Weber County Hydrology Report

for a

Detailed Study on the

Weber River (Upper)

and

Limited Detailed Study on the

South Fork Ogden River (Including North and South Branch)
North Fork Ogden River (Lower)
North Fork Ogden River (Upper)
Sheep Creek
Wolf Creek (North Branch)
Wolf Creek (South Branch)
Middle Fork Ogden River
Dry Hollow Creek
Strong's Gulch
Weber River (Lower)
Weber River (Upper)

Prepared for:
State of Utah Division of Homeland Security
and
FEMA Region VIII

Prepared by:
URS Corporation
756 East Winchester Street
Suite 400
Salt Lake City, Utah 84107

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Introduction

URS is working with the State of Utah Division of Homeland Security to update the Flood Insurance Rate Maps in Utah County for the Federal Emergency Management Agency as a part of the nationwide Map Modernization Effort. This effort involves updating the existing paper maps used for flood insurance into a digital format known as Digital Flood Insurance Rate Maps (DFIRMs). Soon all Flood Insurance Rate Maps nationwide will be converted or created in accordance to the FEMA Flood Hazard Mapping Program Guidelines and Specifications. This nationwide effort will reduce the cost of the Flood Insurance Program and make data more readily available to homeowners, engineers and public officials.

As a part of the conversion to DFIRM for Weber County, a hydrologic analysis was preformed for the following flood sources in Weber County: South Fork Ogden River, (including the North and South Branch), North Fork Ogden River (Lower), North Fork Ogden River (Upper), Sheep Creek, Wolf Creek (North Branch), Wolf Creek (South Branch), Middle Fork Ogden River, Dry Hollow Creek, Strong's Gulch, Weber River (Lower), Weber River (Upper) to update the effective study dated December 16, 2005.

Existing Hydrology

Flood Insurance Study

The current Weber County FIS was updated December 16, 2005 and includes a 1979 hydrologic analyses for the Weber River. The runoff gauging records for the Weber River for a period of 72 years, from 1905 to 1977, were analyzed according to Bulletin 17A. The storage routing effect of upstream reservoirs was considered, based on published reports by the USBR and the United States Army Corp of Engineers (USACE). The current Weber County FIS does not include hydrologic analysis for any other flood sources studied in this report.

Table 1 - Weber County FIS Effective Peak Flow Summary for the Weber River

Storm Events	At Uintah (upper)	At Plain City (lower)
	cfs	cfs
10-year	3,600	3,500
50-year	5,300	4,600
100-year	7,000	6,200
500-year	12,000	11,100

Proposed Hydrology: Weber River (Upper and Lower)

Weber River Hydrologic Setting

In 1969, the Bureau of Reclamation completed the Weber Basin Project. It was constructed in response to the growing population of the surrounding area and consists of seven primary dams and reservoirs, three diversion dams, two aqueduct, one tunnel, four canal systems, and two power plants. The project also incorporated previous work done by Reclamation for the Weber River, Provo River, and Ogden River Projects. The result is a comprehensive municipal and agricultural program under the jurisdiction of the Weber River Water Users Association. The Weber Basin Project incorporates the necessity for water conservation, hydroelectric power, and flood control.

Streamflow in the Weber River is regulated by the seven project reservoirs. Four of the reservoirs, Echo Reservoir, Rockport Lake, Lost Creek, and East Canyon regulate the flow of the Weber River before it emerges from its mountain watershed into the east shore area. Two project reservoirs, Causey and Pineview, regulate the Ogden River flow before it emerges from the mountains to join the Weber River. Arthur V. Watkins Reservoir is the lowest reservoir of the system. It receives water from the Weber River, diverted at the Slaterville Diversion Dam below the mouth of Ogden River and conveyed through the Willard Canal. Water is returned from Arthur V. Watkins Reservoir to Weber River as needed over the same route, facilitated by two pumping plants.

Hydrologic Analysis - Gage Method

The Weber River watershed runoff has been extensively measured for many years. Within the watershed there are numerous river gages that provide good historical flow data. USGS gage number 10136500 is located within the Weber River Upper study area. The gage has ninety-eight annual peak runoff flows on record dating back to 1890. USGS gage number 10141000 is located within the Weber River Lower study area. The gage has one-hundred and four annual peak runoff flows on record dating back to 1905. Since the 1979 effective study was preformed, an additional 30 years (up to 2008) have been recorded and made available by USGS.

Using the available peak annual runoff data from USGS, URS preformed a Log Pearson Type III analysis (LPIII) using methodology outlined in Bulletin 17-B and the modeling program PeakFq Version 5.2. Since the Weber Basin Project was completed in 1969, peak flows before that year were not included in the analysis. Results are shown in Table 2 and Appendix A.

Hydrologic Analysis - Regression Method

For comparison purposes, the regression equation method was included. The study area is located in Regions 1 and 2. USGS recently released version 2 of their StreamStats program which is a web-based geographic information systems (GIS) application that delineates watershed boundaries and inputs the values into their National Streamflow Statistics (NSS) program. The NSS modeling program uses the regression equations for estimating flood discharges. The results are shown in Table 2. It should be noted that the NSS analysis is invalid due to the large watershed area, upstream operations and conditions of the storage and diversion dams located along the Weber River.

For comparison purposes Table 2 includes:

1. the 1979 effective study flows,
2. the results for the Gage Method (LPIII) and,
3. regression equations results.

Table 2 – Summary of Peak Flows (cfs)

Scenario	Recurrence Interval			
	10-yr	50-yr	100-yr	500-yr
Weber River Upper				
1979 FIS Effective Flow (at Uintah)	3,600	5,300	7,000	12,000
Gage Method Post Weber Basin Project (after 1969, 40-year record)	4,677	7,037	8,025	10,260
Regression NSS analysis for Weber River upper (1650 Sq Mi)	3,320	4,250	4,680	5,090
Weber River Lower				
1979 FIS Effective Flow (at Plain City)	3,500	4,600	6,200	11,100
Gage Method Post Weber Basin Project (after 1969, 40-year record)	5,045	8,256	9,657	12,920
Regression NSS analysis for Weber River lower (2070 Sq Mi)	3,620	4,480	3,450	3,550

It is evident from the gage method that the effective flows for the upper and lower Weber River should be higher than the 1979 FIS, except for the Weber River Upper 500-year peak flow. The Weber Basin Project had only been in place for ten years when the 1979 FIS was completed. The increase in peak flows can be attributed to the additional 30 years of record since the 1979 FIS.

Proposed Hydrology: Other Weber County Flooding Sources

Hydrologic Analysis – HEC-HMS Method

A detailed hydrologic analysis was completed using the Hydraulic Engineering Center's Hydrologic Modeling System (HEC-HMS) Version 3.4 developed by the U.S. Army Corps of Engineers. The program is applicable to this modeling effort, as it has the capability to synthesize subwatersheds, using a variety of methods for basin characteristics, hydrograph transformation and storm events. HEC-HMS separates the hydrologic modeling into three components: a basin model, meteorological model, and control specifications. Each of these components are used to create a separate model for the 10, 2, 1 and 0.2 percent annual chance storm.

Basin Model

The HEC-HMS basin models used for this study include ten watersheds. The physical representation of watershed is configured in the basin model. Required inputs for the basin model include: drainage area, loss method and transform method.

Drainage Area Delineation

The contributing drainage areas for each of the ten flooding sources were delineated electronically using the USGS StreamStats program. The contributing drainage areas for the studied basins range from 0.3 square miles to 143 square miles.

Loss Method

The loss method chosen for this study was the SCS Curve Number Method with curve number as the input parameter. Curve numbers (CN) were assigned with the aid of aerial photography and soil classification data. The soil data was retrieved from the United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) Soil Data Access website. The land use information is from the United States Geological Survey National Land Cover Database. After this determination, a weighted curve number was calculated for each of the separate areas within a basin, followed by the calculation of the average CN for each basin by summary of the weighted CN. The sum of the weighted curve numbers, or average curve number for each basin, was calculated. The initial abstraction value is left blank in the HEC-HMS models; the program assumes the value to 0.2 if no value is entered. Since the percent impervious area was included in the weighted CN values, the impervious value was set to zero for all subwatersheds. See Figures 8 and 9 for Soil Type and Land use, Appendix B for CN values.

Transform Method

The transform method chosen was the Snyder's Synthetic Unit Hydrograph with lag time being the input parameter. The Snyder's Method uses the following:

- length of the main channel measured from the watershed outlet to the highest point in the basin (L),
- the watershed shape parameter which is the length measured along the main channel from the watershed outlet to a point on the main channel that is perpendicular to the center of the area of the watershed (L_{ca}) and,
- a watershed storage coefficient (C_t) which was calibrated.

See Appendix C for Lag Time calculations.

$$Lag = C_t (LL_c)^{0.3}$$

C_t = an empirical coefficient derived from gauged nearby watersheds

L = the distance of the mainstream from the basin outlet to the upstream divide (in km or miles)

L_c = the distance from the outlet to a point on the stream nearest the centroid of the watershed area (along the main stream)

Meteorological Model

The SCS Storm Method was selected for the meteorological model for this study. The input parameters for the SCS Storm Method include rainfall depths for a given storm frequency at the centroid of each watershed. The SCS Type II synthetic rainfall distribution was used for this analysis. The rainfall depths for various storm frequencies were determined from the National Oceanic and Atmospheric Administration's (NOAA) Atlas 14 online database. Aerial Reduction

was used on watersheds with drainage areas over fifty square miles. The aerial reduction for watersheds with drainage areas less than fifty square miles is less than five percent reduction in precipitation and was not considered. The Weather Bureau Technical Paper No. 40, Figure 15 was used to reduce the rainfall depths for the 24-hr events. A summary of rainfall depths can be found in Table 3 below and Appendix D.

Table 3 – NOAA Precipitation Frequency Estimates (inches)

Storm Event	10yr 24hr	50yr 24hr	100yr 24hr	500yr 24hr
South Fork Ogden River	2.88	3.78	4.2	5.22
South Fork Ogden River @ 93% for Aerial Reduction	2.68	3.52	3.91	4.85
South Fork Ogden River N	2.52	3.25	3.58	4.37
South Fork Ogden River S	2.88	3.73	4.12	5.05
North Fork Ogden R Lower	3.53	4.58	5.05	6.2
North Fork Ogden R Lower @ 95% for Aerial Reduction	3.35	4.35	4.80	5.89
North Fork Ogden R Upper	5.29	6.92	7.67	9.48
Sheep Creek	3.6	4.68	5.17	6.35
Wolf Creek	3.92	5.13	5.68	7.02
Wolf Creek N and S	3.08	3.99	4.41	5.39
MF Ogden Upper	3.55	4.66	5.18	6.43
MF Ogden Lower	2.98	3.86	4.27	5.23
Dry Hollow Creek	2.79	3.61	3.98	4.86
Strong Gulch	3.64	4.74	5.24	6.46

Control Specifications

Control Specifications are entered for a simulated 24 hour storm event, in increments of fifteen minutes and covers a period of two days.

Calibrations

Calibration was performed by adjusting the watershed lag time for all the studies flooding sources based on the only found applicable gage data within the watershed. USGS Gage No. 10137500, South Fork of the Ogden River North Branch, provided 87 years of data, 44 of which were used in a Peakfq analysis. The recommended range of C_t values is 1.8 to 2.2. The C_t coefficient of 2.2 was used in the in the Snyder's Method calculations. When entered into HEC-HMS this gives values closest to the South Fork of the Ogden River North Branch for the 10-, 50-, 100- and 500-year storm events. The C_t value of 2.2 was used for all watersheds in the HEC-HMS analysis. Peakfq results for the South Fork of Ogden River North Branch are shown in Appendix D.

Routing

A repeating scenario throughout the Weber County Study is where larger watersheds flow to a hydraulic structure or braded location in the stream where the flow splits into two streams. Routing for these locations will be performed under the hydraulics task and take into account the geometry of the hydraulic structures or natural stream bed and banks. Flows reported in these locations (shown in Table 4 as a split condition) will be separated accordingly into the downstream channel.

The North Fork Ogden River Upper has been routed through the North Fork Ogden River Lower watershed, and the results reported for the lower watershed reflect this routing. The Muskingum-Cunge routing method was used to route the Upper basin through the Lower basin. Separate HEC-HMS basin models were retained for each watershed so that the precipitation depth used in the meteorological model can be calculated for the centroid of the watershed. The hydrographs for the Lower basin and routed Upper basin were added together to determine the peak flow. See Appendix E for routing calculations. A summary of watersheds that flow into other watersheds can be found in Table 4 below.

Table 4 – Watershed Routing Table

Upstream Watershed	Condition	Downstream Watersheds
South Fork Ogden River	Split	South Fork Ogden River North Branch
		South Fork Ogden River South Branch
North Fork Ogden River Upper	Routed	North Fork Ogden River Lower
Wolf Creek	Split	Wolf Creek North Branch
		Wolf Creek South Branch
Middle Fork Ogden River (Upper)	Split	Middle Fork Ogden River (Lower)
		Dry Hollow Creek

Results

For comparison purposes, the regression equation method was included. The study areas are located in Regions 1 and 2 and results are shown on Table 4 and Appendix E and F.

