WOLVC7	929.5	0.0	0.0	0.0	0.0	0.0
- continued -						

Appendix Table A9. Continued						
Storage Area	Approx. Field Elevation[a]	Flood Event Size				
		10-yr	20-yr	25-yr	25-yr Long	25-yr EL
		------------------------- acres -----------------------------				
WOLVC8	925.5	0.0	0.0	0.0	0.0	0.0
WOLVC9	923.0	0.0	0.0	0.0	0.0	0.0
WRRND1	923.5	0.0	0.0	0.0	0.0	0.0
WRRND10	919.5	0.0	0.0	0.0	0.0	0.0
WRRND11	912.5	0.0	0.0	0.0	0.0	626.9
WRRND12	909.5	0.0	0.0	0.0	0.0	0.0
WRRND2	913.0	0.0	0.0	0.0	0.0	0.0
WRRND3	919.5	0.0	0.0	0.0	0.0	0.0
WRRND4	915.0	0.0	634.8	0.0	0.0	0.0
WRRND5	910.5	0.0	0.0	0.0	0.0	225.0
WRRND6	910.5	0.0	0.0	0.0	0.0	0.0
WRRND7	906.0	0.0	0.0	0.0	0.0	0.0
WRRND8	906.0	0.0	0.0	0.0	0.0	0.0
WRRND9	908.0	0.0	495.9	0.0	0.0	0.0
WRSA284	911.0	0.0	209.5	0.0	0.0	209.5
WRSA289	917.0	0.0	0.0	0.0	0.0	0.0
WRSA294	914.5	0.0	635.5	0.0	0.0	635.5
WRSA299E	907.0	305.2	305.2	0.0	0.0	0.0
WRSA300	906.5	631.3	631.3	0.0	0.0	0.0
WRSA302	909.5	0.0	0.0	0.0	0.0	613.4
WRSA304E	906.5	0.0	0.0	0.0	0.0	625.2
WRSA305A	910.5	0.0	0.0	0.0	0.0	0.0
WRSA305B	908.5	0.0	308.7	0.0	0.0	0.0
WRSA305C	911.0	0.0	296.9	0.0	0.0	0.0
WRSA305D	917.5	0.0	0.0	0.0	0.0	0.0
WRSA306	919.0	0.0	0.0	0.0	0.0	0.0
WRSA307	917.5	0.0	0.0	0.0	0.0	415.4
WRSA309E	920.5	0.0	0.0	0.0	0.0	622.2
WRSA311	921.5	0.0	0.0	0.0	0.0	0.0
WRSA312	923.0	0.0	0.0	0.0	0.0	0.0
WRSA350	923.0	0.0	0.0	0.0	0.0	0.0
WRSA351	924.0	0.0	0.0	0.0	0.0	0.0
WRSA352	911.5	0.0	268.2	0.0	0.0	0.0
WRSA353	913.0	0.0	251.8	0.0	0.0	251.8
WRSA354	927.5	0.0	0.0	0.0	0.0	0.0
WRSA355	926.0	0.0	0.0	0.0	0.0	0.0
WRSA356	924.0	0.0	0.0	0.0	0.0	0.0
WRSA357	925.0	0.0	0.0	0.0	0.0	0.0
WRSA358	923.0	0.0	0.0	0.0	0.0	0.0
- continued -						

Appendix Table A9. Continued						
Storage Area	Approx. Field Elevation[a]	Flood Event Size				
		10-yr	20-yr	25-yr	25-yr Long	25-yr EL
		------------------------- acres ------------------------------				
WRSA363	917.5	0.0	268.9	0.0	0.0	268.9
WRSA364	911.0	0.0	0.0	0.0	0.0	0.0
WRSA373	913.0	0.0	0.0	0.0	0.0	0.0
WRSA378	915.0	0.0	0.0	0.0	0.0	0.0
WRSA383	909.0	0.0	0.0	0.0	0.0	0.0
WRSA384	909.0	0.0	0.0	0.0	0.0	0.0
WRSA389	902.0	0.0	0.0	0.0	0.0	0.0
WRSA390	915.0	0.0	393.9	0.0	0.0	0.0

[a]Feet above mean seal level. Lowest estimated elevation for storage area.

Source: Houston-Moore Group (2019).

Appendix Table A9. Continued						
Storage Area	Approx. Field Elevation[a]	Flood Event Size				
		2009-yr	50-yr	100-yr	500-yr	PMF
		------------------------- acres ------------------------------				
BD1	908.0	0.0	0.0	0.0	0.0	23.2
CHRSA01	915.0	0.0	0.0	0.0	0.0	0.0
CHRSA02	914.5	0.0	0.0	0.0	0.0	0.0
CHRSA03	918.0	0.0	0.0	0.0	0.0	0.0
CHRSA04	918.0	0.0	0.0	0.0	0.0	0.0
CHRSA05	920.0	0.0	0.0	0.0	0.0	0.0
CHRSA06	920.0	0.0	0.0	0.0	0.0	0.0
CHRSA07	921.0	0.0	0.0	0.0	0.0	0.0
CHRSA08	915.0	0.0	0.0	0.0	0.0	0.0
CHRSA09	918.5	0.0	0.0	0.0	0.0	0.0
CHRSA10	923.0	0.0	0.0	0.0	0.0	0.0
CHRSA103	922.0	0.0	0.0	0.0	0.0	0.0
CHRSA104	931.0	0.0	0.0	0.0	0.0	0.0
CHRSA105	924.0	0.0	0.0	0.0	0.0	0.0
CHRSA106	928.0	0.0	0.0	0.0	0.0	0.0
CHRSA107	918.0	0.0	0.0	0.0	0.0	0.0
CHRSA108	926.5	0.0	0.0	0.0	0.0	0.0
CHRSA109	919.0	0.0	0.0	0.0	0.0	0.0
CHRSA11	925.0	0.0	0.0	0.0	0.0	0.0
CHRSA110	927.5	0.0	0.0	0.0	0.0	0.0
CHRSA111	923.0	0.0	0.0	0.0	0.0	0.0
CHRSA112	918.0	0.0	0.0	0.0	0.0	0.0
CHRSA113	924.5	0.0	0.0	0.0	0.0	0.0
CHRSA114	913.5	0.0	0.0	0.0	0.0	0.0
CHRSA115	921.0	0.0	0.0	0.0	0.0	0.0
CHRSA116	918.0	0.0	0.0	0.0	0.0	0.0
CHRSA117	919.5	0.0	0.0	0.0	11.9	0.0
CHRSA118	910.5	0.0	0.0	0.0	0.0	447.9
CHRSA119	918.0	0.0	0.0	0.0	0.0	0.0
CHRSA12	916.5	0.0	0.0	0.0	0.0	0.0
CHRSA120	919.5	0.0	0.0	0.0	0.0	0.0
CHRSA13	919.5	0.0	0.0	0.0	0.0	0.0
CHRSA14	918.5	0.0	0.0	0.0	0.0	0.0
CHRSA15	924.0	0.0	0.0	0.0	0.0	0.0
CHRSA16	916.0	0.0	0.0	0.0	0.0	0.0
CHRSA17	918.0	0.0	0.0	0.0	0.0	0.0
BD1	908.0	0.0	0.0	0.0	0.0	23.2
CHRSA18	924.0	0.0	0.0	0.0	0.0	0.0
CHRSA19	919.5	0.0	0.0	0.0	0.0	0.0
- continued -						

Appendix Table A9. Continued						
Storage Area	Approx. Field Elevation[a]	Flood Event Size				
		2009-yr	50-yr	100-yr	500-yr	PMF
		------------------------- acres -----------------------------				
CHRSA20	918.0	0.0	0.0	0.0	0.0	0.0
CHRSA23	918.0	0.0	0.0	0.0	0.0	0.0
DIVSA86E	922.0	0.0	0.0	0.0	0.0	0.0
DIVSA89	922.0	0.0	0.0	0.0	0.0	0.0
DIVSA91	921.0	0.0	0.0	0.0	807.2	0.0
DIVSA93	921.0	0.0	0.0	0.0	0.0	0.0
DIVSA95	927.5	0.0	0.0	0.0	0.0	0.0
DIVSA97	927.5	0.0	0.0	0.0	0.0	0.0
DIVSA99	920.0	0.0	0.0	0.0	0.0	0.0
DRAIN371	927.5	0.0	0.0	0.0	0.0	0.0
DRAIN372	928.0	0.0	0.0	0.0	0.0	0.0
DRAIN373	928.5	0.0	0.0	0.0	0.0	0.0
DRAIN374	924.0	0.0	0.0	0.0	0.0	0.0
RR1	913.0	0.0	0.0	0.0	0.0	0.0
RR10	914.0	0.0	0.0	0.0	0.0	0.0
RR11	915.0	0.0	0.0	0.0	0.0	0.0
RR12	915.5	0.0	0.0	0.0	0.0	0.0
RR13	919.0	0.0	0.0	0.0	0.0	0.0
RR14	919.5	0.0	0.0	0.0	0.0	0.0
RR15	913.0	0.0	0.0	0.0	0.0	690.7
RR16	907.5	241.4	241.4	241.4	241.4	241.4
RR17	904.5	0.0	0.0	0.0	0.0	0.0
RR18	905.5	396.2	396.2	396.2	396.2	396.2
RR19	908.5	273.3	0.0	273.3	273.3	273.3
RR2	907.0	442.0	442.0	442.0	442.0	442.0
RR20	910.5	453.0	453.0	453.0	453.0	453.0
RR21	907.5	0.0	65.5	65.5	0.0	65.5
RR22	908.0	0.0	0.0	0.0	0.0	0.0
RR23	908.0	0.0	156.2	156.2	0.0	156.2
RR24	908.5	0.0	0.0	0.0	0.0	119.8
RR25	912.5	0.0	0.0	0.0	0.0	0.0
RR26	910.5	0.0	0.0	0.0	0.0	0.0
RR27	922.5	0.0	0.0	0.0	0.0	157.7
RR28	921.5	0.0	0.0	0.0	0.0	160.3
RR29	920.0	0.0	0.0	0.0	0.0	318.8
RR3	919.0	0.0	0.0	0.0	0.0	331.6
RR30	915.0	0.0	0.0	240.7	0.0	240.7
RR31	909.0	0.0	0.0	0.0	0.0	49.7
RR32	909.0	0.0	0.0	0.0	0.0	77.8
- continued -						

Appendix Table A9. Continued						
Storage Area	Approx. Field Elevation[a]	Flood Event Size				
		2009-yr	50-yr	100-yr	500-yr	PMF
		------------------------- acres -----------------------------				
RR33	909.0	0.0	0.0	0.0	0.0	111.5
RR34	911.5	0.0	0.0	0.0	0.0	0.0
RR35	914.0	0.0	0.0	0.0	0.0	0.0
RR36	908.0	0.0	0.0	0.0	0.0	68.3
RR37	916.0	0.0	0.0	0.0	0.0	0.0
RR38	910.0	0.0	0.0	95.2	0.0	95.2
RR39	913.0	0.0	0.0	0.0	0.0	0.0
RR4	909.0	0.0	0.0	60.1	0.0	60.1
RR40	919.0	0.0	0.0	0.0	0.0	0.0
RR41	909.0	0.0	0.0	0.0	0.0	105.2
RR42	917.5	0.0	0.0	0.0	0.0	0.0
RR43	912.5	0.0	0.0	0.0	0.0	38.6
RR44	921.5	0.0	0.0	0.0	0.0	0.0
RR45	920.0	0.0	0.0	0.0	0.0	0.0
RR46	913.0	0.0	0.0	0.0	0.0	0.0
RR47	917.0	0.0	0.0	0.0	0.0	0.0
RR48	923.0	0.0	0.0	0.0	0.0	0.0
RR5	921.0	0.0	0.0	0.0	0.0	0.0
RR6	910.5	0.0	0.0	0.0	0.0	0.0
RR7	922.5	0.0	0.0	0.0	0.0	0.0
RR8	916.5	0.0	0.0	0.0	0.0	0.0
RR9	916.0	0.0	0.0	0.0	0.0	0.0
WLVSA100	913.5	0.0	0.0	0.0	0.0	64.2
WLVSA101	913.0	0.0	0.0	0.0	0.0	0.0
WLVSA102	914.0	0.0	0.0	0.0	0.0	0.0
WLVSA103	916.5	0.0	0.0	0.0	0.0	0.0
WLVSA104	914.5	0.0	0.0	0.0	0.0	0.0
WLVSA200	923.5	0.0	0.0	0.0	0.0	0.0
WLVSA202	915.5	0.0	0.0	0.0	0.0	0.0
WLVSA203	906.5	0.0	0.0	0.0	0.0	53.6
WLVSA204	925.5	0.0	0.0	0.0	0.0	0.0
WLVSA205	915.5	0.0	0.0	0.0	0.0	0.0
WLVSA206	916.0	0.0	0.0	0.0	0.0	0.0
WLVSA207	920.0	0.0	0.0	0.0	0.0	0.0
WLVSA208	924.0	0.0	0.0	0.0	0.0	0.0
WLVSA209	923.0	0.0	0.0	0.0	0.0	0.0
WLVSA210	932.0	0.0	0.0	0.0	0.0	0.0
WLVSA211	927.5	0.0	0.0	0.0	0.0	0.0
WLVSA212	928.0	0.0	0.0	0.0	0.0	0.0
- continued -						

Appendix Table A9. Continued						
	Approx.	Flood Event Size				
Storage	Field	2009-yr	50-yr	100-yr	500-yr	PMF
Area	Elevation[a]	------------------------- acres -----------------------------				
WLVSA213	926.5	0.0	0.0	0.0	0.0	0.0
WLVSA214	904.0	0.0	0.0	0.0	0.0	0.0
WLVSA215	933.0	0.0	0.0	0.0	0.0	0.0
WLVSA216	919.0	0.0	0.0	0.0	0.0	0.0
WLVSA217	933.0	0.0	0.0	0.0	0.0	0.0
WLVSA218	919.0	0.0	0.0	0.0	0.0	0.0
WLVSA219	932.5	0.0	0.0	0.0	0.0	0.0
WLVSA220	919.0	0.0	0.0	0.0	0.0	0.0
WLVSA221	918.0	0.0	0.0	0.0	0.0	0.0
WLVSA222	919.0	0.0	0.0	0.0	0.0	0.0
WLVSA223	914.5	0.0	0.0	0.0	0.0	0.0
WLVSA224	919.0	0.0	0.0	0.0	0.0	0.0
WLVSA225	910.0	0.0	0.0	0.0	0.0	0.0
WLVSA226	915.0	0.0	0.0	0.0	0.0	0.0
WLVSA227	907.0	0.0	0.0	0.0	0.0	47.3
WLVSA228	909.5	0.0	0.0	0.0	0.0	34.9
WLVSA229	900.0	0.0	0.0	90.2	0.0	0.0
WLVSA230	918.0	0.0	0.0	0.0	0.0	0.0
WLVSA231	928.0	0.0	0.0	0.0	0.0	357.6
WLVSA232	927.0	0.0	0.0	0.0	0.0	0.0
WLVSA233	918.0	0.0	0.0	0.0	0.0	0.0
WLVSA234	924.0	0.0	0.0	0.0	0.0	0.0
WLVSA235	924.0	0.0	0.0	0.0	0.0	0.0
WLVSA236	925.5	0.0	0.0	0.0	0.0	0.0
WLVSA237	923.5	0.0	0.0	0.0	0.0	0.0
WLVSA238	915.5	0.0	0.0	0.0	0.0	0.0
WLVSA239	920.5	0.0	0.0	0.0	0.0	0.0
WLVSA27S	923.0	0.0	0.0	0.0	0.0	0.0
WLVSA28S	919.5	0.0	0.0	0.0	0.0	0.0
WLVSA29S	920.0	0.0	0.0	0.0	0.0	0.0
WLVSA30S	919.5	0.0	0.0	0.0	0.0	0.0
WLVSA31S	911.0	0.0	0.0	0.0	0.0	92.9
WLVSA32	914.5	0.0	0.0	0.0	0.0	0.0
WLVSA33	922.0	0.0	0.0	0.0	0.0	0.0
WLVSA34	921.0	0.0	0.0	0.0	242.3	242.3
WLVSA34A	922.0	0.0	0.0	0.0	0.0	0.0
WLVSA35	908.5	0.0	0.0	0.0	0.0	33.6
WLVSA36	908.5	0.0	0.0	0.0	0.0	31.5
WLVSA37	913.0	0.0	0.0	0.0	0.0	0.0
- continued -						

Appendix Table A9. Continued						
Storage Area	Approx. Field Elevation[a]	Flood Event Size				
		2009-yr	50-yr	100-yr	500-yr	PMF
		------------------------- acres -----------------------------				
WLVSA38	910.0	0.0	0.0	0.0	0.0	56.2
WLVSA39	912.5	0.0	0.0	0.0	0.0	0.0
WLVSA40	914.5	0.0	0.0	0.0	0.0	0.0
WLVSA41	917.0	0.0	0.0	0.0	0.0	0.0
WLVSA42	915.5	0.0	0.0	0.0	0.0	0.0
WLVSA42A	911.5	0.0	0.0	0.0	0.0	35.8
WLVSA43	910.0	0.0	0.0	0.0	0.0	65.7
WLVSA44	910.0	0.0	0.0	0.0	0.0	30.8
WLVSA45	910.5	0.0	0.0	0.0	0.0	8.5
WLVSA46	916.0	0.0	0.0	0.0	0.0	0.0
WLVSA47	912.0	0.0	0.0	0.0	0.0	0.0
WLVSA48	917.5	0.0	0.0	0.0	0.0	0.0
WLVSA49	908.5	0.0	0.0	0.0	0.0	13.8
WLVSA50	910.0	0.0	0.0	0.0	0.0	0.0
WLVSA51	910.0	0.0	0.0	0.0	0.0	0.0
WLVSA51A	921.0	0.0	210.4	0.0	210.4	210.4
WLVSA53	922.0	400.2	0.0	0.0	400.2	400.2
WLVSA54	919.5	0.0	0.0	0.0	0.0	0.0
WLVSA55	923.0	0.0	0.0	0.0	0.0	0.0
WLVSA56	920.0	423.4	0.0	0.0	0.0	0.0
WLVSA57	916.5	320.2	320.2	320.2	0.0	0.0
WLVSA58	919.5	0.0	0.0	0.0	0.0	197.0
WLVSA59	916.0	351.3	351.3	351.3	0.0	351.3
WLVSA63	913.5	288.0	0.0	288.0	0.0	288.0
WLVSA64	912.5	0.0	214.1	0.0	0.0	0.0
WLVSA65	911.0	0.0	0.0	172.9	0.0	172.9
WLVSA66	912.5	0.0	0.0	0.0	0.0	116.6
WLVSA67	911.0	75.9	0.0	75.9	0.0	75.9
WLVSA72	908.5	0.0	0.0	0.0	0.0	202.4
WOLVC1	906.5	0.0	0.0	0.0	0.0	16.3
WOLVC10	920.0	0.0	0.0	0.0	317.3	0.0
WOLVC11	919.5	0.0	0.0	341.0	0.0	341.0
WOLVC12	918.5	0.0	0.0	0.0	0.0	288.6
WOLVC2	918.0	322.0	0.0	0.0	0.0	322.0
WOLVC3	918.5	315.5	315.5	315.5	0.0	315.5
WOLVC4	917.0	0.0	0.0	303.6	0.0	0.0
WOLVC5	917.0	355.2	355.2	0.0	0.0	0.0
WOLVC6	917.5	146.2	0.0	0.0	0.0	0.0
WOLVC7	929.5	0.0	0.0	0.0	0.0	0.0
- continued -						

Appendix Table A9. Continued						
Storage Area	Approx. Field Elevation[a]	Flood Event Size				
		2009-yr	50-yr	100-yr	500-yr	PMF
		------------------------- acres -----------------------------				
WOLVC8	925.5	0.0	0.0	0.0	0.0	0.0
WOLVC9	923.0	0.0	0.0	0.0	0.0	0.0
WRRND1	923.5	0.0	0.0	0.0	0.0	0.0
WRRND10	919.5	0.0	0.0	0.0	0.0	0.0
WRRND11	912.5	0.0	626.9	626.9	0.0	626.9
WRRND12	909.5	0.0	626.3	0.0	0.0	0.0
WRRND2	913.0	0.0	0.0	0.0	0.0	0.0
WRRND3	919.5	639.6	0.0	0.0	0.0	0.0
WRRND4	915.0	634.8	0.0	0.0	0.0	634.8
WRRND5	910.5	225.0	0.0	0.0	0.0	225.0
WRRND6	910.5	407.9	407.9	0.0	0.0	407.9
WRRND7	906.0	808.3	808.3	0.0	0.0	808.3
WRRND8	906.0	431.6	431.6	0.0	0.0	431.6
WRRND9	908.0	0.0	495.9	495.9	0.0	495.9
WRSA284	911.0	0.0	0.0	0.0	209.5	209.5
WRSA289	917.0	0.0	0.0	0.0	0.0	0.0
WRSA294	914.5	635.5	0.0	635.5	635.5	635.5
WRSA299E	907.0	0.0	305.2	305.2	0.0	305.2
WRSA300	906.5	0.0	631.3	0.0	0.0	631.3
WRSA302	909.5	613.4	0.0	613.4	613.4	613.4
WRSA304E	906.5	625.2	625.2	625.2	625.2	625.2
WRSA305A	910.5	0.0	0.0	0.0	274.3	274.3
WRSA305B	908.5	308.7	308.7	308.7	0.0	308.7
WRSA305C	911.0	296.9	296.9	296.9	296.9	296.9
WRSA305D	917.5	0.0	0.0	0.0	0.0	291.9
WRSA306	919.0	0.0	0.0	0.0	0.0	295.3
WRSA307	917.5	0.0	0.0	0.0	0.0	0.0
WRSA309E	920.5	0.0	0.0	0.0	0.0	0.0
WRSA311	921.5	0.0	0.0	0.0	0.0	0.0
WRSA312	923.0	0.0	0.0	0.0	0.0	0.0
WRSA350	923.0	0.0	0.0	0.0	0.0	0.0
WRSA351	924.0	0.0	0.0	0.0	0.0	0.0
WRSA352	911.5	268.2	268.2	268.2	0.0	268.2
WRSA353	913.0	251.8	251.8	251.8	251.8	251.8
WRSA354	927.5	0.0	0.0	0.0	0.0	0.0
WRSA355	926.0	0.0	0.0	0.0	0.0	0.0
WRSA356	924.0	0.0	0.0	0.0	0.0	0.0
WRSA357	925.0	0.0	0.0	0.0	0.0	0.0
WRSA358	923.0	0.0	0.0	0.0	0.0	0.0
continued						

Appendix Table A9. Continued						
Storage Area	Approx. Field Elevation[a]	Flood Event Size				
		2009-yr	50-yr	100-yr	500-yr	PMF
		------------------------- acres ------------------------------				
WRSA363	917.5	268.9	0.0	268.9	268.9	0.0
WRSA364	911.0	0.0	0.0	0.0	0.0	71.8
WRSA373	913.0	0.0	0.0	0.0	0.0	0.0
WRSA378	915.0	0.0	0.0	0.0	11.7	0.0
WRSA383	909.0	0.0	0.0	0.0	0.0	0.0
WRSA384	909.0	0.0	0.0	0.0	0.0	130.9
WRSA389	902.0	0.0	0.0	0.0	0.0	0.0
WRSA390	915.0	0.0	0.0	393.9	393.9	0.0

PMF = Probabilistic Maximum Flood.
[a]Feet above mean seal level. Lowest estimated elevation for storage area.
Source: Houston-Moore Group (2019).

Appendix Table A10. Acreage of Storage Areas That Do Not Flood Without Diversion Conditions but Now Flood with Diversion (new flooding), by Storage Area, by Flood Event Frequency (Hydrology Group Five)

Storage Area	Approx. Field Elevation[a]	Flood Event Size				
		10-yr	20-yr	25-yr	25-yr Long	25-yr EL
		------------------------- acres ------------------------------				
BD1	908.0	0.0	0.0	0.0	0.0	0.0
CHRSA01	915.0	0.0	0.0	306.7	306.7	306.7
CHRSA02	914.5	0.0	0.0	305.0	305.0	305.0
CHRSA03	918.0	0.0	0.0	0.0	0.0	0.0
CHRSA04	918.0	0.0	0.0	0.0	0.0	0.0
CHRSA05	920.0	0.0	0.0	0.0	0.0	0.0
CHRSA06	920.0	0.0	0.0	0.0	0.0	0.0
CHRSA07	921.0	0.0	0.0	0.0	0.0	0.0
CHRSA08	915.0	0.0	0.0	150.5	0.0	0.0
CHRSA09	918.5	0.0	0.0	0.0	160.5	160.5
CHRSA10	923.0	0.0	0.0	0.0	0.0	0.0
CHRSA103	922.0	0.0	0.0	0.0	0.0	0.0
CHRSA104	931.0	0.0	0.0	0.0	0.0	0.0
CHRSA105	924.0	0.0	0.0	0.0	0.0	0.0
CHRSA106	928.0	0.0	0.0	0.0	0.0	0.0
CHRSA107	918.0	0.0	0.0	0.0	0.0	0.0
CHRSA108	926.5	0.0	0.0	0.0	0.0	0.0
CHRSA109	919.0	0.0	0.0	0.0	0.0	0.0
CHRSA11	925.0	0.0	0.0	0.0	0.0	0.0
CHRSA110	927.5	0.0	0.0	0.0	0.0	0.0
CHRSA111	923.0	0.0	0.0	0.0	0.0	0.0
CHRSA112	918.0	0.0	0.0	0.0	0.0	0.0
CHRSA113	924.5	0.0	0.0	0.0	0.0	0.0
CHRSA114	913.5	0.0	0.0	0.0	0.0	0.0
CHRSA115	921.0	0.0	0.0	0.0	0.0	0.0
CHRSA116	918.0	0.0	0.0	0.0	0.0	0.0
CHRSA117	919.5	0.0	0.0	0.0	11.9	11.9
CHRSA118	910.5	0.0	0.0	0.0	0.0	0.0
CHRSA119	918.0	0.0	0.0	0.0	97.8	97.8
CHRSA12	916.5	0.0	0.0	0.0	129.4	129.4
CHRSA120	919.5	0.0	0.0	0.0	0.0	0.0
CHRSA13	919.5	0.0	0.0	0.0	0.0	0.0
CHRSA14	918.5	0.0	0.0	0.0	226.6	226.6
CHRSA15	924.0	0.0	0.0	0.0	0.0	0.0
CHRSA16	916.0	0.0	0.0	59.8	59.8	59.8
CHRSA17	918.0	0.0	0.0	628.8	0.0	0.0
CHRSA18	924.0	0.0	0.0	0.0	0.0	0.0
CHRSA19	919.5	0.0	0.0	0.0	0.0	0.0

- continued -

Appendix Table A10. Continued						
Storage Area	Approx. Field Elevation[a]	Flood Event Size				
		10-yr	20-yr	25-yr	25-yr Long	25-yr EL
		------------------------- acres -----------------------------				
CHRSA20	918.0	0.0	0.0	629.0	0.0	0.0
CHRSA23	918.0	0.0	0.0	0.0	0.0	0.0
DIVSA86E	922.0	0.0	0.0	0.0	0.0	0.0
DIVSA89	922.0	0.0	0.0	0.0	0.0	0.0
DIVSA91	921.0	0.0	0.0	0.0	807.2	807.2
DIVSA93	921.0	0.0	0.0	0.0	0.0	0.0
DIVSA95	927.5	0.0	0.0	0.0	0.0	0.0
DIVSA97	927.5	0.0	0.0	0.0	0.0	0.0
DIVSA99	920.0	0.0	0.0	0.0	0.0	0.0
DRAIN371	927.5	0.0	0.0	0.0	0.0	0.0
DRAIN372	928.0	0.0	0.0	0.0	0.0	0.0
DRAIN373	928.5	0.0	0.0	0.0	0.0	0.0
DRAIN374	924.0	0.0	0.0	0.0	547.7	547.7
RR1	913.0	0.0	0.0	560.0	0.0	0.0
RR10	914.0	0.0	0.0	566.7	0.0	0.0
RR11	915.0	0.0	0.0	585.0	0.0	0.0
RR12	915.5	0.0	0.0	472.5	472.5	472.5
RR13	919.0	0.0	0.0	0.0	0.0	0.0
RR14	919.5	0.0	0.0	0.0	0.0	0.0
RR15	913.0	690.7	690.7	690.7	0.0	0.0
RR16	907.5	0.0	241.4	241.4	0.0	0.0
RR17	904.5	150.1	0.0	0.0	0.0	0.0
RR18	905.5	0.0	396.2	0.0	0.0	0.0
RR19	908.5	0.0	273.3	273.3	273.3	273.3
RR2	907.0	0.0	0.0	0.0	0.0	0.0
RR20	910.5	0.0	0.0	0.0	0.0	0.0
RR21	907.5	0.0	0.0	0.0	0.0	0.0
RR22	908.0	0.0	0.0	0.0	0.0	0.0
RR23	908.0	0.0	0.0	0.0	0.0	0.0
RR24	908.5	0.0	0.0	0.0	0.0	0.0
RR25	912.5	0.0	0.0	159.7	0.0	0.0
RR26	910.5	0.0	0.0	0.0	0.0	0.0
RR27	922.5	0.0	0.0	0.0	0.0	0.0
RR28	921.5	0.0	0.0	0.0	0.0	0.0
RR29	920.0	0.0	0.0	0.0	0.0	0.0
RR3	919.0	0.0	0.0	0.0	0.0	0.0
RR30	915.0	0.0	0.0	0.0	0.0	0.0
RR31	909.0	0.0	0.0	0.0	0.0	0.0
RR32	909.0	0.0	0.0	0.0	0.0	0.0
- continued -						

Appendix Table A10. Continued						
Storage Area	Approx. Field Elevation[a]	Flood Event Size				
		10-yr	20-yr	25-yr	25-yr Long	25-yr EL
		------------------------- acres ------------------------------				
RR33	909.0	0.0	0.0	0.0	0.0	0.0
RR34	911.5	0.0	0.0	0.0	0.0	0.0
RR35	914.0	0.0	0.0	45.6	0.0	0.0
RR36	908.0	0.0	0.0	0.0	0.0	0.0
RR37	916.0	0.0	0.0	38.5	38.5	38.5
RR38	910.0	0.0	0.0	0.0	0.0	0.0
RR39	913.0	0.0	0.0	0.0	0.0	0.0
RR4	909.0	0.0	0.0	0.0	0.0	0.0
RR40	919.0	0.0	0.0	0.0	0.0	0.0
RR41	909.0	0.0	0.0	0.0	0.0	0.0
RR42	917.5	0.0	0.0	0.0	55.7	55.7
RR43	912.5	0.0	0.0	0.0	0.0	0.0
RR44	921.5	0.0	0.0	0.0	0.0	0.0
RR45	920.0	0.0	0.0	0.0	0.0	0.0
RR46	913.0	0.0	0.0	0.0	0.0	0.0
RR47	917.0	0.0	0.0	104.2	0.0	0.0
RR48	923.0	0.0	0.0	0.0	0.0	0.0
RR5	921.0	0.0	0.0	0.0	0.0	0.0
RR6	910.5	0.0	19.2	0.0	0.0	0.0
RR7	922.5	0.0	0.0	0.0	0.0	0.0
RR8	916.5	0.0	0.0	0.0	0.0	0.0
RR9	916.0	0.0	0.0	0.0	0.0	0.0
WLVSA100	913.5	0.0	0.0	0.0	0.0	0.0
WLVSA101	913.0	0.0	0.0	0.0	0.0	0.0
WLVSA102	914.0	0.0	0.0	0.0	0.0	0.0
WLVSA103	916.5	0.0	0.0	0.0	0.0	0.0
WLVSA104	914.5	0.0	0.0	0.0	0.0	0.0
WLVSA200	923.5	0.0	0.0	0.0	0.0	0.0
WLVSA202	915.5	0.0	0.0	0.0	0.0	0.0
WLVSA203	906.5	0.0	0.0	0.0	0.0	0.0
WLVSA204	925.5	0.0	0.0	0.0	0.0	0.0
WLVSA205	915.5	0.0	0.0	0.0	0.0	0.0
WLVSA206	916.0	0.0	0.0	0.0	0.0	0.0
WLVSA207	920.0	0.0	0.0	0.0	0.0	0.0
WLVSA208	924.0	0.0	0.0	0.0	110.0	110.0
WLVSA209	923.0	0.0	0.0	0.0	0.0	0.0
WLVSA210	932.0	0.0	0.0	0.0	0.0	0.0
WLVSA211	927.5	0.0	0.0	0.0	0.0	0.0
WLVSA212	928.0	0.0	0.0	0.0	0.0	0.0
- continued -						

Appendix Table A10. Continued						
Storage Area	Approx. Field Elevation[a]	Flood Event Size				
		10-yr	20-yr	25-yr	25-yr Long	25-yr EL
		------------------------- acres -----------------------------				
WLVSA213	926.5	0.0	0.0	0.0	0.0	0.0
WLVSA214	904.0	0.0	0.0	0.0	0.0	0.0
WLVSA215	933.0	0.0	0.0	0.0	0.0	0.0
WLVSA216	919.0	0.0	0.0	0.0	0.0	0.0
WLVSA217	933.0	0.0	0.0	0.0	0.0	0.0
WLVSA218	919.0	0.0	0.0	0.0	0.0	0.0
WLVSA219	932.5	0.0	0.0	0.0	0.0	0.0
WLVSA220	919.0	0.0	0.0	0.0	0.0	0.0
WLVSA221	918.0	0.0	0.0	0.0	0.0	0.0
WLVSA222	919.0	0.0	0.0	0.0	0.0	0.0
WLVSA223	914.5	0.0	0.0	0.0	0.0	0.0
WLVSA224	919.0	0.0	0.0	0.0	0.0	0.0
WLVSA225	910.0	0.0	0.0	0.0	0.0	0.0
WLVSA226	915.0	0.0	0.0	0.0	0.0	0.0
WLVSA227	907.0	0.0	0.0	0.0	0.0	0.0
WLVSA228	909.5	0.0	0.0	0.0	0.0	0.0
WLVSA229	900.0	0.0	0.0	0.0	0.0	0.0
WLVSA230	918.0	0.0	0.0	0.0	0.0	0.0
WLVSA231	928.0	0.0	0.0	0.0	0.0	0.0
WLVSA232	927.0	0.0	0.0	0.0	0.0	0.0
WLVSA233	918.0	0.0	0.0	0.0	0.0	0.0
WLVSA234	924.0	0.0	0.0	0.0	0.0	0.0
WLVSA235	924.0	0.0	0.0	0.0	0.0	0.0
WLVSA236	925.5	0.0	0.0	0.0	0.0	0.0
WLVSA237	923.5	0.0	0.0	0.0	0.0	0.0
WLVSA238	915.5	0.0	0.0	0.0	0.0	0.0
WLVSA239	920.5	0.0	0.0	0.0	90.3	90.3
WLVSA27S	923.0	0.0	0.0	0.0	0.0	0.0
WLVSA28S	919.5	0.0	0.0	0.0	0.0	0.0
WLVSA29S	920.0	0.0	0.0	0.0	0.0	0.0
WLVSA30S	919.5	0.0	0.0	0.0	0.0	0.0
WLVSA31S	911.0	0.0	0.0	0.0	0.0	0.0
WLVSA32	914.5	0.0	0.0	0.0	0.0	0.0
WLVSA33	922.0	0.0	0.0	0.0	0.0	0.0
WLVSA34	921.0	0.0	0.0	0.0	0.0	0.0
WLVSA34A	922.0	0.0	0.0	0.0	0.0	0.0
WLVSA35	908.5	0.0	0.0	0.0	0.0	0.0
WLVSA36	908.5	0.0	0.0	0.0	0.0	0.0
WLVSA37	913.0	0.0	0.0	68.8	0.0	0.0
- continued -						

Appendix Table A10. Continued						
Storage Area	Approx. Field Elevation[a]	Flood Event Size				
		10-yr	20-yr	25-yr	25-yr Long	25-yr EL
		------------------------- acres -----------------------------				
WLVSA38	910.0	0.0	0.0	0.0	0.0	0.0
WLVSA39	912.5	0.0	0.0	81.1	0.0	0.0
WLVSA40	914.5	0.0	0.0	65.0	65.0	65.0
WLVSA41	917.0	0.0	0.0	0.0	46.7	46.7
WLVSA42	915.5	0.0	0.0	37.6	37.6	37.6
WLVSA42A	911.5	0.0	0.0	0.0	0.0	0.0
WLVSA43	910.0	0.0	0.0	0.0	0.0	0.0
WLVSA44	910.0	0.0	0.0	0.0	0.0	0.0
WLVSA45	910.5	0.0	0.0	0.0	0.0	0.0
WLVSA46	916.0	0.0	0.0	40.5	40.5	40.5
WLVSA47	912.0	0.0	0.0	0.0	0.0	0.0
WLVSA48	917.5	0.0	0.0	0.0	57.5	57.5
WLVSA49	908.5	0.0	0.0	0.0	0.0	0.0
WLVSA50	910.0	0.0	0.0	0.0	0.0	0.0
WLVSA51	910.0	0.0	0.0	0.0	0.0	0.0
WLVSA51A	921.0	0.0	0.0	0.0	0.0	0.0
WLVSA53	922.0	0.0	0.0	0.0	0.0	0.0
WLVSA54	919.5	0.0	0.0	0.0	0.0	0.0
WLVSA55	923.0	0.0	0.0	0.0	0.0	0.0
WLVSA56	920.0	0.0	0.0	0.0	0.0	0.0
WLVSA57	916.5	0.0	0.0	0.0	0.0	0.0
WLVSA58	919.5	0.0	0.0	0.0	0.0	0.0
WLVSA59	916.0	0.0	0.0	0.0	0.0	0.0
WLVSA63	913.5	0.0	0.0	0.0	0.0	0.0
WLVSA64	912.5	0.0	0.0	0.0	0.0	0.0
WLVSA65	911.0	0.0	0.0	0.0	0.0	0.0
WLVSA66	912.5	0.0	0.0	0.0	0.0	0.0
WLVSA67	911.0	0.0	0.0	0.0	0.0	0.0
WLVSA72	908.5	0.0	0.0	0.0	0.0	0.0
WOLVC1	906.5	0.0	0.0	0.0	0.0	0.0
WOLVC10	920.0	0.0	0.0	0.0	0.0	0.0
WOLVC11	919.5	0.0	0.0	0.0	0.0	0.0
WOLVC12	918.5	0.0	0.0	0.0	0.0	0.0
WOLVC2	918.0	0.0	0.0	0.0	0.0	0.0
WOLVC3	918.5	0.0	0.0	0.0	0.0	0.0
WOLVC4	917.0	0.0	0.0	0.0	0.0	0.0
WOLVC5	917.0	0.0	0.0	0.0	0.0	0.0
WOLVC6	917.5	0.0	0.0	0.0	0.0	0.0
WOLVC7	929.5	0.0	0.0	0.0	0.0	0.0
- continued -						

Appendix Table A10. Continued						
Storage Area	Approx. Field Elevation[a]	Flood Event Size				
		10-yr	20-yr	25-yr	25-yr Long	25-yr EL
		------------------------- acres ------------------------------				
WOLVC8	925.5	0.0	0.0	0.0	0.0	0.0
WOLVC9	923.0	0.0	0.0	0.0	0.0	0.0
WRRND1	923.5	0.0	0.0	0.0	0.0	0.0
WRRND10	919.5	0.0	0.0	0.0	0.0	0.0
WRRND11	912.5	0.0	0.0	0.0	0.0	0.0
WRRND12	909.5	0.0	0.0	0.0	0.0	0.0
WRRND2	913.0	0.0	0.0	245.6	245.6	245.6
WRRND3	919.5	0.0	0.0	0.0	0.0	0.0
WRRND4	915.0	0.0	0.0	0.0	0.0	0.0
WRRND5	910.5	0.0	0.0	0.0	0.0	0.0
WRRND6	910.5	0.0	0.0	0.0	0.0	0.0
WRRND7	906.0	0.0	0.0	0.0	0.0	0.0
WRRND8	906.0	0.0	0.0	0.0	0.0	0.0
WRRND9	908.0	0.0	0.0	0.0	0.0	0.0
WRSA284	911.0	0.0	0.0	0.0	0.0	0.0
WRSA289	917.0	0.0	0.0	0.0	637.9	637.9
WRSA294	914.5	0.0	0.0	0.0	0.0	0.0
WRSA299E	907.0	0.0	0.0	0.0	0.0	0.0
WRSA300	906.5	0.0	0.0	0.0	0.0	0.0
WRSA302	909.5	0.0	0.0	0.0	0.0	0.0
WRSA304E	906.5	0.0	625.2	0.0	0.0	0.0
WRSA305A	910.5	274.3	0.0	0.0	0.0	0.0
WRSA305B	908.5	0.0	0.0	0.0	0.0	0.0
WRSA305C	911.0	0.0	0.0	0.0	0.0	0.0
WRSA305D	917.5	0.0	0.0	0.0	0.0	0.0
WRSA306	919.0	0.0	0.0	0.0	0.0	0.0
WRSA307	917.5	0.0	0.0	0.0	0.0	0.0
WRSA309E	920.5	0.0	0.0	0.0	0.0	0.0
WRSA311	921.5	0.0	0.0	0.0	0.0	0.0
WRSA312	923.0	0.0	0.0	0.0	0.0	0.0
WRSA350	923.0	0.0	0.0	0.0	0.0	0.0
WRSA351	924.0	0.0	0.0	0.0	0.0	0.0
WRSA352	911.5	0.0	0.0	0.0	0.0	0.0
WRSA353	913.0	0.0	0.0	0.0	0.0	0.0
WRSA354	927.5	0.0	0.0	0.0	0.0	0.0
WRSA355	926.0	0.0	0.0	0.0	0.0	0.0
WRSA356	924.0	0.0	0.0	0.0	0.0	0.0
WRSA357	925.0	0.0	0.0	0.0	0.0	0.0
WRSA358	923.0	0.0	0.0	0.0	0.0	0.0
- continued -						

Appendix Table A10. Continued						
		Flood Event Size				
Storage Area	Approx. Field Elevation[a]	10-yr	20-yr	25-yr	25-yr Long	25-yr EL
		------------------------- acres ------------------------------				
WRSA363	917.5	0.0	0.0	0.0	0.0	0.0
WRSA364	911.0	0.0	71.8	0.0	0.0	0.0
WRSA373	913.0	0.0	0.0	13.2	0.0	0.0
WRSA378	915.0	0.0	0.0	11.7	11.7	11.7
WRSA383	909.0	0.0	0.0	0.0	0.0	0.0
WRSA384	909.0	0.0	0.0	0.0	0.0	0.0
WRSA389	902.0	0.0	0.0	0.0	0.0	0.0
WRSA390	915.0	0.0	0.0	0.0	0.0	0.0

[a]Feet above mean seal level. Lowest estimated elevation for storage area.
Source: Houston-Moore Group (2019).