For comparison purposes Table 2 includes:

1. HEC-HMS flows,
2. the results for the Gage Method (LPIII) and,
3. regression equations results.

Table 5 – Summary of Peak Flows (cfs)

Scenario	Recurrence Interval			
	10-yr	50-yr	100-yr	500-yr
South Fork Ogden River				
HEC-HMS	1,194	2,267	2,831	4,319
Regression NSS analysis (142.58 Sq Mi)	739	953	1,030	1,210
Calibration: Gage Method (44-year record)	1,510	2,039	2,234	2,628
South Fork Ogden River North Branch				
HEC-HMS	0.5	2.4	3.5	7.2
Regression NSS analysis (0.73 Sq Mi)	13	28	37	48
South Fork Ogden River South Branch				
HEC-HMS	115	293	397	695
Regression NSS analysis (27.37 Sq Mi)	173	255	289	379
North Fork Ogden River Lower				
HEC-HMS and Routing	802	1554	2010	3277
Regression NSS analysis (57.95 Sq Mi)	720	942	1020	1230
North Fork Ogden River Upper				
HEC-HMS	331	678	867	1,381
Regression NSS analysis (10.78 Sq Mi)	396	556	614	794
Sheep Creek				
HEC-HMS (12 Sq Mi)	134	309	408	687
Regression NSS analysis (11.33 Sq Mi)	139	212	242	329
Wolf Creek				
HEC-HMS	127	282	369	614
Regression NSS analysis (8.51 Sq Mi)	108	168	193	266
Wolf Creek North Branch				
HEC-HMS	8	18	23	38
Regression NSS analysis (0.42 Sq Mi)	6	14	19	27
Wolf Creek South Branch				
HEC-HMS	18	37	47	73
Regression NSS analysis (0.73 Sq Mi)	10.2	19.6	24.3	39.9

Scenario	Recurrence Interval			
	10-yr	50-yr	100-yr	500-yr
Middle Fork Ogden River Upper				
HEC-HMS	286	644	849	1,420
Regression NSS analysis (32.79 Sq Mi)	188	317	379	397
Middle Fork Ogden River Lower				
HEC-HMS	2	6	9	17
Regression NSS analysis (0.34 Sq Mi)	5	10	13	23
Dry Hollow Creek				
HEC-HMS	9	21	29	49
Regression NSS analysis (0.65 Sq Mi)	12	26	34	45
Strong Gulch				
HEC-HMS	58	104	128	190
Regression NSS analysis (1.48 Sq Mi)	15	28	35	55

Peak Flow Recommendations

Weber River Peak Flow Recommendations

Table 5 below shows the recommended effective flows to be used in the DFIRM preparation.

Table 6 – Weber River Recommended Effective Peak Flows (cfs)

Return Period	10-yr	50-yr	100-yr	500-yr
Weber River Upper	4,680	7,040	8,025	10,260
Weber River Lower	5,045	8,260	9,660	12,920

Other Weber County Peak Flow Recommendations

Table 6 below shows the recommended effective flows to be used in the DFIRM preparation. These values are from the HEC-HMS analysis.

Table 7 – Other Weber County Recommended Effective Peak Flows (cfs)

Return Period	10-yr	50-yr	100-yr	500-yr
South Fork Ogden River	1,194	2,267	2,831	4,319
South Fork Ogden River North Branch[1]	0.5	2.4	3.5	7.2
South Fork Ogden River South Branch[1]	115	293	397	695
North Fork Ogden River Upper	331	678	867	1,381
North Fork Ogden River Lower	802	1554	2010	3277
Sheep Creek	134	309	408	687
Wolf Creek	127	282	369	614
Wolf Creek North Branch[2]	8	18	23	38
Wolf Creek South Branch[2]	18	37	47	73
Middle Fork Ogden River Upper	286	644	849	1,420
Middle Fork Ogden River Lower[3]	2	6	9	17
Dry Hollow Creek[3]	9	21	29	49
Strong Gulch	58	104	128	190

[1] Flows will include HEC-RAS split results from the South Fork Ogden River after split analysis is completed.

[2] Flows will include HEC-RAS split results from Wolf Creek after split analysis is completed.

[3] Flows will include HEC-RAS split results from Middle Fork Ogden River Upper after split analysis is completed.

References

FEMA, Federal Emergency Management Agency, Weber County, Utah and Unincorporated Areas, Revised: December 16, 2005.

NOAA, 2006. Precipitation-frequency Atlas of the Western U.S. NOAA Atlas 14. Vol. 1. Version 4.0. National weather Service. Weber County, Utah.

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U.S Geological Survey, National Streamflow Statistics (NSS) Version 4, Updated 4/8/2009.

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U.S. Water Resources Council, Hydrology Committee, "Guidelines for Determining Flood Flow Frequency," *Bulletin 17A*, June 1977.

U.S. Water Resources Council, Hydrology Committee, "Guidelines for Determining Flood Flow Frequency," *Bulletin 17B*, June 1982.

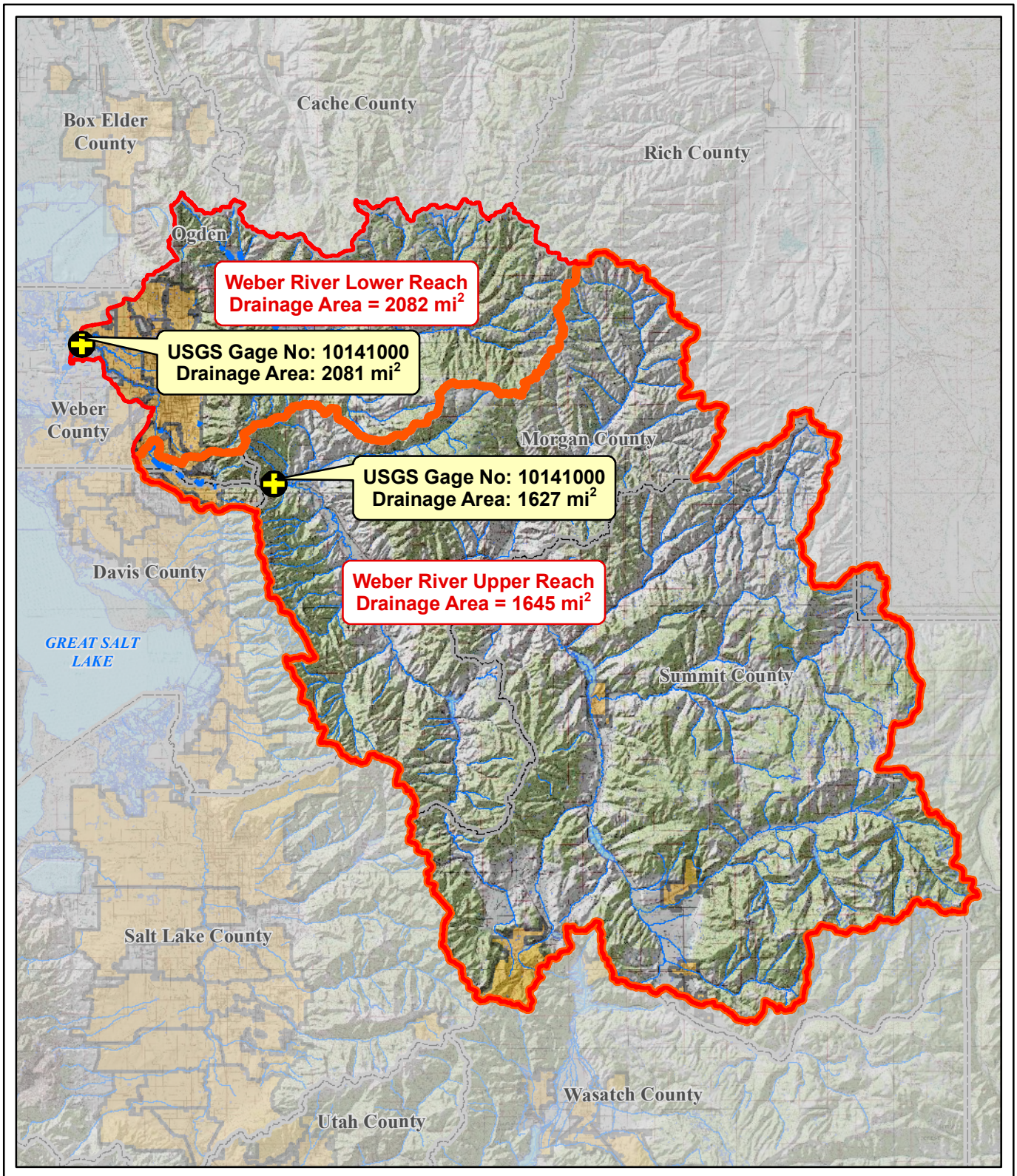

Figure 1 - Weber River Watershed Map
DFIRM Hydrology Study
Weber County, Utah

URS

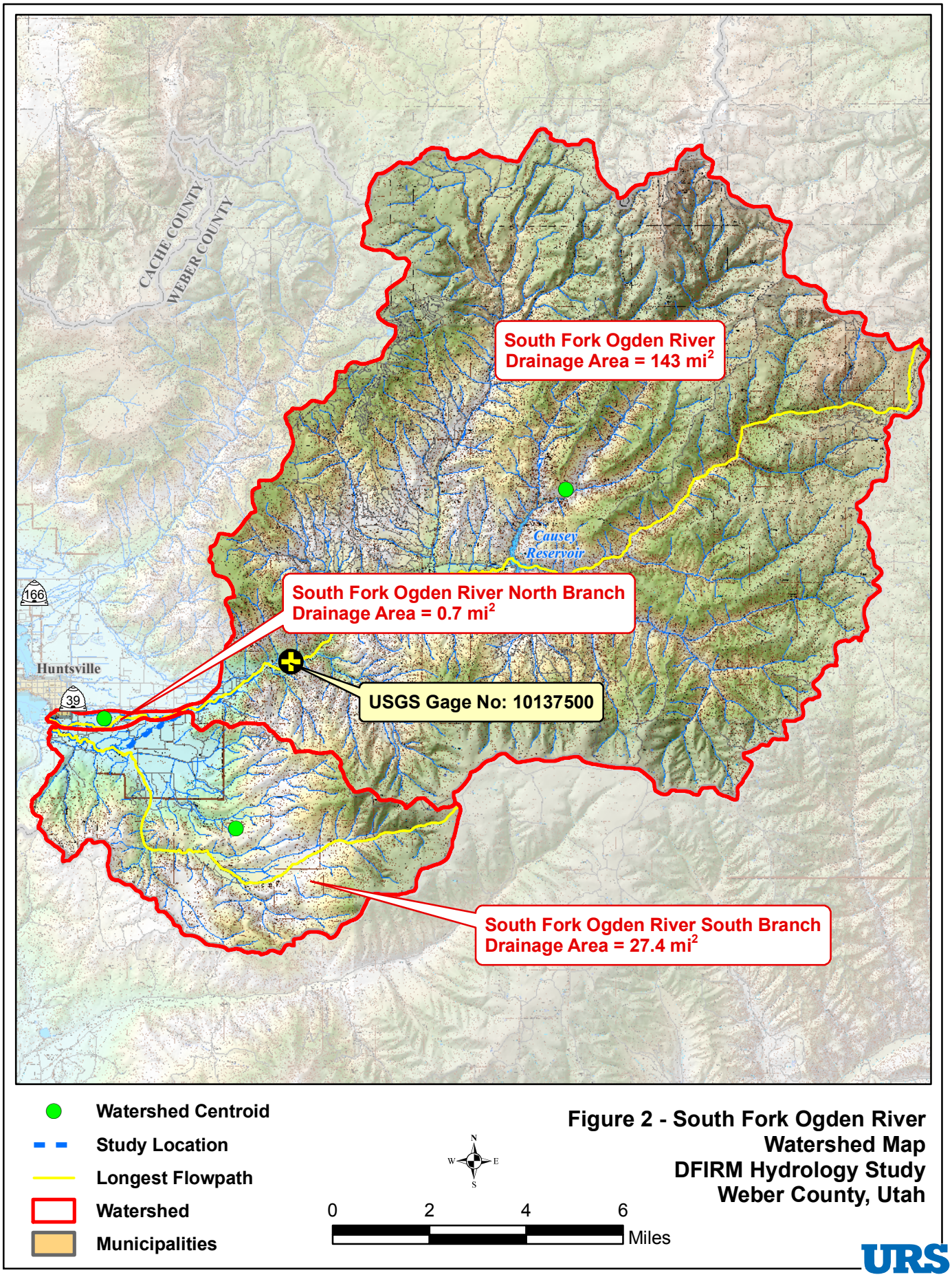

Figure 2 - South Fork Ogden River Watershed Map
DFIRM Hydrology Study
Weber County, Utah

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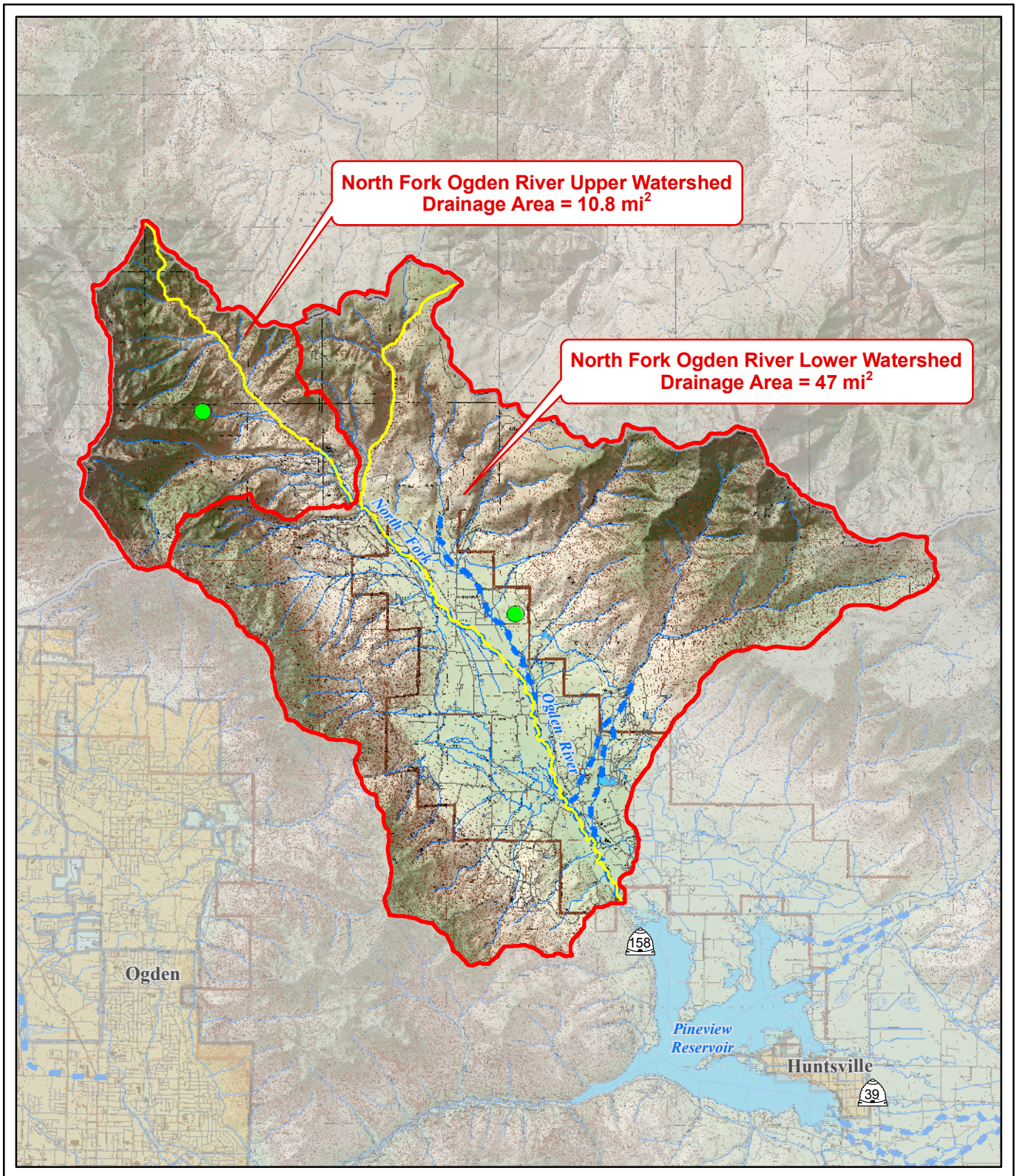

Figure 3 - North Fork Ogden River Watershed Map
DFIRM Hydrology Study
Weber County, Utah

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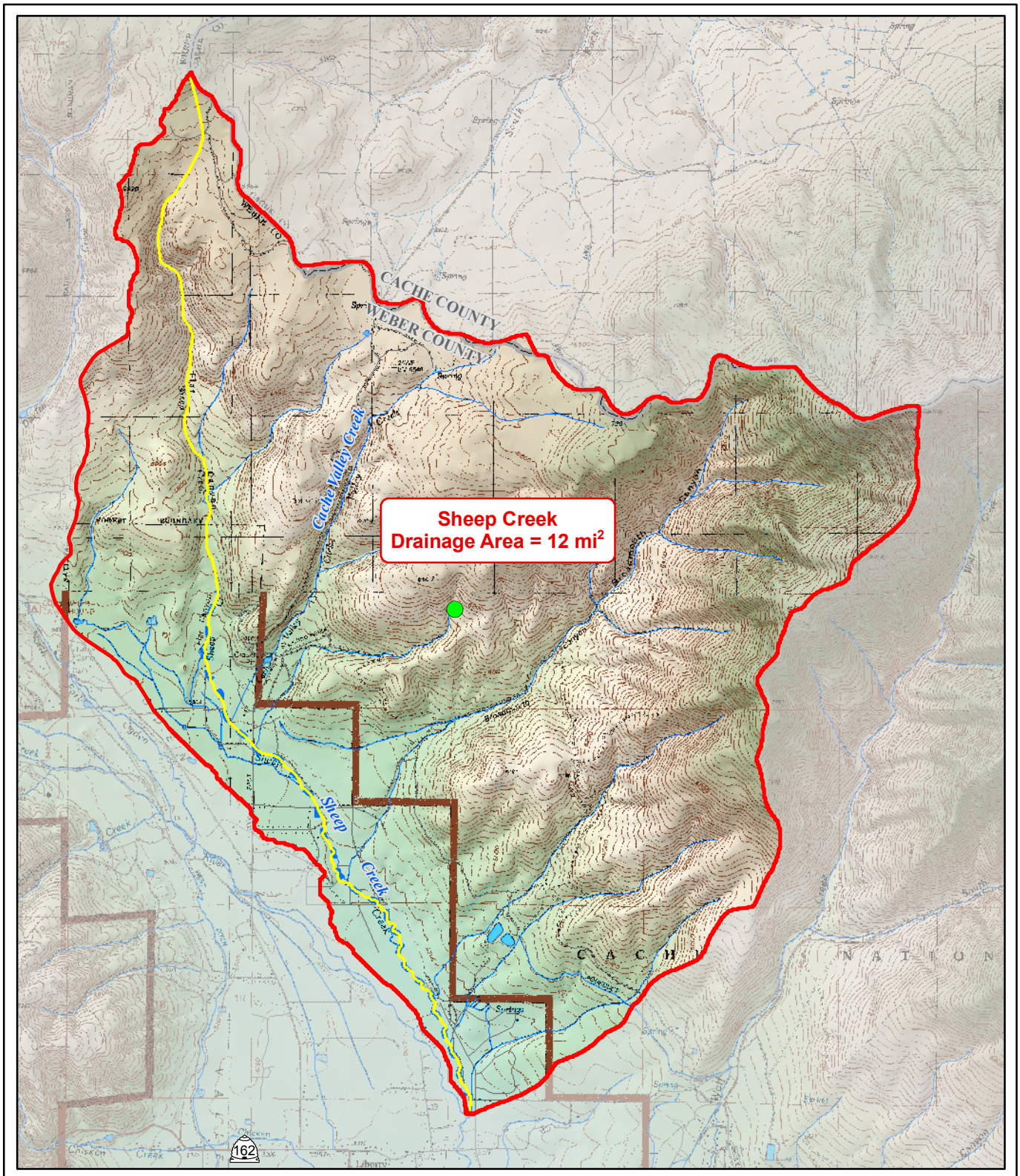

Watershed Centroid
Study Location
Longest Flowpath
Watershed
Municipalities

N
W E
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0 0.5 1 1.5
Miles

Figure 4 - Sheep Creek Watershed Map
DFIRM Hydrology Study
Weber County, Utah

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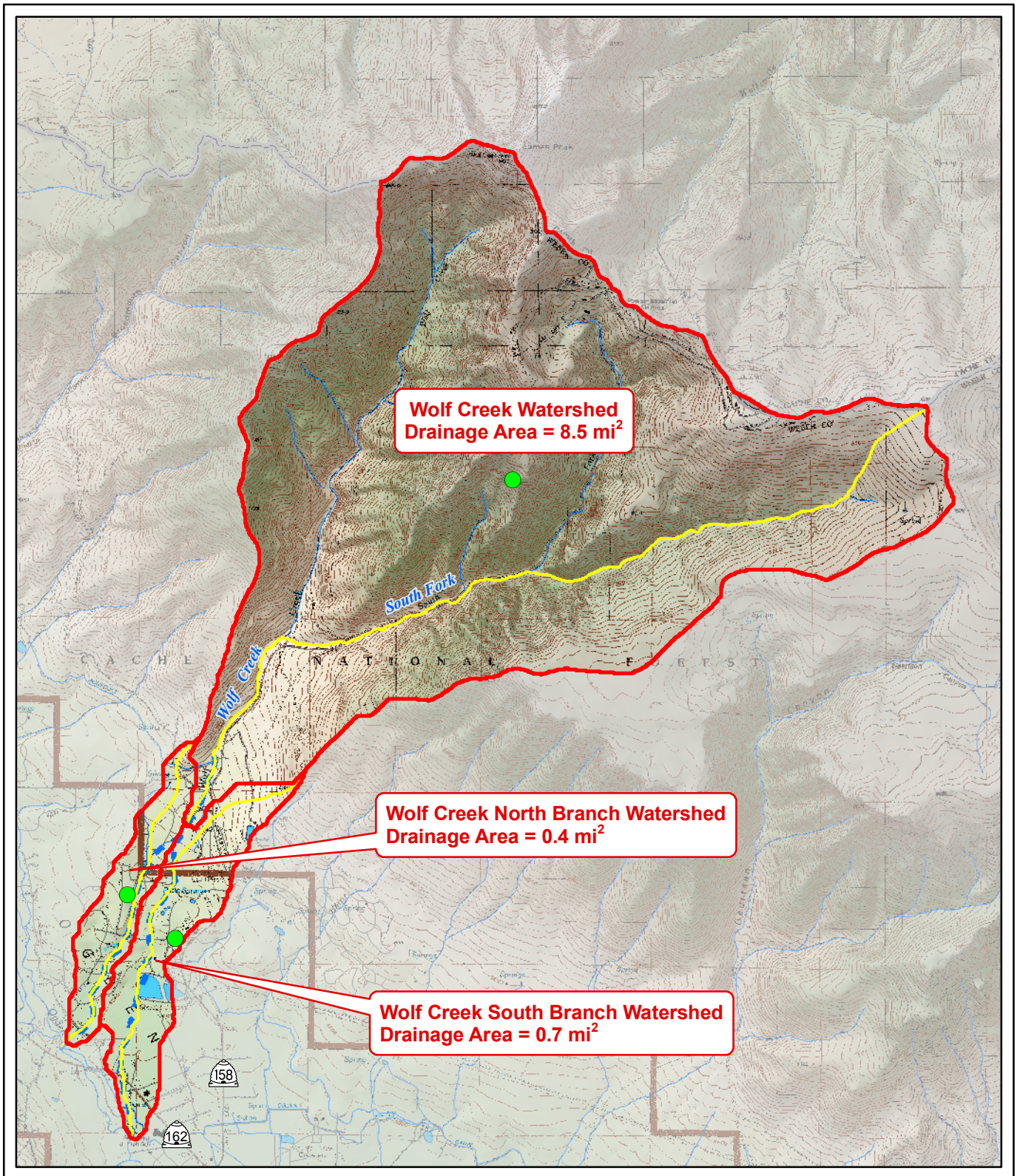

Figure 5 - Wolf Creek Watershed Map
DFIRM Hydrology Study
Weber County, Utah

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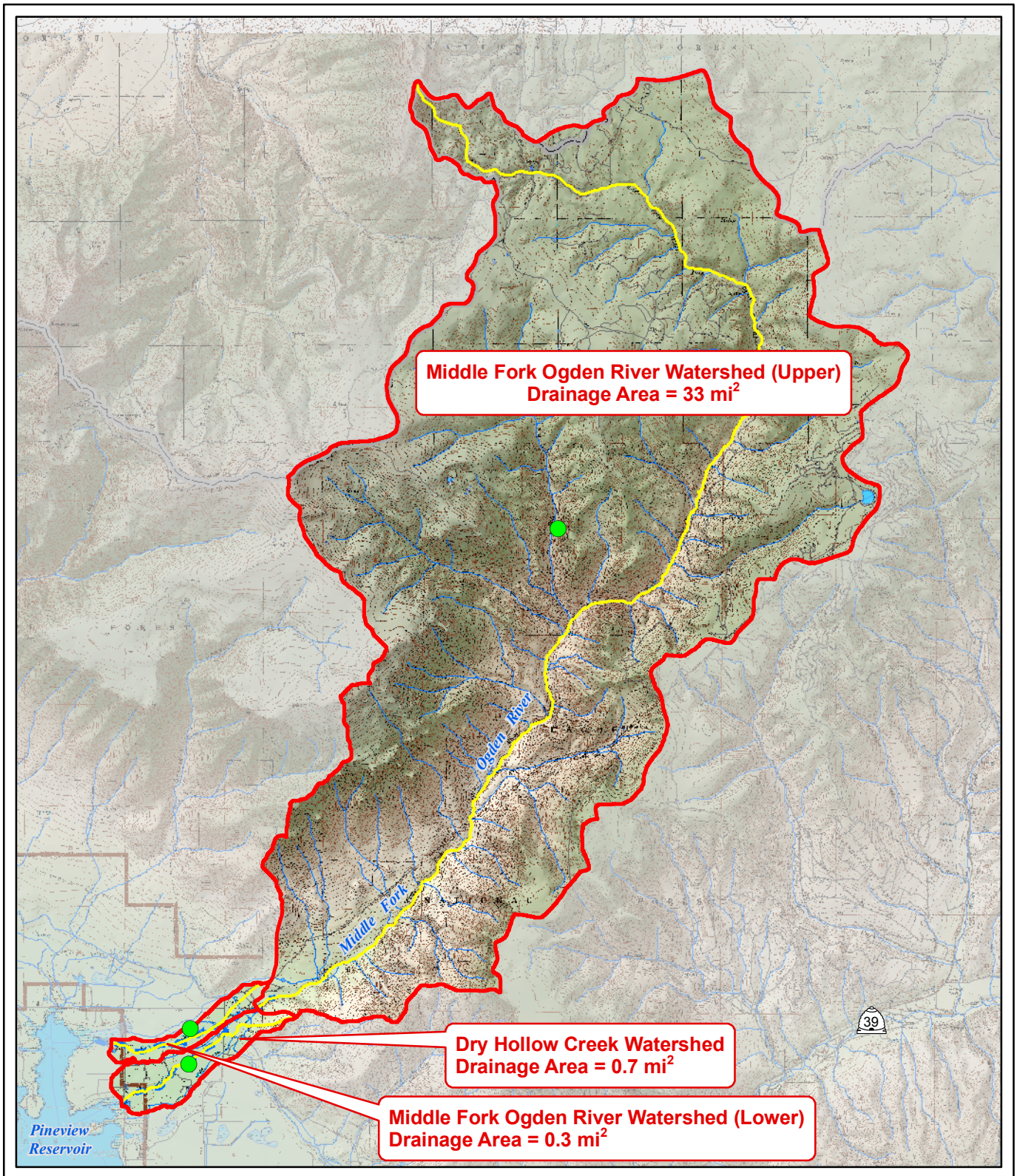