Appendix Table A10.						
		Flood Event Size				
	Approx.	2009-yr	50-yr	100-yr	500-yr	PMF
Storage Area	Field Elevation[a]	------------------------- acres -----------------------------				
BD1	908.0	0.0	0.0	0.0	0.0	0.0
CHRSA01	915.0	306.7	306.7	306.7	0.0	0.0
CHRSA02	914.5	305.0	305.0	305.0	0.0	0.0
CHRSA03	918.0	304.2	304.2	304.2	304.2	0.0
CHRSA04	918.0	283.6	283.6	283.6	0.0	0.0
CHRSA05	920.0	0.0	0.0	0.0	0.0	0.0
CHRSA06	920.0	0.0	0.0	0.0	0.0	0.0
CHRSA07	921.0	0.0	0.0	116.6	0.0	0.0
CHRSA08	915.0	0.0	0.0	0.0	0.0	0.0
CHRSA09	918.5	0.0	160.5	160.5	0.0	0.0
CHRSA10	923.0	0.0	0.0	0.0	0.0	0.0
CHRSA103	922.0	0.0	0.0	0.0	0.0	0.0
CHRSA104	931.0	0.0	0.0	0.0	0.0	0.0
CHRSA105	924.0	0.0	0.0	0.0	0.0	0.0
CHRSA106	928.0	0.0	0.0	0.0	0.0	0.0
CHRSA107	918.0	0.0	0.0	0.0	0.0	0.0
CHRSA108	926.5	0.0	0.0	0.0	0.0	0.0
CHRSA109	919.0	0.0	0.0	0.0	0.0	0.0
CHRSA11	925.0	0.0	0.0	0.0	0.0	0.0
CHRSA110	927.5	75.1	0.0	0.0	0.0	0.0
CHRSA111	923.0	0.0	0.0	20.3	0.0	0.0
CHRSA112	918.0	0.0	0.0	0.0	0.0	0.0
CHRSA113	924.5	0.0	0.0	0.0	0.0	0.0
CHRSA114	913.5	0.0	0.0	0.0	0.0	0.0
CHRSA115	921.0	0.0	0.0	46.9	0.0	0.0
CHRSA116	918.0	0.0	0.0	0.0	0.0	0.0
CHRSA117	919.5	0.0	11.9	0.0	0.0	0.0
CHRSA118	910.5	0.0	0.0	0.0	0.0	0.0
CHRSA119	918.0	0.0	97.8	0.0	0.0	0.0
CHRSA12	916.5	129.4	129.4	129.4	0.0	0.0
CHRSA120	919.5	50.8	50.8	50.8	0.0	0.0
CHRSA13	919.5	85.2	0.0	85.2	0.0	0.0
CHRSA14	918.5	0.0	226.6	226.6	0.0	0.0
CHRSA15	924.0	0.0	0.0	0.0	0.0	0.0
CHRSA16	916.0	0.0	59.8	0.0	0.0	0.0
CHRSA17	918.0	0.0	0.0	0.0	0.0	0.0
CHRSA18	924.0	0.0	0.0	0.0	0.0	0.0
CHRSA19	919.5	0.0	0.0	0.0	0.0	0.0
CHRSA20	918.0	0.0	0.0	0.0	0.0	0.0
- continued -						

Appendix Table A10. Continued						
Storage Area	Approx. Field Elevation[a]	Flood Event Size				
		2009-yr	50-yr	100-yr	500-yr	PMF
		------------------------- acres -----------------------------				
CHRSA23	918.0	0.0	0.0	0.0	0.0	0.0
DIVSA86E	922.0	0.0	0.0	0.0	0.0	0.0
DIVSA89	922.0	0.0	0.0	0.0	0.0	0.0
DIVSA91	921.0	0.0	807.2	0.0	0.0	0.0
DIVSA93	921.0	0.0	0.0	0.0	0.0	0.0
DIVSA95	927.5	0.0	0.0	0.0	0.0	0.0
DIVSA97	927.5	0.0	0.0	0.0	0.0	0.0
DIVSA99	920.0	0.0	0.0	0.0	0.0	0.0
DRAIN371	927.5	0.0	0.0	0.0	0.0	0.0
DRAIN372	928.0	0.0	0.0	0.0	0.0	0.0
DRAIN373	928.5	0.0	0.0	0.0	0.0	0.0
DRAIN374	924.0	0.0	0.0	0.0	0.0	0.0
RR1	913.0	0.0	0.0	0.0	0.0	0.0
RR10	914.0	0.0	0.0	0.0	0.0	0.0
RR11	915.0	0.0	0.0	0.0	0.0	0.0
RR12	915.5	472.5	472.5	472.5	472.5	0.0
RR13	919.0	54.9	0.0	54.9	54.9	0.0
RR14	919.5	508.9	0.0	508.9	508.9	0.0
RR15	913.0	0.0	0.0	0.0	0.0	0.0
RR16	907.5	0.0	0.0	0.0	0.0	0.0
RR17	904.5	0.0	0.0	0.0	0.0	0.0
RR18	905.5	0.0	0.0	0.0	0.0	0.0
RR19	908.5	0.0	273.3	0.0	0.0	0.0
RR2	907.0	0.0	0.0	0.0	0.0	0.0
RR20	910.5	0.0	0.0	0.0	0.0	0.0
RR21	907.5	0.0	0.0	0.0	0.0	0.0
RR22	908.0	0.0	0.0	0.0	0.0	0.0
RR23	908.0	0.0	0.0	0.0	0.0	0.0
RR24	908.5	0.0	0.0	0.0	0.0	0.0
RR25	912.5	0.0	159.7	0.0	0.0	0.0
RR26	910.5	0.0	0.0	0.0	0.0	0.0
RR27	922.5	0.0	0.0	0.0	0.0	0.0
RR28	921.5	0.0	0.0	0.0	0.0	0.0
RR29	920.0	0.0	0.0	0.0	0.0	0.0
RR3	919.0	0.0	0.0	0.0	0.0	0.0
RR30	915.0	0.0	0.0	0.0	0.0	0.0
RR31	909.0	0.0	0.0	0.0	0.0	0.0
RR32	909.0	0.0	0.0	0.0	0.0	0.0
RR33	909.0	0.0	0.0	0.0	0.0	0.0

- continued -

Appendix Table A10. Continued						
Storage Area	Approx. Field Elevation[a]	Flood Event Size				
		2009-yr	50-yr	100-yr	500-yr	PMF
		------------------------- acres -----------------------------				
RR34	911.5	0.0	0.0	0.0	0.0	0.0
RR35	914.0	0.0	0.0	0.0	0.0	0.0
RR36	908.0	0.0	0.0	0.0	0.0	0.0
RR37	916.0	0.0	38.5	0.0	0.0	0.0
RR38	910.0	0.0	0.0	0.0	0.0	0.0
RR39	913.0	0.0	0.0	0.0	0.0	0.0
RR4	909.0	0.0	0.0	0.0	0.0	0.0
RR40	919.0	34.1	34.1	34.1	0.0	0.0
RR41	909.0	0.0	0.0	0.0	0.0	0.0
RR42	917.5	0.0	55.7	0.0	0.0	0.0
RR43	912.5	0.0	0.0	0.0	0.0	0.0
RR44	921.5	0.0	0.0	134.9	0.0	0.0
RR45	920.0	113.7	0.0	113.7	0.0	0.0
RR46	913.0	0.0	0.0	0.0	0.0	0.0
RR47	917.0	0.0	0.0	0.0	0.0	0.0
RR48	923.0	0.0	0.0	0.0	0.0	0.0
RR5	921.0	0.0	0.0	101.6	0.0	0.0
RR6	910.5	0.0	0.0	0.0	0.0	0.0
RR7	922.5	0.0	0.0	85.1	0.0	0.0
RR8	916.5	0.0	0.0	0.0	0.0	0.0
RR9	916.0	0.0	0.0	0.0	0.0	0.0
WLVSA100	913.5	0.0	0.0	0.0	0.0	0.0
WLVSA101	913.0	0.0	0.0	0.0	0.0	0.0
WLVSA102	914.0	0.0	0.0	0.0	0.0	0.0
WLVSA103	916.5	0.0	0.0	0.0	0.0	0.0
WLVSA104	914.5	0.0	0.0	0.0	0.0	0.0
WLVSA200	923.5	0.0	0.0	0.0	0.0	0.0
WLVSA202	915.5	0.0	0.0	0.0	0.0	0.0
WLVSA203	906.5	0.0	0.0	0.0	0.0	0.0
WLVSA204	925.5	0.0	0.0	0.0	0.0	0.0
WLVSA205	915.5	0.0	0.0	0.0	0.0	0.0
WLVSA206	916.0	0.0	0.0	0.0	0.0	0.0
WLVSA207	920.0	0.0	0.0	0.0	0.0	0.0
WLVSA208	924.0	0.0	0.0	0.0	0.0	0.0
WLVSA209	923.0	0.0	0.0	0.0	0.0	0.0
WLVSA210	932.0	0.0	0.0	0.0	0.0	0.0
WLVSA211	927.5	0.0	0.0	73.3	0.0	0.0
WLVSA212	928.0	0.0	0.0	0.0	0.0	0.0
WLVSA213	926.5	0.0	0.0	0.0	0.0	0.0
- continued -						

Appendix Table A10. Continued						
Storage Area	Approx. Field Elevation[a]	Flood Event Size				
		2009-yr	50-yr	100-yr	500-yr	PMF
		------------------------- acres -----------------------------				
WLVSA214	904.0	0.0	0.0	0.0	0.0	0.0
WLVSA215	933.0	0.0	0.0	0.0	0.0	0.0
WLVSA216	919.0	0.0	0.0	0.0	0.0	0.0
WLVSA217	933.0	0.0	0.0	0.0	0.0	0.0
WLVSA218	919.0	0.0	0.0	0.0	0.0	0.0
WLVSA219	932.5	0.0	0.0	0.0	0.0	0.0
WLVSA220	919.0	0.0	0.0	0.0	0.0	0.0
WLVSA221	918.0	0.0	0.0	0.0	0.0	0.0
WLVSA222	919.0	0.0	0.0	0.0	0.0	0.0
WLVSA223	914.5	0.0	0.0	0.0	0.0	0.0
WLVSA224	919.0	0.0	0.0	0.0	0.0	0.0
WLVSA225	910.0	0.0	0.0	0.0	0.0	0.0
WLVSA226	915.0	0.0	0.0	0.0	0.0	0.0
WLVSA227	907.0	0.0	0.0	0.0	0.0	0.0
WLVSA228	909.5	0.0	0.0	0.0	0.0	0.0
WLVSA229	900.0	0.0	0.0	0.0	0.0	0.0
WLVSA230	918.0	0.0	0.0	0.0	0.0	0.0
WLVSA231	928.0	0.0	0.0	0.0	0.0	0.0
WLVSA232	927.0	0.0	0.0	0.0	0.0	0.0
WLVSA233	918.0	0.0	0.0	0.0	0.0	0.0
WLVSA234	924.0	0.0	0.0	46.6	0.0	0.0
WLVSA235	924.0	0.0	0.0	110.8	0.0	0.0
WLVSA236	925.5	0.0	0.0	0.0	0.0	0.0
WLVSA237	923.5	0.0	0.0	26.7	0.0	0.0
WLVSA238	915.5	0.0	0.0	0.0	0.0	0.0
WLVSA239	920.5	0.0	90.3	0.0	0.0	0.0
WLVSA27S	923.0	0.0	0.0	0.0	0.0	0.0
WLVSA28S	919.5	29.2	0.0	29.2	0.0	0.0
WLVSA29S	920.0	45.9	0.0	45.9	0.0	0.0
WLVSA30S	919.5	75.3	0.0	75.3	0.0	0.0
WLVSA31S	911.0	0.0	0.0	0.0	0.0	0.0
WLVSA32	914.5	0.0	0.0	0.0	0.0	0.0
WLVSA33	922.0	0.0	0.0	0.0	0.0	0.0
WLVSA34	921.0	0.0	0.0	242.3	0.0	0.0
WLVSA34A	922.0	0.0	0.0	188.3	0.0	0.0
WLVSA35	908.5	0.0	0.0	0.0	0.0	0.0
WLVSA36	908.5	0.0	0.0	0.0	0.0	0.0
WLVSA37	913.0	0.0	0.0	0.0	0.0	0.0
WLVSA38	910.0	0.0	0.0	0.0	0.0	0.0
- continued -						

Appendix Table A10. Continued						
Storage Area	Approx. Field Elevation[a]	Flood Event Size				
		2009-yr	50-yr	100-yr	500-yr	PMF
		------------------------- acres -----------------------------				
WLVSA39	912.5	0.0	0.0	0.0	0.0	0.0
WLVSA40	914.5	0.0	65.0	0.0	0.0	0.0
WLVSA41	917.0	46.7	46.7	46.7	0.0	0.0
WLVSA42	915.5	0.0	37.6	0.0	0.0	0.0
WLVSA42A	911.5	0.0	0.0	0.0	0.0	0.0
WLVSA43	910.0	0.0	0.0	0.0	0.0	0.0
WLVSA44	910.0	0.0	0.0	0.0	0.0	0.0
WLVSA45	910.5	0.0	0.0	0.0	0.0	0.0
WLVSA46	916.0	0.0	40.5	0.0	0.0	0.0
WLVSA47	912.0	0.0	0.0	0.0	0.0	0.0
WLVSA48	917.5	57.5	57.5	57.5	0.0	0.0
WLVSA49	908.5	0.0	0.0	0.0	0.0	0.0
WLVSA50	910.0	0.0	0.0	0.0	0.0	0.0
WLVSA51	910.0	0.0	0.0	0.0	0.0	0.0
WLVSA51A	921.0	0.0	0.0	0.0	0.0	0.0
WLVSA53	922.0	0.0	0.0	400.2	0.0	0.0
WLVSA54	919.5	0.0	127.0	0.0	0.0	0.0
WLVSA55	923.0	0.0	0.0	212.3	0.0	0.0
WLVSA56	920.0	0.0	0.0	0.0	0.0	0.0
WLVSA57	916.5	0.0	0.0	0.0	0.0	0.0
WLVSA58	919.5	0.0	0.0	0.0	0.0	0.0
WLVSA59	916.0	0.0	0.0	0.0	0.0	0.0
WLVSA63	913.5	0.0	0.0	0.0	0.0	0.0
WLVSA64	912.5	0.0	0.0	0.0	0.0	0.0
WLVSA65	911.0	0.0	0.0	0.0	0.0	0.0
WLVSA66	912.5	0.0	0.0	0.0	0.0	0.0
WLVSA67	911.0	0.0	0.0	0.0	0.0	0.0
WLVSA72	908.5	0.0	0.0	0.0	0.0	0.0
WOLVC1	906.5	0.0	0.0	0.0	0.0	0.0
WOLVC10	920.0	0.0	0.0	0.0	0.0	0.0
WOLVC11	919.5	0.0	0.0	0.0	0.0	0.0
WOLVC12	918.5	0.0	0.0	0.0	0.0	0.0
WOLVC2	918.0	0.0	0.0	0.0	0.0	0.0
WOLVC3	918.5	0.0	0.0	0.0	0.0	0.0
WOLVC4	917.0	0.0	0.0	0.0	0.0	0.0
WOLVC5	917.0	0.0	0.0	0.0	0.0	0.0
WOLVC6	917.5	0.0	0.0	0.0	0.0	0.0
WOLVC7	929.5	0.0	0.0	0.0	0.0	0.0
WOLVC8	925.5	0.0	0.0	0.0	0.0	0.0
- continued -						

Appendix Table A10. Continued						
Storage Area	Approx. Field Elevation[a]	Flood Event Size				
		2009-yr	50-yr	100-yr	500-yr	PMF
		------------------------- acres -----------------------------				
WOLVC9	923.0	0.0	0.0	0.0	0.0	0.0
WRRND1	923.5	0.0	0.0	0.0	0.0	0.0
WRRND10	919.5	0.0	0.0	0.0	0.0	0.0
WRRND11	912.5	0.0	0.0	0.0	0.0	0.0
WRRND12	909.5	0.0	0.0	0.0	0.0	0.0
WRRND2	913.0	0.0	245.6	0.0	0.0	0.0
WRRND3	919.5	0.0	0.0	639.6	639.6	0.0
WRRND4	915.0	0.0	0.0	0.0	0.0	0.0
WRRND5	910.5	0.0	0.0	0.0	0.0	0.0
WRRND6	910.5	0.0	0.0	0.0	0.0	0.0
WRRND7	906.0	0.0	0.0	0.0	0.0	0.0
WRRND8	906.0	0.0	0.0	0.0	0.0	0.0
WRRND9	908.0	0.0	0.0	0.0	0.0	0.0
WRSA284	911.0	0.0	0.0	0.0	0.0	0.0
WRSA289	917.0	637.9	637.9	637.9	637.9	0.0
WRSA294	914.5	0.0	0.0	0.0	0.0	0.0
WRSA299E	907.0	0.0	0.0	0.0	0.0	0.0
WRSA300	906.5	0.0	0.0	0.0	0.0	0.0
WRSA302	909.5	0.0	0.0	0.0	0.0	0.0
WRSA304E	906.5	0.0	0.0	0.0	0.0	0.0
WRSA305A	910.5	0.0	0.0	0.0	0.0	0.0
WRSA305B	908.5	0.0	0.0	0.0	0.0	0.0
WRSA305C	911.0	0.0	0.0	0.0	0.0	0.0
WRSA305D	917.5	0.0	0.0	0.0	0.0	0.0
WRSA306	919.0	0.0	0.0	0.0	0.0	0.0
WRSA307	917.5	0.0	0.0	0.0	0.0	0.0
WRSA309E	920.5	0.0	0.0	0.0	0.0	0.0
WRSA311	921.5	0.0	0.0	0.0	0.0	0.0
WRSA312	923.0	0.0	0.0	0.0	0.0	0.0
WRSA350	923.0	0.0	0.0	0.0	0.0	0.0
WRSA351	924.0	0.0	0.0	0.0	0.0	0.0
WRSA352	911.5	0.0	0.0	0.0	0.0	0.0
WRSA353	913.0	0.0	0.0	0.0	0.0	0.0
WRSA354	927.5	0.0	0.0	0.0	0.0	0.0
WRSA355	926.0	0.0	0.0	0.0	0.0	0.0
WRSA356	924.0	0.0	0.0	0.0	0.0	0.0
WRSA357	925.0	0.0	0.0	0.0	0.0	0.0
WRSA358	923.0	0.0	0.0	0.0	0.0	0.0
WRSA363	917.5	0.0	0.0	0.0	0.0	0.0
- continued -						

Appendix Table A10. Continued						
Storage Area	Approx. Field Elevation[a]	Flood Event Size				
		2009-yr	50-yr	100-yr	500-yr	PMF
		------------------------- acres ------------------------------				
WRSA364	911.0	0.0	0.0	0.0	0.0	0.0
WRSA373	913.0	0.0	0.0	0.0	0.0	0.0
WRSA378	915.0	0.0	11.7	0.0	0.0	0.0
WRSA383	909.0	0.0	0.0	0.0	0.0	0.0
WRSA384	909.0	0.0	0.0	0.0	0.0	0.0
WRSA389	902.0	0.0	0.0	0.0	0.0	0.0
WRSA390	915.0	0.0	0.0	0.0		0.0
WRSA309E	920.5	0.0	0.0	0.0	0.0	0.0

PMF = Probabilistic Maximum Flood.
[a]Feet above mean seal level. Lowest estimated elevation for storage area.
Source: Houston-Moore Group (2019).

Appendix Table A11. Designation of Storage Areas in Common Hydrology Groups, by Size of Flood Event, FM Diversion Staging Area					
Storage Area	Flood Event Size				
	10-yr	20-yr	25-yr	25-yr Long	25-yr Extra Long
	---------------------------------- Group Number and Description of Common Hydrology ----------------------------------				
BD1	2 Floods, same	3 Floods, longer	3 Floods, longer	2 Floods, same	2 Floods, same
CHRSA01	1 No flooding	1 No flooding	5 No Flood, Now Floods	5 No Flood, Now Floods	5 No Flood, Now Floods
CHRSA02	1 No flooding	1 No flooding	5 No Flood, Now Floods	5 No Flood, Now Floods	5 No Flood, Now Floods
CHRSA03	1 No flooding	1 No flooding	1 No flooding	1 No flooding	1 No flooding
CHRSA04	1 No flooding	1 No flooding	1 No flooding	1 No flooding	1 No flooding
CHRSA05E	1 No flooding	1 No flooding	1 No flooding	1 No flooding	1 No flooding
CHRSA05W	1 No flooding	2 Floods, same	3 Floods, longer	3 Floods, longer	3 Floods, longer
CHRSA06	1 No flooding	1 No flooding	1 No flooding	1 No flooding	1 No flooding
CHRSA07	1 No flooding	1 No flooding	5 No Flood, Now Floods	3 Floods, longer	3 Floods, longer
CHRSA08	1 No flooding	1 No flooding	1 No flooding	5 No Flood, Now Floods	5 No Flood, Now Floods
CHRSA09	1 No flooding	1 No flooding	1 No flooding	1 No flooding	1 No flooding
CHRSA10	1 No flooding	1 No flooding	1 No flooding	1 No flooding	1 No flooding
CHRSA100	1 No flooding	1 No flooding	1 No flooding	1 No flooding	1 No flooding
CHRSA101	1 No flooding	1 No flooding	3 Floods, longer	3 Floods, longer	2 Floods, same
CHRSA102	1 No flooding	1 No flooding	1 No flooding	1 No flooding	1 No flooding
CHRSA103	1 No flooding	2 Floods, same	3 Floods, longer	3 Floods, longer	2 Floods, same
CHRSA104	1 No flooding	1 No flooding	1 No flooding	1 No flooding	1 No flooding
CHRSA105	1 No flooding	2 Floods, same	3 Floods, longer	3 Floods, longer	2 Floods, same
CHRSA106	1 No flooding	1 No flooding	1 No flooding	1 No flooding	1 No flooding
CHRSA107	1 No flooding	1 No flooding	1 No flooding	1 No flooding	1 No flooding
CHRSA108	1 No flooding	1 No flooding	1 No flooding	1 No flooding	1 No flooding
CHRSA109	1 No flooding	1 No flooding	1 No flooding	3 Floods, longer	3 Floods, longer
CHRSA11	1 No flooding	1 No flooding	1 No flooding	1 No flooding	1 No flooding
CHRSA110	1 No flooding	2 Floods, same	3 Floods, longer	2 Floods, same	2 Floods, same
CHRSA111	1 No flooding	1 No flooding	1 No flooding	1 No flooding	1 No flooding
- continued -					

Appendix Table A11. Continued					
Storage Area	Flood Event Size				
	10-yr	20-yr	25-yr	25-yr Long	25-yr Extra Long
	---------------------------------- Group Number and Description of Common Hydrology ----------------------------------				
CHRSA112	1 No flooding	1 No flooding	1 No flooding	3 Floods, longer	3 Floods, longer
CHRSA113	1 No flooding	1 No flooding	1 No flooding	5 No Flood, Now Floods	5 No Flood, Now Floods
CHRSA114	1 No flooding	2 Floods, same	3 Floods, longer	3 Floods, longer	2 Floods, same
CHRSA115	1 No flooding	1 No flooding	1 No flooding	5 No Flood, Now Floods	5 No Flood, Now Floods
CHRSA116	1 No flooding	1 No flooding	1 No flooding	5 No Flood, Now Floods	5 No Flood, Now Floods
CHRSA117	1 No flooding	1 No flooding	1 No flooding	1 No flooding	1 No flooding
CHRSA118	1 No flooding	1 No flooding	1 No flooding	1 No flooding	1 No flooding
CHRSA119	1 No flooding	1 No flooding	1 No flooding	5 No Flood, Now Floods	5 No Flood, Now Floods
CHRSA12	1 No flooding	1 No flooding	1 No flooding	1 No flooding	1 No flooding
CHRSA120	1 No flooding	1 No flooding	5 No Flood, Now Floods	5 No Flood, Now Floods	5 No Flood, Now Floods
CHRSA13	1 No flooding	1 No flooding	5 No Flood, Now Floods	3 Floods, longer	2 Floods, same
CHRSA14	1 No flooding	1 No flooding	1 No flooding	1 No flooding	1 No flooding
CHRSA15	1 No flooding	1 No flooding	1 No flooding	3 Floods, longer	3 Floods, longer
CHRSA16	1 No flooding	1 No flooding	5 No Flood, Now Floods	3 Floods, longer	2 Floods, same
CHRSA17	1 No flooding	1 No flooding	3 Floods, longer	3 Floods, longer	2 Floods, same
CHRSA18	1 No flooding	1 No flooding	1 No flooding	1 No flooding	1 No flooding
CHRSA18E	1 No flooding	1 No flooding	1 No flooding	1 No flooding	1 No flooding
CHRSA19	1 No flooding	1 No flooding	1 No flooding	5 No Flood, Now Floods	5 No Flood, Now Floods
CHRSA20	1 No flooding	1 No flooding	3 Floods, longer	3 Floods, longer	3 Floods, longer
CHRSA21	1 No flooding	1 No flooding	1 No flooding	1 No flooding	1 No flooding
CHRSA22	1 No flooding	1 No flooding	1 No flooding	1 No flooding	1 No flooding
CHRSA23	1 No flooding	2 Floods, same	3 Floods, longer	3 Floods, longer	2 Floods, same
CHRSA24	1 No flooding	2 Floods, same	2 Floods, same	2 Floods, same	2 Floods, same
CHRSA25	1 No flooding	1 No flooding	1 No flooding	1 No flooding	1 No flooding
CHRSA26	1 No flooding	1 No flooding	1 No flooding	1 No flooding	1 No flooding
- continued -					

Appendix Table A11. Continued					
Storage Area	Flood Event Size				
	10-yr	20-yr	25-yr	25-yr Long	25-yr Extra Long
	---------------------------------- Group Number and Description of Common Hydrology ----------------------------------				
CHRSA27	1 No flooding	1 No flooding	1 No flooding	5 No Flood, Now Floods	5 No Flood, Now Floods
DIVSA100	1 No flooding	1 No flooding	5 No Flood, Now Floods	3 Floods, longer	3 Floods, longer
DIVSA101	1 No flooding	1 No flooding	5 No Flood, Now Floods	3 Floods, longer	3 Floods, longer
DIVSA102	1 No flooding	1 No flooding	5 No Flood, Now Floods	3 Floods, longer	3 Floods, longer
DIVSA105	1 No flooding	1 No flooding	5 No Flood, Now Floods	5 No Flood, Now Floods	5 No Flood, Now Floods
DIVSA106E	1 No flooding	1 No flooding	1 No flooding	1 No flooding	1 No flooding
DIVSA107E	1 No flooding	1 No flooding	1 No flooding	1 No flooding	1 No flooding
DIVSA84	5 No Flood, Now Floods	5 No Flood, Now Floods	5 No Flood, Now Floods	3 Floods, longer	3 Floods, longer
DIVSA84E	1 No flooding	5 No Flood, Now Floods	5 No Flood, Now Floods	3 Floods, longer	3 Floods, longer
DIVSA85E	5 No Flood, Now Floods	3 Floods, longer	3 Floods, longer	3 Floods, longer	3 Floods, longer
DIVSA86S	1 No flooding	5 No Flood, Now Floods	3 Floods, longer	2 Floods, same	4 Floods, shorter
DIVSA87S	1 No flooding	5 No Flood, Now Floods	5 No Flood, Now Floods	5 No Flood, Now Floods	5 No Flood, Now Floods
DIVSA88W	4 Floods, shorter	3 Floods, longer	3 Floods, longer	4 Floods, shorter	4 Floods, shorter
DIVSA89W	1 No flooding	3 Floods, longer	3 Floods, longer	4 Floods, shorter	4 Floods, shorter
DIVSA90S	4 Floods, shorter	4 Floods, shorter	3 Floods, longer	3 Floods, longer	3 Floods, longer
DIVSA93S	1 No flooding	3 Floods, longer	3 Floods, longer	3 Floods, longer	3 Floods, longer
DIVSA94	4 Floods, shorter	4 Floods, shorter	3 Floods, longer	3 Floods, longer	3 Floods, longer
DIVSA95	1 No flooding	3 Floods, longer	3 Floods, longer	3 Floods, longer	3 Floods, longer
DIVSA98W	1 No flooding	1 No flooding	5 No Flood, Now Floods	3 Floods, longer	3 Floods, longer
DIVSA99W	1 No flooding	3 Floods, longer	3 Floods, longer	3 Floods, longer	2 Floods, same
DRAIN370	2 Floods, same	2 Floods, same	2 Floods, same	2 Floods, same	2 Floods, same
DRAIN371	1 No flooding	2 Floods, same	2 Floods, same	2 Floods, same	2 Floods, same
DRAIN372	1 No flooding	1 No flooding	1 No flooding	3 Floods, longer	2 Floods, same
- continued -					

Appendix Table A11. Continued					
Storage Area	Flood Event Size				
	10-yr	20-yr	25-yr	25-yr Long	25-yr Extra Long
	---------------------------------- Group Number and Description of Common Hydrology ----------------------------------				
DRAIN373	1 No flooding	2 Floods, same	2 Floods, same	3 Floods, longer	3 Floods, longer
DRAIN374	2 Floods, same	2 Floods, same	3 Floods, longer	2 Floods, same	2 Floods, same
RR10	1 No flooding	2 Floods, same	3 Floods, longer	3 Floods, longer	3 Floods, longer
RR11	1 No flooding	2 Floods, same	3 Floods, longer	3 Floods, longer	3 Floods, longer
RR12	1 No flooding	2 Floods, same	3 Floods, longer	3 Floods, longer	3 Floods, longer
RR13	1 No flooding	3 Floods, longer	3 Floods, longer	3 Floods, longer	2 Floods, same
RR14	1 No flooding	1 No flooding	5 No Flood, Now Floods	3 Floods, longer	3 Floods, longer
RR15	2 Floods, same	2 Floods, same	3 Floods, longer	2 Floods, same	2 Floods, same
RR16	1 No flooding	1 No flooding	5 No Flood, Now Floods	5 No Flood, Now Floods	5 No Flood, Now Floods
RR17	1 No flooding	3 Floods, longer	3 Floods, longer	3 Floods, longer	2 Floods, same
RR18	1 No flooding	1 No flooding	3 Floods, longer	3 Floods, longer	3 Floods, longer
RR19	3 Floods, longer	2 Floods, same	3 Floods, longer	2 Floods, same	2 Floods, same
RR20	1 No flooding	1 No flooding	1 No flooding	1 No flooding	1 No flooding
RR21	2 Floods, same	2 Floods, same	3 Floods, longer	3 Floods, longer	2 Floods, same
RR22	1 No flooding	1 No flooding	1 No flooding	5 No Flood, Now Floods	5 No Flood, Now Floods
RR23	1 No flooding	3 Floods, longer	3 Floods, longer	3 Floods, longer	2 Floods, same
RR24	1 No flooding	1 No flooding	1 No flooding	1 No flooding	1 No flooding
RR25	1 No flooding	1 No flooding	1 No flooding	1 No flooding	1 No flooding
RR26	1 No flooding	3 Floods, longer	3 Floods, longer	3 Floods, longer	2 Floods, same
RR27	1 No flooding	1 No flooding	5 No Flood, Now Floods	3 Floods, longer	3 Floods, longer
RR28	1 No flooding	1 No flooding	1 No flooding	1 No flooding	1 No flooding
RR29	1 No flooding	1 No flooding	1 No flooding	1 No flooding	1 No flooding
RR3	1 No flooding	5 No Flood, Now Floods	3 Floods, longer	3 Floods, longer	3 Floods, longer
RR30	1 No flooding	1 No flooding	1 No flooding	1 No flooding	1 No flooding

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Appendix Table A11. Continued					
Storage Area	Flood Event Size				
	10-yr	20-yr	25-yr	25-yr Long	25-yr Extra Long
	---------------------------------- Group Number and Description of Common Hydrology ----------------------------------				
RR31	1 No flooding	1 No flooding	3 Floods, longer	3 Floods, longer	2 Floods, same
RR32	1 No flooding	3 Floods, longer	3 Floods, longer	3 Floods, longer	2 Floods, same
RR33	1 No flooding	2 Floods, same	3 Floods, longer	2 Floods, same	2 Floods, same
RR34	2 Floods, same	2 Floods, same	3 Floods, longer	2 Floods, same	2 Floods, same
RR35	1 No flooding	2 Floods, same	3 Floods, longer	2 Floods, same	2 Floods, same
RR36	1 No flooding	2 Floods, same	3 Floods, longer	3 Floods, longer	2 Floods, same
RR37	3 Floods, longer	2 Floods, same	3 Floods, longer	2 Floods, same	3 Floods, longer
RR38	1 No flooding	1 No flooding	1 No flooding	1 No flooding	1 No flooding
RR39	1 No flooding	2 Floods, same	3 Floods, longer	2 Floods, same	3 Floods, longer
RR4	3 Floods, longer	2 Floods, same	3 Floods, longer	2 Floods, same	2 Floods, same
RR40	1 No flooding	1 No flooding	1 No flooding	1 No flooding	1 No flooding
RR41	2 Floods, same	3 Floods, longer	3 Floods, longer	2 Floods, same	2 Floods, same
RR42	2 Floods, same	3 Floods, longer	3 Floods, longer	3 Floods, longer	2 Floods, same
RR43	1 No flooding	2 Floods, same	3 Floods, longer	3 Floods, longer	2 Floods, same
RR44	1 No flooding	1 No flooding	1 No flooding	5 No Flood, Now Floods	5 No Flood, Now Floods
RR45	1 No flooding	1 No flooding	1 No flooding	3 Floods, longer	3 Floods, longer
RR46	1 No flooding	1 No flooding	1 No flooding	1 No flooding	1 No flooding
RR47	1 No flooding	1 No flooding	1 No flooding	1 No flooding	1 No flooding
RR48	1 No flooding	1 No flooding	1 No flooding	1 No flooding	1 No flooding
RR49	1 No flooding	1 No flooding	1 No flooding	1 No flooding	1 No flooding
RR5	2 Floods, same	3 Floods, longer	3 Floods, longer	3 Floods, longer	2 Floods, same
RR50	1 No flooding	1 No flooding	1 No flooding	1 No flooding	1 No flooding
RR51	2 Floods, same	2 Floods, same	3 Floods, longer	2 Floods, same	3 Floods, longer
RR52	1 No flooding	1 No flooding	1 No flooding	1 No flooding	1 No flooding
RR53	2 Floods, same	2 Floods, same	3 Floods, longer	2 Floods, same	2 Floods, same

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Appendix Table A11. Continued					
Storage Area	Flood Event Size				
	10-yr	20-yr	25-yr	25-yr Long	25-yr Extra Long
	---------------------------------- Group Number and Description of Common Hydrology ----------------------------------				
RR54	1 No flooding	1 No flooding	1 No flooding	1 No flooding	1 No flooding
RR55	3 Floods, longer	2 Floods, same	3 Floods, longer	2 Floods, same	2 Floods, same
RR56	2 Floods, same	2 Floods, same	2 Floods, same	2 Floods, same	2 Floods, same
RR57	3 Floods, longer	2 Floods, same	3 Floods, longer	2 Floods, same	2 Floods, same
RR58	2 Floods, same	2 Floods, same	2 Floods, same	3 Floods, longer	3 Floods, longer
RR59	2 Floods, same	2 Floods, same	2 Floods, same	2 Floods, same	2 Floods, same
RR6	1 No flooding	3 Floods, longer	3 Floods, longer	3 Floods, longer	2 Floods, same
RR60	2 Floods, same	2 Floods, same	3 Floods, longer	3 Floods, longer	3 Floods, longer
RR7	2 Floods, same	2 Floods, same	3 Floods, longer	3 Floods, longer	2 Floods, same
RR8	1 No flooding	3 Floods, longer	3 Floods, longer	3 Floods, longer	3 Floods, longer
RR9	2 Floods, same	3 Floods, longer	3 Floods, longer	2 Floods, same	2 Floods, same
WLVSA200	1 No flooding	2 Floods, same	3 Floods, longer	3 Floods, longer	2 Floods, same
WLVSA202	2 Floods, same	2 Floods, same	2 Floods, same	2 Floods, same	2 Floods, same
WLVSA203	1 No flooding	1 No flooding	1 No flooding	1 No flooding	1 No flooding
WLVSA204	1 No flooding	3 Floods, longer	3 Floods, longer	2 Floods, same	2 Floods, same
WLVSA205	1 No flooding	1 No flooding	1 No flooding	1 No flooding	1 No flooding
WLVSA206	1 No flooding	1 No flooding	1 No flooding	1 No flooding	1 No flooding
WLVSA207	1 No flooding	1 No flooding	1 No flooding	1 No flooding	1 No flooding
WLVSA208	1 No flooding	1 No flooding	1 No flooding	1 No flooding	1 No flooding
WLVSA209	1 No flooding	2 Floods, same	3 Floods, longer	2 Floods, same	2 Floods, same
WLVSA210	1 No flooding	1 No flooding	1 No flooding	5 No Flood, Now Floods	5 No Flood, Now Floods
WLVSA211	1 No flooding	1 No flooding	1 No flooding	1 No flooding	1 No flooding
WLVSA212	1 No flooding	1 No flooding	1 No flooding	1 No flooding	1 No flooding
WLVSA213	1 No flooding	1 No flooding	1 No flooding	1 No flooding	1 No flooding
WLVSA214	1 No flooding	1 No flooding	1 No flooding	1 No flooding	1 No flooding
WLVSA215	1 No flooding	3 Floods, longer	3 Floods, longer	2 Floods, same	3 Floods, longer
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Appendix Table A11. Continued					
Storage Area	Flood Event Size				
	10-yr	20-yr	25-yr	25-yr Long	25-yr Extra Long
	---------------------------------- Group Number and Description of Common Hydrology ----------------------------------				
WLVSA216	1 No flooding	1 No flooding	3 Floods, longer	3 Floods, longer	3 Floods, longer
WLVSA217	1 No flooding	1 No flooding	1 No flooding	1 No flooding	1 No flooding
WLVSA218	1 No flooding	1 No flooding	1 No flooding	4 Floods, shorter	4 Floods, shorter
WLVSA219	1 No flooding	1 No flooding	1 No flooding	1 No flooding	1 No flooding
WLVSA220	1 No flooding	2 Floods, same	3 Floods, longer	3 Floods, longer	2 Floods, same
WLVSA221	1 No flooding	3 Floods, longer	3 Floods, longer	3 Floods, longer	2 Floods, same
WLVSA222	1 No flooding	1 No flooding	5 No Flood, Now Floods	3 Floods, longer	3 Floods, longer
WLVSA223	1 No flooding	3 Floods, longer	3 Floods, longer	3 Floods, longer	3 Floods, longer
WLVSA224	1 No flooding	1 No flooding	5 No Flood, Now Floods	3 Floods, longer	3 Floods, longer
WLVSA225	1 No flooding	1 No flooding	5 No Flood, Now Floods	5 No Flood, Now Floods	5 No Flood, Now Floods
WLVSA226	1 No flooding	1 No flooding	1 No flooding	5 No Flood, Now Floods	5 No Flood, Now Floods
WLVSA227	1 No flooding	1 No flooding	5 No Flood, Now Floods	5 No Flood, Now Floods	5 No Flood, Now Floods
WLVSA228	1 No flooding	3 Floods, longer	3 Floods, longer	3 Floods, longer	2 Floods, same
WLVSA229	1 No flooding	3 Floods, longer	3 Floods, longer	3 Floods, longer	2 Floods, same
WLVSA230	1 No flooding	3 Floods, longer	3 Floods, longer	3 Floods, longer	2 Floods, same
WLVSA231	1 No flooding	3 Floods, longer	3 Floods, longer	3 Floods, longer	3 Floods, longer
WLVSA232	1 No flooding	1 No flooding	5 No Flood, Now Floods	5 No Flood, Now Floods	5 No Flood, Now Floods
WLVSA233	1 No flooding	1 No flooding	3 Floods, longer	3 Floods, longer	3 Floods, longer
WLVSA234	1 No flooding	1 No flooding	1 No flooding	5 No Flood, Now Floods	5 No Flood, Now Floods
WLVSA235	1 No flooding	2 Floods, same	3 Floods, longer	3 Floods, longer	3 Floods, longer
WLVSA236	1 No flooding	3 Floods, longer	3 Floods, longer	3 Floods, longer	2 Floods, same
WLVSA237	1 No flooding	3 Floods, longer	3 Floods, longer	3 Floods, longer	3 Floods, longer

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Appendix Table A11. Continued					
Storage Area	Flood Event Size				
	10-yr	20-yr	25-yr	25-yr Long	25-yr Extra Long
	---------------------------------- Group Number and Description of Common Hydrology ----------------------------------				
WLVSA57	1 No flooding	1 No flooding	1 No flooding	4 Floods, shorter	4 Floods, shorter
WLVSA64	1 No flooding	1 No flooding	1 No flooding	4 Floods, shorter	4 Floods, shorter
WLVSA65	1 No flooding	1 No flooding	1 No flooding	3 Floods, longer	3 Floods, longer
WLVSA66	1 No flooding	1 No flooding	1 No flooding	2 Floods, same	2 Floods, same
WRRND1	2 Floods, same	2 Floods, same	3 Floods, longer	2 Floods, same	4 Floods, shorter
WRRND10	2 Floods, same	2 Floods, same	3 Floods, longer	3 Floods, longer	4 Floods, shorter
WRRND11	1 No flooding	2 Floods, same	2 Floods, same	3 Floods, longer	3 Floods, longer
WRRND12	1 No flooding	2 Floods, same	3 Floods, longer	3 Floods, longer	4 Floods, shorter
WRRND13	2 Floods, same	2 Floods, same	3 Floods, longer	2 Floods, same	4 Floods, shorter
WRRND14	4 Floods, shorter	3 Floods, longer	3 Floods, longer	2 Floods, same	4 Floods, shorter
WRRND15	2 Floods, same	3 Floods, longer	3 Floods, longer	3 Floods, longer	2 Floods, same
WRRND16	2 Floods, same	2 Floods, same	3 Floods, longer	4 Floods, shorter	2 Floods, same
WRRND17	2 Floods, same	3 Floods, longer	3 Floods, longer	2 Floods, same	2 Floods, same
WRRND18	2 Floods, same	3 Floods, longer	3 Floods, longer	2 Floods, same	2 Floods, same
WRRND19	2 Floods, same	3 Floods, longer	3 Floods, longer	2 Floods, same	2 Floods, same
WRRND2	2 Floods, same	2 Floods, same	3 Floods, longer	3 Floods, longer	2 Floods, same
WRRND3	4 Floods, shorter	2 Floods, same	2 Floods, same	2 Floods, same	4 Floods, shorter
WRRND4	2 Floods, same	2 Floods, same	3 Floods, longer	3 Floods, longer	4 Floods, shorter
WRRND5	2 Floods, same	2 Floods, same	3 Floods, longer	2 Floods, same	2 Floods, same
WRRND6	1 No flooding	4 Floods, shorter	3 Floods, longer	3 Floods, longer	2 Floods, same
WRRND7	2 Floods, same	2 Floods, same	3 Floods, longer	2 Floods, same	2 Floods, same
WRRND8	2 Floods, same	2 Floods, same	3 Floods, longer	2 Floods, same	4 Floods, shorter

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Appendix Table A11. Continued					
Storage Area	Flood Event Size				
	10-yr	20-yr	25-yr	25-yr Long	25-yr Extra Long
	---------------------------------- Group Number and Description of Common Hydrology ----------------------------------				
WRRND9	1 No flooding	4 Floods, shorter	3 Floods, longer	3 Floods, longer	4 Floods, shorter
WRSA273	1 No flooding	1 No flooding	1 No flooding	2 Floods, same	2 Floods, same
WRSA280	1 No flooding	1 No flooding	1 No flooding	2 Floods, same	2 Floods, same
WRSA284	1 No flooding	1 No flooding	1 No flooding	1 No flooding	1 No flooding
WRSA289	1 No flooding	1 No flooding	1 No flooding	1 No flooding	1 No flooding
WRSA294	1 No flooding	1 No flooding	1 No flooding	1 No flooding	1 No flooding
WRSA299	1 No flooding	2 Floods, same	3 Floods, longer	2 Floods, same	4 Floods, shorter
WRSA300	2 Floods, same	3 Floods, longer	3 Floods, longer	2 Floods, same	2 Floods, same
WRSA302	1 No flooding	1 No flooding	5 No Flood, Now Floods	5 No Flood, Now Floods	5 No Flood, Now Floods
WRSA303	1 No flooding	1 No flooding	1 No flooding	1 No flooding	1 No flooding
WRSA304	1 No flooding	4 Floods, shorter	3 Floods, longer	3 Floods, longer	3 Floods, longer
WRSA305A	2 Floods, same	3 Floods, longer	3 Floods, longer	2 Floods, same	4 Floods, shorter
WRSA305B	2 Floods, same	3 Floods, longer	3 Floods, longer	2 Floods, same	2 Floods, same
WRSA305C	2 Floods, same	3 Floods, longer	2 Floods, same	2 Floods, same	2 Floods, same
WRSA305D	2 Floods, same	3 Floods, longer	2 Floods, same	2 Floods, same	2 Floods, same
WRSA306	2 Floods, same	4 Floods, shorter	3 Floods, longer	3 Floods, longer	3 Floods, longer
WRSA307	1 No flooding	4 Floods, shorter	3 Floods, longer	3 Floods, longer	4 Floods, shorter
WRSA308	1 No flooding	1 No flooding	1 No flooding	5 No Flood, Now Floods	5 No Flood, Now Floods
WRSA309	1 No flooding	4 Floods, shorter	3 Floods, longer	3 Floods, longer	4 Floods, shorter
WRSA311	4 Floods, shorter	4 Floods, shorter	3 Floods, longer	3 Floods, longer	3 Floods, longer
WRSA312	4 Floods, shorter	4 Floods, shorter	3 Floods, longer	2 Floods, same	2 Floods, same
WRSA315	1 No flooding	3 Floods, longer	3 Floods, longer	3 Floods, longer	4 Floods, shorter
WRSA321	1 No flooding	5 No Flood, Now Floods	3 Floods, longer	3 Floods, longer	4 Floods, shorter
WRSA350	5 No Flood, Now Floods	2 Floods, same	3 Floods, longer	3 Floods, longer	3 Floods, longer

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Appendix Table A11. Continued					
Storage Area	Flood Event Size				
	10-yr	20-yr	25-yr	25-yr Long	25-yr Extra Long
	---------------------------------- Group Number and Description of Common Hydrology ----------------------------------				
WRSA351	3 Floods, longer	4 Floods, shorter	3 Floods, longer	3 Floods, longer	3 Floods, longer
WRSA352	1 No flooding	4 Floods, shorter	3 Floods, longer	3 Floods, longer	3 Floods, longer
WRSA353	1 No flooding	1 No flooding	1 No flooding	3 Floods, longer	3 Floods, longer
WRSA354	1 No flooding	2 Floods, same	2 Floods, same	3 Floods, longer	3 Floods, longer
WRSA355	1 No flooding	2 Floods, same	3 Floods, longer	3 Floods, longer	4 Floods, shorter
WRSA356	1 No flooding	2 Floods, same	3 Floods, longer	3 Floods, longer	4 Floods, shorter
WRSA357	1 No flooding	2 Floods, same	2 Floods, same	3 Floods, longer	3 Floods, longer
WRSA358	1 No flooding	2 Floods, same	2 Floods, same	3 Floods, longer	3 Floods, longer
WRSA359	1 No flooding	2 Floods, same	2 Floods, same	2 Floods, same	3 Floods, longer
WRSA360	1 No flooding	2 Floods, same	2 Floods, same	3 Floods, longer	2 Floods, same
WRSA363	1 No flooding	4 Floods, shorter	3 Floods, longer	3 Floods, longer	2 Floods, same
WRSA364	1 No flooding	4 Floods, shorter	3 Floods, longer	3 Floods, longer	4 Floods, shorter
WRSA373	1 No flooding	1 No flooding	1 No flooding	1 No flooding	1 No flooding
WRSA378	1 No flooding	1 No flooding	1 No flooding	1 No flooding	1 No flooding
WRSA383	1 No flooding	1 No flooding	1 No flooding	1 No flooding	1 No flooding
WRSA384	1 No flooding	1 No flooding	1 No flooding	1 No flooding	1 No flooding
WRSA389	1 No flooding	1 No flooding	1 No flooding	1 No flooding	1 No flooding
WRSA390	1 No flooding	4 Floods, shorter	3 Floods, longer	3 Floods, longer	4 Floods, shorter
WRSA501	1 No flooding	5 No Flood, Now Floods	3 Floods, longer	3 Floods, longer	2 Floods, same
WRSA502	1 No flooding	1 No flooding	5 No Flood, Now Floods	3 Floods, longer	3 Floods, longer
WRSA504	1 No flooding	1 No flooding	5 No Flood, Now Floods	5 No Flood, Now Floods	5 No Flood, Now Floods
WRSA505	1 No flooding	3 Floods, longer	3 Floods, longer	3 Floods, longer	3 Floods, longer
WRSA360	1 No flooding	2 Floods, same	2 Floods, same	3 Floods, longer	2 Floods, same
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Appendix Table A11. Continued					
Storage Area	Flood Event Size				
	2009-like	50-yr	100-yr	500-yr	PMF
	---------------------------------- Group Number and Description of Common Hydrology ----------------------------------				
BD1	2 Floods, same	2 Floods, same	2 Floods, same	3 Floods, longer	4 Floods, shorter
CHRSA01	5 No Flood, Now Floods	5 No Flood, Now Floods	5 No Flood, Now Floods	3 Floods, longer	3 Floods, longer
CHRSA02	5 No Flood, Now Floods	5 No Flood, Now Floods	5 No Flood, Now Floods	3 Floods, longer	3 Floods, longer
CHRSA03	5 No Flood, Now Floods	5 No Flood, Now Floods	5 No Flood, Now Floods	5 No Flood, Now Floods	3 Floods, longer
CHRSA04	5 No Flood, Now Floods	5 No Flood, Now Floods	5 No Flood, Now Floods	3 Floods, longer	3 Floods, longer
CHRSA05E	3 Floods, longer	1 No flooding	3 Floods, longer	3 Floods, longer	2 Floods, same
CHRSA05W	2 Floods, same	3 Floods, longer	2 Floods, same	2 Floods, same	2 Floods, same
CHRSA06	1 No flooding	1 No flooding	5 No Flood, Now Floods	3 Floods, longer	2 Floods, same
CHRSA07	3 Floods, longer	3 Floods, longer	3 Floods, longer	3 Floods, longer	3 Floods, longer
CHRSA08	3 Floods, longer	5 No Flood, Now Floods	5 No Flood, Now Floods	3 Floods, longer	3 Floods, longer
CHRSA09	1 No flooding	1 No flooding	1 No flooding	3 Floods, longer	3 Floods, longer
CHRSA10	1 No flooding	1 No flooding	1 No flooding	3 Floods, longer	2 Floods, same
CHRSA100	2 Floods, same	1 No flooding	1 No flooding	3 Floods, longer	2 Floods, same
CHRSA101	3 Floods, longer	3 Floods, longer	3 Floods, longer	2 Floods, same	3 Floods, longer
CHRSA102	2 Floods, same	1 No flooding	3 Floods, longer	2 Floods, same	3 Floods, longer
CHRSA103	2 Floods, same	3 Floods, longer	2 Floods, same	3 Floods, longer	2 Floods, same
CHRSA104	3 Floods, longer	1 No flooding	1 No flooding	3 Floods, longer	3 Floods, longer
CHRSA105	2 Floods, same	3 Floods, longer	3 Floods, longer	3 Floods, longer	2 Floods, same
CHRSA106	3 Floods, longer	1 No flooding	3 Floods, longer	2 Floods, same	2 Floods, same
CHRSA107	5 No Flood, Now Floods	1 No flooding	1 No flooding	3 Floods, longer	2 Floods, same
CHRSA108	3 Floods, longer	1 No flooding	5 No Flood, Now Floods	2 Floods, same	3 Floods, longer
CHRSA109	3 Floods, longer	3 Floods, longer	3 Floods, longer	2 Floods, same	3 Floods, longer
CHRSA11	1 No flooding	1 No flooding	1 No flooding	3 Floods, longer	2 Floods, same
CHRSA110	2 Floods, same	3 Floods, longer	2 Floods, same	2 Floods, same	2 Floods, same
CHRSA111	3 Floods, longer	1 No flooding	5 No Flood, Now Floods	3 Floods, longer	3 Floods, longer
CHRSA112	3 Floods, longer	3 Floods, longer	3 Floods, longer	2 Floods, same	3 Floods, longer
CHRSA113	3 Floods, longer	5 No Flood, Now Floods	3 Floods, longer	4 Floods, shorter	3 Floods, longer
CHRSA114	2 Floods, same	3 Floods, longer	2 Floods, same	2 Floods, same	4 Floods, shorter
CHRSA115	3 Floods, longer	5 No Flood, Now Floods	3 Floods, longer	2 Floods, same	3 Floods, longer
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Appendix Table A11. Continued

Storage Area	Flood Event Size				
	2009-like	50-yr	100-yr	500-yr	PMF
	---------------------------------- Group Number and Description of Common Hydrology ----------------------------------				
CHRSA116	5 No Flood, Now Floods	5 No Flood, Now Floods	5 No Flood, Now Floods	3 Floods, longer	3 Floods, longer
CHRSA117	5 No Flood, Now Floods	5 No Flood, Now Floods	5 No Flood, Now Floods	3 Floods, longer	3 Floods, longer
CHRSA118	5 No Flood, Now Floods	1 No flooding	5 No Flood, Now Floods	3 Floods, longer	3 Floods, longer
CHRSA119	3 Floods, longer	5 No Flood, Now Floods	5 No Flood, Now Floods	3 Floods, longer	3 Floods, longer
CHRSA12	1 No flooding	1 No flooding	1 No flooding	3 Floods, longer	3 Floods, longer
CHRSA120	3 Floods, longer	5 No Flood, Now Floods	3 Floods, longer	3 Floods, longer	3 Floods, longer
CHRSA13	3 Floods, longer	3 Floods, longer	3 Floods, longer	2 Floods, same	3 Floods, longer
CHRSA14	1 No flooding	1 No flooding	1 No flooding	3 Floods, longer	2 Floods, same
CHRSA15	2 Floods, same	2 Floods, same	3 Floods, longer	2 Floods, same	2 Floods, same
CHRSA16	3 Floods, longer	3 Floods, longer	3 Floods, longer	2 Floods, same	3 Floods, longer
CHRSA17	3 Floods, longer	3 Floods, longer	3 Floods, longer	2 Floods, same	2 Floods, same
CHRSA18	2 Floods, same	2 Floods, same	3 Floods, longer	3 Floods, longer	2 Floods, same
CHRSA18E	3 Floods, longer	1 No flooding	3 Floods, longer	2 Floods, same	3 Floods, longer
CHRSA19	3 Floods, longer	5 No Flood, Now Floods	3 Floods, longer	4 Floods, shorter	3 Floods, longer
CHRSA20	3 Floods, longer	3 Floods, longer	3 Floods, longer	3 Floods, longer	3 Floods, longer
CHRSA21	2 Floods, same	2 Floods, same	3 Floods, longer	3 Floods, longer	2 Floods, same
CHRSA22	2 Floods, same	1 No flooding	3 Floods, longer	3 Floods, longer	2 Floods, same
CHRSA23	2 Floods, same	3 Floods, longer	2 Floods, same	2 Floods, same	2 Floods, same
CHRSA24	2 Floods, same	3 Floods, longer	2 Floods, same	3 Floods, longer	2 Floods, same
CHRSA25	2 Floods, same	2 Floods, same	3 Floods, longer	3 Floods, longer	2 Floods, same
CHRSA26	2 Floods, same	2 Floods, same	2 Floods, same	3 Floods, longer	2 Floods, same
CHRSA27	2 Floods, same	2 Floods, same	2 Floods, same	3 Floods, longer	2 Floods, same
DIVSA100	3 Floods, longer	3 Floods, longer	3 Floods, longer	3 Floods, longer	3 Floods, longer
DIVSA101	3 Floods, longer	3 Floods, longer	3 Floods, longer	3 Floods, longer	3 Floods, longer
DIVSA102	3 Floods, longer	3 Floods, longer	3 Floods, longer	3 Floods, longer	3 Floods, longer
DIVSA105	5 No Flood, Now Floods	5 No Flood, Now Floods	5 No Flood, Now Floods	5 No Flood, Now Floods	3 Floods, longer
DIVSA106E	5 No Flood, Now Floods	1 No flooding	5 No Flood, Now Floods	5 No Flood, Now Floods	2 Floods, same
DIVSA107E	5 No Flood, Now Floods	1 No flooding	5 No Flood, Now Floods	5 No Flood, Now Floods	3 Floods, longer
DIVSA84	3 Floods, longer	3 Floods, longer	3 Floods, longer	3 Floods, longer	4 Floods, shorter
DIVSA84E	4 Floods, shorter	4 Floods, shorter	4 Floods, shorter	4 Floods, shorter	4 Floods, shorter
DIVSA85E	3 Floods, longer	3 Floods, longer	3 Floods, longer	3 Floods, longer	3 Floods, longer

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Appendix Table A11. Continued					
Storage Area	Flood Event Size				
	2009-like	50-yr	100-yr	500-yr	PMF
	---------------------------------- Group Number and Description of Common Hydrology ----------------------------------				
DIVSA86S	4 Floods, shorter	4 Floods, shorter	4 Floods, shorter	4 Floods, shorter	4 Floods, shorter
DIVSA87S	4 Floods, shorter	5 No Flood, Now Floods	4 Floods, shorter	4 Floods, shorter	4 Floods, shorter
DIVSA88W	4 Floods, shorter	4 Floods, shorter	4 Floods, shorter	4 Floods, shorter	4 Floods, shorter
DIVSA89W	4 Floods, shorter	4 Floods, shorter	4 Floods, shorter	4 Floods, shorter	4 Floods, shorter
DIVSA90S	3 Floods, longer	4 Floods, shorter	4 Floods, shorter	3 Floods, longer	4 Floods, shorter
DIVSA93S	3 Floods, longer	3 Floods, longer	3 Floods, longer	3 Floods, longer	2 Floods, same
DIVSA94	3 Floods, longer	4 Floods, shorter	4 Floods, shorter	3 Floods, longer	4 Floods, shorter
DIVSA95	3 Floods, longer	3 Floods, longer	3 Floods, longer	3 Floods, longer	4 Floods, shorter
DIVSA98W	3 Floods, longer	5 No Flood, Now Floods	3 Floods, longer	3 Floods, longer	3 Floods, longer
DIVSA99W	3 Floods, longer	3 Floods, longer	3 Floods, longer	3 Floods, longer	2 Floods, same
DRAIN370	2 Floods, same	2 Floods, same	2 Floods, same	3 Floods, longer	4 Floods, shorter
DRAIN371	2 Floods, same	2 Floods, same	2 Floods, same	3 Floods, longer	4 Floods, shorter
DRAIN372	3 Floods, longer	3 Floods, longer	3 Floods, longer	3 Floods, longer	4 Floods, shorter
DRAIN373	3 Floods, longer	3 Floods, longer	3 Floods, longer	2 Floods, same	4 Floods, shorter
DRAIN374	2 Floods, same	2 Floods, same	4 Floods, shorter	2 Floods, same	4 Floods, shorter
RR10	3 Floods, longer	3 Floods, longer	2 Floods, same	3 Floods, longer	4 Floods, shorter
RR11	2 Floods, same	3 Floods, longer	2 Floods, same	2 Floods, same	4 Floods, shorter
RR12	2 Floods, same	3 Floods, longer	2 Floods, same	2 Floods, same	4 Floods, shorter
RR13	3 Floods, longer	3 Floods, longer	3 Floods, longer	3 Floods, longer	2 Floods, same
RR14	3 Floods, longer	3 Floods, longer	3 Floods, longer	3 Floods, longer	3 Floods, longer
RR15	2 Floods, same	3 Floods, longer	2 Floods, same	2 Floods, same	4 Floods, shorter
RR16	3 Floods, longer	5 No Flood, Now Floods	3 Floods, longer	2 Floods, same	3 Floods, longer
RR17	2 Floods, same	3 Floods, longer	4 Floods, shorter	2 Floods, same	4 Floods, shorter
RR18	3 Floods, longer	3 Floods, longer	3 Floods, longer	3 Floods, longer	2 Floods, same

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Appendix Table A11. Continued					
Storage Area	Flood Event Size				
	2009-like	50-yr	100-yr	500-yr	PMF
	---------------------------------- Group Number and Description of Common Hydrology ----------------------------------				
RR19	2 Floods, same	3 Floods, longer	4 Floods, shorter	2 Floods, same	4 Floods, shorter
RR20	5 No Flood, Now Floods	5 No Flood, Now Floods	5 No Flood, Now Floods	3 Floods, longer	3 Floods, longer
RR21	2 Floods, same	3 Floods, longer	2 Floods, same	2 Floods, same	4 Floods, shorter
RR22	3 Floods, longer	5 No Flood, Now Floods	3 Floods, longer	3 Floods, longer	3 Floods, longer
RR23	3 Floods, longer	3 Floods, longer	3 Floods, longer	2 Floods, same	4 Floods, shorter
RR24	1 No flooding	1 No flooding	5 No Flood, Now Floods	3 Floods, longer	3 Floods, longer
RR25	5 No Flood, Now Floods	1 No flooding	5 No Flood, Now Floods	3 Floods, longer	3 Floods, longer
RR26	2 Floods, same	3 Floods, longer	3 Floods, longer	2 Floods, same	2 Floods, same
RR27	3 Floods, longer	3 Floods, longer	3 Floods, longer	3 Floods, longer	2 Floods, same
RR28	1 No flooding	1 No flooding	1 No flooding	3 Floods, longer	3 Floods, longer
RR29	3 Floods, longer	1 No flooding	5 No Flood, Now Floods	2 Floods, same	3 Floods, longer
RR3	3 Floods, longer	3 Floods, longer	3 Floods, longer	3 Floods, longer	2 Floods, same
RR30	1 No flooding	1 No flooding	5 No Flood, Now Floods	3 Floods, longer	3 Floods, longer
RR31	3 Floods, longer	3 Floods, longer	3 Floods, longer	2 Floods, same	2 Floods, same
RR32	3 Floods, longer	3 Floods, longer	3 Floods, longer	2 Floods, same	2 Floods, same
RR33	2 Floods, same	3 Floods, longer	2 Floods, same	2 Floods, same	4 Floods, shorter
RR34	2 Floods, same	3 Floods, longer	2 Floods, same	2 Floods, same	2 Floods, same
RR35	2 Floods, same	3 Floods, longer	2 Floods, same	2 Floods, same	2 Floods, same
RR36	2 Floods, same	3 Floods, longer	3 Floods, longer	3 Floods, longer	2 Floods, same
RR37	2 Floods, same	3 Floods, longer	2 Floods, same	2 Floods, same	2 Floods, same
RR38	3 Floods, longer	1 No flooding	3 Floods, longer	2 Floods, same	3 Floods, longer
RR39	2 Floods, same	3 Floods, longer	2 Floods, same	2 Floods, same	2 Floods, same
RR4	2 Floods, same	2 Floods, same	2 Floods, same	3 Floods, longer	4 Floods, shorter
RR40	1 No flooding	1 No flooding	1 No flooding	3 Floods, longer	2 Floods, same
RR41	2 Floods, same	3 Floods, longer	2 Floods, same	2 Floods, same	2 Floods, same
RR42	2 Floods, same	3 Floods, longer	2 Floods, same	2 Floods, same	2 Floods, same
RR43	3 Floods, longer	3 Floods, longer	3 Floods, longer	2 Floods, same	2 Floods, same
RR44	3 Floods, longer	1 No flooding	3 Floods, longer	3 Floods, longer	3 Floods, longer
RR45	3 Floods, longer	3 Floods, longer	3 Floods, longer	3 Floods, longer	3 Floods, longer
RR46	1 No flooding	1 No flooding	1 No flooding	1 No flooding	3 Floods, longer

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Appendix Table A11. Continued					
Storage Area	Flood Event Size				
	2009-like	50-yr	100-yr	500-yr	PMF
	---------------------------------- Group Number and Description of Common Hydrology ----------------------------------				
RR47	2 Floods, same	1 No flooding	5 No Flood, Now Floods	3 Floods, longer	2 Floods, same
RR48	2 Floods, same	1 No flooding	1 No flooding	3 Floods, longer	2 Floods, same
RR49	2 Floods, same	1 No flooding	3 Floods, longer	3 Floods, longer	3 Floods, longer
RR5	2 Floods, same	2 Floods, same	2 Floods, same	2 Floods, same	2 Floods, same
RR50	1 No flooding	1 No flooding	1 No flooding	1 No flooding	2 Floods, same
RR51	2 Floods, same	3 Floods, longer	2 Floods, same	2 Floods, same	2 Floods, same
RR52	1 No flooding	1 No flooding	1 No flooding	2 Floods, same	2 Floods, same
RR53	2 Floods, same	3 Floods, longer	2 Floods, same	2 Floods, same	2 Floods, same
RR54	1 No flooding	1 No flooding	1 No flooding	2 Floods, same	2 Floods, same
RR55	2 Floods, same	3 Floods, longer	2 Floods, same	2 Floods, same	2 Floods, same
RR56	2 Floods, same	2 Floods, same	3 Floods, longer	2 Floods, same	2 Floods, same
RR57	2 Floods, same	2 Floods, same	2 Floods, same	2 Floods, same	2 Floods, same
RR58	2 Floods, same	2 Floods, same	2 Floods, same	2 Floods, same	2 Floods, same
RR59	2 Floods, same	3 Floods, longer	3 Floods, longer	2 Floods, same	2 Floods, same
RR6	3 Floods, longer	3 Floods, longer	3 Floods, longer	3 Floods, longer	2 Floods, same
RR60	2 Floods, same	3 Floods, longer	2 Floods, same	2 Floods, same	2 Floods, same
RR7	2 Floods, same	3 Floods, longer	2 Floods, same	2 Floods, same	4 Floods, shorter
RR8	3 Floods, longer	3 Floods, longer	3 Floods, longer	3 Floods, longer	4 Floods, shorter
RR9	2 Floods, same	2 Floods, same	4 Floods, shorter	2 Floods, same	2 Floods, same
WLVSA200	2 Floods, same	3 Floods, longer	2 Floods, same	3 Floods, longer	3 Floods, longer
WLVSA202	2 Floods, same	2 Floods, same	2 Floods, same	3 Floods, longer	4 Floods, shorter
WLVSA203	1 No flooding	1 No flooding	1 No flooding	3 Floods, longer	2 Floods, same
WLVSA204	2 Floods, same	3 Floods, longer	3 Floods, longer	3 Floods, longer	2 Floods, same
WLVSA205	3 Floods, longer	1 No flooding	5 No Flood, Now Floods	3 Floods, longer	3 Floods, longer
WLVSA206	3 Floods, longer	1 No flooding	5 No Flood, Now Floods	3 Floods, longer	3 Floods, longer
WLVSA207	3 Floods, longer	1 No flooding	1 No flooding	3 Floods, longer	3 Floods, longer
WLVSA208	3 Floods, longer	1 No flooding	5 No Flood, Now Floods	3 Floods, longer	3 Floods, longer
WLVSA209	2 Floods, same	3 Floods, longer	3 Floods, longer	2 Floods, same	2 Floods, same
WLVSA210	3 Floods, longer	5 No Flood, Now Floods	3 Floods, longer	2 Floods, same	3 Floods, longer
WLVSA211	1 No flooding	1 No flooding	1 No flooding	3 Floods, longer	3 Floods, longer
WLVSA212	5 No Flood, Now Floods	1 No flooding	5 No Flood, Now Floods	3 Floods, longer	3 Floods, longer

continued

Appendix Table A11. Continued					
Storage Area	Flood Event Size				
	2009-like	50-yr	100-yr	500-yr	PMF
	---------------------------------- Group Number and Description of Common Hydrology ----------------------------------				
WLVSA213	5 No Flood, Now Floods	1 No flooding	5 No Flood, Now Floods	3 Floods, longer	3 Floods, longer
WLVSA214	5 No Flood, Now Floods	1 No flooding	5 No Flood, Now Floods	3 Floods, longer	3 Floods, longer
WLVSA215	2 Floods, same	3 Floods, longer	2 Floods, same	2 Floods, same	4 Floods, shorter
WLVSA216	3 Floods, longer	3 Floods, longer	3 Floods, longer	3 Floods, longer	3 Floods, longer
WLVSA217	1 No flooding	1 No flooding	1 No flooding	3 Floods, longer	3 Floods, longer
WLVSA218	1 No flooding	1 No flooding	5 No Flood, Now Floods	4 Floods, shorter	4 Floods, shorter
WLVSA219	1 No flooding	1 No flooding	5 No Flood, Now Floods	3 Floods, longer	3 Floods, longer
WLVSA220	2 Floods, same	3 Floods, longer	2 Floods, same	3 Floods, longer	4 Floods, shorter
WLVSA221	2 Floods, same	3 Floods, longer	2 Floods, same	3 Floods, longer	4 Floods, shorter
WLVSA222	3 Floods, longer	3 Floods, longer	3 Floods, longer	3 Floods, longer	3 Floods, longer
WLVSA223	3 Floods, longer	3 Floods, longer	2 Floods, same	3 Floods, longer	4 Floods, shorter
WLVSA224	3 Floods, longer	3 Floods, longer	3 Floods, longer	3 Floods, longer	2 Floods, same
WLVSA225	3 Floods, longer	5 No Flood, Now Floods	3 Floods, longer	2 Floods, same	3 Floods, longer
WLVSA226	5 No Flood, Now Floods	5 No Flood, Now Floods	5 No Flood, Now Floods	3 Floods, longer	3 Floods, longer
WLVSA227	3 Floods, longer	5 No Flood, Now Floods	3 Floods, longer	2 Floods, same	3 Floods, longer
WLVSA228	3 Floods, longer	3 Floods, longer	3 Floods, longer	3 Floods, longer	4 Floods, shorter
WLVSA229	3 Floods, longer	3 Floods, longer	2 Floods, same	2 Floods, same	4 Floods, shorter
WLVSA230	3 Floods, longer	3 Floods, longer	2 Floods, same	2 Floods, same	4 Floods, shorter
WLVSA231	3 Floods, longer	3 Floods, longer	2 Floods, same	2 Floods, same	4 Floods, shorter
WLVSA232	3 Floods, longer	5 No Flood, Now Floods	3 Floods, longer	2 Floods, same	3 Floods, longer
WLVSA233	3 Floods, longer	3 Floods, longer	3 Floods, longer	3 Floods, longer	2 Floods, same
WLVSA234	5 No Flood, Now Floods	5 No Flood, Now Floods	5 No Flood, Now Floods	3 Floods, longer	3 Floods, longer
WLVSA235	2 Floods, same	3 Floods, longer	2 Floods, same	2 Floods, same	4 Floods, shorter
WLVSA236	3 Floods, longer	3 Floods, longer	3 Floods, longer	3 Floods, longer	2 Floods, same
WLVSA237	3 Floods, longer	3 Floods, longer	3 Floods, longer	3 Floods, longer	2 Floods, same

continued

Appendix Table A11. Continued					
Storage Area	Flood Event Size				
	2009-like	50-yr	100-yr	500-yr	PMF
	---------------------------------- Group Number and Description of Common Hydrology ----------------------------------				
WLVSA57	3 Floods, longer	4 Floods, shorter	3 Floods, longer	4 Floods, shorter	4 Floods, shorter
WLVSA64	4 Floods, shorter	1 No flooding	5 No Flood, Now Floods	4 Floods, shorter	4 Floods, shorter
WLVSA65	3 Floods, longer	5 No Flood, Now Floods	3 Floods, longer	2 Floods, same	3 Floods, longer
WLVSA66	3 Floods, longer	1 No flooding	5 No Flood, Now Floods	2 Floods, same	2 Floods, same
WRRND1	4 Floods, shorter	2 Floods, same	2 Floods, same	2 Floods, same	2 Floods, same
WRRND10	4 Floods, shorter	4 Floods, shorter	4 Floods, shorter	2 Floods, same	2 Floods, same
WRRND11	3 Floods, longer	3 Floods, longer	3 Floods, longer	3 Floods, longer	4 Floods, shorter
WRRND12	4 Floods, shorter	4 Floods, shorter	4 Floods, shorter	2 Floods, same	4 Floods, shorter
WRRND13	4 Floods, shorter	2 Floods, same	4 Floods, shorter	3 Floods, longer	4 Floods, shorter
WRRND14	2 Floods, same	4 Floods, shorter	2 Floods, same	3 Floods, longer	2 Floods, same
WRRND15	2 Floods, same	2 Floods, same	4 Floods, shorter	3 Floods, longer	4 Floods, shorter
WRRND16	2 Floods, same	2 Floods, same	2 Floods, same	3 Floods, longer	4 Floods, shorter
WRRND17	4 Floods, shorter	2 Floods, same	4 Floods, shorter	3 Floods, longer	4 Floods, shorter
WRRND18	2 Floods, same	2 Floods, same	2 Floods, same	3 Floods, longer	4 Floods, shorter
WRRND19	2 Floods, same	2 Floods, same	2 Floods, same	3 Floods, longer	4 Floods, shorter
WRRND2	2 Floods, same	2 Floods, same	2 Floods, same	4 Floods, shorter	2 Floods, same
WRRND3	2 Floods, same	2 Floods, same	4 Floods, shorter	2 Floods, same	4 Floods, shorter
WRRND4	2 Floods, same	2 Floods, same	2 Floods, same	2 Floods, same	4 Floods, shorter
WRRND5	4 Floods, shorter	2 Floods, same	2 Floods, same	2 Floods, same	4 Floods, shorter
WRRND6	4 Floods, shorter	4 Floods, shorter	4 Floods, shorter	2 Floods, same	4 Floods, shorter
WRRND7	2 Floods, same	2 Floods, same	4 Floods, shorter	2 Floods, same	2 Floods, same
WRRND8	4 Floods, shorter	4 Floods, shorter	2 Floods, same	2 Floods, same	2 Floods, same

continued

Appendix Table A11. Continued					
Storage Area	Flood Event Size				
	2009-like	50-yr	100-yr	500-yr	PMF
	---------------------------------- Group Number and Description of Common Hydrology ----------------------------------				
WRRND9	4 Floods, shorter	2 Floods, same	2 Floods, same	2 Floods, same	2 Floods, same
WRSA273	1 No flooding	1 No flooding	1 No flooding	2 Floods, same	2 Floods, same
WRSA280	1 No flooding	1 No flooding	1 No flooding	2 Floods, same	2 Floods, same
WRSA284	1 No flooding	1 No flooding	1 No flooding	1 No flooding	2 Floods, same
WRSA289	1 No flooding	1 No flooding	1 No flooding	1 No flooding	3 Floods, longer
WRSA294	2 Floods, same	2 Floods, same	2 Floods, same	2 Floods, same	2 Floods, same
WRSA299	2 Floods, same	4 Floods, shorter	4 Floods, shorter	3 Floods, longer	4 Floods, shorter
WRSA300	2 Floods, same	4 Floods, shorter	2 Floods, same	2 Floods, same	2 Floods, same
WRSA302	3 Floods, longer	5 No Flood, Now Floods	3 Floods, longer	3 Floods, longer	3 Floods, longer
WRSA303	4 Floods, shorter	1 No flooding	5 No Flood, Now Floods	5 No Flood, Now Floods	2 Floods, same
WRSA304	4 Floods, shorter	3 Floods, longer	2 Floods, same	2 Floods, same	4 Floods, shorter
WRSA305A	4 Floods, shorter	2 Floods, same	2 Floods, same	3 Floods, longer	4 Floods, shorter
WRSA305B	4 Floods, shorter	4 Floods, shorter	2 Floods, same	3 Floods, longer	4 Floods, shorter
WRSA305C	4 Floods, shorter	4 Floods, shorter	2 Floods, same	3 Floods, longer	4 Floods, shorter
WRSA305D	4 Floods, shorter	4 Floods, shorter	2 Floods, same	3 Floods, longer	4 Floods, shorter
WRSA306	3 Floods, longer	4 Floods, shorter	4 Floods, shorter	3 Floods, longer	4 Floods, shorter
WRSA307	3 Floods, longer	3 Floods, longer	2 Floods, same	4 Floods, shorter	4 Floods, shorter
WRSA308	5 No Flood, Now Floods	5 No Flood, Now Floods	5 No Flood, Now Floods	5 No Flood, Now Floods	2 Floods, same
WRSA309	4 Floods, shorter	2 Floods, same	4 Floods, shorter	4 Floods, shorter	4 Floods, shorter
WRSA311	3 Floods, longer	4 Floods, shorter	4 Floods, shorter	3 Floods, longer	4 Floods, shorter
WRSA312	3 Floods, longer	4 Floods, shorter	2 Floods, same	3 Floods, longer	4 Floods, shorter
WRSA315	4 Floods, shorter	2 Floods, same	4 Floods, shorter	4 Floods, shorter	4 Floods, shorter
WRSA321	4 Floods, shorter	4 Floods, shorter	4 Floods, shorter	4 Floods, shorter	4 Floods, shorter
WRSA350	2 Floods, same	2 Floods, same	2 Floods, same	4 Floods, shorter	4 Floods, shorter
WRSA351	4 Floods, shorter	4 Floods, shorter	4 Floods, shorter	3 Floods, longer	4 Floods, shorter
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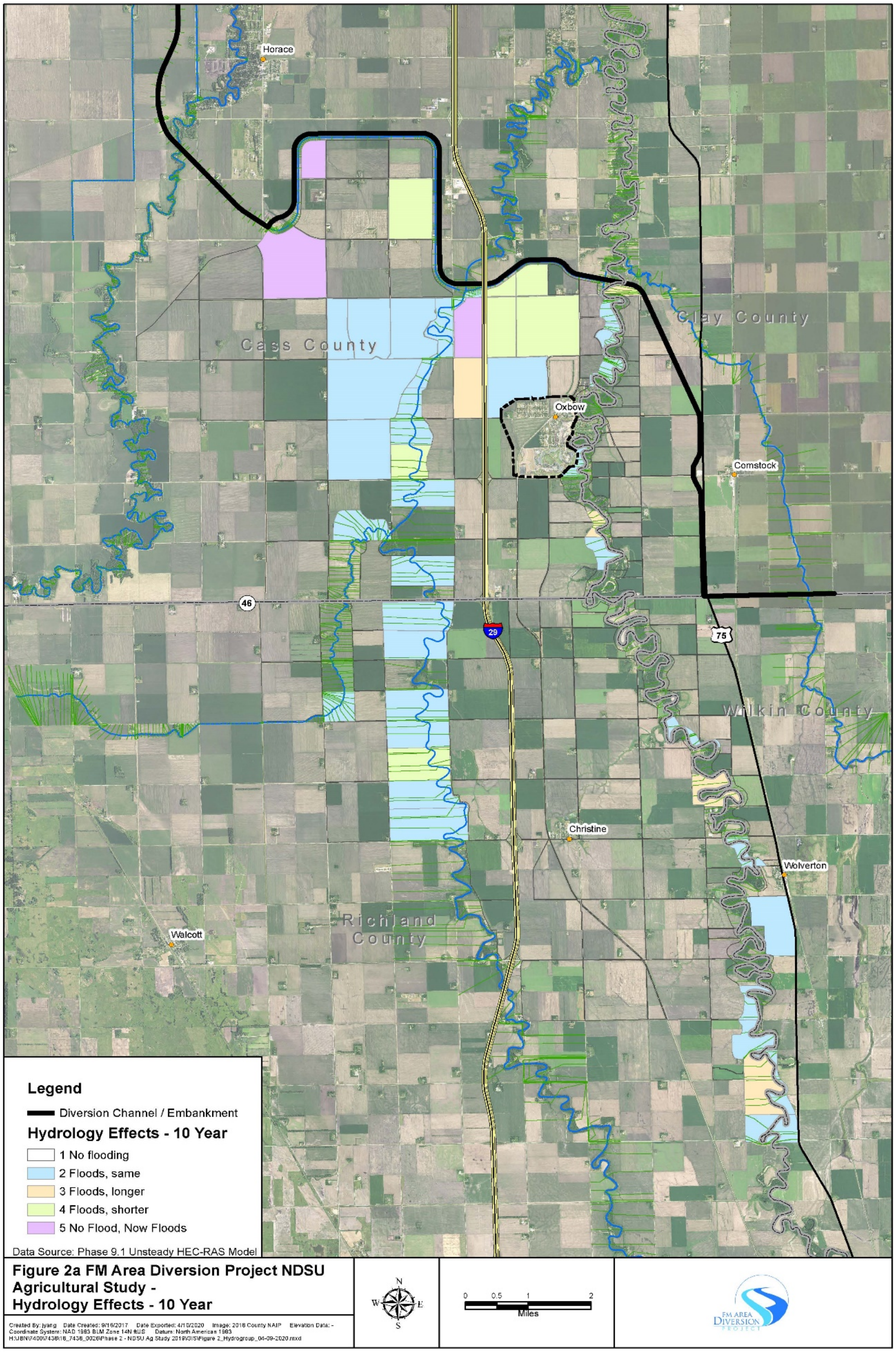
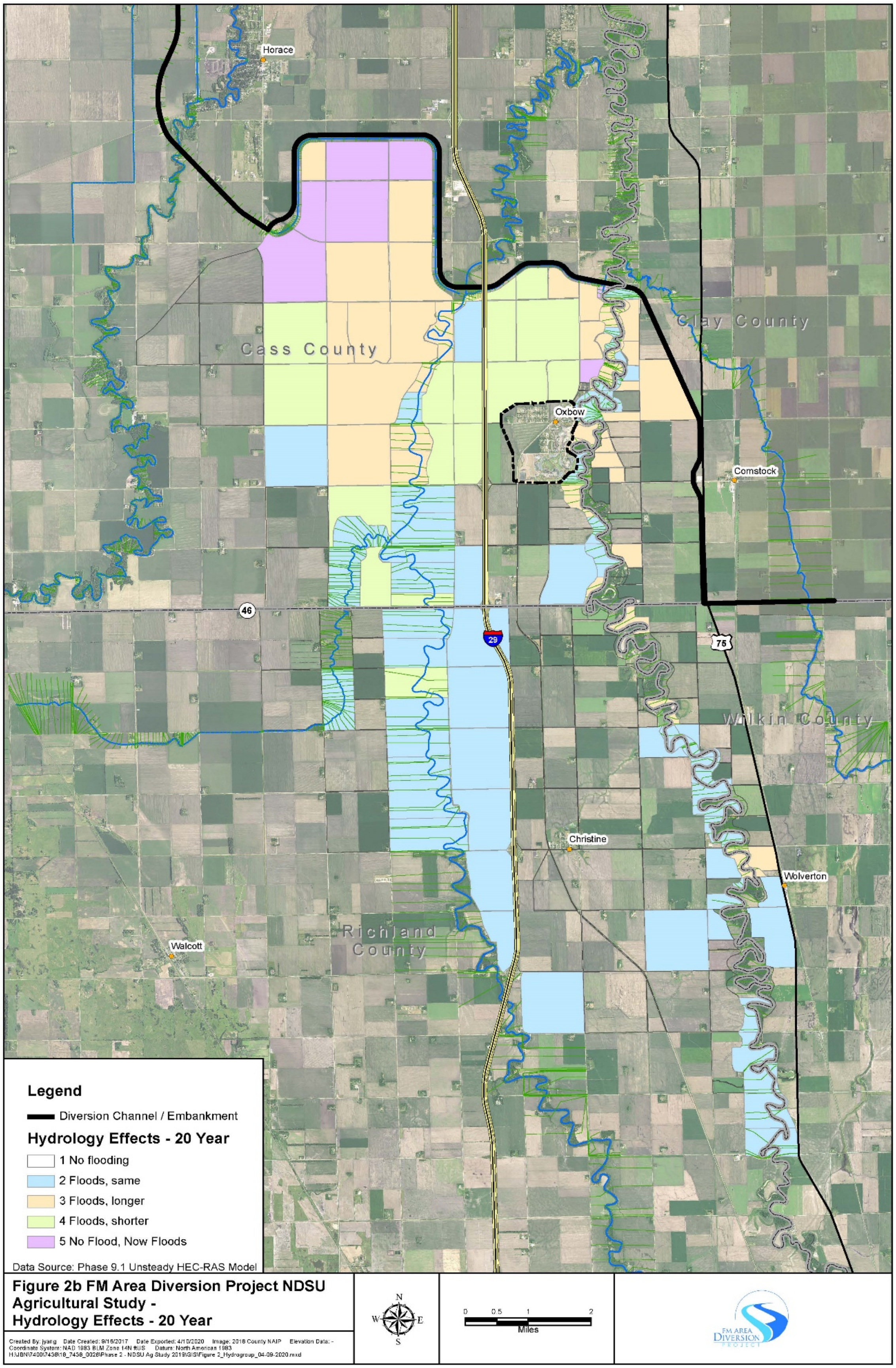
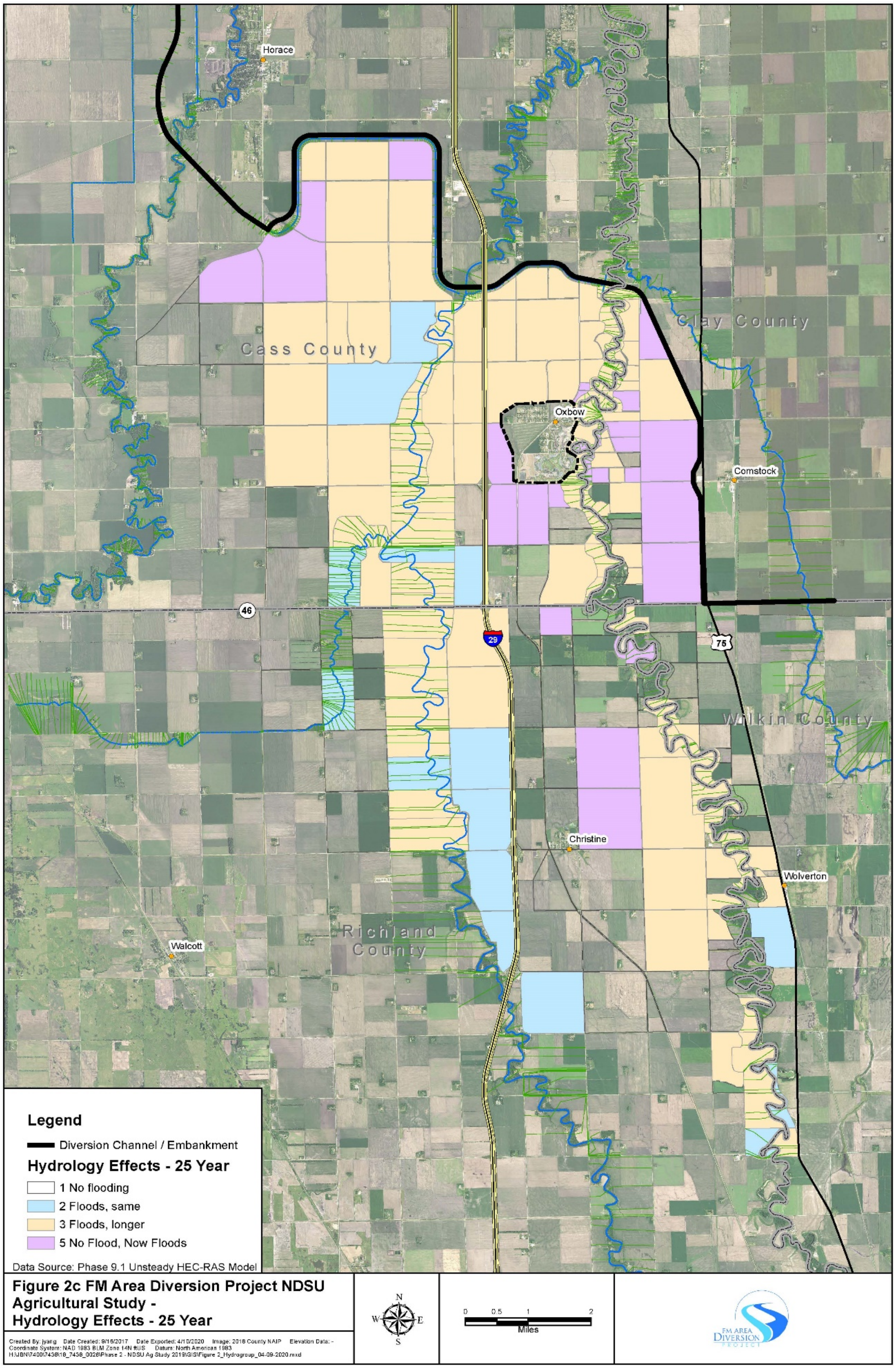
Appendix Table A11. Continued					
Storage Area	Flood Event Size				
	2009-like	50-yr	100-yr	500-yr	PMF
	---------------------------------- Group Number and Description of Common Hydrology ----------------------------------				
WRSA352	4 Floods, shorter	4 Floods, shorter	4 Floods, shorter	4 Floods, shorter	4 Floods, shorter
WRSA353	3 Floods, longer	3 Floods, longer	3 Floods, longer	3 Floods, longer	4 Floods, shorter
WRSA354	2 Floods, same	3 Floods, longer	2 Floods, same	2 Floods, same	4 Floods, shorter
WRSA355	2 Floods, same	2 Floods, same	2 Floods, same	2 Floods, same	2 Floods, same
WRSA356	2 Floods, same	2 Floods, same	2 Floods, same	2 Floods, same	2 Floods, same
WRSA357	2 Floods, same	3 Floods, longer	2 Floods, same	2 Floods, same	2 Floods, same
WRSA358	3 Floods, longer	3 Floods, longer	3 Floods, longer	3 Floods, longer	2 Floods, same
WRSA359	2 Floods, same	3 Floods, longer	2 Floods, same	2 Floods, same	2 Floods, same
WRSA360	2 Floods, same	2 Floods, same	2 Floods, same	2 Floods, same	2 Floods, same
WRSA363	4 Floods, shorter	4 Floods, shorter	4 Floods, shorter	3 Floods, longer	4 Floods, shorter
WRSA364	4 Floods, shorter	4 Floods, shorter	4 Floods, shorter	4 Floods, shorter	4 Floods, shorter
WRSA373	1 No flooding	1 No flooding	1 No flooding	1 No flooding	2 Floods, same
WRSA378	1 No flooding	1 No flooding	1 No flooding	3 Floods, longer	2 Floods, same
WRSA383	1 No flooding	1 No flooding	1 No flooding	1 No flooding	2 Floods, same
WRSA384	1 No flooding	1 No flooding	1 No flooding	3 Floods, longer	2 Floods, same
WRSA389	1 No flooding	1 No flooding	1 No flooding	1 No flooding	2 Floods, same
WRSA390	4 Floods, shorter	2 Floods, same	4 Floods, shorter	4 Floods, shorter	2 Floods, same
WRSA501	3 Floods, longer	3 Floods, longer	3 Floods, longer	2 Floods, same	4 Floods, shorter
WRSA502	3 Floods, longer	3 Floods, longer	3 Floods, longer	3 Floods, longer	3 Floods, longer
WRSA504	3 Floods, longer	5 No Flood, Now Floods	3 Floods, longer	4 Floods, shorter	3 Floods, longer
WRSA505	2 Floods, same	3 Floods, longer	2 Floods, same	2 Floods, same	2 Floods, same
WRSA360	2 Floods, same	2 Floods, same	2 Floods, same	2 Floods, same	2 Floods, same
WRSA363	4 Floods, shorter	4 Floods, shorter	4 Floods, shorter	3 Floods, longer	4 Floods, shorter
WRSA364	4 Floods, shorter	4 Floods, shorter	4 Floods, shorter	4 Floods, shorter	4 Floods, shorter
WRSA373	1 No flooding	1 No flooding	1 No flooding	1 No flooding	2 Floods, same
WRSA378	1 No flooding	1 No flooding	1 No flooding	3 Floods, longer	2 Floods, same
WRSA383	1 No flooding	1 No flooding	1 No flooding	1 No flooding	2 Floods, same
WRSA384	1 No flooding	1 No flooding	1 No flooding	3 Floods, longer	2 Floods, same
WRSA389	1 No flooding	1 No flooding	1 No flooding	1 No flooding	2 Floods, same
WRSA390	4 Floods, shorter	2 Floods, same	4 Floods, shorter	4 Floods, shorter	2 Floods, same
PMF = Probabilistic Maximum Flood.					