Figure 6 - Middle Fork Ogden River & Dry Hollow Creek Watershed Map
DFIRM Hydrology Study
Weber County, Utah

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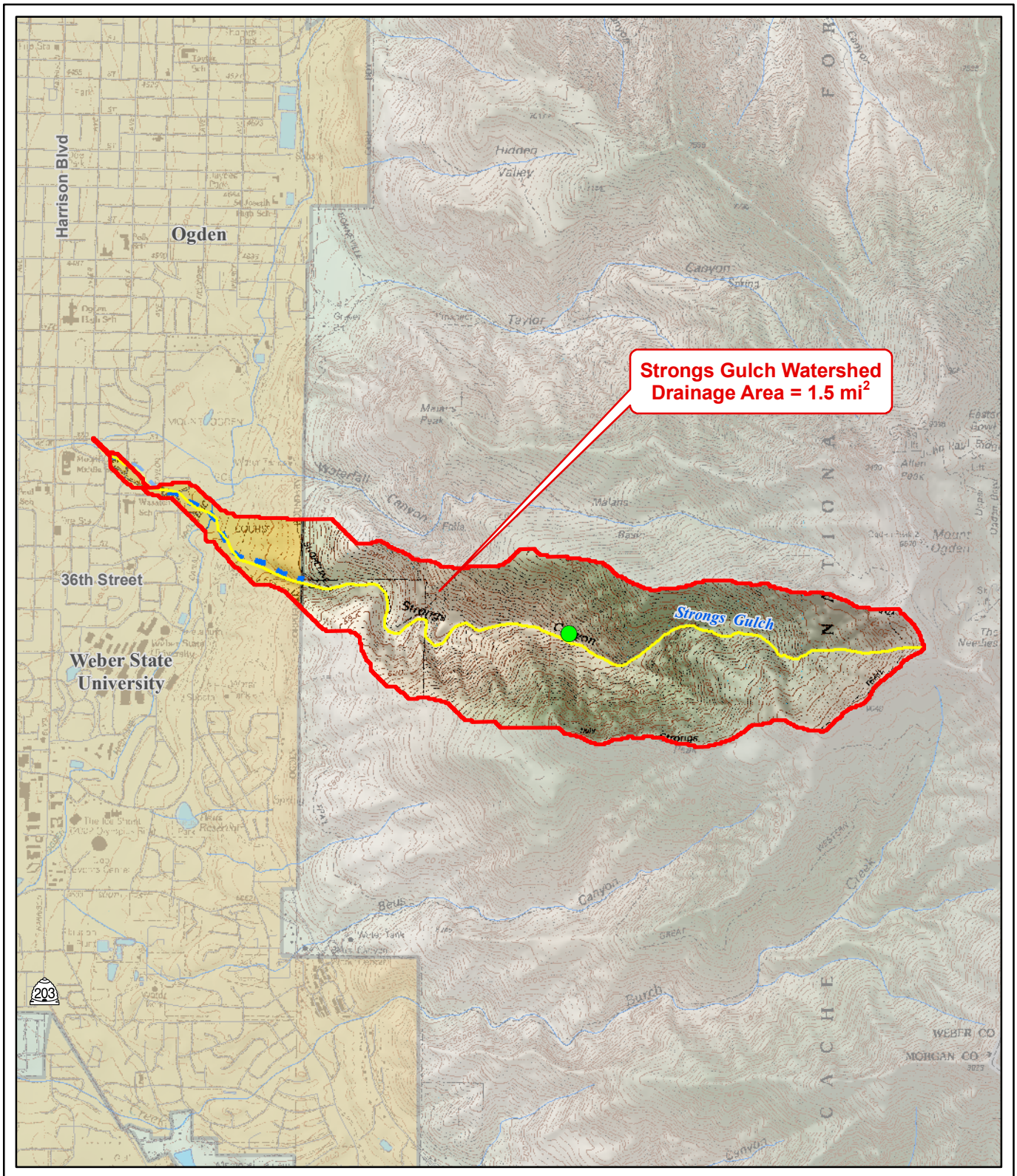

Figure 7 - Strongs Gulch Watershed Map
DFIRM Hydrology Study
Weber County, Utah

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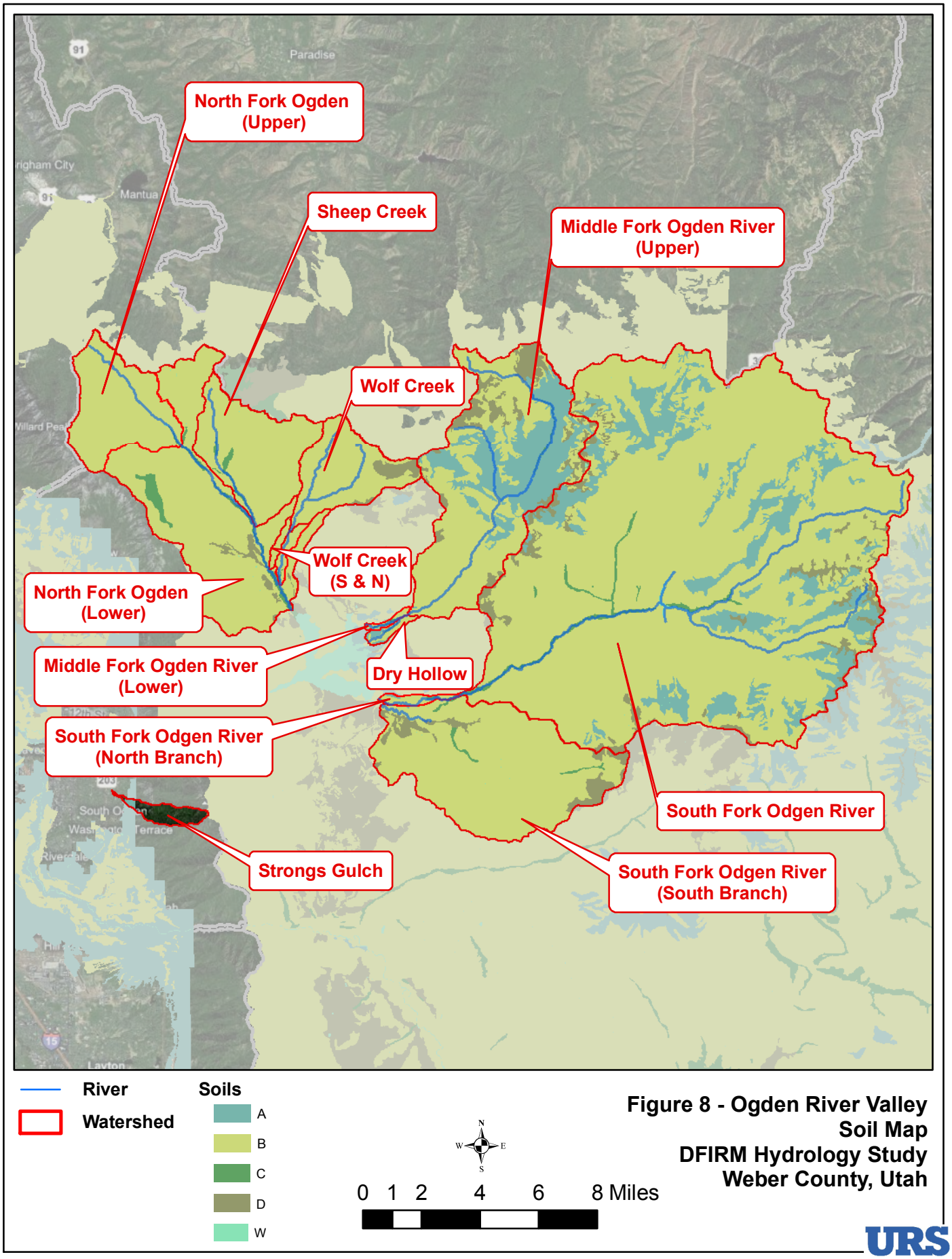

Figure 8 - Ogden River Valley Soil Map
DFIRM Hydrology Study
Weber County, Utah

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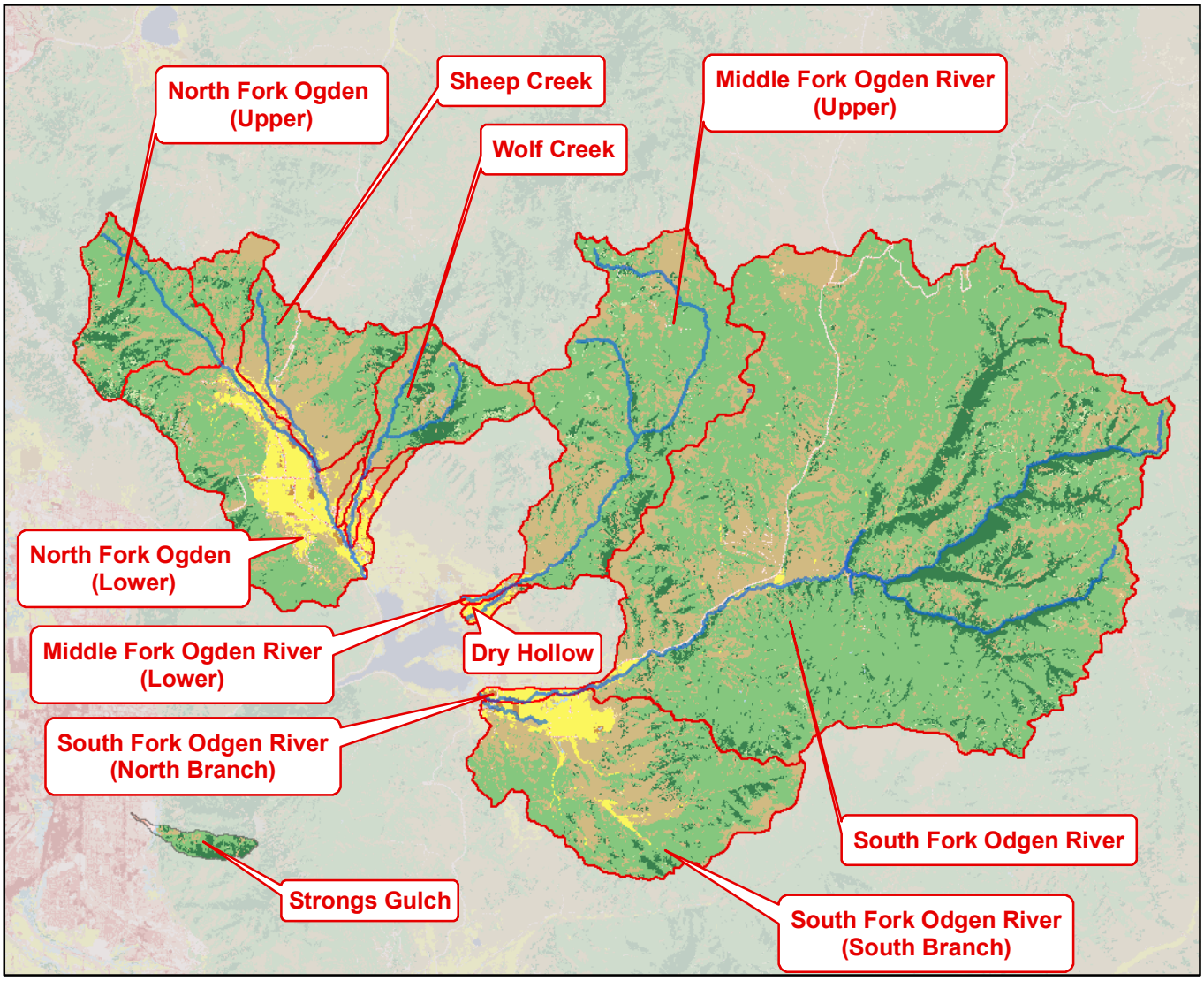

- Water
- Perennial Ice/Snow
- Developed, Open Space
- Developed, Low Intensity
- Developed, Medium Intensity
- Developed, High Intensity
- Barren Land
- Unconsolidated Shore
- Transitional
- Deciduous Forest
- Evergreen Forest
- Mixed Forest
- Shrub/Scrub
- Orchards/Vinyards
- Grasslands/Herbaceous
- Pasture/Hay
- Cultivated Crops
- Urban/Recreational Grasses
- Woody Wetlands
- Palustrine Forested Wetland
- Emergent Herbaceous Wetlands
- Emergent Herbaceous Wetlands
- Palustrine Emergent Wetland
- Estuarine Emergent Wetland
- Palustrine Aquatic Bed
- Estuarine Aquatic Bed

- River
- Watershed

Figure 9 - Ogden River Valley Land Cover Map
DFIRM Hydrology Study
Weber County, Utah

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0 1 2 4 6 8 Mi

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Appendix A – LPIII Flood Frequency Results