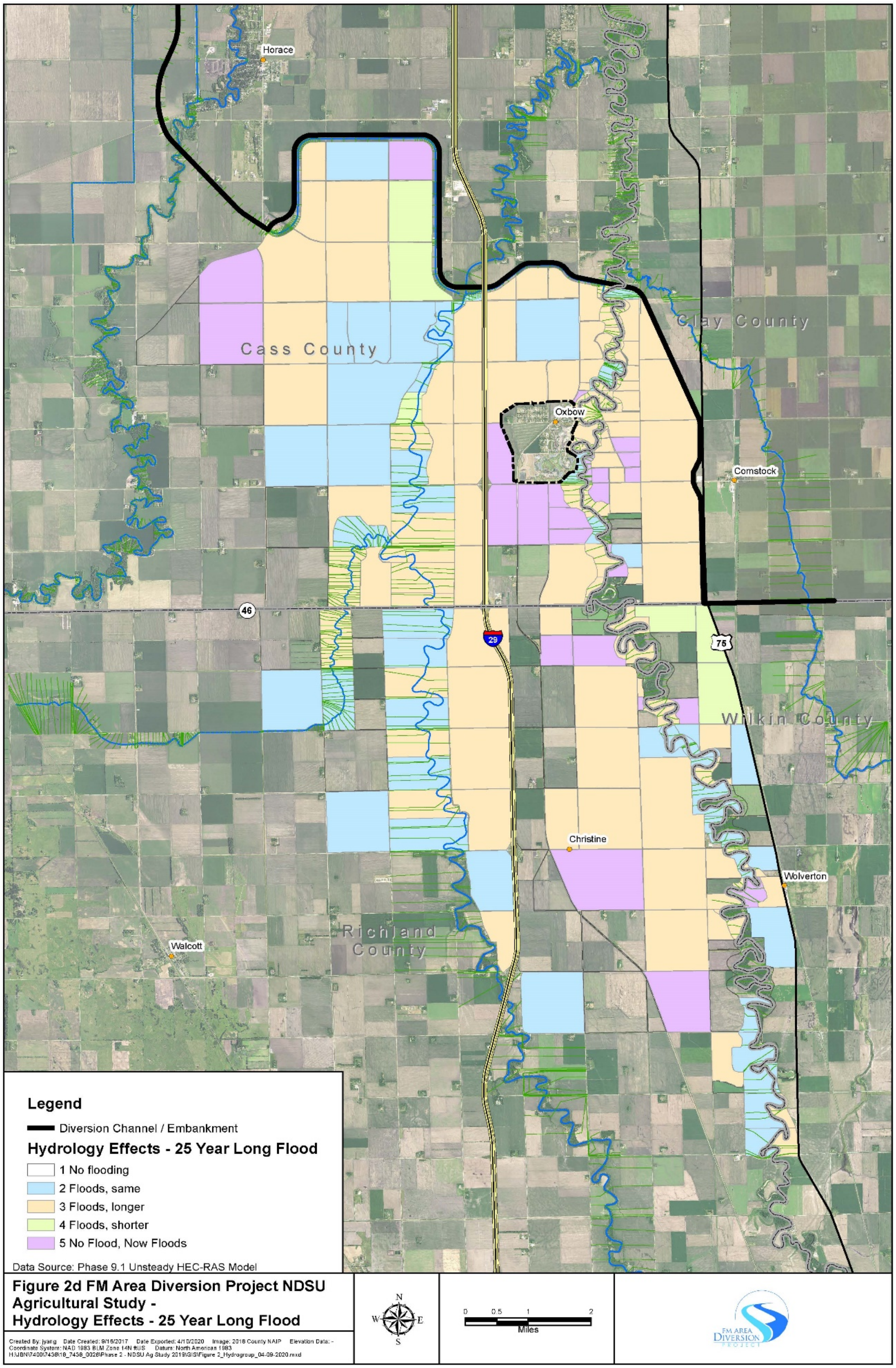
Appendix Figure A1. Hydrology Groups for Storage Areas, 10-year Flood Event



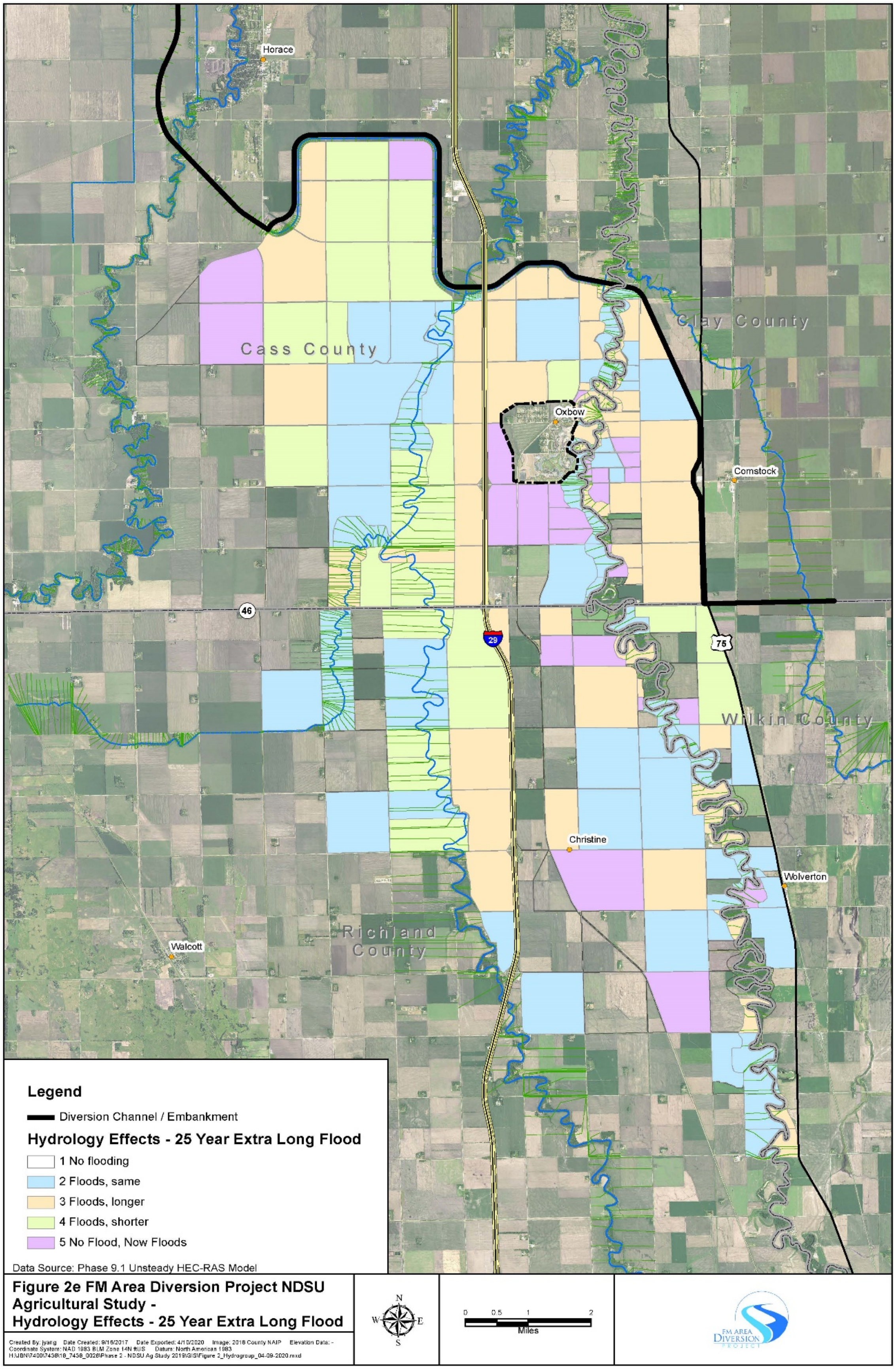
Appendix Figure A2. Hydrology Groups for Storage Areas, 20-year Flood Event



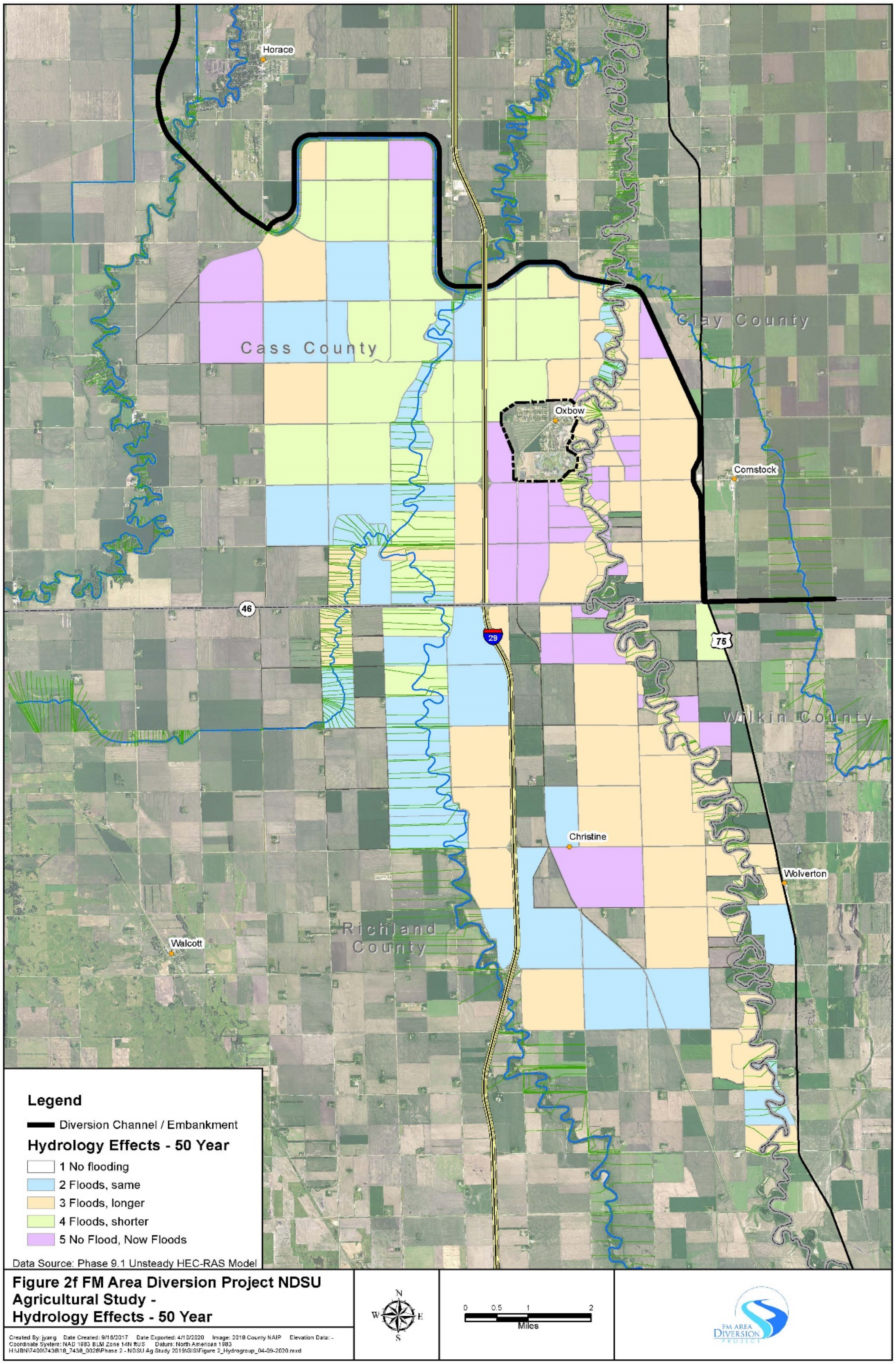
Appendix Figure A3. Hydrology Groups for Storage Areas, 25-year Flood Event



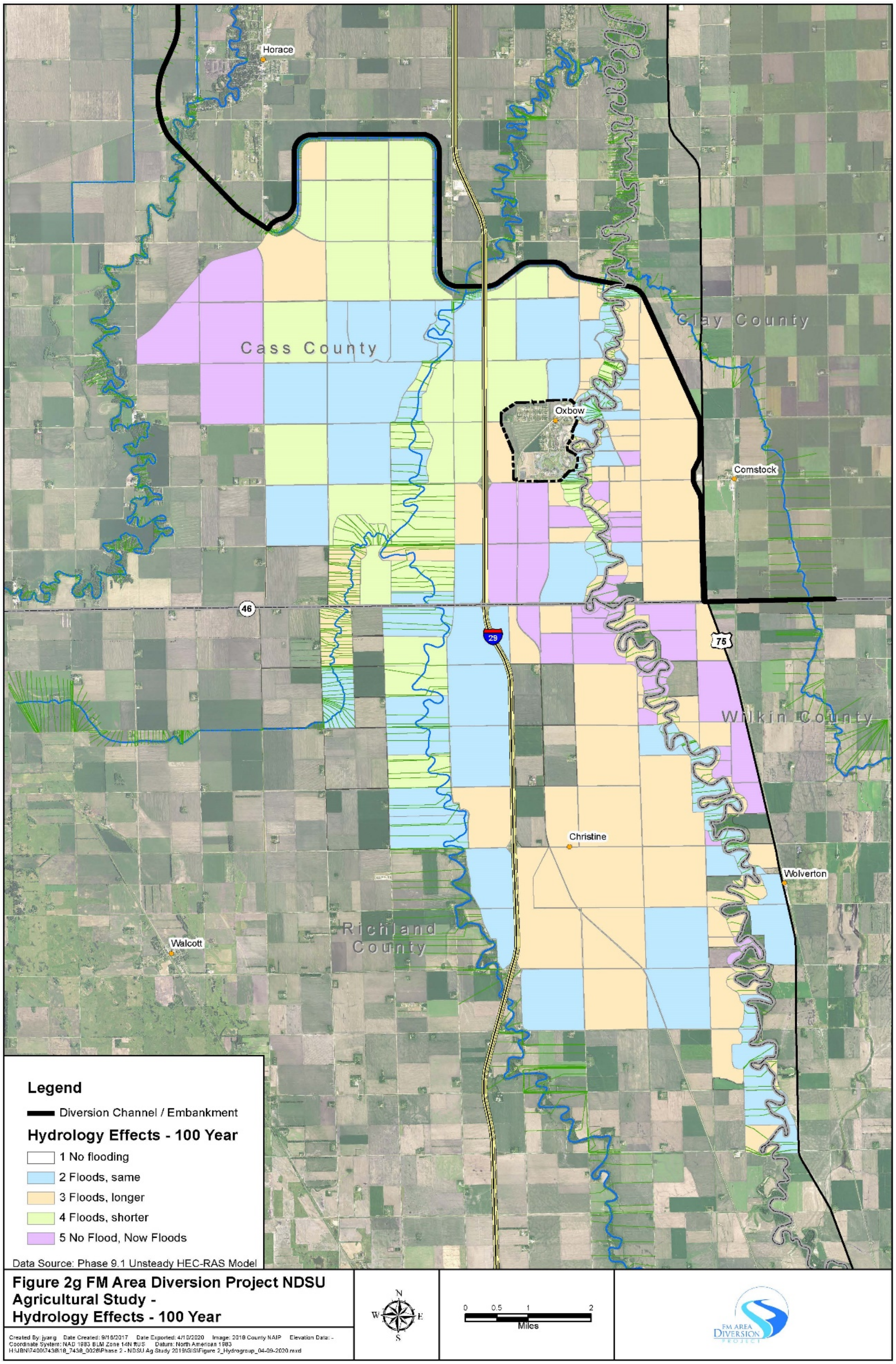
Appendix Figure A4. Hydrology Groups for Storage Areas, 25-year Long Flood Event



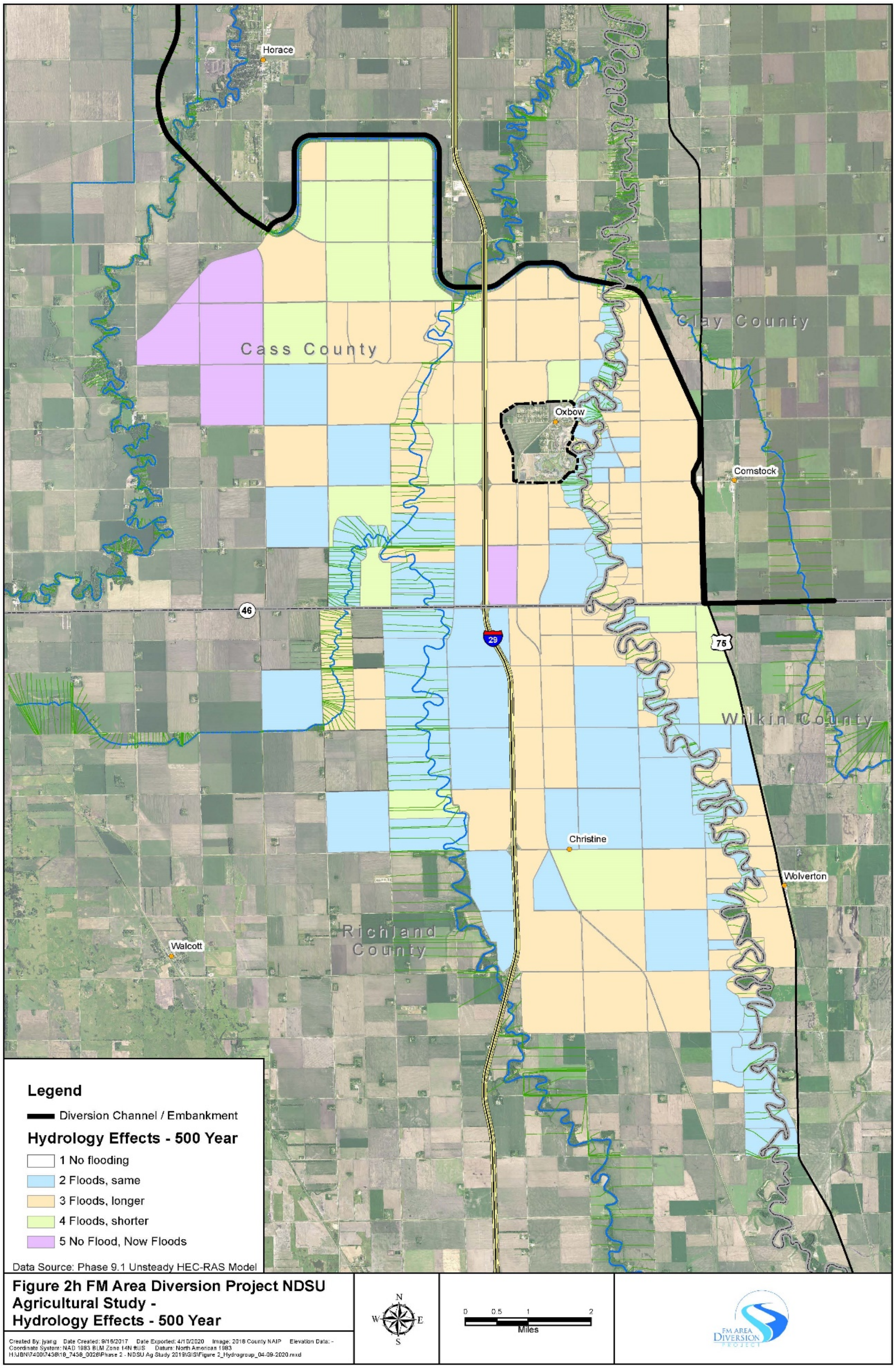
Appendix Figure A5. Hydrology Groups for Storage Areas, 25-year Extra Long Flood Event



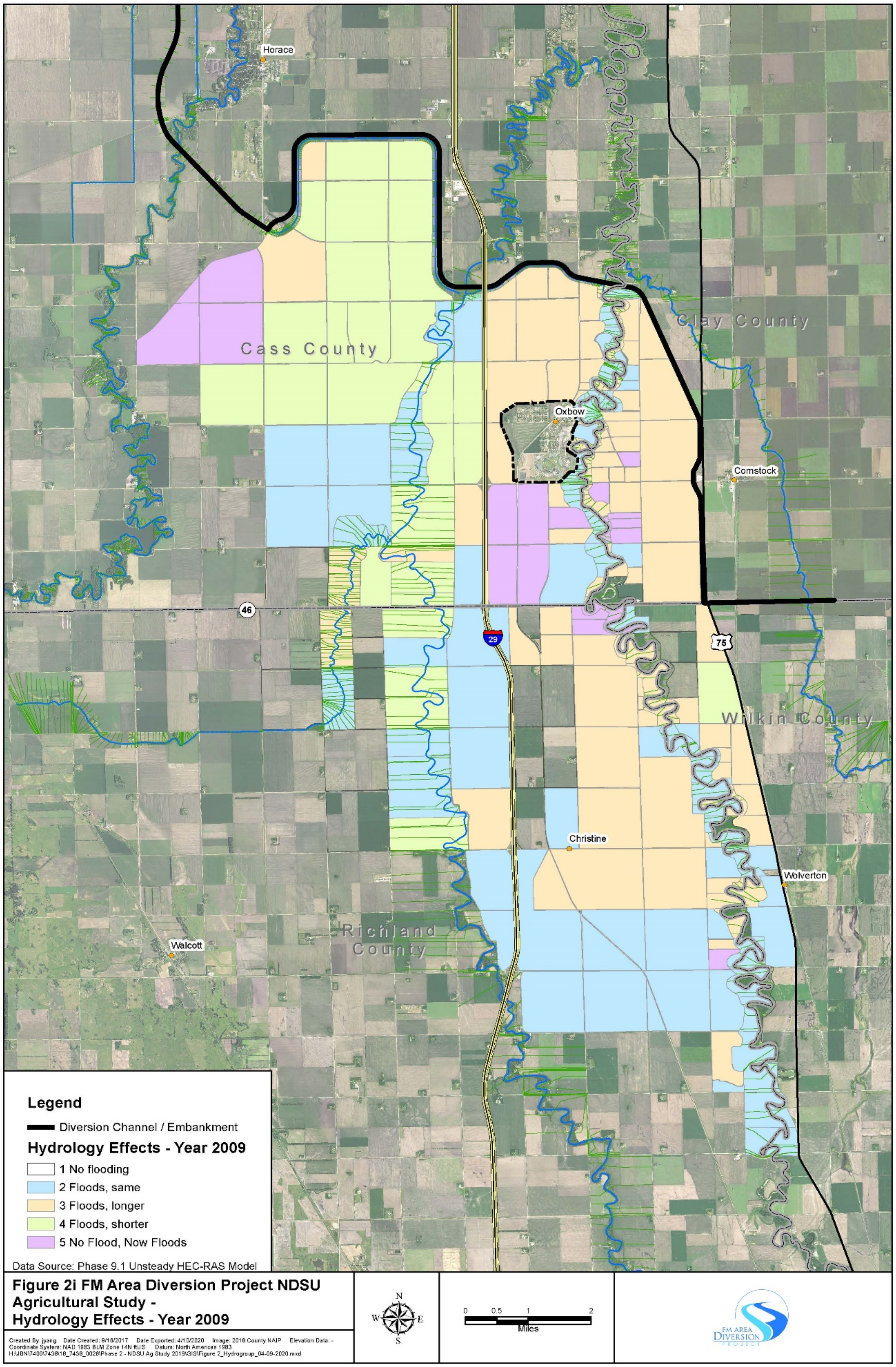
Appendix Figure A6. Hydrology Groups for Storage Areas, 2009-year Flood Event



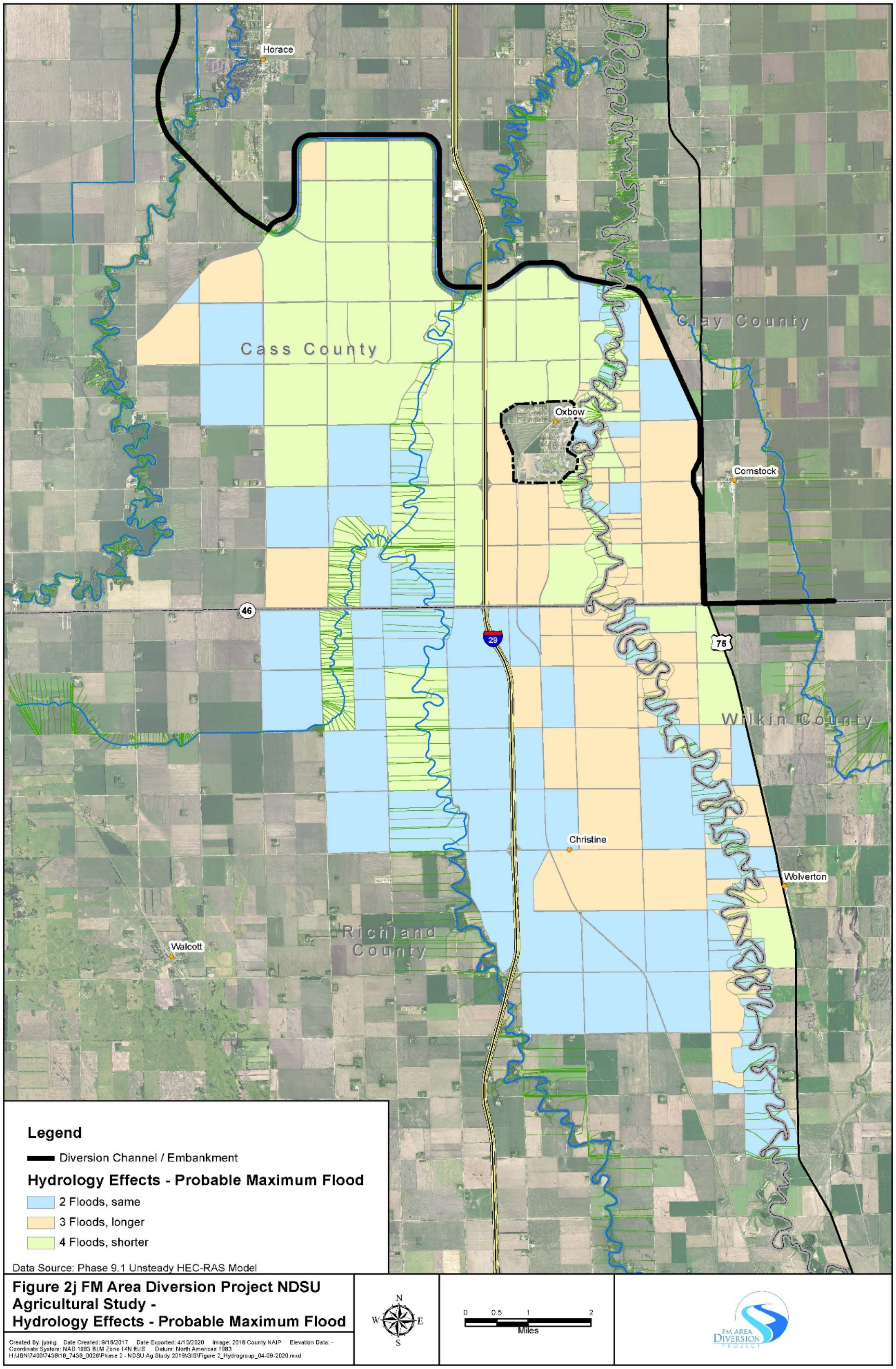
Appendix Figure A7. Hydrology Groups for Storage Areas, 50-year Flood Event



Appendix Figure A8. Hydrology Groups for Storage Areas, 100-year Flood Event



Appendix Figure A9. Hydrology Groups for Storage Areas, 500-year Flood Event



Appendix Table A10: Hydrology Groups for Storage Areas, Probabilistic Maximum Flood Event

Appendix B

NDSU Extension Producer Decision Guide for Prevent Plant

Prevented Planting (PP) and Planting Comparison, per Acre, 2019

Developed by Andrew Swenson, NDSU Extension Service, Revised April 2019

			Instructions and Comments:
PP Crop		**Spring Wheat**	
APH		44	Actual Production History (APH) yield for crop insurance
Crop Insurance Coverage Level		75%	
PP Coverage Buy-up?	Yes	65%	PP Coverage is 60% except corn and canola, 55%, and dry beans, 50%. Buy-up is 5%.
Insured Price for PP Crop		$ 5.770	
PP Indemnity Payment		$ 123.77	
Seed for cover crop	$ 9.00		Don't include 'sunk' costs such as land, mach. depre., and crop insurance
Chemicals	$ 7.00		premiums that would be the same regardless of the PP decision.
Fuel & Lube	$ 8.00		
Repairs	$ 8.00		
Custom work	$ -		
Other	$ -		
PP Land Maintenance		$ 32.00	
PP Indemnity - Maintenance Costs		$ 91.77	Partial Budget of Prevented Planting (PP indemnity payment less direct costs of maintaining idled land.)

Crop, if Planted		**Soybean**	Enter any crop to compare with the PP situation in the above table.
APH		33	
Policy		Revenue	
Crop Insurance Coverage Level		75%	
Crop Insurance Base Price		$ 9.540	Projected (Spring) price if Revenue or Yield Policy, or APH insured price.
Revenue Ins. Harvest Price est.		$ 9.200	If you have a Revenue policy, enter 'Harvest Price.' Enter 0 if APH or Yield policy.
No. of days crop is planted late		3	**No. of days after its "Final Planting Date" that this crop was planted.**[1]
Expected Yield		25	**Estimated actual 2019 yield. Try different numbers to see impact on analysis.**
Expected Market Price		$ 8.00	**Estimated cash sales price of 2019 production.**
Expected Crop Sale Revenue		$ 200.00	
Expected Crop Ins. Indemnity		$ -	
Seed	$ 65.00		Don't include 'sunk' costs such as land, mach. depre., and crop insurance
Chemicals	$ 28.00		premiums that would be the same regardless of the PP decision.
Fertilizer	$ 15.00		Note: do not include cost of fertilizer which was applied prior to the PP decision
Fuel & Lube	$ 13.00		because it would be a 'sunk' cost.
Repairs	$ 18.00		
Drying			
Custom Work			
Other			
Costs, planting through harvest		$ 139.00	
Revenue - Costs, planting thru harv.		$ 61.00	Partial Budget of Planting (Crop sales & crop ins. payments - marginal costs)
Gain (Loss) from Prevent Planting relative to Planting		**$ 30.77**	A positive number indicates a greater return per acre from PP than for seeding. A (negative) number shows loss from PP relative to planting the crop.

Appendix Figure B1. Sample Framework for Determining Producer-level Economics of Switching Crop Acreage versus Prevent Plant.

Source: Swenson (2019).

Appendix C

Crop Insurance Statistics

Appendix Table C1. Revenues from Crop Enterprises, Cass County, North Dakota, 1995 through 2018				
Year	Cash Receipts from Crop Marketings	Government Payments[a]	Crop Insurance Indemnities[b]	Insurance Indemnitees as Percentage of Crop Revenues[c]
	-------------------------- 000s nominal $ --------------------------			
1995	183,496	11,783	5,175	2.82%
1996	197,879	13,023	1,123	0.57%
1997	186,837	13,188	5,990	3.21%
1998	155,291	27,721	6,306	4.06%
1999	167,507	52,824	14,946	8.92%
2000	149,137	59,002	7,542	5.06%
2001	155,423	53,754	8,982	5.78%
2002	201,324	12,959	4,454	2.21%
2003	203,324	23,489	8,039	3.95%
2004	192,571	18,484	24,321	12.63%
2005	179,333	34,978	8,435	4.70%
2006	204,251	18,794	3,961	1.94%
2007	245,546	15,266	33,094	13.48%
2008	360,890	22,435	24,432	6.77%
2009	326,539	12,723	20,681	6.33%
2010	346,547	24,407	14,846	4.28%
2011	345,938	20,288	97,657	28.23%
2012	459,176	16,211	9,853	2.15%
2013	503,046	7,250	26,882	5.34%
2014	442,670	2,544	27,876	6.30%
2015	400,053	3,583	16,571	4.14%
2016	496,951	6,098	2,360	0.47%
2017	456,937	6,523	5,349	1.17%
2018	470,472	16,330	7,150	1.52%

[a] Includes payments for conservation programs, federal disaster aid, and federal farm programs.
[b] Gross indemnities not adjusted for premiums paid.
[c] Crop revenues defined as the sum of cash receipts, government payments, and insurance indemnities.
Source: U.S. Bureau of Economic Analysis (2020).

Appendix Table C2. Revenues from Crop Enterprises, Richland County, North Dakota, 1995 through 2018				
Year	Cash Receipts from Crops	Government Payments[a]	Crop Insurance Indemnities[b]	Insurance Indemnitees as Percentage of Crop Revenues[c]
	-------------------------- 000s nominal $ --------------------------			
1995	141,593	10,983	3,712	2.38%
1996	149,268	11,353	1,112	0.69%
1997	164,238	12,113	2,231	1.25%
1998	124,817	23,812	5,426	3.52%
1999	152,481	47,151	5,058	2.47%
2000	135,758	50,788	3,166	1.67%
2001	137,154	43,194	9,960	5.23%
2002	182,771	14,834	2,414	1.21%
2003	184,895	24,136	2,941	1.39%
2004	180,231	24,548	6,839	3.23%
2005	159,396	38,803	11,082	5.30%
2006	193,189	25,099	5,534	2.47%
2007	223,759	22,616	18,525	6.99%
2008	309,761	37,989	24,428	6.56%
2009	265,723	26,048	32,824	10.11%
2010	307,633	38,895	15,785	4.36%
2011	343,662	46,108	51,621	11.70%
2012	432,061	34,585	2,167	0.46%
2013	412,663	10,798	26,287	5.8%
2014	366,265	3,775	31,389	7.8%
2015	354,889	4,542	8,020	2.2%
2016	414,440	8,371	1,098	0.3%
2017	414,184	7,515	2,587	0.6%
2018	422,400	26,713	2,161	0.5%

[a] Includes payments for conservation programs, federal disaster aid, and federal farm programs.
[b] Gross indemnities not adjusted for premiums paid.
[c] Crop revenues defined as the sum of cash receipts, government payments, and insurance indemnities.
Source: U.S. Bureau of Economic Analysis (2020).

Appendix Table C3. Revenues from Crop Enterprises, Clay County, Minnesota, 1995 through 2018				
Year	Cash Receipts from Crops	Government Payments[a]	Crop Insurance Indemnities[b]	Insurance Indemnitees as Percentage of Crop Revenues[c]
	-------------------------- 000s nominal $ --------------------------			
1995	101,487	7,179	2,575	2.32%
1996	132,063	8,324	1,006	0.71%
1997	98,762	8,390	2,512	2.29%
1998	95,296	14,849	8,160	6.90%
1999	98,370	29,167	6,020	4.51%
2000	97,302	31,580	10,883	7.79%
2001	93,369	29,152	3,074	2.45%
2002	105,024	9,079	6,417	5.32%
2003	127,889	13,702	2,123	1.48%
2004	113,830	11,246	9,394	6.99%
2005	113,354	14,861	3,016	2.30%
2006	137,376	9,989	1,258	0.85%
2007	178,096	8,661	4,581	2.39%
2008	251,062	9,362	14,209	5.17%
2009	188,108	8,190	8,456	4.13%
2010	242,103	9,728	3,763	1.47%
2011	241,270	8,105	23,053	8.46%
2012	337,513	6,986	2,991	0.86%
2013	379,450	2,785	9,308	2.4%
2014	270,436	809	17,141	5.9%
2015	217,221	4,958	4,073	1.8%
2016	266,497	3,813	3,280	1.2%
2017	263,898	5,198	2,738	1.0%
2018	277,435	13,394	4,356	1.5%

[a] Includes payments for conservation programs, federal disaster aid, and federal farm programs.
[b] Gross indemnities not adjusted for premiums paid.
[c] Crop revenues defined as the sum of cash receipts, government payments, and insurance indemnities.
Source: U.S. Bureau of Economic Analysis (2020).

Appendix Table C4. Revenues from Crop Enterprises, Wilkin County, Minnesota, 1995 through 2018				
Year	Cash Receipts from Crops	Government Payments[a]	Crop Insurance Indemnities[b]	Insurance Indemnitees as Percentage of Crop Revenues[c]
	-------------------------- 000s nominal $ --------------------------			
1995	83,938	3,698	848	1.0%
1996	106,505	5,347	380	0.3%
1997	83,183	5,297	692	0.8%
1998	80,090	11,317	1,565	1.7%
1999	89,415	19,764	1,092	1.0%
2000	85,079	22,524	1,776	1.6%
2001	77,804	20,696	3,711	3.6%
2002	91,208	6,740	1,669	1.7%
2003	110,118	9,762	1,416	1.2%
2004	106,341	9,246	4,739	3.9%
2005	94,876	11,994	7,856	6.8%
2006	114,980	7,768	1,056	0.9%
2007	137,609	6,479	8,907	5.8%
2008	179,910	8,779	23,225	11.0%
2009	148,017	5,881	22,234	12.6%
2010	184,503	11,856	2,063	1.0%
2011	203,705	10,113	12,662	5.6%
2012	290,672	6,491	799	0.3%
2013	288,053	2,818	17,238	5.6%
2014	208,861	2,000	15,539	6.9%
2015	173,783	8,985	1,523	0.8%
2016	203,022	7,596	754	0.4%
2017	199,985	5,476	2,108	1.0%
2018	226,572	14,557	1,502	0.6%

[a] Includes payments for conservation programs, federal disaster aid, and federal farm programs.
[b] Gross indemnities not adjusted for premiums paid.
[c] Crop revenues defined as the sum of cash receipts, government payments, and insurance indemnities.
Source: U.S. Bureau of Economic Analysis (2020).

Appendix Table C5. Cumulative Crop Revenues, Government Payments, and Insurance Indemnities, Cass and Richland Counties, North Dakota, Clay and Wilken Counties, Minnesota, 1995 through 2018				
County	Cash Receipts from Marketings	Government Payments[a]	Crop Insurance Indemnities[b]	Average Percentage of Crop Revenues[c] from Insurance
	------------------------------- 000s nominal $ -------------------------------			
Cass	7,031,138	493,657	386,025	4.9%
Richland	6,108,187	465,248	276,367	4.0%
Clay	4,420,175	271,642	154,386	3.2%
Wilkin	3,568,229	225,184	135,356	3.4%
Total	21,127,729	1,455,731	952,134	4.0%

[a] Includes payments for conservation programs, federal disaster aid, and federal farm programs.
[b] Gross indemnities not adjusted for premiums paid.
[c] Crop revenues defined as the sum of cash receipts, government payments, and insurance indemnities.
Source: Bureau of Economic Analysis (2020).

Appendix Table C6. Total Insurance Indemnities, All Causes of Loss, Cass and Richland Counties, North Dakota, Clay and Wilken Counties, Minnesota, 1989 through 2019

Year	Spring Flood Event[a]	Total Indemnities	Year	Spring Flood Event[a]	Ranking of Total Indemnities
		------ 2019 $ ------			------ 2019 $ ------
1989	Yes	18,928,479	1996		5,554,143
1990		6,453,120	1991		6,332,623
1991		6,332,623	1990		6,453,120
1992		6,985,607	1992		6,985,607
1993		41,580,447	2016		7,931,706
1994		15,188,237	2017		13,171,982
1995		19,263,098	2006	Yes	14,775,037
1996		5,554,143	2018		15,028,023
1997	Yes	17,198,419	1994		15,188,237
1998		31,940,641	1997	Yes	17,198,419
1999		39,835,376	2012		17,725,803
2000		33,749,622	1989	Yes	18,928,479
2001	Yes	36,219,011	1995		19,263,098
2002		20,709,081	2003		19,741,014
2003		19,741,014	2002		20,709,081
2004		60,240,461	1998		31,940,641
2005		39,197,266	2015		32,253,803
2006	Yes	14,775,037	2000		33,749,622
2007		78,419,988	2001	Yes	36,219,011
2008		102,684,575	2005		39,197,266
2009	Yes	98,667,870	1999		39,835,376
2010	Yes	42,555,765	1993		41,580,447
2011	Yes	211,972,876	2010	Yes	42,555,765
2012		17,725,803	2004		60,240,461
2013		87,865,124	2007		78,419,988
2014		99,546,896	2019	Yes	80,236,280
2015		32,253,803	2013		87,865,124
2016		7,931,706	2009	Yes	98,667,870
2017		13,171,982	2014		99,546,896
2018		15,028,023	2008		102,684,575
2019	Yes	80,236,280	2011	Yes	211,972,876

Averages		
1989-2019	42,600,000	
2000-2019	55,600,000	
2010-2019	60,800,000	
2014-2019	29,700,000	
Flood years	65,100,000	
Non-flood years	34,800,000	
Flood years Without 2011	44,100,000	(excluding 2011)

[a]Flood events exceeding 17,000 cfs in Fargo, North Dakota.
Source: Risk Management Agency (2020).

Appendix Table C7. Prevent Plant Acreage for Selected Crops, by County, FM Diversion Staging Area, 2009 through 2019											
Minnesota	2019	2018	2017	2016	2015	2014	2013	2012	2011	2010	2009
Clay County											
Corn	5,371	295	485	0	2,243	10,811	1,093	0	4,433	1,457	5,097
Soybeans	585	74	24	0	1,079	2,673	613	111	1,933	360	1,634
Sugarbeets		0	0	0	0	0	0	0	3	0	0
Wheat	133	70	0	0	8	176	39	62	347	102	166
Total	6,089	439	509	0	3,330	13,662	1,745	174	6,717	1,920	6,898
Wilkin County											
Corn	4,473	164	1,203	0	1,064	11,575	4,174	0	1,281	1,500	5,702
Soybeans	293	16	21	0	178	3,963	1,330	0	916	234	1,857
Sugarbeets	0	0	0	0	0	0	28	0	0	0	103
Wheat	62	0	0	0	0	146	46	0	35	278	400
Total	4,829	180	1,224	0	1,242	15,684	5,579	0	2,233	2,012	8,062
North Dakota											
Cass County											
Corn	60,502	854	297	41	20,499	52,463	7,664	972	88,965	26,510	37,386
Soybeans	9,970	656	15	58	4,528	5,127	2,212	1,421	26,267	12,412	7,392
Sugarbeets	0	0	0	0	0	0	0	12	18	0	0
Wheat	1,246	186	0	0	0	275	107	172	7,107	1,540	1,192
Total	71,717	1,696	312	99	25,027	57,866	9,984	2,578	122,359	40,462	45,971
Richland County											
Corn	45,891	697	567	151	8,231	39,963	20,612	2,637	41,343	39,928	42,210
Soybeans	9,750	307	99	300	2,693	9,157	6,315	3,296	9,999	8,624	9,702
Sugarbeets	0	0	0	0	5	127	0	0	11	65	441
Wheat	436	22	1	0	81	353	197	310	1,594	1,280	1,693
Total	56,077	1,026	667	451	11,011	49,600	27,125	6,244	52,949	49,898	54,047
Total ND and MN	138,712	3,342	2,712	550	40,610	136,813	44,435	8,997	184,258	94,293	114,980
Source: Farm Service Agency (2020).											

Appendix Table C8. Total Crop Acreage for Selected Crops, by County, FM Diversion Staging Area, 2009 through 2019

Minnesota	2019	2018	2017	2016	2015	2014	2013	2012	2011	2010	2009
Clay County											
Corn	144,257	128,508	134,747	135,513	106,771	110,676	141,851	129,422	111,798	92,161	86,676
Soybeans	153,334	171,031	181,821	164,182	171,084	194,051	168,041	164,666	167,719	182,129	184,688
Sugarbeets	37,419	36,633	37,718	39,668	37,922	36,674	42,012	41,839	45,555	40,365	41,979
Wheat	68,436	75,510	55,025	67,093	68,114	53,090	55,707	65,231	80,106	86,514	87,039
Total	403,445	411,683	409,311	406,456	383,891	394,491	407,611	401,157	405,178	401,168	400,382
Wilkin County											
Corn	136,491	117,724	123,808	120,641	101,215	105,855	126,792	110,744	92,841	73,279	76,680
Soybeans	152,117	171,258	175,196	162,133	166,263	182,419	154,460	162,618	154,512	171,739	160,379
Sugarbeets	42,245	37,778	39,350	48,861	49,157	50,491	56,154	53,378	56,115	53,340	54,581
Wheat	61,021	72,296	58,439	64,780	77,692	64,015	70,309	78,659	99,705	95,973	103,751
Total	391,874	399,057	396,793	396,415	394,328	402,779	407,716	405,399	403,172	394,332	395,391
North Dakota											
Cass County											
Corn	289,601	278,827	284,364	294,953	228,547	266,761	363,703	350,635	290,972	252,399	234,150
Soybeans	414,749	471,421	503,293	476,786	474,489	533,459	462,041	455,560	513,141	519,625	543,732
Sugarbeets	19,420	19,287	20,941	20,988	20,741	20,198	18,920	17,971	17,297	14,905	16,255
Wheat	85,097	113,116	83,031	96,030	115,496	79,630	71,083	84,010	97,061	114,098	100,868
Total	808,868	882,651	891,630	888,757	839,272	900,048	915,748	908,176	918,470	901,027	895,004
Richland County											
Corn	280,299	287,827	290,468	288,122	273,582	274,743	326,060	300,022	304,519	277,981	277,360
Soybeans	286,796	330,256	332,777	315,837	315,653	354,999	305,090	311,722	300,885	329,152	321,039
Sugarbeets	24,556	22,107	24,955	29,294	29,414	27,134	29,381	29,673	31,140	30,703	31,399
Wheat	48,839	53,642	52,046	59,240	63,035	49,119	44,968	58,092	69,505	67,588	79,256
Total	640,491	693,832	700,245	692,493	681,684	705,995	705,499	699,509	706,049	705,424	709,054
Total ND and MN	2,244,678	2,387,222	2,397,979	2,384,121	2,299,175	2,403,313	2,436,574	2,414,241	2,432,870	2,401,951	2,399,831

Note: Total crop acreage is the sum of all planted acreage and prevent plant acreage.
Source: Farm Service Agency (2020).

Appendix Table C9. Percentage of Total Crop Acreage that was Prevent Plant for Selected Crops, by County, FM Diversion Staging Area, 2009 through 2019

Minnesota	2019	2018	2017	2016	2015	2014	2013	2012	2011	2010	2009
Clay County											
Corn	3.6%	0.2%	0.4%	0.0%	2.1%	8.9%	0.8%	0.0%	3.8%	1.6%	5.6%
Soybeans	0.4%	0.0%	0.0%	0.0%	0.6%	1.4%	0.4%	0.1%	1.1%	0.2%	0.9%
Sugarbeets	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Wheat	0.2%	0.1%	0.0%	0.0%	0.0%	0.3%	0.1%	0.1%	0.4%	0.1%	0.2%
Total	1.5%	0.1%	0.1%	0.0%	0.9%	3.3%	0.4%	0.0%	1.6%	0.5%	1.7%
Wilkin County											
Corn	3.2%	0.1%	1.0%	0.0%	1.0%	10.93	3.29	0.00	1.38	2.05	7.44
Soybeans	0.2%	0.0%	0.0%	0.0%	0.1%	2.17	0.86	0.00	0.59	0.14	1.16
Sugarbeets	0.0%	0.0%	0.0%	0.0%	0.0%	0.00	0.05	0.00	0.00	0.00	0.19
Wheat	0.1%	0.0%	0.0%	0.0%	0.0%	0.23	0.07	0.00	0.04	0.29	0.39
Total	1.2%	0.0%	0.3%	0.0%	0.3%	3.89	1.37	0.00	0.55	0.51	2.04
N											
Cass County											
Corn	17.3%	0.3%	0.1%	0.0%	8.2%	16.4%	2.1%	0.3%	23.4%	9.5%	13.8%
Soybeans	2.3%	0.1%	0.0%	0.0%	0.9%	1.0%	0.5%	0.3%	4.9%	2.3%	1.3%
Sugarbeets	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.1%	0.0%	0.0%
Wheat	1.4%	0.2%	0.0%	0.0%	0.0%	0.3%	0.2%	0.2%	6.8%	1.3%	1.2%
Total	8.1%	0.2%	0.0%	0.0%	2.9%	6.0%	1.1%	0.3%	11.8%	4.3%	4.9%
Richland County											
Corn	14.1%	0.2%	0.2%	0.1%	2.9%	12.7%	5.9%	0.9%	12.0%	12.6%	13.2%
Soybeans	3.3%	0.1%	0.0%	0.1%	0.8%	2.5%	2.0%	1.0%	3.2%	2.6%	2.9%
Sugarbeets	0.0%	0.0%	0.0%	0.0%	0.0%	0.5%	0.0%	0.0%	0.0%	0.2%	1.4%
Wheat	0.9%	0.0%	0.0%	0.0%	0.1%	0.7%	0.4%	0.5%	2.2%	1.9%	2.1%
Total	8.1%	0.1%	0.1%	0.1%	1.6%	6.6%	3.7%	0.9%	7.0%	6.6%	7.1%
Total ND and MN	5.8%	0.1%	0.1%	0.0%	1.7%	5.4%	1.8%	0.4%	7.0%	3.8%	4.6%

Note: Total crop acreage is the sum of all planted acreage and prevent plant acreage.
Source: Farm Service Agency (2020).

Appendix Table C10. Total Insurance Indemnities, Ranked by Cause of Loss, Cass and Richland Counties, North Dakota, Clay and Wilken Counties, Minnesota, 1989 through 2019		
Cause of Loss	Indemnities (2019 $)	Share of Total Indemnities
Earthquake	869	0.00%
Hurricane/Tropical Depression	14,524	0.00%
Fire	18,767	0.00%
Failure Irrig Supply	20,726	0.00%
Poor Drainage	23,249	0.00%
Tornado	25,813	0.00%
Cyclone	43,137	0.00%
Mycotoxin (Aflatoxin)	296,513	0.03%
Cold Winter	417,726	0.04%
Wildlife	431,232	0.04%
Hot Wind	452,970	0.04%
Insects	1,998,946	0.17%
Other (Snow-Lightning-Etc.)	2,640,778	0.23%
Wind/Excess Wind	6,194,297	0.53%
Flood	7,795,280	0.66%
Heat	9,777,650	0.83%
Frost	17,077,146	1.46%
Freeze	17,754,891	1.51%
Plant Disease	46,128,172	3.93%
Cold Wet Weather	53,915,848	4.60%
Decline in Price	64,441,494	5.49%
Drought	86,077,999	7.34%
Hail	100,466,486	8.56%
Excess Moisture/Precip/Rain	757,316,066	64.54%
All Indemnities	1,173,330,579	
Source: Risk Management Agency (2020).		

Appendix Table C11. Causes of Loss, by Year, Cass and Richland Counties, North Dakota, Clay and Wilken Counties, Minnesota, 1989 through 2019

Year	Cold Wet Weather	Decline in Price	Drought	Excess Moisture Precip / Rain	Flood	Hail	Heat	Freeze	Frost	Plant Disease	Wind / Excess Wind	All Other
	percentage of loss by year											
1989	0.0	0.0	65.4	1.3	0.0	2.8	24.2	0.2	3.1	0.0	1.9	1.0
1990	0.1	0.0	65.0	5.7	0.0	15.1	1.2	1.5	2.3	1.1	2.1	5.9
1991	0.0	0.0	9.7	40.0	0.0	3.1	1.2	0.0	0.0	37.7	2.1	6.1
1992	7.7	0.0	0.7	19.1	0.1	35.4	0.2	11.7	15.7	0.1	8.2	1.3
1993	6.5	0.0	0.0	74.9	10.1	0.3	0.0	1.6	2.1	4.2	0.0	0.2
1994	0.2	0.0	2.6	70.8	0.9	12.9	0.0	0.0	0.0	11.0	0.8	0.9
1995	0.6	0.0	0.7	86.9	0.7	2.9	2.1	0.2	0.4	3.3	0.7	1.6
1996	0.4	0.0	16.2	67.7	0.6	7.4	0.2	0.5	0.0	2.3	2.5	2.2
1997	0.1	0.0	2.0	72.5	0.6	13.4	0.1	0.0	0.0	9.3	0.2	1.9
1998	0.1	0.0	0.9	76.4	0.5	3.8	0.1	0.0	0.0	17.6	0.0	0.5
1999	0.0	0.0	0.7	77.1	0.0	11.2	0.4	0.0	0.1	9.8	0.4	0.3
2000	0.3	0.0	0.8	59.8	1.1	4.1	0.0	0.1	0.0	33.3	0.1	0.3
2001	0.1	0.0	1.3	61.5	0.0	22.3	0.2	0.0	0.0	13.6	0.4	0.6
2002	3.5	0.0	5.3	56.0	0.3	19.2	1.1	1.1	1.0	8.0	3.4	1.1
2003	0.2	0.2	26.3	35.0	0.4	32.9	1.0	0.0	0.1	2.7	0.1	1.1
2004	30.7	2.9	1.6	27.0	0.0	8.6	0.1	7.1	18.3	1.4	1.6	0.8
2005	0.2	0.0	0.1	88.4	0.6	3.4	0.2	0.0	0.1	6.1	0.3	0.6
2006	0.1	0.3	34.4	47.4	0.0	13.3	0.9	0.0	0.2	3.0	0.0	0.4
2007	0.0	0.2	2.9	58.6	0.0	36.3	0.2	0.0	0.1	0.6	0.1	1.0
2008	1.8	27.2	5.6	43.3	0.1	12.1	0.5	8.3	0.2	0.4	0.1	0.5
2009	12.9	0.0	0.2	84.2	0.3	1.0	0.0	0.8	0.1	0.1	0.0	0.4
2010	6.1	0.8	0.1	85.6	0.6	2.9	0.0	0.0	0.4	3.1	0.1	0.3
2011	1.9	0.3	0.4	92.0	0.6	1.4	0.6	0.7	0.1	1.2	0.7	0.2
2012	0.1	0.5	81.7	8.8	0.0	2.9	1.8	0.1	0.1	0.9	2.3	0.8
2013	1.6	14.9	31.6	38.3	0.4	8.4	1.7	0.6	0.2	1.1	0.2	1.1
2014	8.4	20.3	2.0	63.5	0.0	2.5	0.0	0.2	2.0	0.4	0.1	0.5
2015	9.6	3.7	8.9	60.4	0.0	15.2	0.2	0.3	0.0	0.2	1.3	0.2
2016	1.8	0.2	13.8	24.6	0.2	51.5	0.4	2.0	1.2	1.7	1.6	1.0
2017	4.5	2.9	49.5	15.0	0.0	22.6	0.0	0.7	0.6	2.4	1.3	0.4
2018	4.0	4.3	18.3	28.3	0.0	36.9	3.1	0.6	0.6	1.7	1.0	1.1
2019	24.0	1.0	0.0	65.8	0.8	1.7	0.0	2.5	0.0	2.8	0.1	1.2

Source: Risk Management Agency (2020).

Appendix D

Target Crop Yields, Estimated Yield Declines, and Gross Revenue per Acre by Planting Date

Cass and Richland Counties, North Dakota

Clay and Wilkin Counties, Minnesota

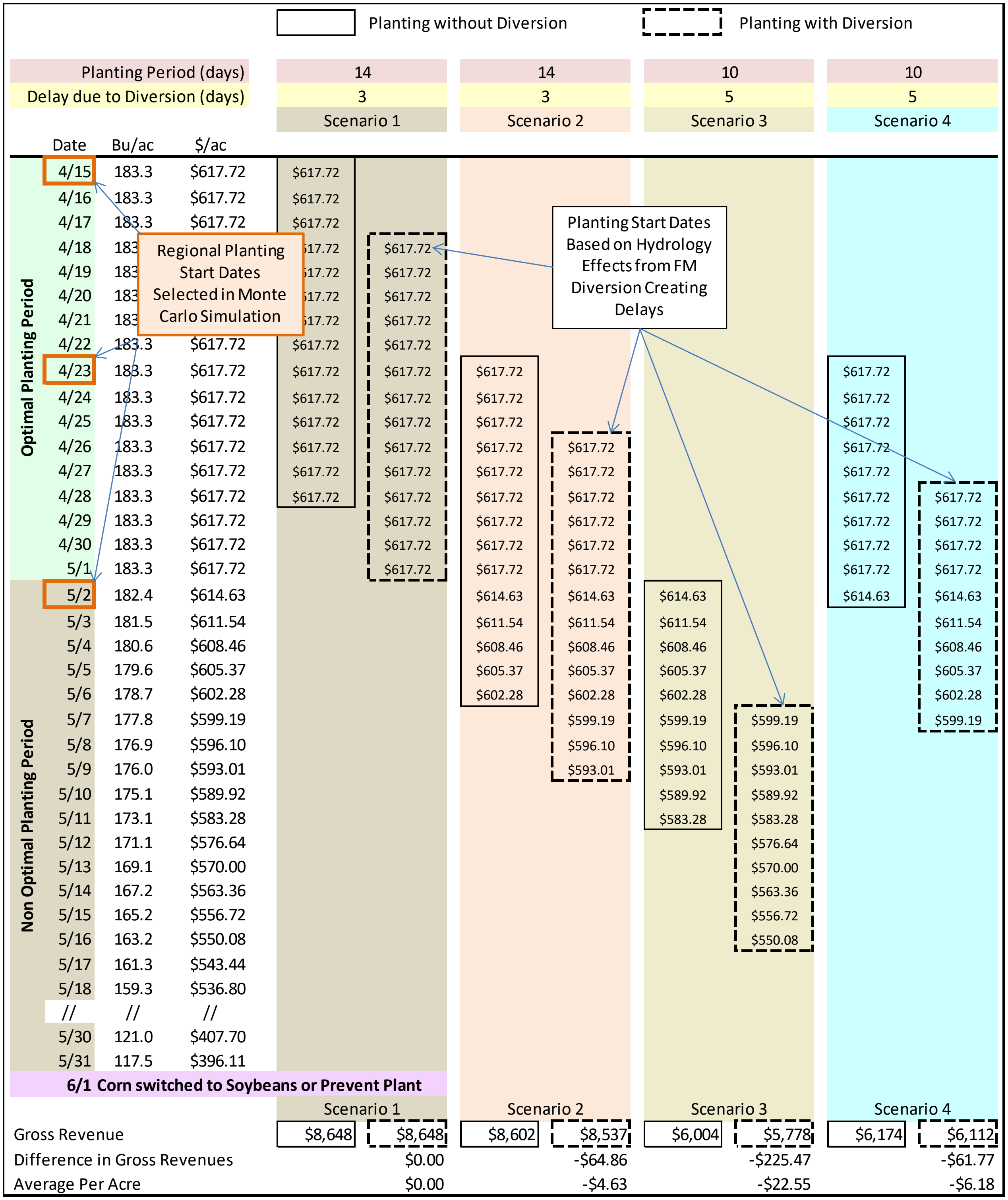
The potentially lost revenue resulting from planting delays is a function of optimal yields, yield declines, prices, planting start dates, and duration of planting period. The analysis begins with determining when planting can begin for a storage area by estimating the time required for the effects of flooding to be over, and comparing that date to when regional planting begins. If the total days from flood event start (i.e., measured as the sum of days to inundate, days of inundation, and a dry-down period) result in a calendar date that is earlier than the regional start date, that storage area would not experience any planting delays. However if the same condition results in a calendar date that is later than the regional start date, that storage area would experience planting delays.

The actual planting date for existing conditions (i.e., no Diversion) and With Diversion conditions are estimated for each storage area. The start date may be the same for With and Without Diversion, longer With the Diversion, or earlier With the Diversion (that is, the few situations when the Diversion creates faster water removal due to improved drainage capacity).

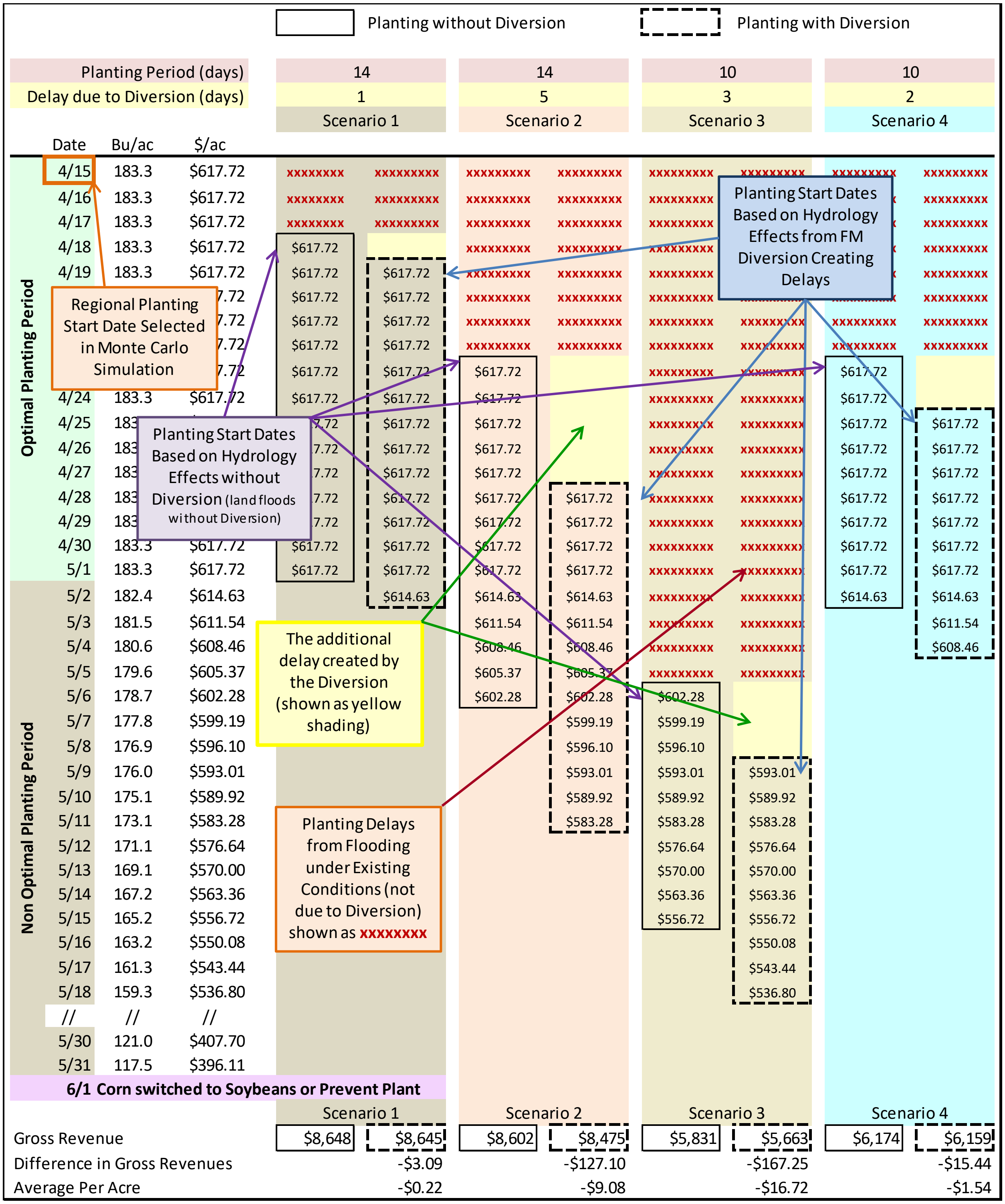
In some cases, a later planting start date between With and Without Diversion conditions may not necessarily result in reduced yields (see Scenario 1 in Appendix Figure D1). For there to be no yield loss with delayed planting, both start and end dates for planting have to occur during the optimal planting period. Since total potential revenue is estimated for both With and Without Diversion conditions, the effects of delayed planting become a function of the duration of planting and difference in start dates (Appendix Figure D1). Yield losses can be different even with the same planting period and same days of delay (compare scenario 1 to scenario 2 and compare scenario 3 to scenario 4 in Appendix Figure D1) if the planting start dates are different. Effects of planting delays also can be influenced by length of the planting period (compare scenario 2 to scenario 4 in Appendix Figure D1).

The conditions illustrated in Appendix Figure D1 represent examples for Hydrology Group 5. For storage areas that already flood without the Diversion, several potential examples of planting delays are presented in Appendix Figure D2. In cases where land already floods, revenue losses may not be commensurate with the additional delay created by the Diversion (compare scenario 2 which has 5 days of additional delay due to the Diversion with scenario 3 which has 3 days of additional planting delays). Because scenario 3 is delayed into May, whereas scenario 2 is able to begin planting in April, per-acre revenue losses are greater in scenario 3 than in scenario 2 (Appendix Table D2). The differences among the scenarios presented in Appendix Tables D1 and D2 help illustraite the difficulties in making generalizations about the magnitude of revenue losses as hydrology conditions change due to the use of the Diversion.

The number of variables that affect the degree of revenue loss from planting delays prevents providing a quick listing of the losses. Rather, daily revenues for corn, wheat, sugarbeets, and soybeans for Cass, Richland, Clay, and Wilken Counties have been placed in Appendix Tables D2 through D5. By summing the total revenues over the planting period and dividing by the number of days (demonstrated at the bottom of Appendix Figures D1 and D2), Appendix Tables D2 through D5 can be used to estimate the average per-acre revenue loss based on different start dates and planting periods.



Appendix Figure D1. Illustration of How Revenue Losses from Planting Delays are Subject to Planting Start Dates, Days of Delay, and Length of Planting Period, Corn, Cass County, Hydrology Group Five.



Appendix Figure D2. Illustration of How Revenue Losses from Planting Delays are Subject to Planting Start Dates, Days of Delay, and Length of Planting Period, Corn, Cass County, Hydrology Group Three.

Revenues for each storage area represent a composite of corn, wheat, soybeans and sugarbeets, based on the respective county's crop rotation percentage. Subtracting the difference in revenue potential between the two conditions, and dividing by the total acres in the storage area provides an estimated per-acre potential revenue loss (Appendix Table D1).

A generic storage area was developed to illustrate how potential revenues are estimated and how per-acre losses are determined. The storage are was assigned 292 acres. For the study, all storage areas were allocated a percentage of corn, wheat, soybeans, and sugarbeets. The generic storage area was modeled to have 101.29 acres in corn, 26.10 acres in wheat, 158.44 acres in soybeans, and 6.17 acres in sugarbeets (see Table 4 for crop share percentages by county).

The hydrology of was assumed to represent conditions for a 25-year flood event and the storage area would not flood Without the diversion but would be inundated using the Diversion staging area (Hydrology Group 5). The regional planting start date for the replication in Appendix Table 28 is April 15th. However, With the Diversion, the effects of flooding would not be over for that storage area until April 18th based on the storage area requiring 19 days for the effects of flooding to be over (both regional planting start date and flood date are based on Monte Carlo simulation whereas 19 days for the effects of flooding to be over is based on the hydrology data) a staging activation date of March 30th.

While the storage area requires 19 days from staging activation until the effects of flooding are over (based on when regional planting reaches 20 percent completion), this situation results in only a three-day planting delay for corn, wheat, and sugarbeets. No planting delays exist for soybeans as the regional planting date of May 8th falls substantially after April 18th (earliest date when the effects of flooding are over). The planting period (number of days from start to end) varies for corn, wheat, soybeans and sugarbeets (those rates are allowed to vary within the Monte Carol simulation). While corn, wheat, and sugarbeets have nearly identical end dates for the last day of optimal planting (see Figures 17 and 18), the revenue effects of delayed planting are different among those three crops. The three-day planting delay did not create any revenue differences for corn as the crop was planted entirely within the optimal planting window for both the With and Without Diversion conditions. However, based on the regional planting start date and duration of the planting period, both wheat and sugarbeets experienced some days of planting during the non-optimal period (i.e., when yields begin to decline). The delay of three days for wheat and sugarbeets subtracted three days of planting from the optimal period and added three days of planting during the non-optimal period.

Total revenues are summed for each crop for the With Diversion and Without Diversion conditions. The difference in revenue represents the effect of the three-day planting delay. When the total acres of all crops are considered, the decline in revenues for wheat and sugarbeets must be averaged with the acres of corn and soybeans. The overall loss for the storage area is not substantial, as the reductions in revenues for wheat and sugarbeets were modest, and 89 percent of the storage area acreage (corn and soybeans) had no revenue losses.

Essentially, the Monte Carlo simulation repeats the above analysis using different combinations of flood event start dates, regional planting dates, and planting rates for the five flood events. A total of 10,000 replications comprise the Monte Carlo simulation.

Appendix Table D1. Demonstration of How Potential Lost Revenues are Generated, using a Hypothetical Storage Area in a 25-year Flood Event								
	Wheat		Corn		Soybeans		Sugarbeets	
	WO	W	WO	W	WO	W	WO	W
Staging Area Activated, Date Selected by MC Simulation		Mar 30		Mar 30		Mar 30		Mar 30
Regional Planting Start Date Selected by MC Simulation	Apr 15	Apr 15	Apr 15	Apr 15	May 8	May 8	Apr 15	Apr 15
Days After Staging Area Activation for Effects of Flooding to be gone (includes dry down period)	na	19	na	19	na	19	na	19
Planting Start Date for for Each Crop	Apr 15	Apr 18	Apr 15	Apr 18	May 8	May 8	Apr 15	Apr 18
Days of Planting Delay	0	3	0	3	0	0	0	3
Planting End Dates (based on planting rates selected by MC Simulation)	May 6	May 9	Apr 27	Apr 30	May 20	May 20	May 4	May 7
Days of Optimal Planting	16	13	13	13	13	13	16	13
Days of Non-Optimal Planting	6	9	0	0	0	0	4	7
Total Revenue ($)	10,236	10,047	62,630	62,630	69,401	69,401	7,878	7,805
Difference in Total Revenue by Crop	-188.86		0		0		-72.40	
Rotation Percentage	8.9		34.9		54.3		2.1	
Total Acres per Crop	26.10		101.92		158.44		6.17	
Difference in Total Revenue per Acre	-7.24		0		0		-11.74	
Revenue Difference Per Acre for Storage Area	Total Losses / Total Acres (-188.86+0+0+-72.40) / 292 = -0.89/acre							

Notes: Based on storage size of 292 acres. WO = Without Diversion W = With Diversion. This example is for a storage area in Hydrology Group 5 meaning it does not flood with existing conditions but would flood With the Diversion during a 25-year flood event. Results in the table would represent one replication out of the 10,000 replications developed in the simulation. Days of optimal and non-optimal planting based on planting start dates and agronomic dates for each crop (see Figures 17 and18). Revenues represent a total of yield x price over the planting period (see Appendix F). Yields represent target yields, along with yield declines occurring after optimal planting (see Appendix F).

Appendix Table D2. Target Crop Yields, Estimated Yield Declines, and Gross Revenue per Acre by Planting Date, Cass County, North Dakota								
	Corn		Soybeans		Wheat		Sugarbeets	
Date	Yield	Gross Revenue	Yield	Gross Revenue	Yield	Gross Revenue	Yield	Gross Revenue
4/15	183.3	$617.72			67.7	$465.23	39.2	$1,710.69
4/16	183.3	$617.72			67.7	$465.23	39.2	$1,710.69
4/17	183.3	$617.72			67.7	$465.23	39.2	$1,710.69
4/18	183.3	$617.72			67.7	$465.23	39.2	$1,710.69
4/19	183.3	$617.72			67.7	$465.23	39.2	$1,710.69
4/20	183.3	$617.72			67.7	$465.23	39.2	$1,710.69
4/21	183.3	$617.72			67.7	$465.23	39.2	$1,710.69
4/22	183.3	$617.72			67.7	$465.23	39.2	$1,710.69
4/23	183.3	$617.72			67.7	$465.23	39.2	$1,710.69
4/24	183.3	$617.72			67.7	$465.23	39.2	$1,710.69
4/25	183.3	$617.72			67.7	$465.23	39.2	$1,710.69
4/26	183.3	$617.72			67.7	$465.23	39.2	$1,710.69
4/27	183.3	$617.72			67.7	$465.23	39.2	$1,710.69
4/28	183.3	$617.72			67.7	$465.23	39.2	$1,710.69
4/29	183.3	$617.72			67.7	$465.23	39.2	$1,710.69
4/30	183.3	$617.72			67.7	$465.23	39.2	$1,710.69
5/1	183.3	$617.72	48.2	$465.13	66.6	$457.46	39.2	$1,710.69
5/2	182.4	$614.63	48.2	$465.13	65.5	$449.83	39.0	$1,701.78
5/3	181.5	$611.54	48.2	$465.13	64.4	$442.31	38.8	$1,692.88
5/4	180.6	$608.46	48.2	$465.13	63.3	$434.93	38.6	$1,683.97
5/5	179.6	$605.37	48.2	$465.13	62.2	$427.66	38.4	$1,675.06
5/6	178.7	$602.28	48.2	$465.13	61.2	$420.52	38.2	$1,666.16
5/7	177.8	$599.19	48.2	$465.13	60.2	$413.50	38.0	$1,657.25
5/8	176.9	$596.10	48.2	$465.13	59.2	$406.59	37.8	$1,648.35
5/9	176.0	$593.01	48.2	$465.13	58.2	$399.80	37.6	$1,639.44
5/10	175.1	$589.92	48.2	$465.13	57.2	$393.13	37.4	$1,630.53
5/11	173.1	$583.28	48.2	$465.13	56.3	$386.56	37.2	$1,621.63
5/12	171.1	$576.64	48.2	$465.13	55.3	$380.11	37.0	$1,612.72
5/13	169.1	$570.00	48.2	$465.13	54.4	$373.76	36.8	$1,603.81
5/14	167.2	$563.36	48.2	$465.13	53.5	$367.52	36.5	$1,594.91
5/15	165.2	$556.72	48.2	$465.13	52.6	$361.38	36.3	$1,586.00
5/16	163.2	$550.08	48.2	$465.13	51.7	$355.34	36.1	$1,577.10
5/17	161.3	$543.44	48.2	$465.13	50.8	$349.41	35.9	$1,568.19
5/18	159.3	$536.80	48.2	$465.13	50.0	$343.57	35.7	$1,559.28
5/19	157.3	$530.16	48.2	$465.13	49.2	$337.84	35.5	$1,550.38

- continued -

Appendix Table D2. Continued								
	Corn		Soybeans		Wheat		Sugarbeets	
Date	Yield	Gross Revenue	Yield	Gross Revenue	Yield	Gross Revenue	Yield	Gross Revenue
5/20	155.3	$523.52	48.2	$465.13	48.3	$332.19	35.3	1,541.47
5/21	151.9	$511.94	48.0	$462.80	47.5	$326.65	35.1	1,532.57
5/22	148.5	$500.35	47.7	$460.49	46.7	$321.19	34.9	1,523.66
5/23	145.0	$488.77	47.5	$458.19	46.0	$315.83	34.7	1,514.75
5/24	141.6	$477.19	47.2	$455.90	45.2	$310.55	34.5	1,505.85
5/25	138.2	$465.61	47.0	$453.62	44.4	$305.37	34.3	1,496.94
5/26	134.7	454.02	46.8	451.35	43.7	300.27	34.1	1,488.03
5/27	131.3	442.44	46.5	449.09	43.0	295.25	33.9	1,479.13
5/28	127.9	430.86	46.3	446.85	42.2	290.32	33.7	1,470.22
5/29	124.4	419.28	46.1	444.61	41.5	285.47	33.5	1,461.32
5/30	121.0	407.70	45.8	442.39	40.8	280.71	33.3	1,452.41
5/31	117.5	396.11	45.6	440.18	40.2	276.02	33.1	1,443.50
6/1	114.1	384.53	45.4	437.98	39.5	271.41	32.9	1,434.60
6/2			45.2	435.79			32.7	1,425.69
6/3			44.9	433.61			32.5	1,416.79
6/4			44.7	431.44			32.3	1,407.88
6/5			44.5	429.28			32.1	1,398.97
6/6			44.3	427.14			31.9	1,390.07
6/7			44.0	425.00			31.6	1,381.16
6/8			43.8	422.88			31.4	1,372.26
6/9			43.6	420.76			31.2	1,363.35
6/10			43.4	418.66			31.0	1,354.44
6/11			43.2	416.56			30.8	1,345.54
6/12								

Appendix Table D3. Target Crop Yields, Estimated Yield Declines, and Gross Revenue per Acre by Planting Date, Richland County, North Dakota								
	Corn		Soybeans		Wheat		Sugarbeets	
Date	Yield	Gross Revenue	Yield	Gross Revenue	Yield	Gross Revenue	Yield	Gross Revenue
4/15	194.3	$654.79			66.8	$459.05	39.2	$1,710.69
4/16	194.3	$654.79			66.8	$459.05	39.2	$1,710.69
4/17	194.3	$654.79			66.8	$459.05	39.2	$1,710.69
4/18	194.3	$654.79			66.8	$459.05	39.2	$1,710.69
4/19	194.3	$654.79			66.8	$459.05	39.2	$1,710.69
4/20	194.3	$654.79			66.8	$459.05	39.2	$1,710.69
4/21	194.3	$654.79			66.8	$459.05	39.2	$1,710.69
4/22	194.3	$654.79			66.8	$459.05	39.2	$1,710.69
4/23	194.3	$654.79			66.8	$459.05	39.2	$1,710.69
4/24	194.3	$654.79			66.8	$459.05	39.2	$1,710.69
4/25	194.3	$654.79			66.8	$459.05	39.2	$1,710.69
4/26	194.3	$654.79			66.8	$459.05	39.2	$1,710.69
4/27	194.3	$654.79			66.8	$459.05	39.2	$1,710.69
4/28	194.3	$654.79			66.8	$459.05	39.2	$1,710.69
4/29	194.3	$654.79			66.8	$459.05	39.2	$1,710.69
4/30	194.3	$654.79			66.8	$459.05	39.2	$1,710.69
5/1	194.3	$654.79	50.6	$488.29	65.7	$451.38	39.2	$1,710.69
5/2	193.3	$651.52	50.6	$488.29	64.6	$443.85	39.0	$1,701.78
5/3	192.4	$648.24	50.6	$488.29	63.5	$436.43	38.8	$1,692.88
5/4	191.4	$644.97	50.6	$488.29	62.4	$429.14	38.6	$1,683.97
5/5	190.4	$641.70	50.6	$488.29	61.4	$421.98	38.4	$1,675.06
5/6	189.4	$638.42	50.6	$488.29	60.4	$414.93	38.2	$1,666.16
5/7	188.5	$635.15	50.6	$488.29	59.4	$408.00	38.0	$1,657.25
5/8	187.5	$631.87	50.6	$488.29	58.4	$401.19	37.8	$1,648.35
5/9	186.5	$628.60	50.6	$488.29	57.4	$394.49	37.6	$1,639.44
5/10	185.6	$625.33	50.6	$488.29	56.4	$387.90	37.4	$1,630.53
5/11	183.5	$618.29	50.6	$488.29	55.5	$381.42	37.2	$1,621.63
5/12	181.4	$611.25	50.6	$488.29	54.6	$375.05	37.0	$1,612.72
5/13	179.3	$604.21	50.6	$488.29	53.7	$368.79	36.8	$1,603.81
5/14	177.2	$597.17	50.6	$488.29	52.8	$362.63	36.5	$1,594.91
5/15	175.1	$590.13	50.6	$488.29	51.9	$356.57	36.3	$1,586.00
5/16	173.0	$583.09	50.6	$488.29	51.0	$350.62	36.1	$1,577.10
5/17	170.9	$576.05	50.6	$488.29	50.2	$344.76	35.9	$1,568.19
5/18	168.8	$569.01	50.6	$488.29	49.3	$339.01	35.7	$1,559.28
5/19	166.8	$561.97	50.6	$488.29	48.5	$333.35	35.5	$1,550.38

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Appendix Table D3. Continued								
	Corn		Soybeans		Wheat		Sugarbeets	
Date	Yield	Gross Revenue	Yield	Gross Revenue	Yield	Gross Revenue	Yield	Gross Revenue
5/20	164.7	554.94	50.6	488.29	47.7	327.78	35.3	1,541.47
5/21	161.0	542.66	50.3	485.85	46.9	322.30	35.1	1,532.57
5/22	157.4	530.38	50.1	483.42	46.1	316.92	34.9	1,523.66
5/23	153.7	518.10	49.8	481.00	45.3	311.63	34.7	1,514.75
5/24	150.1	505.83	49.6	478.60	44.6	306.43	34.5	1,505.85
5/25	146.5	493.55	49.3	476.20	43.8	301.31	34.3	1,496.94
5/26	142.8	481.27	49.1	473.82	43.1	296.28	34.1	1,488.03
5/27	139.2	468.99	48.9	471.45	42.4	291.33	33.9	1,479.13
5/28	135.5	456.72	48.6	469.10	41.7	286.46	33.7	1,470.22
5/29	131.9	444.44	48.4	466.75	41.0	281.68	33.5	1,461.32
5/30	128.2	432.16	48.1	464.42	40.3	276.98	33.3	1,452.41
5/31	124.6	419.88	47.9	462.10	39.6	272.35	33.1	1,443.50
6/1	121.0	407.61	47.6	459.79	39.0	267.80	32.9	1,434.60
6/2			47.4	457.49			32.7	1,425.69
6/3			47.2	455.20			32.5	1,416.79
6/4			46.9	452.92			32.3	1,407.88
6/5			46.7	450.66			32.1	1,398.97
6/6			46.5	448.40			31.9	1,390.07
6/7			46.2	446.16			31.6	1,381.16
6/8			46.0	443.93			31.4	1,372.26
6/9			45.8	441.71			31.2	1,363.35
6/10			45.5	439.50			31.0	1,354.44
6/11			45.3	437.31			30.8	1,345.54
6/12								

Appendix Table D4. Target Crop Yields, Estimated Yield Declines, and Gross Revenue per Acre by Planting Date, Clay County, Minnesota								
	Corn		Soybeans		Wheat		Sugarbeets	
Date	Yield	Gross Revenue	Yield	Gross Revenue	Yield	Gross Revenue	Yield	Gross Revenue
4/15	184.6	622.10			69.6	478.29	35.3	1,540.49
4/16	184.6	622.10			69.6	478.29	35.3	1,540.49
4/17	184.6	622.10			69.6	478.29	35.3	1,540.49
4/18	184.6	622.10			69.6	478.29	35.3	1,540.49
4/19	184.6	622.10			69.6	478.29	35.3	1,540.49
4/20	184.6	622.10			69.6	478.29	35.3	1,540.49
4/21	184.6	622.10			69.6	478.29	35.3	1,540.49
4/22	184.6	622.10			69.6	478.29	35.3	1,540.49
4/23	184.6	622.10			69.6	478.29	35.3	1,540.49
4/24	184.6	622.10			69.6	478.29	35.3	1,540.49
4/25	184.6	622.10			69.6	478.29	35.3	1,540.49
4/26	184.6	622.10			69.6	478.29	35.3	1,540.49
4/27	184.6	622.10			69.6	478.29	35.3	1,540.49
4/28	184.6	622.10			69.6	478.29	35.3	1,540.49
4/29	184.6	622.10			69.6	478.29	35.3	1,540.49
4/30	184.6	622.10			69.6	478.29	35.3	1,540.49
5/1	184.6	622.10	49.8	480.57	68.4	470.30	35.3	1,540.49
5/2	183.7	618.99	49.8	480.57	67.3	462.45	35.1	1,531.59
5/3	182.8	615.88	49.8	480.57	66.2	454.73	34.9	1,522.68
5/4	181.8	612.77	49.8	480.57	65.1	447.13	34.7	1,513.77
5/5	180.9	609.66	49.8	480.57	64.0	439.67	34.5	1,504.87
5/6	180.0	606.55	49.8	480.57	62.9	432.32	34.3	1,495.96
5/7	179.1	603.44	49.8	480.57	61.9	425.10	34.1	1,487.06
5/8	178.1	600.33	49.8	480.57	60.8	418.00	33.9	1,478.15
5/9	177.2	597.22	49.8	480.57	59.8	411.02	33.7	1,469.24
5/10	176.3	594.11	49.8	480.57	58.8	404.16	33.5	1,460.34
5/11	174.3	587.42	49.8	480.57	57.8	397.41	33.3	1,451.43
5/12	172.3	580.73	49.8	480.57	56.9	390.77	33.1	1,442.52
5/13	170.3	574.04	49.8	480.57	55.9	384.25	32.9	1,433.62
5/14	168.4	567.36	49.8	480.57	55.0	377.83	32.6	1,424.71
5/15	166.4	560.67	49.8	480.57	54.1	371.52	32.4	1,415.81
5/16	164.4	553.98	49.8	480.57	53.2	365.32	32.2	1,406.90
5/17	162.4	547.29	49.8	480.57	52.3	359.22	32.0	1,397.99
5/18	160.4	540.61	49.8	480.57	51.4	353.22	31.8	1,389.09
5/19	158.4	533.92	49.8	480.57	50.5	347.32	31.6	1,380.18

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Appendix Table D4. Continued								
	Corn		Soybeans		Wheat		Sugarbeets	
Date	Yield	Gross Revenue	Yield	Gross Revenue	Yield	Gross Revenue	Yield	Gross Revenue
5/20	156.4	527.23	49.8	480.57	49.7	341.52	31.4	1,371.28
5/21	153.0	515.57	49.6	478.17	48.9	335.81	31.2	1,362.37
5/22	149.5	503.90	49.3	475.78	48.1	330.21	31.0	1,353.46
5/23	146.1	492.24	49.1	473.40	47.2	324.69	30.8	1,344.56
5/24	142.6	480.57	48.8	471.03	46.5	319.27	30.6	1,335.65
5/25	139.1	468.91	48.6	468.68	45.7	313.94	30.4	1,326.75
5/26	135.7	457.24	48.3	466.33	44.9	308.69	30.2	1,317.84
5/27	132.2	445.58	48.1	464.00	44.2	303.54	30.0	1,308.93
5/28	128.8	433.92	47.8	461.68	43.4	298.47	29.8	1,300.03
5/29	125.3	422.25	47.6	459.37	42.7	293.49	29.6	1,291.12
5/30	121.8	410.59	47.4	457.07	42.0	288.58	29.4	1,282.21
5/31	118.4	398.92	47.1	454.79	41.3	283.77	29.2	1,273.31
6/1	114.9	387.26	46.9	452.52	40.6	279.03	29.0	1,264.40
6/2			46.7	450.25			28.8	1,255.50
6/3			46.4	448.00			28.6	1,246.59
6/4			46.2	445.76			28.4	1,237.68
6/5			46.0	443.53			28.2	1,228.78
6/6			45.7	441.32			28.0	1,219.87
6/7			45.5	439.11			27.7	1,210.97
6/8			45.3	436.91			27.5	1,202.06
6/9			45.0	434.73			27.3	1,193.15
6/10			44.8	432.56			27.1	1,184.25
6/11			44.6	430.39			26.9	1,175.34
6/12								

Appendix Table D5. Target Crop Yields, Estimated Yield Declines, and Gross Revenue per Acre by Planting Date, Wilkin County, Minnesota								
	Corn		Soybeans		Wheat		Sugarbeets	
Date	Yield	Gross Revenue	Yield	Gross Revenue	Yield	Gross Revenue	Yield	Gross Revenue
4/15	172.0	579.64			68.0	467.30	39.2	1,710.69
4/16	172.0	579.64			68.0	467.30	39.2	1,710.69
4/17	172.0	579.64			68.0	467.30	39.2	1,710.69
4/18	172.0	579.64			68.0	467.30	39.2	1,710.69
4/19	172.0	579.64			68.0	467.30	39.2	1,710.69
4/20	172.0	579.64			68.0	467.30	39.2	1,710.69
4/21	172.0	579.64			68.0	467.30	39.2	1,710.69
4/22	172.0	579.64			68.0	467.30	39.2	1,710.69
4/23	172.0	579.64			68.0	467.30	39.2	1,710.69
4/24	172.0	579.64			68.0	467.30	39.2	1,710.69
4/25	172.0	579.64			68.0	467.30	39.2	1,710.69
4/26	172.0	579.64			68.0	467.30	39.2	1,710.69
4/27	172.0	579.64			68.0	467.30	39.2	1,710.69
4/28	172.0	579.64			68.0	467.30	39.2	1,710.69
4/29	172.0	579.64			68.0	467.30	39.2	1,710.69
4/30	172.0	579.64			68.0	467.30	39.2	1,710.69
5/1	172.0	579.64	46.4	447.76	66.9	459.49	39.2	1,710.69
5/2	171.1	576.74	46.4	447.76	65.7	451.82	39.0	1,701.78
5/3	170.3	573.84	46.4	447.76	64.6	444.27	38.8	1,692.88
5/4	169.4	570.95	46.4	447.76	63.6	436.85	38.6	1,683.97
5/5	168.6	568.05	46.4	447.76	62.5	429.56	38.4	1,675.06
5/6	167.7	565.15	46.4	447.76	61.5	422.38	38.2	1,666.16
5/7	166.8	562.25	46.4	447.76	60.4	415.33	38.0	1,657.25
5/8	166.0	559.35	46.4	447.76	59.4	408.39	37.8	1,648.35
5/9	165.1	556.45	46.4	447.76	58.4	401.57	37.6	1,639.44
5/10	164.3	553.56	46.4	447.76	57.5	394.87	37.4	1,630.53
5/11	162.4	547.33	46.4	447.76	56.5	388.27	37.2	1,621.63
5/12	160.6	541.09	46.4	447.76	55.6	381.79	37.0	1,612.72
5/13	158.7	534.86	46.4	447.76	54.6	375.41	36.8	1,603.81
5/14	156.9	528.63	46.4	447.76	53.7	369.14	36.5	1,594.91
5/15	155.0	522.40	46.4	447.76	52.8	362.98	36.3	1,586.00
5/16	153.2	516.17	46.4	447.76	51.9	356.92	36.1	1,577.10
5/17	151.3	509.94	46.4	447.76	51.1	350.96	35.9	1,568.19
5/18	149.5	503.71	46.4	447.76	50.2	345.10	35.7	1,559.28
5/19	147.6	497.48	46.4	447.76	49.4	339.33	35.5	1,550.38

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Appendix Table D5. Continued								
	Corn		Soybeans		Wheat		Sugarbeets	
Date	Yield	Gross Revenue	Yield	Gross Revenue	Yield	Gross Revenue	Yield	Gross Revenue
5/20	145.8	491.24	46.4	447.76	48.6	333.67	35.3	1,541.47
5/21	142.5	480.38	46.2	445.52	47.7	328.09	35.1	1,532.57
5/22	139.3	469.51	45.9	443.29	46.9	322.62	34.9	1,523.66
5/23	136.1	458.64	45.7	441.08	46.2	317.23	34.7	1,514.75
5/24	132.9	447.77	45.5	438.87	45.4	311.93	34.5	1,505.85
5/25	129.6	436.90	45.3	436.68	44.6	306.72	34.3	1,496.94
5/26	126.4	426.04	45.0	434.49	43.9	301.60	34.1	1,488.03
5/27	123.2	415.17	44.8	432.32	43.2	296.56	33.9	1,479.13
5/28	120.0	404.30	44.6	430.16	42.4	291.61	33.7	1,470.22
5/29	116.7	393.43	44.4	428.01	41.7	286.74	33.5	1,461.32
5/30	113.5	382.56	44.1	425.87	41.0	281.95	33.3	1,452.41
5/31	110.3	371.69	43.9	423.74	40.3	277.24	33.1	1,443.50
6/1	107.1	360.83	43.7	421.62	39.7	272.61	32.9	1,434.60
6/2			43.5	419.51			32.7	1,425.69
6/3			43.3	417.42			32.5	1,416.79
6/4			43.0	415.33			32.3	1,407.88
6/5			42.8	413.25			32.1	1,398.97
6/6			42.6	411.19			31.9	1,390.07
6/7			42.4	409.13			31.6	1,381.16
6/8			42.2	407.08			31.4	1,372.26
6/9			42.0	405.05			31.2	1,363.35
6/10			41.8	403.02			31.0	1,354.44
6/11			41.6	401.01			30.8	1,345.54
6/12								

Appendix E

Liklihood of Per-acre Revenue Losses by Crop

Appendix Table E1. Probability of Losses Resulting from Use of the Staging Area, Hydrology Groups Three and Five Delineated by Difference in Total Days between With and Without Diversion, for Corn and Soybeans, 10-year Flood Event, 10-day Dry Down Period

	Time from Activation of Staging Area until the Effects of Flooding are over[a]			Per Acre Losses for Individual Crop							
Hydrology Group	WO	W	Difference in Total Days	No Loss	$0 to $25/acre[b] Loss	$26 to $50/acre[b] Loss	$51 to $75/acre[b] Loss	$76 to $100/acre[b] Loss	$101 to $125/acre[b] Loss	$126 to $150/acre[b] Loss	Over $150/acre[b] Loss
	-------------------- days --------------------			--------------------------------- Based on 10,000 replications from Monte Carlo Simulation -----------------------------------							
				Corn							
3	14.3	14.8	1 to 5	71.3%	28.7%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
			6 to 10								
5	0	12.0	11 to 15	81.7%	18.0%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%
			16 to 20								
			21 to 25								
			26 to 30								
5	0	59.0	30+	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	99.9%
				Soybeans[c]							
3	14.3	14.8	1 to 5	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
			6 to 10								
5	0	12.0	11 to 15	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
			16 to 20								
			21 to 25								
			26 to 30								
5	0	59.0	30+	0.2%	3.4%	5.4%	4.3%	5.8%	9.9%	12.5%	58.4%

Na=not applicable. There were no storage areas in those categories.
WO=Without Diversion, W=With Diversion
[a] Total days are defined as the sum of 1) days from staging activation until land becomes inundated, 2) days of inundation, and 3) 10-day dry-down. Zero days mean the storage areas do not flood With existing conditions, but zero days do not necessarily mean conditions in the region are suitable for planting.
[b] The range of losses per acre represent an average of all storage areas Within the groups.
[c] Actual odds are not 100 percent that soybeans have no losses. The number of replications With a revenue loss for soybeans was too few to register in the rounding of the percentages.

Appendix Table E2. Probability of Losses Resulting from Use of the Staging Area, Hydrology Groups Three and Five Delineated by Difference in Total Days between With and Without Diversion, for Wheat and Sugarbeets, 10-year Flood Event, 10-day Dry Down Period

	Time from Activation of Staging Area until the Effects of Flooding are over[a]			Per Acre Losses for Individual Crop							
Hydrology Group	WO	W	Difference in Total Days	No Loss	$0 to $25/acre[b] Loss	$26 to $50/acre[b] Loss	$51 to $75/acre[b] Loss	$76 to $100/acre[b] Loss	$101 to $125/acre[b] Loss	$126 to $150/acre[b] Loss	Over $150/acre[b] Loss
	-------------------- days --------------------			-------------------------------- Based on 10,000 replications from Monte Carlo Simulation -----------------------------------							
				Wheat							
3	14.3	14.8	1 to 5	70.9%	29.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
			6 to 10								
5	0	12.0	11 to 15	81.3%	17.3%	1.4%	0.1%	0.0%	0.0%	0.0%	0.0%
			16 to 20								
			21 to 25								
			26 to 30								
5	0	59.0	30+	0.0%	0.0%	0.0%	0.0%	0.6%	2.9%	12.1%	84.5%
				Sugarbeets							
3	14.3	14.8	1 to 5	70.9%	29.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
			6 to 10								
5	0	12.0	11 to 15	81.3%	12.8%	2.9%	1.5%	0.9%	0.4%	0.2%	0.1%
			16 to 20								
			21 to 25								
			26 to 30								
5	0	59.0	30+	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%

Na=not applicable. There were no storage areas in those categories.
WO=Without Diversion, W=With Diversion
[a] Total days are defined as the sum of 1) days from staging activation until land becomes inundated, 2) days of inundation, and 3) 10-day dry-down. Zero days mean the storage areas do not flood With existing conditions, but zero days do not necessarily mean conditions in the region are suitable for planting.
[b] The range of losses per acre represent an average of all storage areas Within the groups.

Appendix Table E3. Probability of Losses Resulting from Use of the Staging Area, Hydrology Groups Three and Five Delineated by Difference in Total Days between With and Without Diversion, for Corn and Soybeans, 20-year Flood Event, 10-day Dry Down Period

	Time from Activation of Staging Area until the Effects of Flooding are over[a]			Per Acre Losses for Individual Crop							
Hydrology Group	WO	W	Difference in Total Days	No Loss	$0 to $25/acre[b] Loss	$26 to $50/acre[b] Loss	$51 to $75/acre[b] Loss	$76 to $100/acre[b] Loss	$101 to $125/acre[b] Loss	$126 to $150/acre[b] Loss	Over $150/acre[b] Loss
	-------------------- days --------------------			--------------------------------- Based on 10,000 replications from Monte Carlo Simulation -----------------------------------							
				Corn							
3	17.2	18.0	1 to 5	40.5%	59.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
3	15.0	21.0	6 to 10	55.5%	38.4%	5.9%	0.2%	0.1%	0.0%	0.0%	0.0%
5	0	13.5	11 to 15	78.4%	21.2%	0.4%	0.0%	0.0%	0.0%	0.0%	0.0%
			16 to 20								
5	0	22.3	21 to 25	47.7%	35.8%	12.7%	2.7%	0.8%	0.2%	0.1%	0.1%
			26 to 30								
5	15.5	59.0	30+	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	99.9%
				Soybeans[c]							
3	17.2	18.0	1 to 5	98.4%	1.6%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
3	15.0	21.0	6 to 10	99.8%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
5	0	13.5	11 to 15	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
			16 to 20								
5	0	22.3	21 to 25	99.2%	0.8%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
			26 to 30								
5	15.5	59.0	30+	0.2%	3.4%	5.4%	4.3%	5.8%	9.9%	12.5%	58.4%

Na=not applicable. There were no storage areas in those categories.
WO=Without Diversion, W=With Diversion
[a] Total days are defined as the sum of 1) days from staging activation until land becomes inundated, 2) days of inundation, and 3) 10-day dry-down. Zero days mean the storage areas do not flood With existing conditions, but zero days do not necessarily mean conditions in the region are suitable for planting.
[b] The range of losses per acre represent an average of all storage areas Within the groups.
[c] Actual odds are not 100 percent that soybeans have no losses. The number of replications With a revenue loss for soybeans was too few to register in the rounding of the percentages.