Weber River Upper – 40 Year Record

```
1
  Program PeakFq           U. S. GEOLOGICAL SURVEY             Seq.000.000
  Ver. 5.2            Annual peak flow frequency analysis      Run Date / Time
  11/01/2007          following Bulletin 17-B Guidelines       02/15/2010 12:44

                         --- PROCESSING OPTIONS ---

                      Plot option         = None
                      Basin char output   = None
                      Print option        = Yes
                      Debug print         = No
                      Input peaks listing = Long
                      Input peaks format  = WATSTORE peak file

                      Input files used:
                         peaks (ascii)  - T:\FEMA\WEBER COUNTY DFIRM - 24585125\HYDROLOGY\GAGE
INFORMATION\WEBER RIVER UPP
                         specifications - PKFQWPSF.TMP
                      Output file(s):
                         main - T:\FEMA\WEBER COUNTY DFIRM - 24585125\HYDROLOGY\GAGE INFORMATION\WEBER
RIVER UPP

1


  Program PeakFq           U. S. GEOLOGICAL SURVEY             Seq.001.001
  Ver. 5.2            Annual peak flow frequency analysis      Run Date / Time
  11/01/2007          following Bulletin 17-B Guidelines       02/15/2010 12:44

                Station - 10136500  WEBER RIVER AT GATEWAY, UT


                    I N P U T   D A T A   S U M M A R Y

               Number of peaks in record           =       40
               Peaks not used in analysis          =        0
               Systematic peaks in analysis        =       40
               Historic peaks in analysis          =        0
               Years of historic record            =        0
               Generalized skew                    =   -0.286
                    Standard error                 =    0.550
                    Mean Square error              =    0.303
               Skew option                         =   WEIGHTED
               Gage base discharge                 =      0.0
               User supplied high outlier threshold =   --
               User supplied low outlier criterion  =   --
               Plotting position parameter         =     0.00



  *********  NOTICE  --  Preliminary machine computations.        *********
  *********  User responsible for assessment and interpretation.  *********

    WCF134I-NO SYSTEMATIC PEAKS WERE BELOW GAGE BASE.                  0.0
    WCF195I-NO LOW OUTLIERS WERE DETECTED BELOW CRITERION.           305.4
    WCF163I-NO HIGH OUTLIERS OR HISTORIC PEAKS EXCEEDED HHBASE.    12938.0
1


  Program PeakFq           U. S. GEOLOGICAL SURVEY             Seq.001.002
  Ver. 5.2            Annual peak flow frequency analysis      Run Date / Time
  11/01/2007          following Bulletin 17-B Guidelines       02/15/2010 12:44

                Station - 10136500  WEBER RIVER AT GATEWAY, UT


          ANNUAL FREQUENCY CURVE PARAMETERS -- LOG-PEARSON TYPE III
```

	FLOOD BASE DISCHARGE	EXCEEDANCE PROBABILITY	LOGARITHMIC MEAN	STANDARD DEVIATION	SKEW
SYSTEMATIC RECORD	0.0	1.0000	3.2984	0.3033	-0.529
BULL.17B ESTIMATE	0.0	1.0000	3.2984	0.3033	-0.442

ANNUAL FREQUENCY CURVE -- DISCHARGES AT SELECTED EXCEEDANCE PROBABILITIES

ANNUAL EXCEEDANCE PROBABILITY	BULL.17B ESTIMATE	SYSTEMATIC RECORD	'EXPECTED PROBABILITY' ESTIMATE	95-PCT CONFIDENCE LIMITS FOR BULL. 17B ESTIMATES LOWER	UPPER
0.9950	246.7	233.2	209.5	146.9	356.5
0.9900	313.4	300.3	276.9	196.3	438.2
0.9500	581.2	573.0	551.0	411.6	751.3
0.9000	790.9	788.0	766.1	592.0	988.9
0.8000	1127.0	1132.0	1109.0	890.3	1369.0
0.6667	1538.0	1553.0	1529.0	1259.0	1846.0
0.5000	2092.0	2114.0	2092.0	1742.0	2523.0
0.4292	2363.0	2385.0	2368.0	1971.0	2870.0
0.2000	3614.0	3616.0	3657.0	2969.0	4591.0
0.1000	4677.0	4633.0	4779.0	3764.0	6179.0
0.0400	6034.0	5893.0	6255.0	4731.0	8334.0
0.0200	7037.0	6797.0	7382.0	5422.0	10000.0
0.0100	8025.0	7667.0	8524.0	6086.0	11700.0
0.0050	8998.0	8504.0	9682.0	6727.0	13420.0
0.0020	10260.0	9563.0	11240.0	7545.0	15710.0

1

Program PeakFq U. S. GEOLOGICAL SURVEY Seq.001.003
Ver. 5.2 Annual peak flow frequency analysis Run Date / Time
11/01/2007 following Bulletin 17-B Guidelines 02/15/2010 12:44

Station - 10136500 WEBER RIVER AT GATEWAY, UT

I N P U T D A T A L I S T I N G

WATER YEAR	DISCHARGE	CODES	WATER YEAR	DISCHARGE	CODES
1969	3200.0		1989	1850.0	
1970	2120.0		1990	735.0	
1971	2420.0		1991	1930.0	
1972	3820.0		1992	639.0	
1973	2890.0		1993	3340.0	
1974	3170.0		1994	1190.0	
1975	3420.0		1995	3700.0	
1976	1720.0		1996	1660.0	
1977	609.0		1997	3340.0	
1978	2560.0		1998	3210.0	
1979	1460.0		1999	3110.0	
1980	3300.0		2000	718.0	
1981	2570.0		2001	1140.0	
1982	4300.0		2002	962.0	
1983	5970.0		2003	406.0	
1984	5080.0		2004	1060.0	
1985	3510.0		2005	2860.0	
1986	6160.0		2006	3240.0	
1987	1110.0		2007	1090.0	
1988	550.0		2008	1640.0	

Explanation of peak discharge qualification codes

PeakFQ CODE	NWIS CODE	DEFINITION
D	3	Dam failure, non-recurrent flow anomaly

```
         G        8    Discharge greater than stated value
         X       3+8   Both of the above
         L        4    Discharge less than stated value
         K     6 OR C  Known effect of regulation or urbanization
         H        7    Historic peak

         -  Minus-flagged discharge -- Not used in computation
               -8888.0 -- No discharge value given
         -  Minus-flagged water year -- Historic peak used in computation



1


  Program PeakFq           U. S. GEOLOGICAL SURVEY            Seq.001.004
  Ver. 5.2            Annual peak flow frequency analysis     Run Date / Time
  11/01/2007          following Bulletin 17-B Guidelines      02/15/2010 12:44

                Station - 10136500  WEBER RIVER AT GATEWAY, UT


   EMPIRICAL FREQUENCY CURVES -- WEIBULL PLOTTING POSITIONS

      WATER         RANKED       SYSTEMATIC      BULL.17B
       YEAR       DISCHARGE        RECORD        ESTIMATE

       1986         6160.0         0.0244         0.0244
       1983         5970.0         0.0488         0.0488
       1984         5080.0         0.0732         0.0732
       1982         4300.0         0.0976         0.0976
       1972         3820.0         0.1220         0.1220
       1995         3700.0         0.1463         0.1463
       1985         3510.0         0.1707         0.1707
       1975         3420.0         0.1951         0.1951
       1993         3340.0         0.2195         0.2195
       1997         3340.0         0.2439         0.2439
       1980         3300.0         0.2683         0.2683
       2006         3240.0         0.2927         0.2927
       1998         3210.0         0.3171         0.3171
       1969         3200.0         0.3415         0.3415
       1974         3170.0         0.3659         0.3659
       1999         3110.0         0.3902         0.3902
       1973         2890.0         0.4146         0.4146
       2005         2860.0         0.4390         0.4390
       1981         2570.0         0.4634         0.4634
       1978         2560.0         0.4878         0.4878
       1971         2420.0         0.5122         0.5122
       1970         2120.0         0.5366         0.5366
       1991         1930.0         0.5610         0.5610
       1989         1850.0         0.5854         0.5854
       1976         1720.0         0.6098         0.6098
       1996         1660.0         0.6341         0.6341
       2008         1640.0         0.6585         0.6585
       1979         1460.0         0.6829         0.6829
       1994         1190.0         0.7073         0.7073
       2001         1140.0         0.7317         0.7317
       1987         1110.0         0.7561         0.7561
       2007         1090.0         0.7805         0.7805
       2004         1060.0         0.8049         0.8049
       2002          962.0         0.8293         0.8293
       1990          735.0         0.8537         0.8537
       2000          718.0         0.8780         0.8780
       1992          639.0         0.9024         0.9024
       1977          609.0         0.9268         0.9268
       1988          550.0         0.9512         0.9512
       2003          406.0         0.9756         0.9756
1


 End PeakFQ analysis.
   Stations processed :       1
   Number of errors   :       0
   Stations skipped   :       0
```

```
   Station years      :      40


Data records may have been ignored for the stations listed below.
(Card type must be Y, Z, N, H, I, 2, 3, 4,  or *.)
(2, 4, and * records are ignored.)

 For the station below, the following records were ignored:

 FINISHED PROCESSING STATION:  10136500       USGS WEBER RIVER AT GATEWAY, UT


 For the station below, the following records were ignored:

 FINISHED PROCESSING STATION:
```

Appendix A – LPIII Flood Frequency Results

Weber River Lower – 40 Year Record

```
1
  Program PeakFq           U. S. GEOLOGICAL SURVEY            Seq.000.000
  Ver. 5.2            Annual peak flow frequency analysis     Run Date / Time
  11/01/2007          following Bulletin 17-B Guidelines      02/15/2010 12:40

                         --- PROCESSING OPTIONS ---

                      Plot option         = None
                      Basin char output   = None
                      Print option        = Yes
                      Debug print         = No
                      Input peaks listing = Long
                      Input peaks format  = WATSTORE peak file

                      Input files used:
                         peaks (ascii)  - T:\FEMA\WEBER COUNTY DFIRM - 24585125\HYDROLOGY\GAGE
INFORMATION\WEBER RIVER LOW
                         specifications - PKFQWPSF.TMP
                      Output file(s):
                         main - T:\FEMA\WEBER COUNTY DFIRM - 24585125\HYDROLOGY\GAGE INFORMATION\WEBER
RIVER LOW

1


  Program PeakFq           U. S. GEOLOGICAL SURVEY            Seq.001.001
  Ver. 5.2            Annual peak flow frequency analysis     Run Date / Time
  11/01/2007          following Bulletin 17-B Guidelines      02/15/2010 12:40

              Station - 10141000  WEBER RIVER NEAR PLAIN CITY, UT


                    I N P U T   D A T A   S U M M A R Y

                Number of peaks in record            =       40
                Peaks not used in analysis           =        0
                Systematic peaks in analysis         =       40
                Historic peaks in analysis           =        0
                Years of historic record             =        0
                Generalized skew                     =   -0.282
                     Standard error                  =    0.550
                     Mean Square error               =    0.303
                Skew option                          =   WEIGHTED
                Gage base discharge                  =      0.0
                User supplied high outlier threshold =   --
                User supplied low outlier criterion  =   --
                Plotting position parameter          =     0.00



  *********  NOTICE  --  Preliminary machine computations.        *********
  *********  User responsible for assessment and interpretation.  *********

    WCF134I-NO SYSTEMATIC PEAKS WERE BELOW GAGE BASE.                  0.0
    WCF195I-NO LOW OUTLIERS WERE DETECTED BELOW CRITERION.           173.1
    WCF163I-NO HIGH OUTLIERS OR HISTORIC PEAKS EXCEEDED HHBASE.    17863.6
1


  Program PeakFq           U. S. GEOLOGICAL SURVEY            Seq.001.002
  Ver. 5.2            Annual peak flow frequency analysis     Run Date / Time
  11/01/2007          following Bulletin 17-B Guidelines      02/15/2010 12:40

              Station - 10141000  WEBER RIVER NEAR PLAIN CITY, UT


           ANNUAL FREQUENCY CURVE PARAMETERS -- LOG-PEARSON TYPE III

                         FLOOD BASE                  LOGARITHMIC
```

	DISCHARGE	EXCEEDANCE PROBABILITY	MEAN	STANDARD DEVIATION	SKEW
SYSTEMATIC RECORD	0.0	1.0000	3.2451	0.3754	-0.593
BULL.17B ESTIMATE	0.0	1.0000	3.2451	0.3754	-0.479

ANNUAL FREQUENCY CURVE -- DISCHARGES AT SELECTED EXCEEDANCE PROBABILITIES

ANNUAL EXCEEDANCE PROBABILITY	BULL.17B ESTIMATE	SYSTEMATIC RECORD	'EXPECTED PROBABILITY' ESTIMATE	95-PCT CONFIDENCE LIMITS FOR BULL. 17B ESTIMATES LOWER	UPPER
0.9950	129.0	117.9	104.9	67.5	204.3
0.9900	174.7	163.1	149.3	97.4	265.3
0.9500	380.9	372.4	356.1	248.1	523.8
0.9000	560.8	557.7	538.8	391.7	739.6
0.8000	872.9	880.4	856.3	652.5	1110.0
0.6667	1287.0	1306.0	1277.0	1004.0	1612.0
0.5000	1883.0	1914.0	1883.0	1501.0	2375.0
0.4292	2189.0	2222.0	2194.0	1748.0	2784.0
0.2000	3686.0	3689.0	3740.0	2890.0	4958.0
0.1000	5045.0	4967.0	5179.0	3858.0	7117.0
0.0400	6864.0	6604.0	7168.0	5087.0	10210.0
0.0200	8256.0	7805.0	8742.0	5992.0	12710.0
0.0100	9657.0	8971.0	10380.0	6878.0	15320.0
0.0050	11060.0	10100.0	12060.0	7748.0	18030.0
0.0020	12920.0	11540.0	14380.0	8872.0	21730.0

1

Program PeakFq U. S. GEOLOGICAL SURVEY Seq.001.003
Ver. 5.2 Annual peak flow frequency analysis Run Date / Time
11/01/2007 following Bulletin 17-B Guidelines 02/15/2010 12:40