Appendix Table E4. Probability of Losses Resulting from Use of the Staging Area, Hydrology Groups Three and Five Delineated by Difference in Total Days between With and Without Diversion, for Wheat and Sugarbeets, 20-year Flood Event, 10-day Dry Down Period

	Time from Activation of Staging Area until the Effects of Flooding are over[a]			Per Acre Losses for Individual Crop							
Hydrology Group	WO	W	Difference in Total Days	No Loss	$0 to $25/acre[b] Loss	$26 to $50/acre[b] Loss	$51 to $75/acre[b] Loss	$76 to $100/acre[b] Loss	$101 to $125/acre[b] Loss	$126 to $150/acre[b] Loss	Over $150/acre[b] Loss
	------------------- days -------------------			--------------------------------- Based on 10,000 replications from Monte Carlo Simulation -----------------------------------							
				Wheat							
3	17.2	18.0	1 to 5	40.4%	59.6%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
3	15.0	21.0	6 to 10	55.3%	24.7%	20.0%	0.0%	0.0%	0.0%	0.0%	0.0%
5	0	13.5	11 to 15	77.8%	20.4%	1.5%	0.2%	0.0%	0.0%	0.0%	0.0%
			16 to 20								
5	0	22.3	21 to 25	47.5%	22.5%	17.0%	8.9%	3.3%	0.7%	0.0%	0.0%
			26 to 30								
5	15.5	59.0	30+	0.0%	0.0%	0.0%	0.0%	0.6%	2.9%	12.2%	84.4%
				Sugarbeets							
3	17.2	18.0	1 to 5	40.4%	59.6%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
3	15.0	21.0	6 to 10	55.3%	7.4%	8.2%	9.2%	9.9%	10.1%	0.0%	0.0%
5	0	13.5	11 to 15	77.9%	15.5%	3.3%	1.5%	1.0%	0.5%	0.2%	0.2%
			16 to 20								
5	0	22.3	21 to 25	47.6%	7.0%	8.0%	7.7%	6.5%	5.6%	5.3%	12.4%
			26 to 30								
5	15.5	59.0	30+	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%

Na=not applicable. There were no storage areas in those categories.
WO=Without Diversion, W=With Diversion
[a] Total days are defined as the sum of 1) days from staging activation until land becomes inundated, 2) days of inundation, and 3) 10-day dry-down. Zero days mean the storage areas do not flood With existing conditions, but zero days do not necessarily mean conditions in the region are suitable for planting.
[b] The range of losses per acre represent an average of all storage areas Within the groups.

Appendix Table E5. Probability of Losses Resulting from Use of the Staging Area, Hydrology Groups Three and Five Delineated by Difference in Total Days between With and Without Diversion, for Corn and Soybeans, 25-year Flood Event, 10-day Dry Down Period

	Time from Activation of Staging Area until the Effects of Flooding are over[a]			Per Acre Losses for Individual Crop							
Hydrology Group	WO	W	Difference in Total Days	No Loss	$0 to $25/acre[b] Loss	$26 to $50/acre[b] Loss	$51 to $75/acre[b] Loss	$76 to $100/acre[b] Loss	$101 to $125/acre[b] Loss	$126 to $150/acre[b] Loss	Over $150/acre[b] Loss
	-------------------- days --------------------			--------------------------------- Based on 10,000 replications from Monte Carlo Simulation -----------------------------------							
				Corn							
3	17.4	19.2	1 to 5	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
3	13.3	19.2	6 to 10	44.7%	55.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
			11 to 15								
5	0	17.2	16 to 20	55.5%	41.2%	3.1%	0.2%	0.0%	0.0%	0.0%	0.0%
5	0	20.5	21 to 25	59.6%	37.1%	2.7%	0.5%	0.1%	0.0%	0.0%	0.0%
			26 to 30								
3	17	59.0	30+	55.5%	33.9%	8.4%	1.6%	0.4%	0.1%	0.1%	0.0%
				Soybeans[c]							
3	17.4	19.2	1 to 5	99.6%	0.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
3	13.3	19.2	6 to 10	99.8%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
			11 to 15								
5	0	17.2	16 to 20	99.9%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
5	0	20.5	21 to 25	99.8%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
			26 to 30								
3	17	59.0	30+	0.2%	3.4%	5.4%	4.3%	5.8%	9.9%	12.5%	58.4%

Na=not applicable. There were no storage areas in those categories.
WO=Without Diversion, W=With Diversion
[a] Total days are defined as the sum of 1) days from staging activation until land becomes inundated, 2) days of inundation, and 3) 10-day dry-down. Zero days mean the storage areas do not flood With existing conditions, but zero days do not necessarily mean conditions in the region are suitable for planting.
[b] The range of losses per acre represent an average of all storage areas Within the groups.
[c] Actual odds are not 100 percent that soybeans have no losses. The number of replications With a revenue loss for soybeans was too few to register in the rounding of the percentages.

Appendix Table E6. Probability of Losses Resulting from Use of the Staging Area, Hydrology Groups Three and Five Delineated by Difference in Total Days between With and Without Diversion, for Wheat and Sugarbeets, 25-year Flood Event, 10-day Dry Down Period

	Time from Activation of Staging Area until the Effects of Flooding are over[a]			Per Acre Losses for Individual Crop							
Hydrology Group	WO	W	Difference in Total Days	No Loss	$0 to $25/acre[b] Loss	$26 to $50/acre[b] Loss	$51 to $75/acre[b] Loss	$76 to $100/acre[b] Loss	$101 to $125/acre[b] Loss	$126 to $150/acre[b] Loss	Over $150/acre[b] Loss
	-------------------- days --------------------			-------------------------------- Based on 10,000 replications from Monte Carlo Simulation -----------------------------------							
				Wheat							
3	17.4	19.2	1 to 5	47.7%	52.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
3	13.3	19.2	6 to 10	55.3%	31.1%	13.6%	0.0%	0.0%	0.0%	0.0%	0.0%
			11 to 15								
5	0	17.2	16 to 20	59.4%	29.7%	8.0%	2.5%	0.5%	0.0%	0.0%	0.0%
5	0	20.5	21 to 25	55.3%	22.4%	14.1%	6.1%	1.8%	0.4%	0.0%	0.0%
			26 to 30								
3	17	59.0	30+	0.0%	0.0%	0.0%	0.0%	0.6%	2.9%	12.3%	84.2%
				Sugarbeets							
3	17.4	19.2	1 to 5	40.5%	45.0%	14.5%	0.0%	0.0%	0.0%	0.0%	0.0%
3	13.3	19.2	6 to 10	55.3%	7.8%	9.8%	12.4%	14.8%	0.0%	0.0%	0.0%
			11 to 15								
5	0	17.2	16 to 20	59.4%	17.8%	8.6%	5.0%	3.8%	2.3%	1.2%	2.0%
5	0	20.5	21 to 25	55.3%	7.4%	7.8%	7.2%	6.1%	4.6%	3.4%	8.2%
			26 to 30								
3	17	59.0	30+	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%

Na=not applicable. There were no storage areas in those categories.
WO=Without Diversion, W=With Diversion
[a] Total days are defined as the sum of 1) days from staging activation until land becomes inundated, 2) days of inundation, and 3) 10-day dry-down. Zero days mean the storage areas do not flood With existing conditions, but zero days do not necessarily mean conditions in the region are suitable for planting.
[b] The range of losses per acre represent an average of all storage areas Within the groups.

Appendix Table E7. Probability of Losses Resulting from Use of the Staging Area, Hydrology Groups Three and Five Delineated by Difference in Total Days between With and Without Diversion, for Corn and Soybeans, 25-year Long Flood Event, 10-day Dry Down Period

	Time from Activation of Staging Area until the Effects of Flooding are over[a]			Per Acre Losses for Individual Crop							
Hydrology Group	WO	W	Difference in Total Days	No Loss	$0 to $25/acre[b] Loss	$26 to $50/acre[b] Loss	$51 to $75/acre[b] Loss	$76 to $100/acre[b] Loss	$101 to $125/acre[b] Loss	$126 to $150/acre[b] Loss	Over $150/acre[b] Loss
	-------------------- days --------------------			--------------------------------- Based on 10,000 replications from Monte Carlo Simulation -----------------------------------							
				Corn							
3	20.7	22.0	1 to 5	1.2%	98.8%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
3	13.7	20.0	6 to 10	55.5%	37.5%	6.8%	0.2%	0.1%	0.0%	0.0%	0.0%
5	0	14.5	11 to 15	78.4%	20.5%	1.0%	0.1%	0.0%	0.0%	0.0%	0.0%
5	0	17.8	16 to 20	59.6%	37.1%	2.7%	0.5%	0.1%	0.0%	0.0%	0.0%
5	0	21.5	21 to 25	51.4%	34.5%	11.1%	2.1%	0.6%	0.1%	0.1%	0.1%
			26 to 30								
3	21.5	59.0	30+	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	99.9%
				Soybeans[c]							
3	20.7	22.0	1 to 5	21.7%	78.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
3	13.7	20.0	6 to 10	99.8%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
5	0	14.5	11 to 15	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
5	0	17.8	16 to 20	99.9%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
5	0	21.5	21 to 25	99.6%	0.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
			26 to 30								
3	21.5	59.0	30+	0.2%	3.4%	5.4%	4.3%	5.8%	9.9%	12.5%	58.4%

Na=not applicable. There were no storage areas in those categories.
WO=Without Diversion, W=With Diversion
[a] Total days are defined as the sum of 1) days from staging activation until land becomes inundated, 2) days of inundation, and 3) 10-day dry-down. Zero days mean the storage areas do not flood With existing conditions, but zero days do not necessarily mean conditions in the region are suitable for planting.
[b] The range of losses per acre represent an average of all storage areas Within the groups.
[c] Actual odds are not 100 percent that soybeans have no losses. The number of replications With a revenue loss for soybeans was too few to register in the rounding of the percentages.

Appendix Table E8. Probability of Losses Resulting from Use of the Staging Area, Hydrology Groups Three and Five Delineated by Difference in Total Days between With and Without Diversion, for Wheat and Sugarbeets, 25-year Long Flood Event, 10-day Dry Down Period

	Time from Activation of Staging Area until the Effects of Flooding are over[a]			Per Acre Losses for Individual Crop							
Hydrology Group	WO	W	Difference in Total Days	No Loss	$0 to $25/acre[b] Loss	$26 to $50/acre[b] Loss	$51 to $75/acre[b] Loss	$76 to $100/acre[b] Loss	$101 to $125/acre[b] Loss	$126 to $150/acre[b] Loss	Over $150/acre[b] Loss
	-------------------- days --------------------			--------------------------------- Based on 10,000 replications from Monte Carlo Simulation -----------------------------------							
				Wheat							
3	20.7	22.0	1 to 5	1.2%	98.8%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
3	13.7	20.0	6 to 10	55.3%	26.1%	18.7%	0.0%	0.0%	0.0%	0.0%	0.0%
5	0	14.5	11 to 15	77.8%	17.6%	3.9%	0.7%	0.0%	0.0%	0.0%	0.0%
5	0	17.8	16 to 20	59.4%	30.6%	7.5%	2.0%	0.4%	0.0%	0.0%	0.0%
5	0	21.5	21 to 25	51.2%	21.0%	16.2%	8.1%	2.8%	0.7%	0.0%	0.0%
			26 to 30								
3	21.5	59.0	30+	0.0%	0.0%	0.0%	0.0%	0.7%	3.4%	14.5%	81.5%
				Sugarbeets							
3	20.7	22.0	1 to 5	0.0%	92.2%	7.8%	0.0%	0.0%	0.0%	0.0%	0.0%
3	13.7	20.0	6 to 10	55.3%	8.2%	8.7%	8.9%	8.3%	8.9%	1.7%	0.0%
5	0	14.5	11 to 15	77.9%	10.2%	5.7%	3.0%	1.5%	1.0%	0.4%	0.3%
5	0	17.8	16 to 20	59.4%	16.8%	7.8%	5.7%	3.7%	2.5%	1.6%	2.5%
5	0	21.5	21 to 25	51.3%	9.5%	10.3%	9.3%	7.0%	4.5%	3.6%	4.5%
			26 to 30								
3	21.5	59.0	30+	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%

Na=not applicable. There were no storage areas in those categories.
WO=Without Diversion, W=With Diversion
[a] Total days are defined as the sum of 1) days from staging activation until land becomes inundated, 2) days of inundation, and 3) 10-day dry-down. Zero days mean the storage areas do not flood With existing conditions, but zero days do not necessarily mean conditions in the region are suitable for planting.
[b] The range of losses per acre represent an average of all storage areas Within the groups.

Appendix Table E9. Probability of Losses Resulting from Use of the Staging Area, Hydrology Groups Three and Five Delineated by Difference in Total Days between With and Without Diversion, for Corn and Soybeans, 25-year Extra Long Flood Event, 10-day Dry Down Period

	Time from Activation of Staging Area until the Effects of Flooding are over[a]			Per Acre Losses for Individual Crop							
Hydrology Group	WO	W	Difference in Total Days	No Loss	$0 to $25/acre[b] Loss	$26 to $50/acre[b] Loss	$51 to $75/acre[b] Loss	$76 to $100/acre[b] Loss	$101 to $125/acre[b] Loss	$126 to $150/acre[b] Loss	Over $150/acre[b] Loss
	-------------------- days --------------------			-------------------------------- Based on 10,000 replications from Monte Carlo Simulation ----------------------------------							
				Corn							
3	25.8	27.2	1 to 5	0.0%	99.8%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%
3	14.9	21.7	6 to 10	44.0%	46.0%	9.4%	0.4%	0.2%	0.0%	0.0%	0.0%
			11 to 15								
5	0	18.9	16 to 20	59.6%	34.4%	4.9%	0.9%	0.2%	0.1%	0.0%	0.0%
5	0	21.2	21 to 25	44.0%	43.3%	10.1%	1.9%	0.5%	0.1%	0.1%	0.0%
			26 to 30								
3	26.0	59.0	30+	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	99.9%
				Soybeans[c]							
3	25.8	27.2	1 to 5	9.7%	90.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
3	14.9	21.7	6 to 10	98.8%	1.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
			11 to 15								
5	0	18.9	16 to 20	99.9%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
5	0	21.2	21 to 25	98.8%	1.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
			26 to 30								
3	26.0	59.0	30+	0.2%	3.4%	5.4%	4.3%	5.8%	9.9%	12.5%	58.4%

Na=not applicable. There were no storage areas in those categories.
WO=Without Diversion, W=With Diversion
[a] Total days are defined as the sum of 1) days from staging activation until land becomes inundated, 2) days of inundation, and 3) 10-day dry-down. Zero days mean the storage areas do not flood With existing conditions, but zero days do not necessarily mean conditions in the region are suitable for planting.
[b] The range of losses per acre represent an average of all storage areas Within the groups.
[c] Actual odds are not 100 percent that soybeans have no losses. The number of replications With a revenue loss for soybeans was too few to register in the rounding of the percentages.

Appendix Table E10. Probability of Losses Resulting from Use of the Staging Area, Hydrology Groups Three and Five Delineated by Difference in Total Days between With and Without Diversion, for Wheat and Sugarbeets, 25-year Extra Long Flood Event, 10-day Dry Down Period

	Time from Activation of Staging Area until the Effects of Flooding are over[a]			Per Acre Losses for Individual Crop							
Hydrology Group	WO	W	Difference in Total Days	No Loss	$0 to $25/acre[b] Loss	$26 to $50/acre[b] Loss	$51 to $75/acre[b] Loss	$76 to $100/acre[b] Loss	$101 to $125/acre[b] Loss	$126 to $150/acre[b] Loss	Over $150/acre[b] Loss
	-------------------- days --------------------			-------------------------------- Based on 10,000 replications from Monte Carlo Simulation -----------------------------------							
				Wheat							
3	25.8	27.2	1 to 5	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
3	14.9	21.7	6 to 10	43.9%	25.5%	30.6%	0.0%	0.0%	0.0%	0.0%	0.0%
			11 to 15								
5	0	18.9	16 to 20	59.4%	26.4%	10.1%	3.4%	0.8%	0.1%	0.0%	0.0%
5	0	21.2	21 to 25	43.9%	29.0%	16.1%	7.7%	2.8%	0.6%	0.0%	0.0%
			26 to 30								
3	26.0	59.0	30+	0.0%	0.0%	0.0%	0.2%	1.2%	6.2%	21.0%	71.5%
				Sugarbeets							
3	25.8	27.2	1 to 5	0.0%	74.4%	25.6%	0.0%	0.0%	0.0%	0.0%	0.0%
3	14.9	21.7	6 to 10	44.0%	14.7%	9.9%	11.1%	10.8%	9.5%	0.0%	0.0%
			11 to 15								
5	0	18.9	16 to 20	59.4%	11.9%	8.1%	6.4%	4.5%	3.5%	2.1%	4.0%
5	0	21.2	21 to 25	44.0%	15.9%	8.7%	7.5%	6.0%	5.8%	3.5%	8.8%
			26 to 30								
3	26.0	59.0	30+	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%

Na=not applicable. There were no storage areas in those categories.
WO=Without Diversion, W=With Diversion
[a] Total days are defined as the sum of 1) days from staging activation until land becomes inundated, 2) days of inundation, and 3) 10-day dry-down. Zero days mean the storage areas do not flood With existing conditions, but zero days do not necessarily mean conditions in the region are suitable for planting.
[b] The range of losses per acre represent an average of all storage areas Within the groups.

Appendix Table E11. Probability of Losses Resulting from Use of the Staging Area, Hydrology Groups Three and Five Delineated by Difference in Total Days between With and Without Diversion, for Corn and Soybeans, 2009-like Flood Event, 10-day Dry Down Period

	Time from Activation of Staging Area until the Effects of Flooding are over[a]			Per Acre Losses for Individual Crop							
Hydrology Group	WO	W	Difference in Total Days	No Loss	$0 to $25/acre[b] Loss	$26 to $50/acre[b] Loss	$51 to $75/acre[b] Loss	$76 to $100/acre[b] Loss	$101 to $125/acre[b] Loss	$126 to $150/acre[b] Loss	Over $150/acre[b] Loss
	-------------------- days --------------------			-------------------------------- Based on 10,000 replications from Monte Carlo Simulation -----------------------------------							
				Corn							
3	16.3	18.8	1 to 5	8.4%	91.5%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%
3	25.5	33.4	6 to 10	10.7%	15.9%	36.7%	26.4%	4.5%	4.1%	1.5%	0.2%
3	19.0	31.8	11 to 15	13.0%	25.3%	29.6%	19.8%	8.0%	2.1%	1.3%	0.9%
5	0	12.0	11 to 15								
5	0	17.3	16 to 20	59.6%	36.5%	3.2%	0.6%	0.1%	0.0%	0.0%	0.0%
5	0	21.5	21 to 25	51.4%	34.7%	11.0%	2.1%	0.6%	0.1%	0.1%	0.0%
			26 to 30								
3	25.0	57.5	30+	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.1%	99.8%
				Soybeans[c]							
3	16.3	18.8	1 to 5	69.7%	30.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
3	25.5	33.4	6 to 10	74.7%	24.6%	0.2%	0.3%	0.1%	0.1%	0.0%	0.0%
3	19.0	31.8	11 to 15	79.2%	20.6%	0.2%	0.1%	0.1%	0.0%	0.0%	0.0%
5	0	12.0	11 to 15								
5	0	17.3	16 to 20	99.9%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
5	0	21.5	21 to 25	99.6%	0.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
			26 to 30								
3	25.0	57.5	30+	0.3%	4.6%	6.5%	4.6%	5.9%	10.1%	12.1%	55.9%

Na=not applicable. There were no storage areas in those categories.
WO=Without Diversion, W=With Diversion
[a] Total days are defined as the sum of 1) days from staging activation until land becomes inundated, 2) days of inundation, and 3) 10-day dry-down. Zero days mean the storage areas do not flood With existing conditions, but zero days do not necessarily mean conditions in the region are suitable for planting.
[b] The range of losses per acre represent an average of all storage areas Within the groups.
[c] Actual odds are not 100 percent that soybeans have no losses. The number of replications With a revenue loss for soybeans was too few to register in the rounding of the percentages.

Appendix Table E12. Probability of Losses Resulting from Use of the Staging Area, Hydrology Groups Three and Five Delineated by Difference in Total Days between With and Without Diversion, for Wheat and Sugarbeets, 2009-like Flood Event, 10-day Dry Down Period

	Time from Activation of Staging Area until the Effects of Flooding are over[a]			Per Acre Losses for Individual Crop							
Hydrology Group	WO	W	Difference in Total Days	No Loss	$0 to $25/acre[b] Loss	$26 to $50/acre[b] Loss	$51 to $75/acre[b] Loss	$76 to $100/acre[b] Loss	$101 to $125/acre[b] Loss	$126 to $150/acre[b] Loss	Over $150/acre[b] Loss
	-------------------- days --------------------			-------------------------------- Based on 10,000 replications from Monte Carlo Simulation ----------------------------------							
				Wheat							
3	16.3	18.8	1 to 5	8.4%	91.6%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
3	25.5	33.4	6 to 10	10.7%	12.2%	22.5%	54.7%	0.0%	0.0%	0.0%	0.0%
3	19.0	31.8	11 to 15	13.0%	20.5%	19.4%	34.2%	12.8%	0.0%	0.0%	0.0%
5	0	12.0	11 to 15								
5	0	17.3	16 to 20	59.4%	30.2%	7.8%	2.2%	0.5%	0.0%	0.0%	0.0%
5	0	21.5	21 to 25	51.2%	21.7%	16.1%	7.8%	2.7%	0.5%	0.0%	0.0%
			26 to 30								
3	25.0	57.5	30+	0.0%	0.0%	0.0%	0.1%	1.2%	5.3%	19.2%	74.3%
				Sugarbeets							
3	16.3	18.8	1 to 5	8.4%	68.5%	23.2%	0.0%	0.0%	0.0%	0.0%	0.0%
3	25.5	33.4	6 to 10	10.7%	2.5%	6.0%	3.8%	3.7%	8.1%	13.9%	51.3%
3	19.0	31.8	11 to 15	13.0%	9.6%	3.4%	4.2%	7.7%	5.4%	5.7%	50.9%
5	0	12.0	11 to 15								
5	0	17.3	16 to 20	59.4%	15.2%	8.1%	5.9%	4.1%	2.7%	1.8%	2.9%
5	0	21.5	21 to 25	51.3%	7.2%	7.4%	7.2%	6.9%	5.0%	4.2%	10.8%
			26 to 30								
3	25.0	57.5	30+	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%

Na=not applicable. There were no storage areas in those categories.
WO=Without Diversion, W=With Diversion
[a] Total days are defined as the sum of 1) days from staging activation until land becomes inundated, 2) days of inundation, and 3) 10-day dry-down. Zero days mean the storage areas do not flood With existing conditions, but zero days do not necessarily mean conditions in the region are suitable for planting.
[b] The range of losses per acre represent an average of all storage areas Within the groups.

Appendix Table E13. Probability of Losses Resulting from Use of the Staging Area, Hydrology Groups Three and Five Delineated by Difference in Total Days between With and Without Diversion, for Corn and Soybeans, 50-year Flood Event, 10-day Dry Down Period

	Time from Activation of Staging Area until the Effects of Flooding are over[a]			Per Acre Losses for Individual Crop							
Hydrology Group	WO	W	Difference in Total Days	No Loss	$0 to $25/acre[b] Loss	$26 to $50/acre[b] Loss	$51 to $75/acre[b] Loss	$76 to $100/acre[b] Loss	$101 to $125/acre[b] Loss	$126 to $150/acre[b] Loss	Over $150/acre[b] Loss
	-------------------- days --------------------			--------------------------------- Based on 10,000 replications from Monte Carlo Simulation ------------------------------------							
				Corn							
3	19.6	21.3	1 to 5	44.2%	55.7%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%
3	14.0	20.2	6 to 10	55.5%	39.2%	5.1%	0.2%	0.1%	0.0%	0.0%	0.0%
			11 to 15								
5	0	18.3	16 to 20	59.6%	36.3%	3.4%	0.6%	0.1%	0.0%	0.0%	0.0%
5	0	21.0	21 to 25	47.7%	41.5%	8.6%	1.7%	0.4%	0.1%	0.1%	0.0%
			26 to 30								
5	25.0	60.0	30+	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
				Soybeans[c]							
3	19.6	21.3	1 to 5	98.9%	1.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
3	14.0	20.2	6 to 10	99.8%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
			11 to 15								
5	0	18.3	16 to 20	99.9%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
5	0	21.0	21 to 25	99.2%	0.8%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
			26 to 30								
5	25.0	60.0	30+	0.2%	2.4%	4.8%	3.9%	5.8%	9.9%	12.5%	60.6%

Na=not applicable. There were no storage areas in those categories.

WO=Without Diversion, W=With Diversion

[a] Total days are defined as the sum of 1) days from staging activation until land becomes inundated, 2) days of inundation, and 3) 10-day dry-down. Zero days mean the storage areas do not flood With existing conditions, but zero days do not necessarily mean conditions in the region are suitable for planting.

[b] The range of losses per acre represent an average of all storage areas Within the groups.

[c] Actual odds are not 100 percent that soybeans have no losses. The number of replications With a revenue loss for soybeans was too few to register in the rounding of the percentages.

Appendix Table E14. Probability of Losses Resulting from Use of the Staging Area, Hydrology Groups Three and Five Delineated by Difference in Total Days between With and Without Diversion, for Wheat and Sugarbeets, 50-year Flood Event, 10-day Dry Down Period

	Time from Activation of Staging Area until the Effects of Flooding are over[a]			Per Acre Losses for Individual Crop							
Hydrology Group	WO	W	Difference in Total Days	No Loss	$0 to $25/acre[b] Loss	$26 to $50/acre[b] Loss	$51 to $75/acre[b] Loss	$76 to $100/acre[b] Loss	$101 to $125/acre[b] Loss	$126 to $150/acre[b] Loss	Over $150/acre[b] Loss
	-------------------- days --------------------			--------------------------------- Based on 10,000 replications from Monte Carlo Simulation -----------------------------------							
				Wheat							
3	19.6	21.3	1 to 5	44.0%	56.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
3	14.0	20.2	6 to 10	55.3%	24.1%	20.6%	0.0%	0.0%	0.0%	0.0%	0.0%
			11 to 15								
5	0	18.3	16 to 20	59.4%	28.9%	8.6%	2.6%	0.5%	0.0%	0.0%	0.0%
5	0	21.0	21 to 25	47.5%	28.1%	14.9%	6.7%	2.3%	0.5%	0.0%	0.0%
			26 to 30								
5	25.0	60.0	30+	0.0%	0.0%	0.0%	0.1%	0.9%	4.8%	18.8%	75.5%
				Sugarbeets							
3	19.6	21.3	1 to 5	44.0%	32.4%	23.6%	0.0%	0.0%	0.0%	0.0%	0.0%
3	14.0	20.2	6 to 10	55.3%	11.8%	10.3%	11.5%	11.1%	0.0%	0.0%	0.0%
			11 to 15								
5	0	18.3	16 to 20	59.4%	13.5%	8.8%	6.0%	4.1%	3.1%	2.1%	3.1%
5	0	21.0	21 to 25	47.6%	15.2%	8.1%	8.0%	5.6%	4.7%	3.8%	7.1%
			26 to 30								
5	25.0	60.0	30+	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%

Na=not applicable. There were no storage areas in those categories.
WO=Without Diversion, W=With Diversion
[a] Total days are defined as the sum of 1) days from staging activation until land becomes inundated, 2) days of inundation, and 3) 10-day dry-down. Zero days mean the storage areas do not flood With existing conditions, but zero days do not necessarily mean conditions in the region are suitable for planting.
[b] The range of losses per acre represent an average of all storage areas Within the groups.

Appendix Table E15. Probability of Losses Resulting from Use of the Staging Area, Hydrology Groups Three and Five Delineated by Difference in Total Days between With and Without Diversion, for Corn and Soybeans, 100-year Flood Event, 10-day Dry Down Period

	Time from Activation of Staging Area until the Effects of Flooding are over[a]			Per Acre Losses for Individual Crop							
Hydrology Group	WO	W	Difference in Total Days	No Loss	$0 to $25/acre[b] Loss	$26 to $50/acre[b] Loss	$51 to $75/acre[b] Loss	$76 to $100/acre[b] Loss	$101 to $125/acre[b] Loss	$126 to $150/acre[b] Loss	Over $150/acre[b] Loss
	-------------------- days --------------------			-------------------------------- Based on 10,000 replications from Monte Carlo Simulation -----------------------------------							
				Corn							
3	20.8	22.9	1 to 5	0.9%	98.9%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%
3	15.2	21.8	6 to 10	44.0%	44.5%	10.9%	0.4%	0.2%	0.0%	0.0%	0.0%
5	0	13.0	11 to 15	85.0%	14.4%	0.6%	0.1%	0.0%	0.0%	0.0%	0.0%
5	0	18.3	16 to 20	59.6%	35.7%	3.9%	0.6%	0.1%	0.0%	0.0%	0.0%
5	0	21.8	21 to 25	40.4%	44.7%	11.5%	2.4%	0.7%	0.1%	0.1%	0.1%
			26 to 30								
3	28.5	60.5	30+	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
				Soybeans[c]							
3	20.8	22.9	1 to 5	63.2%	36.8%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
3	15.2	21.8	6 to 10	98.8%	1.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
5	0	13.0	11 to 15	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
5	0	18.3	16 to 20	99.9%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
5	0	21.8	21 to 25	98.2%	1.8%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
			26 to 30								
3	28.5	60.5	30+	0.1%	1.7%	4.3%	3.8%	5.3%	10.0%	12.7%	62.2%

Na=not applicable. There were no storage areas in those categories.
WO=Without Diversion, W=With Diversion
[a] Total days are defined as the sum of 1) days from staging activation until land becomes inundated, 2) days of inundation, and 3) 10-day dry-down. Zero days mean the storage areas do not flood With existing conditions, but zero days do not necessarily mean conditions in the region are suitable for planting.
[b] The range of losses per acre represent an average of all storage areas Within the groups.
[c] Actual odds are not 100 percent that soybeans have no losses. The number of replications With a revenue loss for soybeans was too few to register in the rounding of the percentages.

Appendix Table E16. Probability of Losses Resulting from Use of the Staging Area, Hydrology Groups Three and Five Delineated by Difference in Total Days between With and Without Diversion, for Wheat and Sugarbeets, 100-year Flood Event, 10-day Dry Down Period

	Time from Activation of Staging Area until the Effects of Flooding are over[a]			Per Acre Losses for Individual Crop							
Hydrology Group	WO	W	Difference in Total Days	No Loss	$0 to $25/acre[b] Loss	$26 to $50/acre[b] Loss	$51 to $75/acre[b] Loss	$76 to $100/acre[b] Loss	$101 to $125/acre[b] Loss	$126 to $150/acre[b] Loss	Over $150/acre[b] Loss
	-------------------- days --------------------			-------------------------------- Based on 10,000 replications from Monte Carlo Simulation -----------------------------------							
				Wheat							
3	20.8	22.9	1 to 5	0.9%	99.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
3	15.2	21.8	6 to 10	43.9%	28.6%	27.5%	0.0%	0.0%	0.0%	0.0%	0.0%
5	0	13.0	11 to 15	84.6%	13.3%	1.8%	0.3%	0.0%	0.0%	0.0%	0.0%
5	0	18.3	16 to 20	59.4%	29.4%	8.2%	2.5%	0.5%	0.0%	0.0%	0.0%
5	0	21.8	21 to 25	40.4%	34.0%	15.2%	7.5%	2.5%	0.5%	0.0%	0.0%
			26 to 30								
3	28.5	60.5	30+	0.0%	0.0%	0.0%	0.7%	2.8%	11.7%	27.2%	57.6%
				Sugarbeets							
3	20.8	22.9	1 to 5	0.9%	67.4%	31.8%	0.0%	0.0%	0.0%	0.0%	0.0%
3	15.2	21.8	6 to 10	44.0%	14.0%	8.2%	9.8%	10.9%	13.2%	0.0%	0.0%
5	0	13.0	11 to 15	84.5%	7.5%	3.9%	1.7%	1.1%	0.7%	0.3%	0.2%
5	0	18.3	16 to 20	59.4%	15.8%	8.0%	6.2%	3.9%	2.6%	1.6%	2.4%
5	0	21.8	21 to 25	40.4%	16.9%	7.4%	7.1%	6.8%	5.7%	4.5%	11.2%
			26 to 30								
3	28.5	60.5	30+	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%

Na=not applicable. There were no storage areas in those categories.
WO=Without Diversion, W=With Diversion
[a] Total days are defined as the sum of 1) days from staging activation until land becomes inundated, 2) days of inundation, and 3) 10-day dry-down. Zero days mean the storage areas do not flood With existing conditions, but zero days do not necessarily mean conditions in the region are suitable for planting.
[b] The range of losses per acre represent an average of all storage areas Within the groups.

Appendix Table E17. Probability of Losses Resulting from Use of the Staging Area, Hydrology Groups Three and Five Delineated by Difference in Total Days between With and Without Diversion, for Corn and Soybeans, 500-year Flood Event, 10-day Dry Down Period

	Time from Activation of Staging Area until the Effects of Flooding are over[a]			Per Acre Losses for Individual Crop							
Hydrology Group	WO	W	Difference in Total Days	No Loss	$0 to $25/acre[b] Loss	$26 to $50/acre[b] Loss	$51 to $75/acre[b] Loss	$76 to $100/acre[b] Loss	$101 to $125/acre[b] Loss	$126 to $150/acre[b] Loss	Over $150/acre[b] Loss
	-------------------- days --------------------			--------------------------------- Based on 10,000 replications from Monte Carlo Simulation -----------------------------------							
				Corn							
3	32.2	33.6	1 to 5	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
3	20.9	26.9	6 to 10	6.6%	56.4%	28.2%	8.1%	0.8%	0.0%	0.0%	0.0%
3	39.5	52.3	11 to 15	0.0%	0.0%	0.7%	1.2%	3.1%	4.8%	6.2%	84.1%
3	41.5	58.2	16 to 20	0.0%	1.0%	1.5%	2.8%	3.7%	5.1%	6.6%	79.3%
5	0	22.5	21 to 25	44.0%	39.4%	12.7%	2.7%	0.8%	0.2%	0.1%	0.1%
3	35.0	61.5	26 to 30	0.0%	0.0%	0.0%	0.0%	0.2%	0.4%	0.8%	98.6%
			30+								
				Soybeans[c]							
3	32.2	33.6	1 to 5	1.0%	99.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
3	20.9	26.9	6 to 10	64.4%	35.0%	0.5%	0.0%	0.0%	0.0%	0.0%	0.0%
3	39.5	52.3	11 to 15	2.0%	23.4%	11.2%	9.5%	8.0%	8.3%	10.8%	26.9%
3	41.5	58.2	16 to 20	0.1%	3.9%	4.6%	7.6%	8.3%	11.7%	14.0%	49.8%
5	0	22.5	21 to 25	98.8%	1.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
3	35.0	61.5	26 to 30	0.1%	1.1%	3.8%	4.5%	5.0%	9.6%	12.9%	62.9%
			30+								

Na=not applicable. There were no storage areas in those categories.
WO=Without Diversion, W=With Diversion
[a] Total days are defined as the sum of 1) days from staging activation until land becomes inundated, 2) days of inundation, and 3) 10-day dry-down. Zero days mean the storage areas do not flood With existing conditions, but zero days do not necessarily mean conditions in the region are suitable for planting.
[b] The range of losses per acre represent an average of all storage areas Within the groups.
[c] Actual odds are not 100 percent that soybeans have no losses. The number of replications With a revenue loss for soybeans was too few to register in the rounding of the percentages.

Appendix Table E18. Probability of Losses Resulting from Use of the Staging Area, Hydrology Groups Three and Five Delineated by Difference in Total Days between With and Without Diversion, for Wheat and Sugarbeets, 500-year Flood Event, 10-day Dry Down Period

	Time from Activation of Staging Area until the Effects of Flooding are over[a]			Per Acre Losses for Individual Crop							
Hydrology Group	WO	W	Difference in Total Days	No Loss	$0 to $25/acre[b] Loss	$26 to $50/acre[b] Loss	$51 to $75/acre[b] Loss	$76 to $100/acre[b] Loss	$101 to $125/acre[b] Loss	$126 to $150/acre[b] Loss	Over $150/acre[b] Loss
	-------------------- days --------------------			--------------------------------- Based on 10,000 replications from Monte Carlo Simulation -----------------------------------							
				Wheat							
3	32.2	33.6	1 to 5	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
3	20.9	26.9	6 to 10	6.6%	35.3%	58.1%	0.0%	0.0%	0.0%	0.0%	0.0%
3	39.5	52.3	11 to 15	0.0%	3.1%	13.2%	26.6%	57.2%	0.0%	0.0%	0.0%
3	41.5	58.2	16 to 20	0.0%	8.5%	20.5%	23.2%	24.5%	23.1%	0.2%	0.0%
5	0	22.5	21 to 25	43.9%	26.2%	17.2%	8.6%	3.3%	0.7%	0.0%	0.0%
3	35.0	61.5	26 to 30	0.0%	0.1%	2.2%	6.6%	15.2%	27.3%	28.0%	20.7%
			30+								
				Sugarbeets							
3	32.2	33.6	1 to 5	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
3	20.9	26.9	6 to 10	6.6%	13.6%	29.4%	11.4%	15.9%	23.1%	0.0%	0.0%
3	39.5	52.3	11 to 15	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.1%	99.7%
3	41.5	58.2	16 to 20	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	100.0%
5	0	22.5	21 to 25	44.0%	10.5%	8.0%	7.8%	6.5%	5.7%	5.2%	12.4%
3	35.0	61.5	26 to 30	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
			30+								

Na=not applicable. There were no storage areas in those categories.
WO=Without Diversion, W=With Diversion
[a] Total days are defined as the sum of 1) days from staging activation until land becomes inundated, 2) days of inundation, and 3) 10-day dry-down. Zero days mean the storage areas do not flood With existing conditions, but zero days do not necessarily mean conditions in the region are suitable for planting.
[b] The range of losses per acre represent an average of all storage areas Within the groups.

Appendix Table E19. Probability of Losses Resulting from Use of the Staging Area, Hydrology Groups Three and Five Delineated by Difference in Total Days between With and Without Diversion, for Corn and Soybeans, Probabilistic Maximum Flood Event, 10-day Dry Down Period

	Time from Activation of Staging Area until the Effects of Flooding are over[a]			Per Acre Losses for Individual Crop							
Hydrology Group	WO	W	Difference in Total Days	No Loss	$0 to $25/acre[b] Loss	$26 to $50/acre[b] Loss	$51 to $75/acre[b] Loss	$76 to $100/acre[b] Loss	$101 to $125/acre[b] Loss	$126 to $150/acre[b] Loss	Over $150/acre[b] Loss
	-------------------- days --------------------			--------------------------------- Based on 10,000 replications from Monte Carlo Simulation -----------------------------------							
				Corn							
3	31.0	32.3	1 to 5	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
3	29.3	35.6	6 to 10	0.9%	23.6%	37.5%	25.4%	12.5%	0.1%	0.0%	0.0%
			11 to 15								
			16 to 20								
			21 to 25								
			26 to 30								
			30+								
				Soybeans[c]							
3	31.0	32.3	1 to 5	18.3%	81.7%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
3	29.3	35.6	6 to 10	31.2%	62.6%	5.0%	1.2%	0.0%	0.0%	0.0%	0.0%
			11 to 15								
			16 to 20								
			21 to 25								
			26 to 30								
			30+								

Na=not applicable. There were no storage areas in those categories.
WO=Without Diversion, W=With Diversion
[a] Total days are defined as the sum of 1) days from staging activation until land becomes inundated, 2) days of inundation, and 3) 10-day dry-down. Zero days mean the storage areas do not flood With existing conditions, but zero days do not necessarily mean conditions in the region are suitable for planting.
[b] The range of losses per acre represent an average of all storage areas Within the groups.
[c] Actual odds are not 100 percent that soybeans have no losses. The number of replications With a revenue loss for soybeans was too few to register in the rounding of the percentages.

Appendix Table E20. Probability of Losses Resulting from Use of the Staging Area, Hydrology Groups Three and Five Delineated by Difference in Total Days between With and Without Diversion, for Wheat and Sugarbeets, Probabilistic Maximum Flood Event, 10-day Dry Down Period

	Time from Activation of Staging Area until the Effects of Flooding are over[a]			Per Acre Losses for Individual Crop							
Hydrology Group	WO	W	Difference in Total Days	No Loss	$0 to $25/acre[b] Loss	$26 to $50/acre[b] Loss	$51 to $75/acre[b] Loss	$76 to $100/acre[b] Loss	$101 to $125/acre[b] Loss	$126 to $150/acre[b] Loss	Over $150/acre[b] Loss
	-------------------- days --------------------			--------------------------------- Based on 10,000 replications from Monte Carlo Simulation -----------------------------------							
				Wheat							
3	31.0	32.3	1 to 5	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
3	29.3	35.6	6 to 10	0.9%	24.8%	74.4%	0.0%	0.0%	0.0%	0.0%	0.0%
			11 to 15								
			16 to 20								
			21 to 25								
			26 to 30								
			30+								
				Sugarbeets							
3	31.0	32.3	1 to 5	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
3	29.3	35.6	6 to 10	0.9%	2.9%	12.5%	21.0%	10.8%	20.6%	31.4%	0.0%
			11 to 15								
			16 to 20								
			21 to 25								
			26 to 30								
			30+								

Na=not applicable. There were no storage areas in those categories.
WO=Without Diversion, W=With Diversion
[a] Total days are defined as the sum of 1) days from staging activation until land becomes inundated, 2) days of inundation, and 3) 10-day dry-down. Zero days mean the storage areas do not flood With existing conditions, but zero days do not necessarily mean conditions in the region are suitable for planting.
[b] The range of losses per acre represent an average of all storage areas Within the groups.

Appendix Table E21. Probability of Losses Resulting from Use of the Staging Area, Hydrology Groups Three and Five Delineated by Difference in Total Days between With and Without Diversion, for Corn and Soybeans, 10-year Flood Event, 14-day Dry Down Period

	Time from Activation of Staging Area until the Effects of Flooding are over[a]			Per Acre Losses for Individual Crop							
Hydrology Group	WO	W	Difference in Total Days	No Loss	$0 to $25/acre[b] Loss	$26 to $50/acre[b] Loss	$51 to $75/acre[b] Loss	$76 to $100/acre[b] Loss	$101 to $125/acre[b] Loss	$126 to $150/acre[b] Loss	Over $150/acre[b] Loss
	-------------------- days --------------------			--------------------------------- Based on 10,000 replications from Monte Carlo Simulation -----------------------------------							
				Corn							
3	18.3	18.8	1 to 5	55.5%	44.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
			6 to 10								
5	0	14.5	11 to 15	78.4%	20.3%	1.2%	0.1%	0.0%	0.0%	0.0%	0.0%
5	0	17.5	16 to 20	67.4%	29.0%	3.0%	0.5%	0.1%	0.0%	0.0%	0.0%
			21 to 25								
			26 to 30								
5	0	63.0	30+	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
				Soybeans[c]							
3	18.3	18.8	1 to 5	99.8%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
			6 to 10								
5	0	14.5	11 to 15	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
5	0	17.5	16 to 20	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
			21 to 25								
			26 to 30								
5	0	63.0	30+	0.1%	0.8%	3.5%	3.4%	5.3%	9.9%	12.6%	64.4%

Na=not applicable. There were no storage areas in those categories.
WO=Without Diversion, W=With Diversion
[a] Total days are defined as the sum of 1) days from staging activation until land becomes inundated, 2) days of inundation, and 3) 14-day dry-down. Zero days mean the storage areas do not flood With existing conditions, but zero days do not necessarily mean conditions in the region are suitable for planting.
[b] The range of losses per acre represent an average of all storage areas Within the groups.
[c] Actual odds are not 100 percent that soybeans have no losses. The number of replications With a revenue loss for soybeans was too few to register in the rounding of the percentages.

Appendix Table E22. Probability of Losses Resulting from Use of the Staging Area, Hydrology Groups Three and Five Delineated by Difference in Total Days between With and Without Diversion, for Wheat and Sugarbeets, 10-year Flood Event, 14-day Dry Down Period

	Time from Activation of Staging Area until the Effects of Flooding are over[a]			Per Acre Losses for Individual Crop							
Hydrology Group	WO	W	Difference in Total Days	No Loss	$0 to $25/acre[b] Loss	$26 to $50/acre[b] Loss	$51 to $75/acre[b] Loss	$76 to $100/acre[b] Loss	$101 to $125/acre[b] Loss	$126 to $150/acre[b] Loss	Over $150/acre[b] Loss
	-------------------- days --------------------			--------------------------------- Based on 10,000 replications from Monte Carlo Simulation -----------------------------------							
				Wheat							
3	18.3	18.8	1 to 5	55.3%	44.7%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
			6 to 10								
5	0	14.5	11 to 15	77.8%	17.6%	3.9%	0.7%	0.0%	0.0%	0.0%	0.0%
5	0	17.5	16 to 20	67.2%	21.6%	8.2%	2.5%	0.5%	0.0%	0.0%	0.0%
			21 to 25								
			26 to 30								
5	0	63.0	30+	0.0%	0.0%	0.0%	0.0%	0.4%	2.1%	11.6%	86.0%
				Sugarbeets							
3	18.3	18.8	1 to 5	55.3%	44.7%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
			6 to 10								
5	0	14.5	11 to 15	77.9%	8.9%	5.4%	3.3%	1.9%	1.0%	0.8%	0.8%
5	0	17.5	16 to 20	67.2%	8.6%	7.4%	5.6%	4.0%	2.6%	1.7%	3.0%
			21 to 25								
			26 to 30								
5	0	63.0	30+	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%

Na=not applicable. There were no storage areas in those categories.
WO=Without Diversion, W=With Diversion
[a] Total days are defined as the sum of 1) days from staging activation until land becomes inundated, 2) days of inundation, and 3) 14-day dry-down. Zero days mean the storage areas do not flood With existing conditions, but zero days do not necessarily mean conditions in the region are suitable for planting.
[b] The range of losses per acre represent an average of all storage areas Within the groups.

Appendix Table E23. Probability of Losses Resulting from Use of the Staging Area, Hydrology Groups Three and Five Delineated by Difference in Total Days between With and Without Diversion, for Corn and Soybeans, 20-year Flood Event, 14-day Dry Down Period

	Time from Activation of Staging Area until the Effects of Flooding are over[a]			Per Acre Losses for Individual Crop							
Hydrology Group	WO	W	Difference in Total Days	No Loss	$0 to $25/acre[b] Loss	$26 to $50/acre[b] Loss	$51 to $75/acre[b] Loss	$76 to $100/acre[b] Loss	$101 to $125/acre[b] Loss	$126 to $150/acre[b] Loss	Over $150/acre[b] Loss
	---------------------- days ----------------------			---------------------------------- Based on 10,000 replications from Monte Carlo Simulation ----------------------------------							
				Corn							
3	21.2	22.0	1 to 5	25.7%	74.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
3	19.0	25.0	6 to 10	40.4%	39.0%	19.5%	0.8%	0.3%	0.0%	0.0%	0.0%
			11 to 15								
5	0	17.5	16 to 20	63.7%	34.2%	1.8%	0.2%	0.0%	0.0%	0.0%	0.0%
			21 to 25								
5	0	26.3	26 to 30	32.7%	30.1%	22.3%	9.8%	3.1%	1.1%	0.4%	0.5%
3	19.5	63.0	30+	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
				Soybeans[c]							
3	21.2	22.0	1 to 5	92.7%	7.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
3	19.0	25.0	6 to 10	98.2%	1.8%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
			11 to 15								
5	0	17.5	16 to 20	100.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
			21 to 25								
5	0	26.3	26 to 30	95.9%	4.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
3	19.5	63.0	30+	0.1%	0.8%	3.5%	3.4%	5.3%	9.9%	12.6%	64.4%

Na=not applicable. There were no storage areas in those categories.
WO=Without Diversion, W=With Diversion
[a] Total days are defined as the sum of 1) days from staging activation until land becomes inundated, 2) days of inundation, and 3) 14-day dry-down. Zero days mean the storage areas do not flood With existing conditions, but zero days do not necessarily mean conditions in the region are suitable for planting.
[b] The range of losses per acre represent an average of all storage areas Within the groups.
[c] Actual odds are not 100 percent that soybeans have no losses. The number of replications With a revenue loss for soybeans was too few to register in the rounding of the percentages.