Station - 10141000 WEBER RIVER NEAR PLAIN CITY, UT

I N P U T D A T A L I S T I N G

WATER YEAR	DISCHARGE	CODES	WATER YEAR	DISCHARGE	CODES
1969	2740.0		1989	625.0	
1970	1840.0		1990	371.0	
1971	2950.0		1991	1300.0	
1972	2940.0		1992	569.0	
1973	2560.0		1993	3230.0	
1974	3410.0		1994	1290.0	
1975	3600.0		1995	3350.0	
1976	1830.0		1996	1850.0	
1977	530.0		1997	2830.0	
1978	2870.0		1998	3130.0	
1979	1450.0		1999	3530.0	
1980	3610.0		2000	957.0	
1981	2290.0		2001	414.0	
1982	3820.0		2002	524.0	
1983	7250.0		2003	426.0	
1984	5590.0		2004	545.0	
1985	3500.0		2005	3490.0	
1986	5760.0		2006	3800.0	
1987	1360.0		2007	969.0	
1988	266.0		2008	1430.0	

Explanation of peak discharge qualification codes

PeakFQ CODE	NWIS CODE	DEFINITION
D	3	Dam failure, non-recurrent flow anomaly
G	8	Discharge greater than stated value
X	3+8	Both of the above

```
          L        4    Discharge less than stated value
          K     6 OR C  Known effect of regulation or urbanization
          H        7    Historic peak

          -  Minus-flagged discharge -- Not used in computation
                -8888.0 -- No discharge value given
          -  Minus-flagged water year -- Historic peak used in computation



1


  Program PeakFq           U. S. GEOLOGICAL SURVEY             Seq.001.004
  Ver. 5.2            Annual peak flow frequency analysis      Run Date / Time
  11/01/2007          following Bulletin 17-B Guidelines       02/15/2010 12:40

              Station - 10141000  WEBER RIVER NEAR PLAIN CITY, UT


   EMPIRICAL FREQUENCY CURVES -- WEIBULL PLOTTING POSITIONS

      WATER         RANKED       SYSTEMATIC      BULL.17B
       YEAR       DISCHARGE        RECORD        ESTIMATE

       1983         7250.0         0.0244         0.0244
       1986         5760.0         0.0488         0.0488
       1984         5590.0         0.0732         0.0732
       1982         3820.0         0.0976         0.0976
       2006         3800.0         0.1220         0.1220
       1980         3610.0         0.1463         0.1463
       1975         3600.0         0.1707         0.1707
       1999         3530.0         0.1951         0.1951
       1985         3500.0         0.2195         0.2195
       2005         3490.0         0.2439         0.2439
       1974         3410.0         0.2683         0.2683
       1995         3350.0         0.2927         0.2927
       1993         3230.0         0.3171         0.3171
       1998         3130.0         0.3415         0.3415
       1971         2950.0         0.3659         0.3659
       1972         2940.0         0.3902         0.3902
       1978         2870.0         0.4146         0.4146
       1997         2830.0         0.4390         0.4390
       1969         2740.0         0.4634         0.4634
       1973         2560.0         0.4878         0.4878
       1981         2290.0         0.5122         0.5122
       1996         1850.0         0.5366         0.5366
       1970         1840.0         0.5610         0.5610
       1976         1830.0         0.5854         0.5854
       1979         1450.0         0.6098         0.6098
       2008         1430.0         0.6341         0.6341
       1987         1360.0         0.6585         0.6585
       1991         1300.0         0.6829         0.6829
       1994         1290.0         0.7073         0.7073
       2007          969.0         0.7317         0.7317
       2000          957.0         0.7561         0.7561
       1989          625.0         0.7805         0.7805
       1992          569.0         0.8049         0.8049
       2004          545.0         0.8293         0.8293
       1977          530.0         0.8537         0.8537
       2002          524.0         0.8780         0.8780
       2003          426.0         0.9024         0.9024
       2001          414.0         0.9268         0.9268
       1990          371.0         0.9512         0.9512
       1988          266.0         0.9756         0.9756
1


 End PeakFQ analysis.
   Stations processed :       1
   Number of errors   :       0
   Stations skipped   :       0
   Station years      :      40
```

```
Data records may have been ignored for the stations listed below.
(Card type must be Y, Z, N, H, I, 2, 3, 4,  or *.)
(2, 4, and * records are ignored.)

 For the station below, the following records were ignored:

 FINISHED PROCESSING STATION:  10141000       USGS WEBER RIVER NEAR PLAIN CITY,


 For the station below, the following records were ignored:

 FINISHED PROCESSING STATION:
```

Appendix B – Weighted CN Calculations

Weighted CN Calculations						
	Total Area (acres)	Total Area (sq miles)	Area by Land Use (acres)	Hydrologic Soil Group	CN	Weighted CN Value
South Fork Ogden River						
Barren Land	91262.10	142.60	7.84	B	86	**51**
Deciduous Forest			9914.54	A	48	
Deciduous Forest			48580.86	B	48	
Deciduous Forest			222.69	C	57	
Deciduous Forest			1106.34	D	63	
Developed, Low Intensity			1.83	A	51	
Developed, Low Intensity			8.13	B	68	
Developed, Low Intensity			9.14	C	79	
Developed, Medium Intensity			1.26	B	70	
Developed, Open Space			70.21	A	49	
Developed, Open Space			372.96	B	69	
Developed, Open Space			124.66	C	79	
Developed, Open Space			0.95	D	84	
Evergreen Forest			406.84	A	58	
Evergreen Forest			9720.37	B	58	
Evergreen Forest			49.20	C	73	
Evergreen Forest			27.47	D	80	
Hay/Pasture			144.19	B	69	
Hay/Pasture			161.82	C	79	
Herbaceuous			2.21	A	71	
Herbaceuous			27.08	B	71	
Herbaceuous			2.83	D	89	
Mixed Forest			82.16	A	53	
Mixed Forest			442.47	B	53	
Mixed Forest			15.28	D	72	
Shrub/Scrub			2190.04	A	35	
Shrub/Scrub			14970.08	B	56	
Shrub/Scrub			418.59	C	70	
Shrub/Scrub			1980.41	D	77	
Woody Wetlands			0.10	A	36	
Woody Wetlands			15.29	B	60	
Woody Wetlands			24.36	C	73	
Water			159.91	W	100	
South Fork Ogden River N						
Cultivated Crops	467.92	0.73	0.65	A	67	**69**
Cultivated Crops			57.81	B	78	
Developed, Low Intensity			2.90	A	51	

Developed, Low Intensity			1.48	B	68	
Developed, Low Intensity			1.32	C	79	
Developed, Medium Intensity			0.38	A	54	
Developed, Medium Intensity			1.14	B	70	
Developed, Medium Intensity			0.30	C	80	
Developed, Open Space			4.78	A	49	
Developed, Open Space			9.63	B	69	
Developed, Open Space			0.54	C	79	
Hay/Pasture			23.85	A	49	
Hay/Pasture			291.93	B	69	
Hay/Pasture			48.55	C	79	
Shrub/Scrub			1.41	A	35	
Shrub/Scrub			5.41	B	56	
Shrub/Scrub			2.45	C	70	
Woody Wetlands			5.63	B	36	
Woody Wetlands			7.76	C	60	
South Fork Ogden River S						
Cultivated Crops	17526.81	27.39	64.31	B	78	**55**
Cultivated Crops			6.79	D	89	
Deciduous Forest			8004.29	B	48	
Deciduous Forest			63.76	C	57	
Deciduous Forest			235.97	D	63	
Developed, Low Intensity			8.49	B	68	
Developed, Low Intensity			0.92	C	79	
Developed, Low Intensity			5.97	D	84	
Developed, Medium Intensity			0.25	B	70	
Developed, Medium Intensity			0.25	D	85	
Developed, Open Space			29.97	B	69	
Developed, Open Space			0.90	C	79	
Developed, Open Space			7.09	D	84	
Evergreen Forest			991.32	B	58	
Evergreen Forest			1.24	C	73	
Evergreen Forest			5.41	D	80	
Hay/Pasture			5.49	A	49	
Hay/Pasture			1496.33	B	69	
Hay/Pasture			83.99	C	79	
Hay/Pasture			256.12	D	84	
Herbaceuous			23.34	B	71	
Mixed Forest			10.33	B	53	
Mixed Forest			2.05	D	72	
Shrub/Scrub			5281.75	B	56	
Shrub/Scrub			46.71	C	70	
Shrub/Scrub			858.30	D	77	
Woody Wetlands			18.34	B	60	
Woody Wetlands			10.99	C	73	
Woody Wetlands			0.38	D	79	
Water			5.74	W	100	
North Fork Ogden R Lower						
Barren Land	30175.84	47.15	28.39	B	86	**56**
Barren Land			27.17	C	91	
Cultivated Crops			90.67	B	78	

Cultivated Crops			4.34	C	85	
Cultivated Crops			23.71	D	89	
Deciduous Forest			12399.80	B	48	
Deciduous Forest			218.36	C	57	
Deciduous Forest			350.47	D	63	
Developed, High Intensity			0.25	B	75	
Developed, Low Intensity			197.64	B	68	
Developed, Low Intensity			17.12	C	79	
Developed, Low Intensity			3.70	D	84	
Developed, Medium Intensity			44.36	B	70	
Developed, Medium Intensity			3.76	C	80	
Developed, Medium Intensity			1.08	D	85	
Developed, Open Space			395.52	B	69	
Developed, Open Space			21.58	C	79	
Developed, Open Space			6.91	D	84	
Evergreen Forest			1836.05	B	58	
Evergreen Forest			42.75	C	73	
Evergreen Forest			4.67	D	80	
Hay/Pasture			3081.57	B	69	
Hay/Pasture			275.12	C	79	
Hay/Pasture			265.15	D	84	
Herbaceuous			18.06	B	71	
Herbaceuous			0.77	D	89	
Mixed Forest			251.38	B	53	
Mixed Forest			7.92	C	65	
Mixed Forest			1.71	D	72	
Shrub/Scrub			9708.37	B	56	
Shrub/Scrub			451.18	C	70	
Shrub/Scrub			286.74	D	77	
Woody Wetlands			30.97	B	60	
Woody Wetlands			62.50	C	73	
Woody Wetlands			3.47	D	79	
Water			13.62	W	100	
North Fork Ogden R Upper						
Barren Land	6865.94	10.73	25.55	B	86	**51**
Deciduous Forest			4308.34	B	48	
Deciduous Forest			21.07	C	57	
Developed, Low Intensity			1.00	B	68	
Developed, Open Space			3.36	B	69	
Evergreen Forest			894.85	B	58	
Herbaceuous			0.01	B	71	
Mixed Forest			116.67	B	53	
Shrub/Scrub			1478.78	B	56	
Shrub/Scrub			8.11	C	70	
Woody Wetlands			2.77	B	60	
Water			5.42	W	100	
Sheep Creek						
Deciduous Forest	7682.52	12.00	3062.69	B	48	**54**
Deciduous Forest			25.56	C	57	
Developed, Low Intensity			14.32	B	68	
Developed, Low Intensity			4.81	C	79	

Developed, Medium Intensity			1.45	B	70	
Developed, Open Space			67.63	B	69	
Developed, Open Space			6.16	C	79	
Evergreen Forest			367.96	B	58	
Evergreen Forest			2.74	C	73	
Hay/Pasture			228.02	B	69	
Hay/Pasture			34.54	C	79	
Herbaceuous			4.27	B	71	
Mixed Forest			10.63	B	53	
Shrub/Scrub			3674.65	B	56	
Shrub/Scrub			160.50	C	70	
Shrub/Scrub			2.09	D	77	
Woody Wetlands			5.48	B	60	
Woody Wetlands			6.80	C	73	
Water			2.24	W	100	
Wolf Creek						
Barren Land	5442.61	8.50	22.23	B	86	**54**
Deciduous Forest			2488.61	B	48	
Deciduous Forest			339.19	D	63	
Developed, Low Intensity			3.58	B	68	
Developed, Open Space			13.46	B	69	
Evergreen Forest			848.13	B	58	
Evergreen Forest			4.67	D	80	
Hay/Pasture			17.75	B	69	
Herbaceuous			0.00	D	89	
Mixed Forest			117.07	B	53	
Mixed Forest			1.71	D	72	
Shrub/Scrub			1404.43	B	56	
Shrub/Scrub			181.77	D	77	
Wolf Creek N						
Deciduous Forest	270.30	0.42	0.05	B	48	**61**
Developed, Low Intensity			10.34	B	68	
Developed, Medium Intensity			3.55	B	70	
Developed, Open Space			9.63	B	69	
Evergreen Forest			0.90	B	58	
Hay/Pasture			73.72	B	69	
Shrub/Scrub			171.68	B	56	
Woody Wetlands			0.43	B	60	
Wolf Creek S						
Developed, Low Intensity	464.39	0.73	25.60	B	68	**65**
Developed, Low Intensity			1.76	C	79	
Developed, Medium Intensity			5.31	B	70	
Developed, Medium Intensity			0.61	C	80	
Developed, Open Space			23.44	B	69	
Developed, Open Space			0.41	C	79	
Evergreen Forest			4.64	B	58	
Hay/Pasture			211.51	B	69	
Hay/Pasture			15.68	C	79	
Shrub/Scrub			167.66	B	56	
Shrub/Scrub			2.07	C	70	
Woody Wetlands			2.31	B	60	

Woody Wetlands			1.43	C	73	
Water			1.96	W	100	
MF Ogden Upper						
Barren Land	20973.74	32.77	0.93	B	86	**52**
Deciduous Forest			5140.95	A	48	
Deciduous Forest			6946.19	B	48	
Deciduous Forest			82.55	C	57	
Deciduous Forest			559.64	D	63	
Developed, Low Intensity			0.50	B	68	
Developed, Low Intensity			0.25	D	84	
Developed, Open Space			6.00	A	49	
Developed, Open Space			13.66	B	69	
Developed, Open Space			0.10	C	79	
Developed, Open Space			2.90	D	84	
Evergreen Forest			273.67	A	58	
Evergreen Forest			990.46	B	58	
Evergreen Forest			0.23	C	73	
Evergreen Forest			29.30	D	80	
Hay/Pasture			0.51	A	49	
Hay/Pasture			74.64	B	69	
Herbaceuous			2.72	B	71	
Herbaceuous			2.26	D	89	
Mixed Forest			16.01	A	53	
Mixed Forest			151.93	B	53	
Mixed Forest			17.19	D	72	
Shrub/Scrub			1307.96	A	35	
Shrub/Scrub			3680.23	B	56	
Shrub/Scrub			16.14	C	70	
Shrub/Scrub			1641.65	D	77	
Woody Wetlands			1.36	A	36	
Woody Wetlands			4.90	B	60	
Woody Wetlands			0.26	C	73	
Water			8.67	W	100	
MF Ogden Lower						
Barren Land	37041.78	57.88	53.94	B	86	**55**
Barren Land			27.17	C	91	
Cultivated Crops			90.67	B	78	
Cultivated Crops			4.34	C	85	
Cultivated Crops			23.71	D	89	
Deciduous Forest			16708.14	B	48	
Deciduous Forest			239.44	C	57	
Deciduous Forest			350.47	D	63	
Developed, High Intensity			0.25	B	75	
Developed, Low Intensity			197.64	B	68	
Developed, Low Intensity			17.12	C	79	
Developed, Low Intensity			3.70	D	84	
Developed, Medium Intensity			44.36	B	70	
Developed, Medium Intensity			3.76	C	80	
Developed, Medium Intensity			1.08	D	85	
Developed, Open Space			398.88	B	69	
Developed, Open Space			21.58	C	79	

Developed, Open Space			6.91	D	84	
Evergreen Forest			2730.90	B	58	
Evergreen Forest			42.75	C	73	
Evergreen Forest			4.67	D	80	
Hay/Pasture			3081.57	B	69	
Hay/Pasture			275.12	C	79	
Hay/Pasture			265.15	D	84	
Herbaceuous			18.08	B	71	
Herbaceuous			0.77	D	89	
Mixed Forest			368.05	B	53	
Mixed Forest			7.92	C	65	
Mixed Forest			1.71	D	72	
Shrub/Scrub			11187.15	B	56	
Shrub/Scrub			459.29	C	70	
Shrub/Scrub			286.74	D	77	
Woody Wetlands			33.74	B	60	
Woody Wetlands			62.50	C	73	
Woody Wetlands			3.47	D	79	
Water			19.04	W	100	
Dry Hollow Creek						
Cultivated Crops			6.93	A	67	
Cultivated Crops			14.26	B	78	
Deciduous Forest			2.92	B	48	
Developed, Low Intensity			3.26	A	51	
Developed, Low Intensity			2.58	B	68	
Developed, Low Intensity			0.03	C	79	
Developed, Medium Intensity			0.84	A	54	
Developed, Medium Intensity			0.25	B	70	
Developed, Open Space			3.32	A	49	
Developed, Open Space			4.92	B	69	
Developed, Open Space	417.79	0.65	0.26	C	79	**61**
Evergreen Forest			9.37	B	58	
Hay/Pasture			99.03	A	49	
Hay/Pasture			154.65	B	69	
Hay/Pasture			5.89	C	79	
Herbaceuous			4.26	B	71	
Shrub/Scrub			84.08	B	56	
Shrub/Scrub			15.15	C	70	
Woody Wetlands			1.14	A	36	
Woody Wetlands			3.83	B	60	
Water			0.81	W	100	
Strong Gulch - Limited Soil Data, Assumed CN Value of 68						

CN Values are from the NRCS Urban Hydrology for Small Watersheds TR-55 Manual, June 1986

Appendix C – Lag Time Calculations

Lag Time Calculations								
River	Drainage Area (sq miles)	Length (ft)	Length (miles)	Length to Centroid L_C (ft)	Length to Centroid L_C (miles)	Ct	T_L (hours)	T_L (min)
South Fork Ogden River	142.58	110952	21.01	59272	11.23	2.2	11.33	679.81
South Fork Ogden River N	0.73	16512	3.13	6956	1.32	2.2	3.36	201.86
South Fork Ogden River S	27.37	62869	11.91	33163	6.28	2.2	8.03	481.64
North Fork Ogden R Lower	47.51	62130	11.77	25159	4.76	2.2	7.36	441.77
North Fork Ogden R Upper	10.78	29181	5.53	12659	2.40	2.2	4.78	286.58
Sheep Creek	12.00	33039	6.26	14751	2.79	2.2	5.19	311.42
Wolf Creek	8.51	30084	5.70	16545	3.13	2.2	5.22	313.40
Wolf Creek N	0.42	11111	2.10	5469	1.04	2.2	2.78	166.76
Wolf Creek S	0.73	14574	2.76	6960	1.32	2.2	3.24	194.47
MF Ogden Upper	32.79	76832	14.55	33650	6.37	2.2	8.56	513.75
MF Ogden Lower	0.34	9495	1.80	4889	0.93	2.2	2.56	153.82
Dry Hollow Creek	0.65	11141	2.11	4355	0.82	2.2	2.60	155.87
Strong Gulch	1.48	21063	3.99	12817	2.43	2.2	4.35	260.85

Transform Method

The transform method chosen was the Snyder's Synthetic Unit Hydrograph with lag time being the input parameter. The Snyder's Method uses the following:

- length of the main channel measured from the watershed outlet to the highest point in the basin (L),
- the watershed shape parameter which is the length measured along the main channel from the watershed outlet to a point on the main channel that is perpendicular to the center of the area of the watershed (L_{ca}) and,
- a watershed storage coefficient (C_t) which was calibrated

$$Lag = C_t (LL_c)^{0.3}$$

Ct = an empirical coefficient derived from gauged nearby watersheds

L = the distance of the mainstream from the basin outlet to the upstream divide (in km or miles)

L_c = the distance from the outlet to a point on the stream nearest the centroid of the watershed area (along the main stream)

Appendix D – NOAA Precipitation Frequency Estimates

South Fork Ogden River

POINT PRECIPITATION FREQUENCY ESTIMATES FROM NOAA ATLAS 14

Utah 41.32004 N 111.5649 W 6715 feet

from "Precipitation-Frequency Atlas of the United States" NOAA Atlas 14, Volume 1, Version 4
G.M. Bonnin, D. Martin, B. Lin, T. Parzybok, M.Yekta, and D. Riley
NOAA, National Weather Service, Silver Spring, Maryland, 2006

Extracted: Thu Jun 17 2010

Confidence Limits | Seasonality | Related Info | GIS data | Maps | Docs | Return to State Map

Precipitation Frequency Estimates (inches)

ARI* (years)	5 min	10 min	15 min	30 min	60 min	120 min	3 hr	6 hr	12 hr	24 hr	48 hr	4 day	7 day	10 day	20 day	30 day	45 day	60 day
1	0.16	0.24	0.30	0.40	0.50	0.66	0.77	1.07	1.42	1.69	2.07	2.71	3.48	4.04	5.61	6.98	8.88	10.44
2	0.20	0.31	0.38	0.51	0.63	0.82	0.95	1.31	1.74	2.07	2.55	3.35	4.30	4.99	6.91	8.60	10.91	12.83
5	0.27	0.41	0.51	0.69	0.86	1.07	1.19	1.59	2.10	2.51	3.09	4.06	5.22	6.01	8.28	10.23	12.93	15.16
10	0.34	0.51	0.63	0.85	1.05	1.29	1.42	1.84	2.43	2.88	3.53	4.66	5.98	6.85	9.33	11.48	14.50	16.92
25	0.44	0.66	0.82	1.11	1.37	1.66	1.78	2.22	2.91	3.38	4.14	5.49	7.02	7.96	10.70	13.11	16.53	19.16
50	0.53	0.80	0.99	1.34	1.66	1.99	2.11	2.53	3.31	3.78	4.62	6.13	7.84	8.80	11.71	14.30	18.01	20.75
100	0.63	0.96	1.20	1.61	1.99	2.38	2.50	2.88	3.73	4.20	5.11	6.80	8.68	9.65	12.71	15.46	19.47	22.29
200	0.76	1.16	1.44	1.93	2.39	2.85	2.95	3.29	4.19	4.63	5.62	7.49	9.55	10.51	13.68	16.59	20.88	23.75
500	0.97	1.47	1.82	2.46	3.04	3.60	3.69	4.04	4.90	5.22	6.30	8.43	10.72	11.63	14.91	18.01	22.66	25.57
1000	1.16	1.77	2.19	2.95	3.65	4.30	4.38	4.73	5.48	5.69	6.84	9.17	11.64	12.48	15.82	19.04	23.96	26.87

* These precipitation frequency estimates are based on a partial duration series. ARI is the Average Recurrence Interval.
Please refer to NOAA Atlas 14 Document for more information. NOTE: Formatting forces estimates near zero to appear as zero.

South Fork Ogden River North Branch

POINT PRECIPITATION FREQUENCY ESTIMATES FROM NOAA ATLAS 14

Utah 41.25111 N 111.74813 W 4963 feet

from "Precipitation-Frequency Atlas of the United States" NOAA Atlas 14, Volume 1, Version 4
G.M. Bonnin, D. Martin, B. Lin, T. Parzybok, M.Yekta, and D. Riley
NOAA, National Weather Service, Silver Spring, Maryland, 2006

Extracted: Thu Jun 17 2010

Confidence Limits | Seasonality | Related Info | GIS data | Maps | Docs | Return to State Map

Precipitation Frequency Estimates (inches)

ARI* (years)	5 min	10 min	15 min	30 min	60 min	120 min	3 hr	6 hr	12 hr	24 hr	48 hr	4 day	7 day	10 day	20 day	30 day	45 day	60 day
1	0.14	0.22	0.27	0.37	0.46	0.59	0.68	0.93	1.20	1.52	1.80	2.23	2.75	3.13	4.10	4.99	6.25	7.38
2	0.18	0.28	0.34	0.47	0.57	0.73	0.84	1.14	1.47	1.86	2.20	2.73	3.37	3.84	5.03	6.11	7.64	9.04
5	0.25	0.38	0.47	0.63	0.78	0.95	1.06	1.38	1.77	2.22	2.62	3.27	4.03	4.56	5.94	7.17	8.96	10.58
10	0.31	0.47	0.58	0.78	0.97	1.16	1.26	1.59	2.04	2.52	2.97	3.72	4.58	5.14	6.64	7.99	9.98	11.76
25	0.41	0.62	0.76	1.03	1.27	1.49	1.58	1.92	2.44	2.93	3.44	4.33	5.31	5.90	7.53	9.02	11.28	13.25
50	0.49	0.75	0.93	1.26	1.55	1.80	1.88	2.19	2.78	3.25	3.80	4.81	5.88	6.46	8.17	9.76	12.21	14.31
100	0.60	0.91	1.13	1.52	1.89	2.17	2.24	2.51	3.14	3.58	4.17	5.30	6.46	7.02	8.79	10.47	13.11	15.32
200	0.72	1.10	1.37	1.84	2.28	2.60	2.67	2.87	3.52	3.92	4.53	5.80	7.04	7.57	9.37	11.14	13.95	16.26
500	0.93	1.41	1.75	2.36	2.92	3.30	3.36	3.57	4.13	4.37	5.01	6.46	7.82	8.26	10.08	11.96	14.97	17.39
1000	1.12	1.70	2.11	2.84	3.52	3.96	4.01	4.21	4.62	4.71	5.37	6.98	8.40	8.77	10.59	12.53	15.68	18.17

* These precipitation frequency estimates are based on a partial duration series. ARI is the Average Recurrence Interval.
Please refer to NOAA Atlas 14 Document for more information. NOTE: Formatting forces estimates near zero to appear as zero.

South Fork Ogden River South Branch

POINT PRECIPITATION FREQUENCY ESTIMATES FROM NOAA ATLAS 14

Utah 41.21842 N 111.69583 W 5639 feet

from "Precipitation-Frequency Atlas of the United States" NOAA Atlas 14, Volume 1, Version 4
G.M. Bonnin, D. Martin, B. Lin, T. Parzybok, M.Yekta, and D. Riley
NOAA, National Weather Service, Silver Spring, Maryland, 2006

Extracted: Thu Jun 17 2010

Confidence Limits | Seasonality | Related Info | GIS data | Maps | Docs | Return to State Map

Precipitation Frequency Estimates (inches)

ARI* (years)	5 min	10 min	15 min	30 min	60 min	120 min	3 hr	6 hr	12 hr	24 hr	48 hr	4 day	7 day	10 day	20 day	30 day	45 day	60 day
1	0.15	0.23	0.29	0.39	0.48	0.63	0.74	1.02	1.34	1.72	2.07	2.63	3.33	3.82	5.12	6.29	7.98	9.42
2	0.20	0.30	0.37	0.49	0.61	0.79	0.91	1.25	1.64	2.11	2.54	3.24	4.09	4.71	6.30	7.74	9.78	11.56
5	0.26	0.40	0.50	0.67	0.83	1.03	1.14	1.51	1.98	2.53	3.04	3.91	4.94	5.63	7.48	9.13	11.52	13.60
10	0.33	0.50	0.62	0.83	1.03	1.25	1.36	1.75	2.28	2.88	3.46	4.47	5.64	6.38	8.39	10.20	12.89	15.18
25	0.43	0.65	0.81	1.08	1.34	1.60	1.71	2.10	2.73	3.36	4.03	5.24	6.59	7.38	9.56	11.59	14.66	17.20
50	0.52	0.79	0.98	1.32	1.63	1.93	2.02	2.40	3.10	3.73	4.47	5.85	7.35	8.13	10.41	12.61	15.96	18.65
100	0.63	0.95	1.18	1.59	1.97	2.32	2.41	2.73	3.50	4.12	4.93	6.48	8.12	8.88	11.25	13.59	17.25	20.06
200	0.76	1.15	1.43	1.92	2.38	2.78	2.85	3.12	3.92	4.52	5.39	7.13	8.91	9.63	12.06	14.54	18.49	21.41
500	0.96	1.47	1.82	2.45	3.04	3.52	3.60	3.88	4.60	5.05	6.00	8.01	9.99	10.61	13.07	15.73	20.08	23.11
1000	1.16	1.77	2.19	2.95	3.66	4.21	4.28	4.56	5.15	5.46	6.48	8.70	10.82	11.35	13.82	16.60	21.25	24.34

* These precipitation frequency estimates are based on a partial duration series. ARI is the Average Recurrence Interval.