Appendix Table E24. Probability of Losses Resulting from Use of the Staging Area, Hydrology Groups Three and Five Delineated by Difference in Total Days between With and Without Diversion, for Wheat and Sugarbeets, 20-year Flood Event, 14-day Dry Down Period

	Time from Activation of Staging Area until the Effects of Flooding are over[a]			Per Acre Losses for Individual Crop							
Hydrology Group	WO	W	Difference in Total Days	No Loss	$0 to $25/acre[b] Loss	$26 to $50/acre[b] Loss	$51 to $75/acre[b] Loss	$76 to $100/acre[b] Loss	$101 to $125/acre[b] Loss	$126 to $150/acre[b] Loss	Over $150/acre[b] Loss
	-------------------- days --------------------			--------------------------------- Based on 10,000 replications from Monte Carlo Simulation -----------------------------------							
				Wheat							
3	21.2	22.0	1 to 5	25.6%	74.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
3	19.0	25.0	6 to 10	40.4%	19.4%	40.3%	0.0%	0.0%	0.0%	0.0%	0.0%
			11 to 15								
5	0	17.5	16 to 20	63.5%	29.4%	5.4%	1.3%	0.2%	0.0%	0.0%	0.0%
			21 to 25								
5	0	26.3	26 to 30	32.7%	18.2%	18.6%	16.9%	9.3%	3.3%	0.8%	0.1%
3	19.5	63.0	30+	0.0%	0.0%	0.0%	0.0%	0.4%	2.2%	12.7%	84.7%
				Sugarbeets							
3	21.2	22.0	1 to 5	25.6%	74.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
3	19.0	25.0	6 to 10	40.4%	4.8%	6.4%	8.4%	13.0%	27.0%	0.0%	0.0%
			11 to 15								
5	0	17.5	16 to 20	63.3%	19.2%	6.5%	4.2%	2.7%	1.7%	1.0%	1.6%
			21 to 25								
5	0	26.3	26 to 30	32.7%	4.7%	6.0%	7.7%	6.1%	6.5%	7.2%	29.2%
3	19.5	63.0	30+	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%

Na=not applicable. There were no storage areas in those categories.
WO=Without Diversion, W=With Diversion
[a] Total days are defined as the sum of 1) days from staging activation until land becomes inundated, 2) days of inundation, and 3) 14-day dry-down. Zero days mean the storage areas do not flood With existing conditions, but zero days do not necessarily mean conditions in the region are suitable for planting.
[b] The range of losses per acre represent an average of all storage areas Within the groups.

Appendix Table E25. Probability of Losses Resulting from Use of the Staging Area, Hydrology Groups Three and Five Delineated by Difference in Total Days between With and Without Diversion, for Corn and Soybeans, 25-year Flood Event, 14-day Dry Down Period

	Time from Activation of Staging Area until the Effects of Flooding are over[a]			Per Acre Losses for Individual Crop							
Hydrology Group	WO	W	Difference in Total Days	No Loss	\$0 to \$25/acre[b] Loss	\$26 to \$50/acre[b] Loss	\$51 to \$75/acre[b] Loss	\$76 to \$100/acre[b] Loss	\$101 to \$125/acre[b] Loss	\$126 to \$150/acre[b] Loss	Over \$150/acre[b] Loss
	-------------------- days --------------------			-------------------------------- Based on 10,000 replications from Monte Carlo Simulation -----------------------------------							
				Corn							
3	21.4	23.2	1 to 5	27.5%	72.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
3	17.3	23.2	6 to 10	40.4%	46.0%	12.8%	0.6%	0.1%	0.0%	0.0%	0.0%
			11 to 15								
5	0	19.8	16 to 20	59.6%	32.0%	6.7%	1.3%	0.3%	0.1%	0.0%	0.0%
5	0	22.1	21 to 25	40.4%	43.5%	12.4%	2.7%	0.8%	0.2%	0.1%	0.1%
			26 to 30								
3	21.0	63.0	30+	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
				Soybeans[c]							
3	21.4	23.2	1 to 5	96.9%	3.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
3	17.3	23.2	6 to 10	98.2%	1.8%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
			11 to 15								
5	0	19.8	16 to 20	99.9%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
5	0	22.1	21 to 25	98.2%	1.8%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
			26 to 30								
3	21.0	63.0	30+	0.1%	0.8%	3.5%	3.4%	5.3%	9.9%	12.6%	64.4%

Na=not applicable. There were no storage areas in those categories.
WO=Without Diversion, W=With Diversion
[a] Total days are defined as the sum of 1) days from staging activation until land becomes inundated, 2) days of inundation, and 3) 14-day dry-down. Zero days mean the storage areas do not flood With existing conditions, but zero days do not necessarily mean conditions in the region are suitable for planting.
[b] The range of losses per acre represent an average of all storage areas Within the groups.
[c] Actual odds are not 100 percent that soybeans have no losses. The number of replications With a revenue loss for soybeans was too few to register in the rounding of the percentages.

Appendix Table E26. Probability of Losses Resulting from Use of the Staging Area, Hydrology Groups Three and Five Delineated by Difference in Total Days between With and Without Diversion, for Wheat and Sugarbeets, 25-year Flood Event, 14-day Dry Down Period

	Time from Activation of Staging Area until the Effects of Flooding are over[a]			Per Acre Losses for Individual Crop							
Hydrology Group	WO	W	Difference in Total Days	No Loss	$0 to $25/acre[b] Loss	$26 to $50/acre[b] Loss	$51 to $75/acre[b] Loss	$76 to $100/acre[b] Loss	$101 to $125/acre[b] Loss	$126 to $150/acre[b] Loss	Over $150/acre[b] Loss
	-------------------- days --------------------			--------------------------------- Based on 10,000 replications from Monte Carlo Simulation -----------------------------------							
				Wheat							
3	21.4	23.2	1 to 5	32.7%	67.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
3	17.3	23.2	6 to 10	40.4%	27.7%	31.9%	0.0%	0.0%	0.0%	0.0%	0.0%
			11 to 15								
5	0	19.8	16 to 20	59.4%	22.2%	12.4%	4.6%	1.2%	0.2%	0.0%	0.0%
5	0	22.1	21 to 25	40.4%	31.2%	16.5%	8.3%	2.9%	0.7%	0.0%	0.0%
			26 to 30								
3	21.0	63.0	30+	0.0%	0.0%	0.0%	0.0%	0.4%	2.4%	13.2%	84.0%
				Sugarbeets							
3	21.4	23.2	1 to 5	25.6%	41.0%	33.4%	0.0%	0.0%	0.0%	0.0%	0.0%
3	17.3	23.2	6 to 10	40.4%	5.1%	7.3%	13.3%	34.0%	0.0%	0.0%	0.0%
			11 to 15								
5	0	19.8	16 to 20	59.4%	7.9%	8.2%	6.8%	5.5%	3.7%	3.1%	5.4%
5	0	22.1	21 to 25	40.4%	15.6%	9.2%	8.1%	7.3%	5.9%	4.3%	9.3%
			26 to 30								
3	21.0	63.0	30+	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%

Na=not applicable. There were no storage areas in those categories.
WO=Without Diversion, W=With Diversion
[a] Total days are defined as the sum of 1) days from staging activation until land becomes inundated, 2) days of inundation, and 3) 14-day dry-down. Zero days mean the storage areas do not flood With existing conditions, but zero days do not necessarily mean conditions in the region are suitable for planting.
[b] The range of losses per acre represent an average of all storage areas Within the groups.

Appendix Table E27. Probability of Losses Resulting from Use of the Staging Area, Hydrology Groups Three and Five Delineated by Difference in Total Days between With and Without Diversion, for Corn and Soybeans, 25-year Long Flood Event, 14-day Dry Down Period

	Time from Activation of Staging Area until the Effects of Flooding are over[a]			Per Acre Losses for Individual Crop							
Hydrology Group	WO	W	Difference in Total Days	No Loss	$0 to $25/acre[b] Loss	$26 to $50/acre[b] Loss	$51 to $75/acre[b] Loss	$76 to $100/acre[b] Loss	$101 to $125/acre[b] Loss	$126 to $150/acre[b] Loss	Over $150/acre[b] Loss
	-------------------- days --------------------			--------------------------------- Based on 10,000 replications from Monte Carlo Simulation -----------------------------------							
				Corn							
3	24.7	26.0	1 to 5	2.2%	97.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
3	17.7	24.0	6 to 10	40.4%	37.1%	20.7%	1.4%	0.3%	0.1%	0.0%	0.0%
			11 to 15								
5	0	19.3	16 to 20	59.6%	32.2%	6.5%	1.3%	0.3%	0.1%	0.0%	0.0%
5	0	22.0	21 to 25	44.0%	41.2%	11.5%	2.3%	0.7%	0.1%	0.1%	0.1%
5	0	25.5	26 to 30	36.5%	29.8%	21.3%	8.6%	2.3%	0.9%	0.3%	0.3%
3	25.5	63.0	30+	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
				Soybeans[c]							
3	24.7	26.0	1 to 5	42.1%	57.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
3	17.7	24.0	6 to 10	98.2%	1.8%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
			11 to 15								
5	0	19.3	16 to 20	99.9%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
5	0	22.0	21 to 25	98.8%	1.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
5	0	25.5	26 to 30	97.3%	2.7%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
3	25.5	63.0	30+	0.1%	0.8%	3.5%	3.4%	5.3%	9.9%	12.6%	64.4%

Na=not applicable. There were no storage areas in those categories.
WO=Without Diversion, W=With Diversion
[a] Total days are defined as the sum of 1) days from staging activation until land becomes inundated, 2) days of inundation, and 3) 14-day dry-down. Zero days mean the storage areas do not flood With existing conditions, but zero days do not necessarily mean conditions in the region are suitable for planting.
[b] The range of losses per acre represent an average of all storage areas Within the groups.
[c] Actual odds are not 100 percent that soybeans have no losses. The number of replications With a revenue loss for soybeans was too few to register in the rounding of the percentages.

Appendix Table E28. Probability of Losses Resulting from Use of the Staging Area, Hydrology Groups Three and Five Delineated by Difference in Total Days between With and Without Diversion, for Wheat and Sugarbeets, 25-year Long Flood Event, 14-day Dry Down Period

	Time from Activation of Staging Area until the Effects of Flooding are over[a]			Per Acre Losses for Individual Crop							
Hydrology Group	WO	W	Difference in Total Days	No Loss	$0 to $25/acre[b] Loss	$26 to $50/acre[b] Loss	$51 to $75/acre[b] Loss	$76 to $100/acre[b] Loss	$101 to $125/acre[b] Loss	$126 to $150/acre[b] Loss	Over $150/acre[b] Loss
	-------------------- days --------------------			--------------------------------- Based on 10,000 replications from Monte Carlo Simulation -----------------------------------							
				Wheat							
3	24.7	26.0	1 to 5	2.2%	97.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
3	17.7	24.0	6 to 10	40.4%	21.9%	37.7%	0.0%	0.0%	0.0%	0.0%	0.0%
			11 to 15								
5	0	19.3	16 to 20	59.4%	23.8%	11.6%	4.0%	1.1%	0.1%	0.0%	0.0%
5	0	22.0	21 to 25	43.9%	28.8%	16.2%	7.7%	2.7%	0.5%	0.0%	0.0%
5	0	25.5	26 to 30	36.5%	15.9%	19.6%	15.8%	8.3%	3.2%	0.7%	0.1%
3	25.5	63.0	30+	0.0%	0.0%	0.0%	0.1%	1.0%	5.4%	20.5%	73.0%
				Sugarbeets							
3	24.7	26.0	1 to 5	0.0%	76.6%	23.4%	0.0%	0.0%	0.0%	0.0%	0.0%
3	17.7	24.0	6 to 10	40.4%	5.4%	7.0%	9.3%	10.4%	18.3%	9.2%	0.0%
			11 to 15								
5	0	19.3	16 to 20	59.4%	8.5%	8.2%	7.0%	5.2%	3.8%	2.9%	5.1%
5	0	22.0	21 to 25	44.0%	13.7%	7.3%	7.5%	7.1%	5.2%	4.5%	10.8%
5	0	25.5	26 to 30	36.5%	6.0%	9.3%	9.7%	9.1%	7.8%	7.2%	14.5%
3	25.5	63.0	30+	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%

Na=not applicable. There were no storage areas in those categories.
WO=Without Diversion, W=With Diversion
[a] Total days are defined as the sum of 1) days from staging activation until land becomes inundated, 2) days of inundation, and 3) 14-day dry-down. Zero days mean the storage areas do not flood With existing conditions, but zero days do not necessarily mean conditions in the region are suitable for planting.
[b] The range of losses per acre represent an average of all storage areas Within the groups.

Appendix Table E29. Probability of Losses Resulting from Use of the Staging Area, Hydrology Groups Three and Five Delineated by Difference in Total Days between With and Without Diversion, for Corn and Soybeans, 25-year Extra Long Flood Event, 14-day Dry Down Period

	Time from Activation of Staging Area until the Effects of Flooding are over[a]			Per Acre Losses for Individual Crop							
Hydrology Group	WO	W	Difference in Total Days	No Loss	$0 to $25/acre[b] Loss	$26 to $50/acre[b] Loss	$51 to $75/acre[b] Loss	$76 to $100/acre[b] Loss	$101 to $125/acre[b] Loss	$126 to $150/acre[b] Loss	Over $150/acre[b] Loss
	-------------------- days --------------------			-------------------------------- Based on 10,000 replications from Monte Carlo Simulation -----------------------------------							
				Corn							
3	29.8	31.2	1 to 5	0.0%	99.4%	0.6%	0.0%	0.0%	0.0%	0.0%	0.0%
3	18.9	25.7	6 to 10	29.0%	43.3%	24.9%	2.1%	0.6%	0.1%	0.0%	0.0%
			11 to 15								
5	0	23.4	16 to 20	40.4%	39.8%	14.6%	3.6%	1.1%	0.4%	0.1%	0.1%
5	0	26.5	21 to 25	29.0%	36.6%	21.3%	9.0%	2.5%	0.9%	0.4%	0.4%
			26 to 30								
3	30.0	63.0	30+	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	99.9%
				Soybeans[c]							
3	29.8	31.2	1 to 5	4.2%	95.8%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
3	18.9	25.7	6 to 10	94.3%	5.7%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
			11 to 15								
5	0	23.4	16 to 20	98.2%	1.8%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
5	0	26.5	21 to 25	94.3%	5.7%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
			26 to 30								
3	30.0	63.0	30+	0.1%	0.8%	3.5%	3.6%	5.2%	9.9%	12.6%	64.4%

Na=not applicable. There were no storage areas in those categories.
WO=Without Diversion, W=With Diversion
[a] Total days are defined as the sum of 1) days from staging activation until land becomes inundated, 2) days of inundation, and 3) 14-day dry-down. Zero days mean the storage areas do not flood With existing conditions, but zero days do not necessarily mean conditions in the region are suitable for planting.
[b] The range of losses per acre represent an average of all storage areas Within the groups.
[c] Actual odds are not 100 percent that soybeans have no losses. The number of replications With a revenue loss for soybeans was too few to register in the rounding of the percentages.

Appendix Table E30. Probability of Losses Resulting from Use of the Staging Area, Hydrology Groups Three and Five Delineated by Difference in Total Days between With and Without Diversion, for Wheat and Sugarbeets, 25-year Extra Long Flood Event, 14-day Dry Down Period

	Time from Activation of Staging Area until the Effects of Flooding are over[a]			Per Acre Losses for Individual Crop							
Hydrology Group	WO	W	Difference in Total Days	No Loss	$0 to $25/acre[b] Loss	$26 to $50/acre[b] Loss	$51 to $75/acre[b] Loss	$76 to $100/acre[b] Loss	$101 to $125/acre[b] Loss	$126 to $150/acre[b] Loss	Over $150/acre[b] Loss
	-------------------- days --------------------			--------------------------------- Based on 10,000 replications from Monte Carlo Simulation -----------------------------------							
				Wheat							
3	29.8	31.2	1 to 5	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
3	18.9	25.7	6 to 10	28.9%	19.9%	51.2%	0.0%	0.0%	0.0%	0.0%	0.0%
			11 to 15								
5	0	23.4	16 to 20	40.4%	26.5%	18.1%	10.1%	3.9%	1.0%	0.1%	0.0%
5	0	26.5	21 to 25	28.9%	19.1%	19.7%	16.9%	10.2%	4.0%	1.1%	0.2%
			26 to 30								
3	30.0	63.0	30+	0.0%	0.0%	0.1%	1.0%	3.9%	14.0%	28.6%	52.3%
				Sugarbeets							
3	29.8	31.2	1 to 5	0.0%	53.7%	46.3%	0.0%	0.0%	0.0%	0.0%	0.0%
3	18.9	25.7	6 to 10	29.0%	12.3%	7.5%	10.9%	14.4%	26.1%	0.0%	0.0%
			11 to 15								
5	0	23.4	16 to 20	40.4%	11.1%	8.7%	7.2%	7.4%	5.9%	5.4%	13.9%
5	0	26.5	21 to 25	29.0%	12.1%	5.8%	6.3%	8.0%	6.1%	6.4%	26.3%
			26 to 30								
3	30.0	63.0	30+	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%

Na=not applicable. There were no storage areas in those categories.
WO=Without Diversion, W=With Diversion
[a] Total days are defined as the sum of 1) days from staging activation until land becomes inundated, 2) days of inundation, and 3) 14-day dry-down. Zero days mean the storage areas do not flood With existing conditions, but zero days do not necessarily mean conditions in the region are suitable for planting.
[b] The range of losses per acre represent an average of all storage areas Within the groups.

Appendix Table E31. Probability of Losses Resulting from Use of the Staging Area, Hydrology Groups Three and Five Delineated by Difference in Total Days between With and Without Diversion, for Corn and Soybeans, 2009-like Flood Event, 14-day Dry Down Period

	Time from Activation of Staging Area until the Effects of Flooding are over[a]			Per Acre Losses for Individual Crop							
Hydrology Group	WO	W	Difference in Total Days	No Loss	$0 to $25/acre[b] Loss	$26 to $50/acre[b] Loss	$51 to $75/acre[b] Loss	$76 to $100/acre[b] Loss	$101 to $125/acre[b] Loss	$126 to $150/acre[b] Loss	Over $150/acre[b] Loss
	-------------------- days --------------------			-------------------------------- Based on 10,000 replications from Monte Carlo Simulation -----------------------------------							
				Corn							
3	20.3	22.8	1 to 5	2.7%	96.8%	0.5%	0.0%	0.0%	0.0%	0.0%	0.0%
3	29.5	37.4	6 to 10	3.7%	7.2%	23.3%	37.3%	9.9%	10.6%	5.9%	2.1%
3	23.0	35.8	11 to 15	5.0%	12.5%	16.9%	24.7%	20.6%	8.2%	4.9%	7.2%
5	0	19.2	16 to 20	59.6%	33.4%	5.7%	1.0%	0.2%	0.1%	0.0%	0.0%
5	0	21.8	21 to 25	44.0%	39.2%	12.8%	2.8%	0.8%	0.2%	0.1%	0.1%
5	0	25.5	26 to 30	36.5%	30.0%	21.2%	8.5%	2.3%	0.9%	0.4%	0.3%
5	29.5	61.5	30+	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
				Soybeans[c]							
3	20.3	22.8	1 to 5	47.2%	52.8%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
3	29.5	37.4	6 to 10	53.1%	43.6%	0.9%	1.0%	0.6%	0.4%	0.4%	0.0%
3	23.0	35.8	11 to 15	58.7%	39.5%	0.8%	0.5%	0.2%	0.2%	0.1%	0.0%
5	0	19.2	16 to 20	99.9%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
5	0	21.8	21 to 25	98.8%	1.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
5	0	25.5	26 to 30	97.3%	2.7%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
5	29.5	61.5	30+	0.1%	1.1%	3.9%	3.6%	5.3%	9.8%	12.7%	63.5%

Na=not applicable. There were no storage areas in those categories.
WO=Without Diversion, W=With Diversion
[a] Total days are defined as the sum of 1) days from staging activation until land becomes inundated, 2) days of inundation, and 3) 14-day dry-down. Zero days mean the storage areas do not flood With existing conditions, but zero days do not necessarily mean conditions in the region are suitable for planting.
[b] The range of losses per acre represent an average of all storage areas Within the groups.
[c] Actual odds are not 100 percent that soybeans have no losses. The number of replications With a revenue loss for soybeans was too few to register in the rounding of the percentages.

Appendix Table E32. Probability of Losses Resulting from Use of the Staging Area, Hydrology Groups Three and Five Delineated by Difference in Total Days between With and Without Diversion, for Wheat and Sugarbeets, 2009-like Flood Event, 14-day Dry Down Period											
	Time from Activation of Staging Area until the Effects of Flooding are over[a]			Per Acre Losses for Individual Crop							
Hydrology Group	WO	W	Difference in Total Days	No Loss	$0 to $25/acre[b] Loss	$26 to $50/acre[b] Loss	$51 to $75/acre[b] Loss	$76 to $100/acre[b] Loss	$101 to $125/acre[b] Loss	$126 to $150/acre[b] Loss	Over $150/acre[b] Loss
	-------------------- days --------------------			-------------------------------- Based on 10,000 replications from Monte Carlo Simulation -----------------------------------							
				Wheat							
3	20.3	22.8	1 to 5	2.7%	97.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
3	29.5	37.4	6 to 10	3.7%	7.1%	15.4%	73.8%	0.0%	0.0%	0.0%	0.0%
3	23.0	35.8	11 to 15	5.0%	11.1%	13.5%	18.4%	52.1%	0.0%	0.0%	0.0%
5	0	19.2	16 to 20	59.4%	23.5%	11.6%	4.2%	1.2%	0.2%	0.0%	0.0%
5	0	21.8	21 to 25	43.9%	27.8%	16.6%	8.2%	2.9%	0.6%	0.0%	0.0%
5	0	25.5	26 to 30	36.5%	16.4%	20.2%	15.4%	8.1%	2.9%	0.6%	0.0%
5	29.5	61.5	30+	0.0%	0.0%	0.0%	0.7%	2.7%	11.6%	27.1%	57.9%
				Sugarbeets							
3	20.3	22.8	1 to 5	2.7%	54.8%	42.6%	0.0%	0.0%	0.0%	0.0%	0.0%
3	29.5	37.4	6 to 10	3.7%	1.3%	3.4%	2.4%	2.4%	6.2%	7.6%	73.0%
3	23.0	35.8	11 to 15	5.0%	3.5%	4.6%	3.0%	3.6%	6.5%	3.8%	70.1%
5	0	19.2	16 to 20	59.4%	8.5%	8.7%	6.7%	5.2%	3.6%	2.9%	5.0%
5	0	21.8	21 to 25	44.0%	10.4%	8.1%	7.8%	6.6%	5.8%	5.2%	12.2%
5	0	25.5	26 to 30	36.5%	4.6%	5.9%	6.3%	7.8%	6.0%	6.1%	26.7%
5	29.5	61.5	30+	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%

Na=not applicable. There were no storage areas in those categories.
WO=Without Diversion, W=With Diversion
[a] Total days are defined as the sum of 1) days from staging activation until land becomes inundated, 2) days of inundation, and 3) 14-day dry-down. Zero days mean the storage areas do not flood With existing conditions, but zero days do not necessarily mean conditions in the region are suitable for planting.
[b] The range of losses per acre represent an average of all storage areas Within the groups.

Appendix Table E33. Probability of Losses Resulting from Use of the Staging Area, Hydrology Groups Three and Five Delineated by Difference in Total Days between With and Without Diversion, for Corn and Soybeans, 50-year Flood Event, 14-day Dry Down Period

	Time from Activation of Staging Area until the Effects of Flooding are over[a]			Per Acre Losses for Individual Crop							
Hydrology Group	WO	W	Difference in Total Days	No Loss	$0 to $25/acre[b] Loss	$26 to $50/acre[b] Loss	$51 to $75/acre[b] Loss	$76 to $100/acre[b] Loss	$101 to $125/acre[b] Loss	$126 to $150/acre[b] Loss	Over $150/acre[b] Loss
	-------------------- days --------------------			--------------------------------- Based on 10,000 replications from Monte Carlo Simulation -----------------------------------							
				Corn							
3	23.6	25.3	1 to 5	29.0%	70.5%	0.5%	0.0%	0.0%	0.0%	0.0%	0.0%
3	18.0	24.2	6 to 10	40.4%	40.8%	17.6%	0.8%	0.3%	0.0%	0.0%	0.0%
			11 to 15								
5	0	19.7	16 to 20	59.6%	32.1%	6.6%	1.3%	0.3%	0.1%	0.0%	0.0%
5	0	23.1	21 to 25	40.4%	39.1%	15.0%	3.8%	1.1%	0.4%	0.1%	0.1%
5	0	26.5	26 to 30	32.7%	28.0%	22.9%	10.6%	3.6%	1.2%	0.4%	0.6%
5	0	64.0	30+	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
				Soybeans[c]							
3	23.6	25.3	1 to 5	94.8%	5.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
3	18.0	24.2	6 to 10	98.2%	1.8%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
			11 to 15								
5	0	19.7	16 to 20	99.9%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
5	0	23.1	21 to 25	98.2%	1.8%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
5	0	26.5	26 to 30	95.9%	4.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
5	0	64.0	30+	0.1%	0.5%	3.3%	3.4%	5.2%	9.9%	12.7%	64.9%

Na=not applicable. There were no storage areas in those categories.
WO=Without Diversion, W=With Diversion
[a] Total days are defined as the sum of 1) days from staging activation until land becomes inundated, 2) days of inundation, and 3) 14-day dry-down. Zero days mean the storage areas do not flood With existing conditions, but zero days do not necessarily mean conditions in the region are suitable for planting.
[b] The range of losses per acre represent an average of all storage areas Within the groups.
[c] Actual odds are not 100 percent that soybeans have no losses. The number of replications With a revenue loss for soybeans was too few to register in the rounding of the percentages.

Appendix Table E34. Probability of Losses Resulting from Use of the Staging Area, Hydrology Groups Three and Five Delineated by Difference in Total Days between With and Without Diversion, for Wheat and Sugarbeets, 50-year Flood Event, 14-day Dry Down Period

Hydrology Group	Time from Activation of Staging Area until the Effects of Flooding are over[a] WO	W	Difference in Total Days	Per Acre Losses for Individual Crop: No Loss	$0 to $25/acre[b] Loss	$26 to $50/acre[b] Loss	$51 to $75/acre[b] Loss	$76 to $100/acre[b] Loss	$101 to $125/acre[b] Loss	$126 to $150/acre[b] Loss	Over $150/acre[b] Loss
	-------------------- days --------------------			--------------------------------- Based on 10,000 replications from Monte Carlo Simulation -----------------------------------							
				Wheat							
3	23.6	25.3	1 to 5	29.0%	71.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
3	18.0	24.2	6 to 10	40.4%	19.1%	40.6%	0.0%	0.0%	0.0%	0.0%	0.0%
			11 to 15								
5	0	19.7	16 to 20	59.4%	22.2%	12.5%	4.6%	1.2%	0.2%	0.0%	0.0%
5	0	23.1	21 to 25	40.4%	25.8%	18.0%	10.4%	4.1%	1.1%	0.2%	0.0%
5	0	26.5	26 to 30	32.7%	15.4%	19.0%	16.9%	10.3%	4.3%	1.2%	0.2%
5	0	64.0	30+	0.0%	0.0%	0.0%	0.7%	2.7%	11.3%	27.1%	58.3%
				Sugarbeets							
3	23.6	25.3	1 to 5	29.0%	26.4%	44.6%	0.0%	0.0%	0.0%	0.0%	0.0%
3	18.0	24.2	6 to 10	40.4%	9.0%	8.5%	13.9%	28.2%	0.0%	0.0%	0.0%
			11 to 15								
5	0	19.7	16 to 20	59.4%	7.9%	8.3%	7.2%	5.2%	3.7%	3.1%	5.3%
5	0	23.1	21 to 25	40.4%	10.0%	9.0%	7.0%	6.9%	6.9%	5.0%	14.9%
5	0	26.5	26 to 30	32.7%	5.4%	9.3%	9.3%	9.1%	7.9%	7.9%	18.5%
5	0	64.0	30+	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%

Na=not applicable. There were no storage areas in those categories.
WO=Without Diversion, W=With Diversion
[a] Total days are defined as the sum of 1) days from staging activation until land becomes inundated, 2) days of inundation, and 3) 14-day dry-down. Zero days mean the storage areas do not flood With existing conditions, but zero days do not necessarily mean conditions in the region are suitable for planting.
[b] The range of losses per acre represent an average of all storage areas Within the groups.

Appendix Table E35. Probability of Losses Resulting from Use of the Staging Area, Hydrology Groups Three and Five Delineated by Difference in Total Days between With and Without Diversion, for Corn and Soybeans, 100-year Flood Event, 14-day Dry Down Period											
	Time from Activation of Staging Area until the Effects of Flooding are over[a]			Per Acre Losses for Individual Crop							
Hydrology Group	WO	W	Difference in Total Days	No Loss	$0 to $25/acre[b] Loss	$26 to $50/acre[b] Loss	$51 to $75/acre[b] Loss	$76 to $100/acre[b] Loss	$101 to $125/acre[b] Loss	$126 to $150/acre[b] Loss	Over $150/acre[b] Loss
	-------------------- days --------------------			--------------------------------- Based on 10,000 replications from Monte Carlo Simulation -----------------------------------							
				Corn							
3	24.8	26.9	1 to 5	0.2%	98.7%	1.2%	0.0%	0.0%	0.0%	0.0%	0.0%
3	19.2	25.8	6 to 10	29.0%	41.0%	26.9%	2.5%	0.6%	0.1%	0.0%	0.0%
			11 to 15								
5	0	18.5	16 to 20	59.6%	36.7%	3.0%	0.6%	0.1%	0.0%	0.0%	0.0%
5	0	23.0	21 to 25	40.4%	39.7%	14.7%	3.6%	1.1%	0.3%	0.1%	0.1%
5	0	27.2	26 to 30	25.6%	34.9%	23.0%	10.6%	3.7%	1.2%	0.5%	0.6%
3	32.5	64.5	30+	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.3%	99.6%
				Soybeans[c]							
3	24.8	26.9	1 to 5	33.5%	66.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
3	19.2	25.8	6 to 10	94.3%	5.7%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
			11 to 15								
5	0	18.5	16 to 20	99.9%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
5	0	23.0	21 to 25	98.2%	1.8%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
5	0	27.2	26 to 30	91.9%	8.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
3	32.5	64.5	30+	0.1%	0.4%	3.1%	3.7%	4.9%	9.8%	12.9%	65.1%

Na=not applicable. There were no storage areas in those categories.
WO=Without Diversion, W=With Diversion
[a] Total days are defined as the sum of 1) days from staging activation until land becomes inundated, 2) days of inundation, and 3) 14-day dry-down. Zero days mean the storage areas do not flood With existing conditions, but zero days do not necessarily mean conditions in the region are suitable for planting.
[b] The range of losses per acre represent an average of all storage areas Within the groups.
[c] Actual odds are not 100 percent that soybeans have no losses. The number of replications With a revenue loss for soybeans was too few to register in the rounding of the percentages.

Appendix Table E36. Probability of Losses Resulting from Use of the Staging Area, Hydrology Groups Three and Five Delineated by Difference in Total Days between With and Without Diversion, for Wheat and Sugarbeets, 100-year Flood Event, 14-day Dry Down Period

	Time from Activation of Staging Area until the Effects of Flooding are over[a]			Per Acre Losses for Individual Crop							
Hydrology Group	WO	W	Difference in Total Days	No Loss	$0 to $25/acre[b] Loss	$26 to $50/acre[b] Loss	$51 to $75/acre[b] Loss	$76 to $100/acre[b] Loss	$101 to $125/acre[b] Loss	$126 to $150/acre[b] Loss	Over $150/acre[b] Loss
	-------------------- days --------------------			--------------------------------- Based on 10,000 replications from Monte Carlo Simulation -----------------------------------							
				Wheat							
3	24.8	26.9	1 to 5	0.2%	99.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
3	19.2	25.8	6 to 10	28.9%	23.3%	47.8%	0.0%	0.0%	0.0%	0.0%	0.0%
			11 to 15								
5	0	18.5	16 to 20	59.4%	24.5%	11.2%	3.9%	1.0%	0.1%	0.0%	0.0%
5	0	23.0	21 to 25	40.4%	30.3%	17.1%	8.5%	3.1%	0.7%	0.0%	0.0%
5	0	27.2	26 to 30	25.6%	22.5%	19.8%	17.0%	10.1%	3.9%	1.0%	0.2%
3	32.5	64.5	30+	0.0%	0.0%	0.8%	3.6%	9.7%	22.5%	30.5%	32.9%
				Sugarbeets							
3	24.8	26.9	1 to 5	0.2%	48.1%	51.8%	0.0%	0.0%	0.0%	0.0%	0.0%
3	19.2	25.8	6 to 10	29.0%	12.1%	6.1%	8.1%	13.0%	31.7%	0.0%	0.0%
			11 to 15								
5	0	18.5	16 to 20	59.4%	13.9%	8.8%	6.2%	4.4%	2.8%	1.8%	2.6%
5	0	23.0	21 to 25	40.4%	13.3%	8.3%	8.4%	7.1%	6.4%	4.9%	11.3%
5	0	27.2	26 to 30	25.6%	11.4%	5.3%	6.0%	7.7%	5.9%	6.4%	31.7%
3	32.5	64.5	30+	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%

Na=not applicable. There were no storage areas in those categories.
WO=Without Diversion, W=With Diversion
[a] Total days are defined as the sum of 1) days from staging activation until land becomes inundated, 2) days of inundation, and 3) 14-day dry-down. Zero days mean the storage areas do not flood With existing conditions, but zero days do not necessarily mean conditions in the region are suitable for planting.
[b] The range of losses per acre represent an average of all storage areas Within the groups.

Appendix Table E37. Probability of Losses Resulting from Use of the Staging Area, Hydrology Groups Three and Five Delineated by Difference in Total Days between With and Without Diversion, for Corn and Soybeans, 500-year Flood Event, 14-day Dry Down Period

	Time from Activation of Staging Area until the Effects of Flooding are over[a]			Per Acre Losses for Individual Crop							
Hydrology Group	WO	W	Difference in Total Days	No Loss	$0 to $25/acre[b] Loss	$26 to $50/acre[b] Loss	$51 to $75/acre[b] Loss	$76 to $100/acre[b] Loss	$101 to $125/acre[b] Loss	$126 to $150/acre[b] Loss	Over $150/acre[b] Loss
	-------------------- days --------------------			--------------------------------- Based on 10,000 replications from Monte Carlo Simulation -----------------------------------							
				Corn							
3	36.2	37.6	1 to 5	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
3	24.8	30.9	6 to 10	1.9%	34.0%	37.9%	21.4%	4.7%	0.2%	0.0%	0.0%
3	43.5	56.3	11 to 15	0.9%	1.1%	2.8%	3.7%	5.8%	8.4%	8.3%	69.0%
3	45.5	62.2	16 to 20	0.9%	5.8%	5.3%	7.2%	9.4%	9.6%	9.0%	52.7%
5	0	25.0	21 to 25	40.4%	31.7%	18.7%	6.6%	1.7%	0.5%	0.2%	0.2%
5	0	26.8	26 to 30	0.0%	32.4%	37.8%	21.7%	5.9%	1.4%	0.4%	0.0%
3	39.0	65.5	26 to 30								
			30+								
				Soybeans[c]							
3	36.2	37.6	1 to 5	0.2%	99.8%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
3	24.8	30.9	6 to 10	41.7%	55.5%	2.7%	0.1%	0.0%	0.0%	0.0%	0.0%
3	43.5	56.3	11 to 15	2.3%	9.4%	8.1%	9.6%	11.0%	11.7%	13.5%	34.4%
3	45.5	62.2	16 to 20	1.8%	7.5%	4.4%	8.0%	11.4%	13.5%	14.1%	39.3%
5	0	25.0	21 to 25	98.2%	1.8%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
5	0	26.8	26 to 30	0.1%	99.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
3	39.0	65.5	26 to 30								
			30+								

Na=not applicable. There were no storage areas in those categories.
WO=Without Diversion, W=With Diversion
[a] Total days are defined as the sum of 1) days from staging activation until land becomes inundated, 2) days of inundation, and 3) 14-day dry-down. Zero days mean the storage areas do not flood With existing conditions, but zero days do not necessarily mean conditions in the region are suitable for planting.
[b] The range of losses per acre represent an average of all storage areas Within the groups.
[c] Actual odds are not 100 percent that soybeans have no losses. The number of replications With a revenue loss for soybeans was too few to register in the rounding of the percentages.

Appendix Table E38. Probability of Losses Resulting from Use of the Staging Area, Hydrology Groups Three and Five Delineated by Difference in Total Days between With and Without Diversion, for Wheat and Sugarbeets, 500-year Flood Event, 14-day Dry Down Period

	Time from Activation of Staging Area until the Effects of Flooding are over[a]			Per Acre Losses for Individual Crop							
Hydrology Group	WO	W	Difference in Total Days	No Loss	$0 to $25/acre[b] Loss	$26 to $50/acre[b] Loss	$51 to $75/acre[b] Loss	$76 to $100/acre[b] Loss	$101 to $125/acre[b] Loss	$126 to $150/acre[b] Loss	Over $150/acre[b] Loss
	-------------------- days --------------------			--------------------------------- Based on 10,000 replications from Monte Carlo Simulation -----------------------------------							
				Wheat							
3	36.2	37.6	1 to 5	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
3	24.8	30.9	6 to 10	1.9%	22.5%	75.6%	0.0%	0.0%	0.0%	0.0%	0.0%
3	43.5	56.3	11 to 15	0.9%	12.8%	26.5%	29.3%	30.5%	0.0%	0.0%	0.0%
3	45.5	62.2	16 to 20	0.9%	27.3%	30.0%	21.2%	13.3%	7.3%	0.1%	0.0%
5	0	25.0	21 to 25	40.4%	17.7%	19.7%	13.4%	6.4%	2.0%	0.4%	0.0%
5	0	26.8	26 to 30	0.0%	44.2%	21.2%	19.6%	10.9%	3.5%	0.6%	0.0%
3	39.0	65.5	26 to 30								
			30+								
				Sugarbeets							
3	36.2	37.6	1 to 5	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
3	24.8	30.9	6 to 10	1.9%	6.6%	24.7%	9.3%	12.9%	44.6%	0.0%	0.0%
3	43.5	56.3	11 to 15	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.3%	99.6%
3	45.5	62.2	16 to 20	0.0%	0.0%	0.0%	0.0%	0.0%	0.2%	0.6%	99.2%
5	0	25.0	21 to 25	40.4%	4.9%	6.2%	6.9%	7.7%	6.1%	6.0%	22.0%
5	0	26.8	26 to 30	0.0%	0.3%	34.4%	6.9%	6.6%	7.5%	6.6%	37.8%
3	39.0	65.5	26 to 30								
			30+								

Na=not applicable. There were no storage areas in those categories.
WO=Without Diversion, W=With Diversion
[a] Total days are defined as the sum of 1) days from staging activation until land becomes inundated, 2) days of inundation, and 3) 14-day dry-down. Zero days mean the storage areas do not flood With existing conditions, but zero days do not necessarily mean conditions in the region are suitable for planting.
[b] The range of losses per acre represent an average of all storage areas Within the groups.

Appendix Table E39. Probability of Losses Resulting from Use of the Staging Area, Hydrology Groups Three and Five Delineated by Difference in Total Days between With and Without Diversion, for Corn and Soybeans, Probabilistic Maximum Flood Event, 14-day Dry Down Period

	Time from Activation of Staging Area until the Effects of Flooding are over[a]			Per Acre Losses for Individual Crop							
Hydrology Group	WO	W	Difference in Total Days	No Loss	$0 to $25/acre[b] Loss	$26 to $50/acre[b] Loss	$51 to $75/acre[b] Loss	$76 to $100/acre[b] Loss	$101 to $125/acre[b] Loss	$126 to $150/acre[b] Loss	Over $150/acre[b] Loss
	-------------------- days --------------------			-------------------------------- Based on 10,000 replications from Monte Carlo Simulation -----------------------------------							
				Corn							
3	31.0	32.3	1 to 5	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
3	29.3	35.6	6 to 10	0.2%	8.1%	25.0%	31.7%	33.8%	1.2%	0.0%	0.0%
			11 to 15								
			16 to 20								
			21 to 25								
			26 to 30								
			30+								
				Soybeans[c]							
3	31.0	32.3	1 to 5	10.4%	89.6%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
3	29.3	35.6	6 to 10	14.7%	67.5%	12.2%	5.4%	0.2%	0.0%	0.0%	0.0%
			11 to 15								
			16 to 20								
			21 to 25								
			26 to 30								
			30+								

Na=not applicable. There were no storage areas in those categories.
WO=Without Diversion, W=With Diversion
[a] Total days are defined as the sum of 1) days from staging activation until land becomes inundated, 2) days of inundation, and 3) 14-day dry-down. Zero days mean the storage areas do not flood With existing conditions, but zero days do not necessarily mean conditions in the region are suitable for planting.
[b] The range of losses per acre represent an average of all storage areas Within the groups.
[c] Actual odds are not 100 percent that soybeans have no losses. The number of replications With a revenue loss for soybeans was too few to register in the rounding of the percentages.

Appendix Table E40. Probability of Losses Resulting from Use of the Staging Area, Hydrology Groups Three and Five Delineated by Difference in Total Days between With and Without Diversion, for Wheat and Sugarbeets, Probabilistic Maximum Flood Event, 14-day Dry Down Period

	Time from Activation of Staging Area until the Effects of Flooding are over[a]			Per Acre Losses for Individual Crop							
Hydrology Group	WO	W	Difference in Total Days	No Loss	$0 to $25/acre[b] Loss	$26 to $50/acre[b] Loss	$51 to $75/acre[b] Loss	$76 to $100/acre[b] Loss	$101 to $125/acre[b] Loss	$126 to $150/acre[b] Loss	Over $150/acre[b] Loss
	-------------------- days --------------------			--------------------------------- Based on 10,000 replications from Monte Carlo Simulation -----------------------------------							
				Wheat							
3	31.0	32.3	1 to 5	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
3	29.3	35.6	6 to 10	0.2%	12.3%	87.6%	0.0%	0.0%	0.0%	0.0%	0.0%
			11 to 15								
			16 to 20								
			21 to 25								
			26 to 30								
			30+								
				Sugarbeets							
3	31.0	32.3	1 to 5	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
3	29.3	35.6	6 to 10	0.2%	0.7%	5.8%	16.1%	7.1%	15.1%	55.1%	0.0%
			11 to 15								
			16 to 20								
			21 to 25								
			26 to 30								
			30+								

Na=not applicable. There were no storage areas in those categories.
WO=Without Diversion, W=With Diversion
[a] Total days are defined as the sum of 1) days from staging activation until land becomes inundated, 2) days of inundation, and 3) 14-day dry-down. Zero days mean the storage areas do not flood With existing conditions, but zero days do not necessarily mean conditions in the region are suitable for planting.
[b] The range of losses per acre represent an average of all storage areas Within the groups.

Appendix Table E41. Per-Acre Revenue Losses, by Crop, due to Diversion (High and Low 5% of Observations and Average), Hydrology Group 3 (floods longer), 10-day Dry Down Period

	10-year	20-year	25-year	25-year Long	25-year Extra Long	2009-like	50-year	100-year	500-year	PMF
---------- Corn ----------										
Least (5%)	$0.00	$0.00	$0.00	-$0.04	-$0.19	$0.00	$0.00	-$0.01	-$12.99	-$1.50
Average	-$0.20	-$1.86	-$1.70	-$1.96	-$4.88	-$7.68	-$2.89	-$3.80	-$21.37	-$9.48
Maximum (5%)	-$1.47	-$8.99	-$9.39	-$9.46	-$18.62	-$26.96	-$15.12	-$16.44	-$26.44	-$18.44
---------- Wheat ----------										
Least (5%)	$0.00	$0.00	$0.00	-$0.04	-$0.52	$0.00	$0.00	-$0.05	-$3.17	-$1.95
Average	-$0.29	-$1.50	-$3.36	-$3.56	-$7.91	-$5.45	-$5.89	-$6.35	-$6.41	-$6.61
Maximum (5%)	-$1.57	-$5.83	-$13.81	-$12.42	-$20.24	-$18.10	-$21.00	-$18.39	-$9.24	-$8.58
---------- Sugarbeets ----------										
Least (5%)	$0.00	$0.00	$0.00	-$0.30	-$0.59	$0.00	$0.00	-$0.07	-$29.02	-$3.93
Average	-$0.81	-$8.30	-$9.04	-$8.85	-$17.70	-$28.64	-$13.12	-$15.76	-$38.85	-$20.42
Maximum (5%)	-$4.53	-$27.34	-$34.09	-$31.12	-$49.28	-$64.52	-$46.06	-$45.22	-$46.56	-$27.51
---------- Soybeans ----------										
Least (5%)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	-$1.64	$0.00
Average	$0.00	$0.00	$0.00	-$0.09	-$0.20	-$0.26	$0.00	-$0.02	-$12.74	-$1.22
Maximum (5%)	$0.00	-$0.05	-$0.02	-$0.28	-$1.10	-$3.23	-$0.05	-$0.22	-$24.47	-$9.96

PMF = Probabilistic Maximum Flood.

Appendix Table E42. Per-Acre Revenue Losses, by Crop, due to Diversion (High and Low 5% of Observations and Average), Hydrology Group 5 (new flooding), 10-day Dry Down Period

	10-year	20-year	25-year	25-year Long	25-year Extra Long	2009-like	50-year	100-year	500-year	PMF
---------- Corn ----------										
Least (5%)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	na
Average	-$0.71	-$7.61	-$3.97	-$3.61	-$6.01	-$4.69	-$5.10	-$7.32	-$11.22	na
Maximum (5%)	-$11.03	-$47.21	-$35.08	-$33.20	-$45.59	-$38.15	-$40.63	-$49.67	-$65.72	na
---------- Wheat ----------										
Least (5%)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	na
Average	-$1.50	-$12.60	-$7.34	-$6.71	-$10.61	-$7.55	-$9.27	-$9.00	-$18.27	na
Maximum (5%)	-$21.81	-$65.55	-$56.83	-$52.82	-$67.19	-$56.16	-$62.31	-$61.29	-$86.96	na
---------- Sugarbeets ----------										
Least (5%)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	na
Average	-$4.53	-$37.39	-$20.75	-$20.71	-$31.16	-$25.61	-$27.82	-$34.15	-$54.21	na
Maximum (5%)	-$65.58	-$195.27	-$152.90	-$158.90	-$195.43	-$176.11	-$183.15	-$196.08	-$258.69	na
---------- Soybeans ----------										
Least (5%)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	na
Average	$0.00	-$0.01	$0.00	$0.00	$0.00	$0.00	$0.00	-$0.01	-$0.01	na
Maximum (5%)	$0.00	-$0.13	-$0.01	-$0.01	-$0.04	-$0.02	-$0.03	-$0.12	-$0.23	na

PMF = Probabilistic Maximum Flood.

Appendix Table E43. Per-Acre Revenue Losses, by Crop, due to Diversion (High and Low 5% of Observations and Average), Hydrology Group 3 (floods longer), 14-day Dry Down Period

	10-year	20-year	25-year	25-year Long	25-year Extra Long	2009-like	50-year	100-year	500-year	PMF
---------- Corn ----------										
Least (5%)	$0.00	$0.00	$0.00	-$0.02	-$0.35	-$0.23	$0.00	-$0.02	-$11.48	-$3.23
Average	-$0.20	-$3.56	-$3.43	-$3.67	-$8.38	-$12.82	-$5.71	-$6.97	-$19.77	-$12.94
Maximum (5%)	-$1.47	-$12.75	-$13.36	-$13.49	-$25.59	-$35.83	-$21.46	-$23.36	-$26.29	-$20.73
---------- Wheat ----------										
Least (5%)	$0.00	$0.00	$0.00	-$0.02	-$0.57	-$0.06	$0.00	-$0.05	-$3.12	-$3.25
Average	-$0.56	-$2.53	-$5.83	-$5.71	-$11.42	-$8.57	-$9.70	-$9.72	-$6.81	-$7.17
Maximum (5%)	-$1.61	-$6.02	-$14.10	-$12.64	-$20.52	-$18.62	-$21.41	-$18.72	-$9.26	-$8.65
---------- Sugarbeets ----------										
Least (5%)	$0.00	$0.00	$0.00	-$0.29	-$0.60	-$0.80	$0.00	-$0.08	-$30.29	-$7.01
Average	-$0.31	-$2.61	-$15.18	-$14.33	-$26.16	-$38.80	-$21.45	-$24.02	-$40.33	-$23.46
Maximum (5%)	-$1.20	-$7.32	-$34.49	-$31.59	-$49.95	-$65.29	-$46.59	-$45.40	-$46.68	-$27.51
---------- Soybeans ----------										
Least (5%)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	-$2.32	$0.00
Average	$0.00	-$0.02	-$0.01	-$0.08	-$0.42	-$0.87	-$0.03	-$0.08	-$13.43	-$2.78
Maximum (5%)	-$0.01	-$0.43	-$0.24	-$0.49	-$2.81	-$9.15	-$0.52	-$1.26	-$24.32	-$13.56

PMF = Probabilistic Maximum Flood.

Appendix Table E44. Per-Acre Revenue Losses, by Crop, due to Diversion (High and Low 5% of Observations and Average), Hydrology Group 5 (new flooding), 14-day Dry Down Period

	10-year	20-year	25-year	25-year Long	25-year Extra Long	2009-like	50-year	100-year	500-year	PMF
---------- Corn ----------										
Least (5%)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	na
Average	-$2.33	-$16.12	-$9.78	-$9.06	-$13.86	-$11.14	-$12.01	-$16.07	-$23.21	na
Maximum (5%)	-$25.01	-$76.51	-$60.63	-$58.06	-$75.25	-$64.70	-$68.29	-$80.58	-$102.91	na
---------- Wheat ----------										
Least (5%)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	na
Average	-$4.58	-$23.42	-$16.27	-$14.95	-$21.51	-$16.41	-$19.27	-$18.79	-$32.90	na
Maximum (5%)	-$43.30	-$90.62	-$83.45	-$78.85	-$93.57	-$82.38	-$88.66	-$87.60	-$113.41	na
---------- Sugarbeets ----------										
Least (5%)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	na
Average	-$2.16	-$12.45	-$44.69	-$45.42	-$62.63	-$53.47	-$57.07	-$65.94	-$97.33	na
Maximum (5%)	-$21.10	-$52.08	-$221.55	-$233.01	-$270.03	-$251.23	-$256.92	-$267.80	-$336.12	na
---------- Soybeans ----------										
Least (5%)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	na
Average	$0.00	-$0.06	-$0.01	-$0.01	-$0.02	-$0.02	-$0.02	-$0.06	-$0.11	na
Maximum (5%)	$0.00	-$1.30	-$0.19	-$0.15	-$0.50	-$0.32	-$0.37	-$1.09	-$2.13	na

PMF = Probabilistic Maximum Flood.

Appendix F

Average Losses Expressed as the Difference Between With and Without Diversion Conditions, Average for Corn, Wheat, Soybean and Sugarbeet Crops, by Flood Event, by Storage Area

Appendix Table F1. Crop Revenue Losses, All Crops, by Flood Event Frequency, FM Diversion Staging Area, Phase 9.1 HEC-RAS Modeling, 10-day and 14-day Dry Down Periods										
	Revenue Losses due to Planting Delays Caused by Diversion Operations Averaged Across Full Monte Carlo Simulation (average of 10,000 replications)									
	10-day Dry Down Period					14-day Dry Down Period				
Storage Area	10-yr	20-yr	25-yr	25-yr Long	25-yr EL	10-yr	20-yr	25-yr	25-yr Long	25-yr EL
BD1	0	-28	0	0	0	0	-47	0	0	0
CHRSA01	0	0	-843	-1,346	-1,670	0	0	-2,048	-2,983	-3,545
CHRSA02	0	0	-1,066	-1,339	-2,037	0	0	-2,471	-2,967	-4,152
CHRSA03	0	0	0	0	0	0	0	0	0	0
CHRSA04	0	0	0	0	0	0	0	0	0	0
CHRSA05E	0	0	0	0	0	0	0	0	0	0
CHRSA05W	0	0	-52	-65	-261	0	0	-119	-142	-478
CHRSA06	0	0	0	0	0	0	0	0	0	0
CHRSA07	0	0	-478	-275	-269	0	0	-1,134	-504	-431
CHRSA08	0	0	0	-399	-644	0	0	0	-991	-1,461
CHRSA09	0	0	0	0	0	0	0	0	0	0
CHRSA10	0	0	0	0	0	0	0	0	0	0
CHRSA100	0	0	0	0	0	0	0	0	0	0
CHRSA101	0	0	-48	-183	0	0	0	-124	-342	0
CHRSA102	0	0	0	0	0	0	0	0	0	0
CHRSA103	0	0	-139	-213	0	0	0	-294	-349	0
CHRSA104	0	0	0	0	0	0	0	0	0	0
CHRSA105	0	0	-91	-139	0	0	0	-191	-227	0
CHRSA106	0	0	0	0	0	0	0	0	0	0
CHRSA107	0	0	0	0	0	0	0	0	0	0
CHRSA108	0	0	0	0	0	0	0	0	0	0
CHRSA109	0	0	0	-1,614	-3,200	0	0	0	-3,226	-5,716
CHRSA11	0	0	0	0	0	0	0	0	0	0
CHRSA110	0	0	-122	0	0	0	0	-229	0	0
CHRSA111	0	0	0	0	0	0	0	0	0	0
CHRSA112	0	0	0	-44	-86	0	0	0	-87	-153
CHRSA113	0	0	0	-29	-59	0	0	0	-73	-129
CHRSA114	0	0	-873	-1,028	0	0	0	-1,548	-1,515	0
CHRSA115	0	0	0	-342	-532	0	0	0	-792	-1,130
CHRSA116	0	0	0	-453	-705	0	0	0	-1,049	-1,496
CHRSA117	0	0	0	0	0	0	0	0	0	0
CHRSA118	0	0	0	0	0	0	0	0	0	0
CHRSA119	0	0	0	-562	-907	0	0	0	-1,396	-2,060
CHRSA12	0	0	0	0	0	0	0	0	0	0
CHRSA120	0	0	-128	-263	-400	0	0	-326	-583	-815

continued

Appendix Table F1. Continued										
	Revenue Losses due to Planting Delays Caused by Diversion Operations Averaged Across Full Monte Carlo Simulation (10,000 replications)									
	10-day Dry Down Period					14-day Dry Down Period				
Storage Area	10-yr	20-yr	25-yr	25-yr Long	25-yr EL	10-yr	20-yr	25-yr	25-yr Long	25-yr EL
CHRSA13	0	0	-1,205	-1,148	0	0	0	-3,143	-2,108	0
CHRSA14	0	0	0	0	0	0	0	0	0	0
CHRSA15	0	0	0	-554	-1,410	0	0	0	-1,140	-2,477
CHRSA16	0	0	-1,205	-1,148	0	0	0	-3,144	-2,109	0
CHRSA17	0	0	-1,161	-980	0	0	0	-2,511	-1,694	0
CHRSA18	0	0	0	0	0	0	0	0	0	0
CHRSA18E	0	0	0	0	0	0	0	0	0	0
CHRSA19	0	0	0	-1,547	-3,234	0	0	0	-4,035	-7,343
CHRSA20	0	0	-180	-626	-1,620	0	0	-436	-1,127	-2,453
CHRSA21	0	0	0	0	0	0	0	0	0	0
CHRSA22	0	0	0	0	0	0	0	0	0	0
CHRSA23	0	0	-520	0	0	0	0	-1,160	0	0
CHRSA24	0	0	0	0	0	0	0	0	0	0
CHRSA25	0	0	0	0	0	0	0	0	0	0
CHRSA26	0	0	0	0	0	0	0	0	0	0
CHRSA27	0	0	0	-1,049	-2,194	0	0	0	-2,738	-4,981
DIVSA100	0	0	-2,102	-1,987	-4,822	0	0	-4,861	-3,653	-7,834
DIVSA101	0	0	-2,128	-2,011	-3,773	0	0	-4,920	-3,697	-6,237
DIVSA102	0	0	-2,196	-1,689	-2,155	0	0	-5,078	-3,045	-3,326
DIVSA105	0	0	-1,300	-1,653	-2,574	0	0	-3,157	-3,830	-5,464
DIVSA106E	0	0	0	0	0	0	0	0	0	0
DIVSA107E	0	0	0	0	0	0	0	0	0	0
DIVSA84	-334	-463	-3,762	-3,761	-4,746	-1,129	-1,474	-7,986	-6,989	-8,574
DIVSA84E	0	-1,957	-1,613	0	-344	0	-3,842	-3,288	0	-554
DIVSA85E	-43,314	-42,994	-42,901	-42,098	-40,926	-45,622	-44,805	-44,620	-43,234	-41,454
DIVSA86S	0	-3,855	-1,557	0	0	0	-7,317	-2,748	0	0
DIVSA87S	0	-2,214	-1,825	-1,488	-2,214	0	-4,347	-3,720	-3,159	-4,347
DIVSA88W	0	-2,037	-544	0	0	0	-3,450	-907	0	0
DIVSA89W	0	-883	-478	0	0	0	-1,567	-831	0	0
DIVSA90S	0	0	-81	0	0	0	0	-134	0	0
DIVSA93S	0	-90	-382	-246	-487	0	-171	-661	-373	-685
DIVSA94	0	0	-193	0	-633	0	0	-321	0	-892
DIVSA95	0	-74	-322	-220	-445	0	-148	-585	-338	-628
DIVSA98W	0	0	-600	-722	-1,452	0	0	-1,387	-1,376	-2,546
DIVSA99W	0	0	-1,560	-669	0	0	0	-2,869	-1,071	0
DRAIN370	0	0	0	0	0	0	0	0	0	0

continued

Appendix Table F1. Continued										
	Revenue Losses due to Planting Delays Caused by Diversion Operations Averaged Across Full Monte Carlo Simulation (10,000 replications)									
	10-day Dry Down Period					14-day Dry Down Period				
Storage Area	10-yr	20-yr	25-yr	25-yr Long	25-yr EL	10-yr	20-yr	25-yr	25-yr Long	25-yr EL
DRAIN371	0	0	0	0	0	0	0	0	0	0
DRAIN372	0	0	0	-70	0	0	0	0	-180	0
DRAIN373	0	0	0	-299	-751	0	0	0	-646	-1,528
DRAIN374	0	0	-215	0	0	0	0	-391	0	0
RR10	0	0	-104	-109	0	0	0	-183	-163	0
RR11	0	0	-152	0	-315	0	0	-269	0	-444
RR12	0	0	-233	0	-472	0	0	-411	0	-655
RR13	0	-23	-127	-80	0	0	-50	-241	-130	0
RR14	0	0	-171	-162	-260	0	0	-395	-297	-423
RR15	0	0	-84	0	0	0	0	-140	0	0
RR16	0	0	-88	-181	-275	0	0	-225	-401	-560
RR17	0	0	-185	0	0	0	0	-329	0	0
RR18	0	0	-176	-95	0	0	0	-357	-159	0
RR19	-24	0	-138	0	0	-53	0	-234	0	0
RR20	0	0	0	0	0	0	0	0	0	0
RR21	0	0	-241	0	0	0	0	-408	0	0
RR22	0	0	0	-209	-325	0	0	0	-483	-688
RR23	0	0	-87	-63	0	0	0	-166	-99	0
RR24	0	0	0	0	0	0	0	0	0	0
RR25	0	0	0	0	0	0	0	0	0	0
RR26	0	0	-293	0	0	0	0	-543	0	0
RR27	0	0	-200	-158	-186	0	0	-521	-305	-298
RR28	0	0	0	0	0	0	0	0	0	0
RR29	0	0	0	0	0	0	0	0	0	0
RR3	0	-31	-53	-51	-54	0	-84	-102	-84	-78
RR30	0	0	0	0	0	0	0	0	0	0
RR31	0	0	-83	-70	0	0	0	-179	-121	0
RR32	0	-25	-144	-108	0	0	-57	-283	-168	0
RR33	0	0	-54	0	0	0	0	-100	0	0
RR34	0	0	-217	0	0	0	0	-375	0	0
RR35	0	0	-39	0	0	0	0	-75	0	0
RR36	0	0	-193	0	0	0	0	-378	0	0
RR37	0	0	-146	0	0	0	0	-273	0	0
RR38	0	0	0	0	0	0	0	0	0	0
RR39	0	0	-150	0	-423	0	0	-289	0	-617
RR4	0	0	-70	0	0	0	0	-117	0	0
continued										

Appendix Table F1. Continued										
	Revenue Losses due to Planting Delays Caused by Diversion Operations Averaged Across Full Monte Carlo Simulation (10,000 replications)									
	With a 10-day Dry Down Period					With a 14-day Dry Down Period				
Storage Area	10-yr	20-yr	25-yr	25-yr Long	25-yr EL	10-yr	20-yr	25-yr	25-yr Long	25-yr EL
RR40	0	0	0	0	0	0	0	0	0	0
RR41	0	0	-51	0	0	0	0	-96	0	0
RR42	0	-43	-115	-152	0	0	-85	-209	-216	0
RR43	0	0	-85	-121	0	0	0	-190	-210	0
RR44	0	0	0	-249	-528	0	0	0	-661	-1,207
RR45	0	0	0	-77	-84	0	0	0	-156	-141
RR46	0	0	0	0	0	0	0	0	0	0
RR47	0	0	0	0	0	0	0	0	0	0
RR48	0	0	0	0	0	0	0	0	0	0
RR49	0	0	0	0	0	0	0	0	0	0
RR5	0	0	-117	0	0	0	0	-184	0	0
RR50	0	0	0	0	0	0	0	0	0	0
RR51	0	0	-80	0	0	0	0	-151	0	0
RR52	0	0	0	0	0	0	0	0	0	0
RR53	0	0	0	0	0	0	0	0	0	0
RR54	0	0	0	0	0	0	0	0	0	0
RR55	0	0	-117	0	0	0	0	-210	0	0
RR56	0	0	0	0	0	0	0	0	0	0
RR57	-109	0	0	0	0	-226	0	0	0	0
RR58	0	0	0	-778	-773	0	0	0	-576	-817
RR59	0	0	0	0	0	0	0	0	0	0
RR6	0	-21	-139	-60	0	0	-44	-256	-96	0
RR60	0	0	0	-2,073	-2,505	0	0	0	-1,269	-2,466
RR7	0	0	-58	0	0	0	0	-97	0	0
RR8	0	0	-101	0	0	0	0	-182	0	0
RR9	0	-186	0	0	0	0	-280	0	0	0
WLVSA200	0	0	-196	0	0	0	0	-374	0	0
WLVSA202	0	0	0	0	0	0	0	0	0	0
WLVSA203	0	0	0	0	0	0	0	0	0	0
WLVSA204	0	-57	-263	0	0	0	-126	-514	0	0
WLVSA205	0	0	0	0	0	0	0	0	0	0
WLVSA206	0	0	0	0	0	0	0	0	0	0
WLVSA207	0	0	0	0	0	0	0	0	0	0
WLVSA208	0	0	0	0	0	0	0	0	0	0
WLVSA209	0	0	-131	0	0	0	0	-254	0	0
WLVSA210	0	0	0	-343	-544	0	0	0	-821	-1,186
continued										

Appendix Table F1. Continued										
	Revenue Losses due to Planting Delays Caused by Diversion Operations Averaged Across Full Monte Carlo Simulation (10,000 replications)									
	10-day Dry Down Period					14-day Dry Down Period				
Storage Area	10-yr	20-yr	25-yr	25-yr Long	25-yr EL	10-yr	20-yr	25-yr	25-yr Long	25-yr EL
WLVSA211	0	0	0	0	0	0	0	0	0	0
WLVSA212	0	0	0	0	0	0	0	0	0	0
WLVSA213	0	0	0	0	0	0	0	0	0	0
WLVSA214	0	0	0	0	0	0	0	0	0	0
WLVSA215	0	-62	-268	0	0	0	-122	-483	0	0
WLVSA216	0	0	-137	-88	-92	0	0	-294	-156	-139
WLVSA217	0	0	0	0	0	0	0	0	0	0
WLVSA218	0	0	0	0	0	0	0	0	0	0
WLVSA219	0	0	0	0	0	0	0	0	0	0
WLVSA220	0	0	-70	0	0	0	0	-123	0	0
WLVSA221	0	-25	-107	0	0	0	-48	-185	0	0
WLVSA222	0	0	-258	-244	-458	0	0	-597	-449	-757
WLVSA223	0	0	-162	0	0	0	0	-292	0	0
WLVSA224	0	0	-304	-276	-197	0	0	-703	-476	-288
WLVSA225	0	0	-380	-565	-804	0	0	-804	-1,104	-1,474
WLVSA226	0	0	0	-175	-219	0	0	0	-405	-486
WLVSA227	0	0	-111	-178	-270	0	0	-270	-392	-548
WLVSA228	0	-15	-106	-55	0	0	-34	-205	-87	0
WLVSA229	0	-44	-189	0	0	0	-87	-342	0	0
WLVSA230	0	-20	-89	0	0	0	-41	-160	0	0
WLVSA231	0	0	-24	0	0	0	0	-44	0	0
WLVSA232	0	0	-93	-191	-290	0	0	-237	-422	-589
WLVSA233	0	0	-457	-439	-461	0	0	-881	-714	-655
WLVSA234	0	0	0	-170	-271	0	0	0	-412	-599
WLVSA235	0	0	-29	0	-58	0	0	-51	0	-81
WLVSA236	0	-30	-200	-97	0	0	-64	-366	-151	0
WLVSA237	0	-55	-361	-155	-333	0	-115	-664	-248	-467
WLVSA57	0	0	0	0	0	0	0	0	0	0
WLVSA64	0	0	0	0	0	0	0	0	0	0
WLVSA65	0	0	0	-393	-866	0	0	0	-783	-1,547
WLVSA66	0	0	0	0	0	0	0	0	0	0
WRRND1	0	0	-292	0	0	0	0	-577	0	0
WRRND10	0	0	-239	-395	0	0	0	-456	-658	0
WRRND11	0	0	0	-63	-79	0	0	0	-147	-176
WRRND12	0	0	-262	0	0	0	0	-500	0	0
WRRND13	0	0	-304	0	0	0	0	-528	0	0

continued

Appendix Table F1. Continued										
	Revenue Losses due to Planting Delays Caused by Diversion Operations Averaged Across Full Monte Carlo Simulation (10,000 replications)									
	10-day Dry Down Period					14-day Dry Down Period				
Storage Area	10-yr	20-yr	25-yr	25-yr Long	25-yr EL	10-yr	20-yr	25-yr	25-yr Long	25-yr EL
WRRND14	0	-191	-226	0	0	0	-348	-392	0	0
WRRND15	0	-182	-214	-441	0	0	-317	-355	-642	0
WRRND16	0	0	-123	0	0	0	0	-214	0	0
WRRND17	0	0	-94	0	0	0	0	-156	0	0
WRRND18	0	-249	-289	0	0	0	-415	-465	0	0
WRRND19	0	-24	0	0	0	0	-38	0	0	0
WRRND2	0	0	0	0	0	0	0	0	0	0
WRRND3	0	0	0	0	0	0	0	0	0	0
WRRND4	0	0	0	-393	0	0	0	0	-658	0
WRRND5	0	0	0	0	0	0	0	0	0	0
WRRND6	0	0	0	-313	0	0	0	0	-563	0
WRRND7	0	0	-253	0	0	0	0	-475	0	0
WRRND8	0	0	0	0	0	0	0	0	0	0
WRRND9	0	0	-110	-155	0	0	0	-209	-268	0
WRSA273	0	0	0	0	0	0	0	0	0	0
WRSA280	0	0	0	0	0	0	0	0	0	0
WRSA284	0	0	0	0	0	0	0	0	0	0
WRSA289	0	0	0	0	0	0	0	0	0	0
WRSA294	0	0	0	0	0	0	0	0	0	0
WRSA299	0	0	-1,223	0	0	0	0	-2,168	0	0
WRSA300	0	-661	-772	0	0	0	-1,148	-1,286	0	0
WRSA302	0	0	-1,078	-1,338	-1,991	0	0	-2,390	-2,840	-3,908
WRSA303	0	0	0	0	0	0	0	0	0	0
WRSA304	0	0	-1,181	-1,749	-2,493	0	0	-2,357	-3,388	-4,403
WRSA305A	0	0	-277	0	0	0	0	-462	0	0
WRSA305B	0	0	-503	0	0	0	0	-837	0	0
WRSA305C	0	-1,313	0	0	0	0	-2,065	0	0	0
WRSA305D	0	-701	0	0	0	0	-1,103	0	0	0
WRSA306	0	0	-612	0	-2,010	0	0	-1,019	0	-2,831
WRSA307	0	0	-953	-298	0	0	0	-1,712	-481	0
WRSA308	0	0	0	-1,755	-2,232	0	0	0	-4,262	-5,171
WRSA309	0	0	-866	-1,043	0	0	0	-1,689	-1,938	0
WRSA311	0	0	-376	-780	-1,345	0	0	-627	-1,134	-1,885
WRSA312	0	0	-779	0	0	0	0	-1,296	0	0
WRSA315	0	-3,094	-2,788	-1,952	0	0	-5,658	-5,011	-3,380	0
WRSA321	0	-6,082	-2,842	0	0	0	-11,545	-5,107	0	0
continued										

Appendix Table F1. Continued										
	Revenue Losses due to Planting Delays Caused by Diversion Operations Averaged Across Full Monte Carlo Simulation (10,000 replications)									
	10-day Dry Down Period					14-day Dry Down Period				
Storage Area	10-yr	20-yr	25-yr	25-yr Long	25-yr EL	10-yr	20-yr	25-yr	25-yr Long	25-yr EL
WRSA350	-338	0	-290	-836	-1,779	-959	0	-503	-1,330	-2,525
WRSA351	0	0	-381	-634	0	0	0	-634	-957	0
WRSA352	0	0	-679	-423	-921	0	0	-1,153	-682	-1,309
WRSA353	0	0	0	-607	-825	0	0	0	-1,326	-1,742
WRSA354	0	0	0	-329	-796	0	0	0	-676	-1,442
WRSA355	0	0	-287	0	0	0	0	-566	0	0
WRSA356	0	0	0	-352	0	0	0	0	-727	0
WRSA357	0	0	0	0	-424	0	0	0	0	-838
WRSA358	0	0	0	0	-179	0	0	0	0	-410
WRSA359	0	0	0	0	-364	0	0	0	0	-685
WRSA360	0	0	0	0	0	0	0	0	0	0
WRSA363	0	0	-283	0	0	0	0	-491	0	0
WRSA364	0	0	-225	-266	0	0	0	-409	-461	0
WRSA373	0	0	0	0	0	0	0	0	0	0
WRSA378	0	0	0	0	0	0	0	0	0	0
WRSA383	0	0	0	0	0	0	0	0	0	0
WRSA384	0	0	0	0	0	0	0	0	0	0
WRSA389	0	0	0	0	0	0	0	0	0	0
WRSA390	0	0	-165	-441	0	0	0	-331	-820	0
WRSA501	0	-88	-198	-191	0	0	-251	-383	-312	0
WRSA502	0	0	-46	-44	-81	0	0	-107	-81	-129
WRSA504	0	0	-32	-51	-78	0	0	-78	-114	-159
WRSA505	0	-49	-127	-142	0	0	-90	-216	-206	0
WRSA506	0	-81	-255	-240	-486	0	-162	-453	-369	-686
WRSA507	0	-54	-59	0	0	0	-82	-90	0	0
WRSA907	0	0	-733	-888	0	0	0	-1,463	-1,687	0
continued										

Appendix Table F1. Continued										
	Revenue Losses due to Planting Delays Caused by Diversion Operations Averaged Across Full Monte Carlo Simulation (10,000 replications)									
	10-day Dry Down Period					14-day Dry Down Period				
Storage Area	2009-like	50-yr	100-yr	500-yr	PMF	2009-like	50-yr	100-yr	500-yr	PMF
BD1	0	0	0	0	0	0	0	0	0	0
CHRSA01	-1,670	-1,670	-2,983	-3,103	-4,778	-3,545	-3,545	-5,663	-4,995	-6,813
CHRSA02	-2,471	-2,037	-4,152	-1,640	-1,344	-4,852	-4,152	-7,437	-2,369	-1,884
CHRSA03	-1,336	-1,064	-2,466	-3,518	-2,959	-2,960	-2,466	-4,841	-6,477	-4,336
CHRSA04	-1,545	-1,246	-2,760	-2,214	-1,839	-3,280	-2,760	-5,238	-3,365	-2,611
CHRSA05E	-79	0	-619	-586	0	-174	0	-1,202	-949	0
CHRSA05W	0	0	0	0	0	0	0	0	0	0
CHRSA06	0	0	-466	-594	0	0	0	-1,060	-1,009	0
CHRSA07	-314	-533	-766	0	-1,543	-616	-1,035	-1,303	0	-1,948
CHRSA08	-379	-510	-991	-366	-510	-811	-1,210	-2,072	-563	-754
CHRSA09	0	0	0	-762	0	0	0	0	-1,295	0
CHRSA10	0	0	0	-1,203	0	0	0	0	-2,199	0
CHRSA100	0	0	0	-83	0	0	0	0	-133	0
CHRSA101	-99	-124	-554	0	-2,406	-217	-255	-941	0	-2,941
CHRSA102	0	0	-101	0	0	0	0	-231	0	0
CHRSA103	0	-294	0	0	0	0	-517	0	0	0
CHRSA104	-13	0	0	-124	0	-35	0	0	-196	0
CHRSA105	0	-88	-178	0	0	0	-158	-281	0	0
CHRSA106	-16	0	-54	0	0	-36	0	-108	0	0
CHRSA107	-45	0	0	-134	0	-144	0	0	-215	0
CHRSA108	-6	0	-63	0	0	-14	0	-152	0	0
CHRSA109	-1,085	-2,025	-2,762	0	-4,700	-2,233	-4,193	-4,852	0	-6,497
CHRSA11	0	0	0	0	0	0	0	0	0	0
CHRSA110	0	-199	0	0	0	0	-333	0	0	0
CHRSA111	-52	0	-188	-107	-149	-118	0	-427	-164	-221
CHRSA112	-30	-55	-74	0	-126	-60	-113	-130	0	-175
CHRSA113	-16	-38	-51	0	-98	-36	-89	-94	0	-143
CHRSA114	0	-727	0	0	0	0	-1,145	0	0	0
CHRSA115	-222	-429	-533	0	-331	-450	-951	-989	0	-468
CHRSA116	-1,049	-864	-1,762	-993	-524	-2,059	-1,762	-3,156	-1,443	-739
CHRSA117	-126	-97	-254	-193	-146	-313	-254	-553	-307	-218
CHRSA118	-212	0	-526	-325	-515	-526	0	-1,100	-515	-765
CHRSA119	-535	-718	-1,396	-516	-1,514	-1,143	-1,705	-2,922	-794	-2,234
CHRSA12	0	0	0	-1,096	0	0	0	0	-1,775	0
CHRSA120	-189	-326	-388	-610	-1,531	-373	-693	-690	-864	-2,147

continued

Appendix Table F1. Continued										
	Revenue Losses due to Planting Delays Caused by Diversion Operations Averaged Across Full Monte Carlo Simulation (10,000 replications)									
	10-day Dry Down Period					14-day Dry Down Period				
Storage Area	2009-like	50-yr	100-yr	500-yr	PMF	2009-like	50-yr	100-yr	500-yr	PMF
CHRSA13	-1,314	-1,938	-1,592	0	0	-2,577	-3,700	-2,704	0	0
CHRSA14	0	0	0	-308	0	0	0	0	-554	0
CHRSA15	0	0	-654	0	0	0	0	-1,029	0	0
CHRSA16	-1,315	-1,939	-1,592	0	0	-2,578	-3,701	-2,705	0	0
CHRSA17	-1,753	-2,111	-1,314	0	0	-3,437	-3,955	-2,152	0	0
CHRSA18	0	0	-1,723	0	0	0	0	-2,710	0	0
CHRSA18E	-92	0	-642	0	-886	-210	0	-1,286	0	-1,304
CHRSA19	-661	-1,547	-2,488	0	-3,795	-1,473	-4,035	-4,750	0	-5,490
CHRSA20	-358	-1,320	-860	-8,483	0	-738	-2,587	-1,439	-8,731	0
CHRSA21	0	0	-543	0	0	0	0	-854	0	0
CHRSA22	0	0	0	0	0	0	0	0	0	0
CHRSA23	0	0	0	0	0	0	0	0	0	0
CHRSA24	0	-527	0	0	0	0	-991	0	0	0
CHRSA25	0	0	-1,275	0	0	0	0	-2,006	0	0
CHRSA26	0	0	0	-162	0	0	0	0	-256	0
CHRSA27	0	0	0	-3,421	0	0	0	0	-4,803	0
DIVSA100	-1,987	-3,025	-3,193	-3,824	-4,780	-3,653	-5,508	-5,194	-5,126	-6,143
DIVSA101	-2,011	-3,306	-3,773	0	-4,498	-3,697	-6,116	-6,237	0	-5,886
DIVSA102	-1,415	-3,160	-3,335	0	-4,993	-2,674	-5,754	-5,426	0	-6,418
DIVSA105	-2,075	-2,574	-3,830	-5,464	-6,903	-4,598	-5,464	-7,519	-10,060	-10,360
DIVSA106E	-151	0	-299	-445	0	-367	0	-635	-873	0
DIVSA107E	-1,086	0	-2,234	-3,399	-1,165	-2,772	0	-4,951	-6,929	-1,978
DIVSA84	-19,848	-3,698	-4,224	-1,585	0	-29,913	-6,376	-6,718	-2,338	0
DIVSA84E	0	0	0	0	0	0	0	0	0	0
DIVSA85E	-40,360	-42,025	-41,027	-37,700	-515	-41,542	-42,295	-40,229	-35,063	-222
DIVSA86S	0	0	0	0	0	0	0	0	0	0
DIVSA87S	0	-1,825	0	0	0	0	-3,720	0	0	0
DIVSA88W	0	0	0	0	0	0	0	0	0	0
DIVSA89W	0	0	0	0	0	0	0	0	0	0
DIVSA90S	-1,888	0	0	-11,994	0	-2,671	0	0	-11,239	0
DIVSA93S	-3,994	-195	-338	-7,796	0	-5,795	-307	-487	-6,313	0
DIVSA94	-3,755	0	0	-23,657	0	-5,327	0	0	-23,965	0
DIVSA95	0	-194	-306	-7,768	0	0	-306	-445	-7,262	0
DIVSA98W	-568	-1,144	-1,064	-4,630	-4,899	-1,042	-2,325	-1,759	-6,351	-6,434
DIVSA99W	-1,076	-1,249	0	-5,223	0	-1,818	-2,031	0	-5,417	0
DRAIN370	0	0	0	-199	0	0	0	0	-399	0

continued

Appendix Table F1. Continued										
	Revenue Losses due to Planting Delays Caused by Diversion Operations Averaged Across Full Monte Carlo Simulation (10,000 replications)									
	10-day Dry Down Period					14-day Dry Down Period				
Storage Area	2009-like	50-yr	100-yr	500-yr	PMF	2009-like	50-yr	100-yr	500-yr	PMF
DRAIN371	0	0	0	-494	0	0	0	0	-944	0
DRAIN372	-325	-352	-983	-807	0	-689	-803	-1,875	-1,371	0
DRAIN373	-296	-296	0	0	0	-538	-538	0	0	0
DRAIN374	0	0	0	0	0	0	0	0	0	0
RR10	-228	-86	0	-570	0	-315	-134	0	-378	0
RR11	0	-127	0	0	0	0	-199	0	0	0
RR12	0	-193	0	0	0	0	-301	0	0	0
RR13	-110	-209	-116	-724	0	-195	-349	-175	-727	0
RR14	-110	-266	-224	-336	-362	-208	-492	-379	-445	-474
RR15	0	-125	0	0	0	0	-193	0	0	0
RR16	-130	-225	-246	0	-682	-257	-476	-429	0	-942
RR17	0	-155	0	0	0	0	-243	0	0	0
RR18	-209	-246	-141	0	0	-377	-425	-216	0	0
RR19	0	0	0	0	0	0	0	0	0	0
RR20	-101	-101	-199	-222	-194	-244	-244	-421	-351	-277
RR21	0	0	0	0	0	0	0	0	0	0
RR22	-135	-263	-325	-166	-414	-274	-580	-601	-236	-578
RR23	-75	-103	0	0	0	-133	-168	0	0	0
RR24	0	0	-507	-772	-295	0	0	-1,171	-1,326	-441
RR25	-218	0	-569	-432	-325	-569	0	-1,238	-687	-487
RR26	0	-339	0	0	0	0	-538	0	0	0
RR27	-265	-369	-368	0	0	-531	-717	-635	0	0
RR28	0	0	0	-606	0	0	0	0	-998	0
RR29	-112	0	-507	0	-323	-255	0	-1,105	0	-478
RR3	-44	-71	-40	-392	0	-75	-119	-59	-483	0
RR30	0	0	-323	-387	-278	0	0	-773	-581	-385
RR31	-125	-150	-94	0	0	-245	-281	-154	0	0
RR32	-126	-244	-137	0	0	-230	-412	-204	0	0
RR33	0	-88	0	0	0	0	-146	0	0	0
RR34	0	-156	0	0	0	0	-245	0	0	0
RR35	0	-64	0	0	0	0	-108	0	0	0
RR36	0	-234	0	0	0	0	-386	0	0	0
RR37	0	-238	0	0	0	0	-398	0	0	0
RR38	-36	0	-258	0	-323	-84	0	-514	0	-436
RR39	0	-135	0	0	0	0	-226	0	0	0
RR4	0	0	0	0	0	0	0	0	0	0
continued										

Appendix Table F1. Continued										
	Revenue Losses due to Planting Delays Caused by Diversion Operations Averaged Across Full Monte Carlo Simulation (10,000 replications)									
	With a 10-day Dry Down Period					With a 14-day Dry Down Period				
Storage Area	2009-like	50-yr	100-yr	500-yr	PMF	2009-like	50-yr	100-yr	500-yr	PMF
RR40	0	0	0	-186	0	0	0	0	-275	0
RR41	0	-83	0	0	0	0	-139	0	0	0
RR42	0	-98	0	0	0	0	-152	0	0	0
RR43	-131	-262	-163	0	0	-263	-491	-267	0	0
RR44	-61	0	-337	-664	-576	-133	0	-625	-860	-757
RR45	-28	-51	-185	-587	-498	-61	-113	-331	-765	-679
RR46	0	0	0	0	0	0	0	0	0	0
RR47	0	0	-60	0	0	0	0	-182	0	0
RR48	0	0	0	-258	0	0	0	0	-375	0
RR49	0	0	-118	0	-406	0	0	-251	0	-598
RR5	0	0	0	0	0	0	0	0	0	0
RR50	0	0	0	0	0	0	0	0	0	0
RR51	0	-131	0	0	0	0	-219	0	0	0
RR52	0	0	0	0	0	0	0	0	0	0
RR53	0	-230	0	0	0	0	-385	0	0	0
RR54	0	0	0	0	0	0	0	0	0	0
RR55	0	0	0	0	0	0	0	0	0	0
RR56	0	0	-425	0	0	0	0	-508	0	0
RR57	0	0	0	0	0	0	0	0	0	0
RR58	0	0	0	0	0	0	0	0	0	0
RR59	0	-218	0	0	0	0	-357	0	0	0
RR6	-96	-112	0	-449	0	-162	-182	0	-490	0
RR60	0	0	0	0	0	0	0	0	0	0
RR7	0	-86	0	0	0	0	-133	0	0	0
RR8	-46	-54	0	0	0	-77	-85	0	0	0
RR9	0	0	0	0	0	0	0	0	0	0
WLVSA200	0	-323	0	0	0	0	-534	0	0	0
WLVSA202	0	0	0	-678	0	0	0	0	-1,058	0
WLVSA203	0	0	0	-30	0	0	0	0	-45	0
WLVSA204	0	-317	-276	0	0	0	-525	-401	0	0
WLVSA205	0	0	-137	0	-166	0	0	-346	0	-227
WLVSA206	-48	0	-420	-328	-395	-112	0	-1,006	-463	-541
WLVSA207	-47	0	0	-371	0	-117	0	0	-538	0
WLVSA208	-12	0	-101	0	-96	-28	0	-243	0	-130
WLVSA209	0	-157	-137	0	0	0	-261	-199	0	0
WLVSA210	-112	-267	-405	0	-441	-238	-672	-731	0	-583
continued										

Appendix Table F1. Continued										
	Revenue Losses due to Planting Delays Caused by Diversion Operations Averaged Across Full Monte Carlo Simulation (10,000 replications)									
	10-day Dry Down Period					14-day Dry Down Period				
Storage Area	2009-like	50-yr	100-yr	500-yr	PMF	2009-like	50-yr	100-yr	500-yr	PMF
WLVSA211	0	0	0	-345	-524	0	0	0	-524	-728
WLVSA212	-67	0	-170	-195	-151	-170	0	-361	-322	-218
WLVSA213	-105	0	-268	-395	-236	-268	0	-567	-642	-342
WLVSA214	-222	0	-538	-655	-225	-538	0	-1,094	-1,022	-318
WLVSA215	0	-141	0	0	0	0	-226	0	0	0
WLVSA216	-150	-206	-194	-387	-414	-277	-369	-310	-485	-504
WLVSA217	0	0	0	-357	-136	0	0	0	-613	-204
WLVSA218	0	0	-1,458	0	0	0	0	-3,181	0	0
WLVSA219	0	0	-905	-1,360	-730	0	0	-2,068	-2,016	-987
WLVSA220	0	-58	0	-326	0	0	-91	0	-182	0
WLVSA221	0	-55	0	-305	0	0	-85	0	-171	0
WLVSA222	-244	-401	-392	-470	-1,134	-449	-742	-638	-630	-1,470
WLVSA223	-74	-86	0	0	0	-123	-137	0	0	0
WLVSA224	-234	-341	-264	0	0	-422	-599	-417	0	0
WLVSA225	-373	-677	-560	0	-1,912	-638	-1,280	-909	0	-2,588
WLVSA226	-175	-219	-334	-345	-419	-405	-486	-679	-532	-594
WLVSA227	-128	-220	-261	0	-665	-251	-465	-461	0	-920
WLVSA228	-75	-143	-78	-425	0	-132	-235	-117	-442	0
WLVSA229	-301	-214	0	0	0	-416	-338	0	0	0
WLVSA230	-141	-100	0	0	0	-195	-159	0	0	0
WLVSA231	-21	-13	0	0	0	-35	-21	0	0	0
WLVSA232	-137	-237	-259	0	-778	-270	-501	-451	0	-1,069
WLVSA233	-762	-881	-639	-1,696	0	-1,283	-1,434	-966	-1,930	0
WLVSA234	-216	-271	-412	-375	-326	-499	-599	-837	-592	-467
WLVSA235	0	-24	0	0	0	0	-37	0	0	0
WLVSA236	-137	-159	0	-667	0	-232	-259	0	-691	0
WLVSA237	-249	-289	-222	-2,281	0	-421	-470	-333	-2,542	0
WLVSA57	-92	0	-906	0	0	-214	0	-1,749	0	0
WLVSA64	0	0	-1,518	0	0	0	0	-3,636	0	0
WLVSA65	-194	-611	-672	0	-874	-390	-1,394	-1,157	0	-1,120
WLVSA66	-93	0	-1,022	0	0	-216	0	-2,333	0	0
WRRND1	0	0	0	0	0	0	0	0	0	0
WRRND10	0	0	0	0	0	0	0	0	0	0
WRRND11	-147	-147	-243	0	0	-281	-281	-405	0	0
WRRND12	0	0	0	0	0	0	0	0	0	0
WRRND13	0	0	0	-1,270	0	0	0	0	-1,779	0
continued										

Appendix Table F1. Continued										
	Revenue Losses due to Planting Delays Caused by Diversion Operations Averaged Across Full Monte Carlo Simulation (10,000 replications)									
	10-day Dry Down Period					14-day Dry Down Period				
Storage Area	2009-like	50-yr	100-yr	500-yr	PMF	2009-like	50-yr	100-yr	500-yr	PMF
WRRND14	0	0	0	-1,027	0	0	0	0	-1,435	0
WRRND15	0	0	0	-1,069	0	0	0	0	-1,474	0
WRRND16	0	0	0	-515	0	0	0	0	-720	0
WRRND17	0	0	0	-902	0	0	0	0	-1,244	0
WRRND18	0	0	0	-1,725	0	0	0	0	-2,281	0
WRRND19	0	0	0	-193	0	0	0	0	-217	0
WRRND2	0	0	0	0	0	0	0	0	0	0
WRRND3	0	0	0	0	0	0	0	0	0	0
WRRND4	0	0	0	0	0	0	0	0	0	0
WRRND5	0	0	0	0	0	0	0	0	0	0
WRRND6	0	0	0	0	0	0	0	0	0	0
WRRND7	0	0	0	0	0	0	0	0	0	0
WRRND8	0	0	0	0	0	0	0	0	0	0
WRRND9	0	0	0	0	0	0	0	0	0	0
WRSA273	0	0	0	0	0	0	0	0	0	0
WRSA280	0	0	0	0	0	0	0	0	0	0
WRSA284	0	0	0	0	0	0	0	0	0	0
WRSA289	0	0	0	0	0	0	0	0	0	0
WRSA294	0	0	0	0	0	0	0	0	0	0
WRSA299	0	0	0	0	0	0	0	0	0	0
WRSA300	0	0	0	0	0	0	0	0	0	0
WRSA302	-814	-1,641	-1,866	-1,885	-12,641	-1,502	-3,344	-3,198	-2,739	-16,991
WRSA303	0	0	-2,809	-5,184	0	0	0	-6,223	-10,177	0
WRSA304	0	-1,452	0	0	0	0	-2,467	0	0	0
WRSA305A	0	0	0	-1,390	0	0	0	0	-1,918	0
WRSA305B	0	0	0	-2,520	0	0	0	0	-3,477	0
WRSA305C	0	0	0	0	0	0	0	0	0	0
WRSA305D	0	0	0	0	0	0	0	0	0	0
WRSA306	-13,059	0	0	-75,100	0	-18,590	0	0	-76,078	0
WRSA307	-557	-639	0	0	0	-911	-1,016	0	0	0
WRSA308	-2,232	-2,802	-4,262	-6,207	0	-5,171	-6,207	-8,687	-11,781	0
WRSA309	0	0	0	0	0	0	0	0	0	0
WRSA311	-8,800	0	0	-57,113	0	-12,453	0	0	-48,506	0
WRSA312	-14,023	0	0	-117,672	0	-19,639	0	0	-95,064	0
WRSA315	0	0	0	0	0	0	0	0	0	0

PMF = probabilistic maximum flood.

Appendix Table F1. Continued										
	Revenue Losses due to Planting Delays Caused by Diversion Operations Averaged Across Full Monte Carlo Simulation (10,000 replications)									
	10-day Dry Down Period					14-day Dry Down Period				
Storage Area	2009-like	50-yr	100-yr	500-yr	PMF	2009-like	50-yr	100-yr	500-yr	PMF
WRSA350	0	0	0	0	0	0	0	0	0	0
WRSA351	0	0	0	-38,945	0	0	0	0	-41,800	0
WRSA352	0	0	0	0	0	0	0	0	0	0
WRSA353	-544	-921	-1,326	-890	0	-1,084	-1,818	-2,384	-1,416	0
WRSA354	0	-312	0	0	0	0	-542	0	0	0
WRSA355	0	0	0	0	0	0	0	0	0	0
WRSA356	0	0	0	0	0	0	0	0	0	0
WRSA357	0	-609	0	0	0	0	-1,097	0	0	0
WRSA358	-410	0	0	0	0	-770	0	0	0	0
WRSA359	0	0	0	0	0	0	0	0	0	0
WRSA360	0	0	0	0	0	0	0	0	0	0
WRSA363	0	0	0	-1,286	0	0	0	0	-1,797	0
WRSA364	0	0	0	0	0	0	0	0	0	0
WRSA373	0	0	0	0	0	0	0	0	0	0
WRSA378	0	0	0	-71	0	0	0	0	-155	0
WRSA383	0	0	0	0	0	0	0	0	0	0
WRSA384	0	0	0	-107	0	0	0	0	-212	0
WRSA389	0	0	0	0	0	0	0	0	0	0
WRSA390	0	0	0	0	0	0	0	0	0	0
WRSA501	-228	-267	-147	0	0	-395	-444	-223	0	0
WRSA502	-44	-67	-71	-96	-235	-81	-122	-116	-131	-306
WRSA504	-32	-64	-63	0	-118	-62	-135	-108	0	-164
WRSA505	0	-102	0	0	0	0	-157	0	0	0
WRSA506	-348	-213	0	0	0	-569	-335	0	0	0
WRSA507	0	0	0	0	0	0	0	0	0	0
WRSA907	0	0	0	0	0	0	0	0	0	0
PMF = probabilistic maximum flood.										