North Fork Ogden River Upper

POINT PRECIPITATION FREQUENCY ESTIMATES FROM NOAA ATLAS 14

Utah 41.39500 N 111.94246 W 6984 feet

from "Precipitation-Frequency Atlas of the United States" NOAA Atlas 14, Volume 1, Version 4
G.M. Bonnin, D. Martin, B. Lin, T. Parzybok, M.Yekta, and D. Riley
NOAA, National Weather Service, Silver Spring, Maryland, 2006

Extracted: Thu Jun 17 2010

Confidence Limits | Seasonality | Related Info | GIS data | Maps | Docs | Return to State Map

Precipitation Frequency Estimates (inches)

ARI* (years)	5 min	10 min	15 min	30 min	60 min	120 min	3 hr	6 hr	12 hr	24 hr	48 hr	4 day	7 day	10 day	20 day	30 day	45 day	60 day
1	0.19	0.29	0.36	0.49	0.60	0.81	0.95	1.36	1.84	3.13	3.79	4.98	6.40	7.37	9.75	12.06	15.09	17.33
2	0.24	0.37	0.46	0.61	0.76	1.02	1.17	1.67	2.25	3.85	4.67	6.16	7.92	9.12	12.04	14.86	18.56	21.34
5	0.33	0.50	0.61	0.83	1.02	1.30	1.45	1.99	2.71	4.63	5.65	7.53	9.66	11.03	14.39	17.68	22.00	25.25
10	0.40	0.61	0.76	1.02	1.26	1.57	1.71	2.29	3.12	5.29	6.47	8.67	11.12	12.60	16.23	19.90	24.73	28.26
25	0.51	0.78	0.97	1.31	1.62	1.99	2.13	2.74	3.73	6.21	7.61	10.27	13.16	14.70	18.62	22.81	28.33	32.14
50	0.62	0.94	1.17	1.57	1.94	2.38	2.51	3.11	4.23	6.92	8.52	11.55	14.77	16.33	20.39	24.96	31.03	35.00
100	0.74	1.12	1.40	1.88	2.33	2.83	2.97	3.53	4.78	7.67	9.45	12.89	16.47	17.99	22.16	27.11	33.75	37.82
200	0.88	1.34	1.67	2.25	2.78	3.36	3.50	4.00	5.35	8.43	10.42	14.28	18.22	19.67	23.91	29.21	36.46	40.57
500	1.12	1.71	2.11	2.85	3.52	4.22	4.36	4.89	6.22	9.48	11.75	16.20	20.64	21.94	26.17	31.93	40.05	44.14
1000	1.35	2.05	2.54	3.42	4.24	5.02	5.16	5.70	6.91	10.30	12.80	17.73	22.57	23.69	27.86	33.98	42.80	46.84

* These precipitation frequency estimates are based on a partial duration series. ARI is the Average Recurrence Interval.
Please refer to NOAA Atlas 14 Document for more information. NOTE: Formatting forces estimates near zero to appear as zero.

North Fork Ogden River Lower

POINT PRECIPITATION FREQUENCY ESTIMATES FROM NOAA ATLAS 14

Utah 41.36161 N 111.8733 W 5357 feet

from "Precipitation-Frequency Atlas of the United States" NOAA Atlas 14, Volume 1, Version 4
G.M. Bonnin, D. Martin, B. Lin, T. Parzybok, M.Yekta, and D. Riley
NOAA, National Weather Service, Silver Spring, Maryland, 2006

Extracted: Thu Jun 17 2010

Confidence Limits | Seasonality | Related Info | GIS data | Maps | Docs | Return to State Map

Precipitation Frequency Estimates (inches)

ARI* (years)	5 min	10 min	15 min	30 min	60 min	120 min	3 hr	6 hr	12 hr	24 hr	48 hr	4 day	7 day	10 day	20 day	30 day	45 day	60 day
1	0.17	0.25	0.32	0.42	0.53	0.69	0.81	1.13	1.49	2.11	2.56	3.30	4.15	4.76	6.27	7.67	9.62	11.15
2	0.21	0.32	0.40	0.54	0.67	0.87	1.00	1.38	1.82	2.59	3.15	4.07	5.11	5.87	7.72	9.41	11.80	13.68
5	0.29	0.43	0.54	0.73	0.90	1.12	1.24	1.66	2.20	3.10	3.77	4.92	6.18	7.04	9.17	11.13	13.90	16.10
10	0.35	0.54	0.67	0.90	1.11	1.36	1.47	1.92	2.53	3.53	4.30	5.63	7.06	7.99	10.30	12.47	15.56	17.96
25	0.46	0.70	0.86	1.16	1.44	1.74	1.84	2.30	3.03	4.12	5.01	6.62	8.29	9.26	11.75	14.20	17.72	20.34
50	0.55	0.84	1.04	1.41	1.74	2.08	2.18	2.62	3.44	4.58	5.57	7.40	9.24	10.22	12.81	15.46	19.31	22.07
100	0.67	1.01	1.26	1.69	2.10	2.49	2.59	2.98	3.89	5.05	6.15	8.21	10.23	11.19	13.86	16.70	20.88	23.75
200	0.80	1.22	1.51	2.03	2.52	2.97	3.07	3.39	4.36	5.54	6.73	9.04	11.25	12.16	14.87	17.90	22.41	25.35
500	1.02	1.55	1.92	2.59	3.21	3.74	3.84	4.19	5.08	6.20	7.52	10.18	12.63	13.44	16.15	19.41	24.37	27.37
1000	1.23	1.87	2.31	3.12	3.86	4.47	4.55	4.91	5.66	6.71	8.13	11.07	13.71	14.41	17.09	20.52	25.82	28.84

* These precipitation frequency estimates are based on a partial duration series. ARI is the Average Recurrence Interval.

Sheep Creek

POINT PRECIPITATION FREQUENCY ESTIMATES FROM NOAA ATLAS 14

Utah 41.37342 N 111.85164 W 6135 feet

from "Precipitation-Frequency Atlas of the United States" NOAA Atlas 14, Volume 1, Version 4
G.M. Bonnin, D. Martin, B. Lin, T. Parzybok, M.Yekta, and D. Riley
NOAA, National Weather Service, Silver Spring, Maryland, 2006

Extracted: Thu Jun 17 2010

Confidence Limits | Seasonality | Related Info | GIS data | Maps | Docs | Return to State Map

Precipitation Frequency Estimates (inches)

ARI* (years)	5 min	10 min	15 min	30 min	60 min	120 min	3 hr	6 hr	12 hr	24 hr	48 hr	4 day	7 day	10 day	20 day	30 day	45 day	60 day
1	0.17	0.27	0.33	0.44	0.55	0.73	0.84	1.19	1.57	2.15	2.64	3.48	4.38	5.05	6.66	8.11	10.28	11.96
2	0.22	0.34	0.42	0.56	0.69	0.91	1.04	1.45	1.93	2.64	3.24	4.29	5.40	6.22	8.20	9.96	12.61	14.68
5	0.30	0.45	0.56	0.76	0.94	1.18	1.30	1.75	2.33	3.16	3.89	5.20	6.54	7.48	9.75	11.80	14.88	17.30
10	0.37	0.56	0.69	0.93	1.16	1.42	1.54	2.02	2.68	3.60	4.44	5.96	7.48	8.51	10.96	13.23	16.67	19.31
25	0.47	0.72	0.90	1.21	1.49	1.81	1.92	2.42	3.21	4.21	5.19	7.02	8.80	9.87	12.52	15.08	19.00	21.89
50	0.57	0.87	1.08	1.46	1.80	2.17	2.28	2.76	3.64	4.68	5.77	7.86	9.82	10.90	13.67	16.43	20.73	23.76
100	0.69	1.05	1.30	1.75	2.16	2.59	2.70	3.13	4.11	5.17	6.38	8.73	10.89	11.95	14.79	17.77	22.45	25.59
200	0.82	1.25	1.55	2.09	2.59	3.08	3.19	3.56	4.61	5.67	6.99	9.63	11.99	13.00	15.89	19.06	24.12	27.35
500	1.05	1.59	1.98	2.66	3.29	3.88	3.98	4.38	5.37	6.35	7.82	10.86	13.48	14.40	17.28	20.71	26.29	29.58
1000	1.26	1.92	2.38	3.20	3.96	4.63	4.71	5.12	5.98	6.88	8.46	11.83	14.65	15.46	18.31	21.92	27.91	31.22

* These precipitation frequency estimates are based on a partial duration series. ARI is the Average Recurrence Interval.
Please refer to NOAA Atlas 14 Document for more information. NOTE: Formatting forces estimates near zero to appear as zero.

Wolf Creek

POINT PRECIPITATION FREQUENCY ESTIMATES FROM NOAA ATLAS 14

Utah 41.36346 N 111.79284 W 7936 feet

from "Precipitation-Frequency Atlas of the United States" NOAA Atlas 14, Volume 1, Version 4
G.M. Bonnin, D. Martin, B. Lin, T. Parzybok, M.Yekta, and D. Riley
NOAA, National Weather Service, Silver Spring, Maryland, 2006

Extracted: Thu Jun 17 2010

Confidence Limits | Seasonality | Related Info | GIS data | Maps | Docs | Return to State Map

Precipitation Frequency Estimates (inches)

ARI* (years)	5 min	10 min	15 min	30 min	60 min	120 min	3 hr	6 hr	12 hr	24 hr	48 hr	4 day	7 day	10 day	20 day	30 day	45 day	60 day
1	0.19	0.28	0.35	0.47	0.59	0.78	0.90	1.27	1.70	2.32	2.87	3.83	4.85	5.62	7.45	9.12	11.59	13.52
2	0.24	0.36	0.45	0.60	0.74	0.98	1.11	1.56	2.08	2.86	3.53	4.73	5.99	6.94	9.19	11.21	14.25	16.62
5	0.32	0.49	0.60	0.81	1.00	1.26	1.38	1.87	2.51	3.44	4.26	5.76	7.29	8.38	10.97	13.31	16.86	19.63
10	0.39	0.60	0.74	1.00	1.23	1.52	1.64	2.16	2.89	3.92	4.88	6.63	8.38	9.55	12.35	14.95	18.93	21.95
25	0.51	0.77	0.95	1.28	1.59	1.94	2.04	2.58	3.46	4.60	5.73	7.83	9.88	11.11	14.15	17.09	21.63	24.91
50	0.61	0.92	1.14	1.54	1.91	2.32	2.42	2.94	3.93	5.13	6.39	8.79	11.07	12.31	15.48	18.66	23.65	27.08
100	0.73	1.10	1.37	1.84	2.28	2.76	2.86	3.34	4.43	5.68	7.09	9.79	12.31	13.53	16.79	20.21	25.66	29.21
200	0.87	1.32	1.63	2.20	2.72	3.28	3.37	3.80	4.97	6.25	7.80	10.82	13.59	14.76	18.08	21.72	27.63	31.27
500	1.10	1.67	2.07	2.79	3.45	4.12	4.20	4.66	5.79	7.02	8.77	12.24	15.34	16.40	19.73	23.65	30.22	33.90
1000	1.32	2.01	2.49	3.35	4.15	4.91	4.97	5.44	6.45	7.62	9.53	13.37	16.72	17.66	20.97	25.08	32.17	35.85

* These precipitation frequency estimates are based on a partial duration series. **ARI** is the Average Recurrence Interval.
Please refer to NOAA Atlas 14 Document for more information. NOTE: Formatting forces estimates near zero to appear as zero.

Wolf Creek North and South Branches

POINT PRECIPITATION FREQUENCY ESTIMATES FROM NOAA ATLAS 14

Utah 41.32806 N 111.83619 W 5226 feet

from "Precipitation-Frequency Atlas of the United States" NOAA Atlas 14, Volume 1, Version 4
G.M. Bonnin, D. Martin, B. Lin, T. Parzybok, M.Yekta, and D. Riley
NOAA, National Weather Service, Silver Spring, Maryland, 2006

Extracted: Thu Jun 17 2010

Confidence Limits | Seasonality | Related Info | GIS data | Maps | Docs | Return to State Map

Precipitation Frequency Estimates (inches)

ARI* (years)	5 min	10 min	15 min	30 min	60 min	120 min	3 hr	6 hr	12 hr	24 hr	48 hr	4 day	7 day	10 day	20 day	30 day	45 day	60 day
1	0.16	0.24	0.30	0.41	0.51	0.67	0.77	1.07	1.40	1.84	2.23	2.81	3.50	4.01	5.30	6.50	8.17	9.56
2	0.20	0.31	0.38	0.52	0.64	0.84	0.96	1.31	1.72	2.26	2.73	3.45	4.30	4.93	6.52	7.97	10.01	11.73
5	0.28	0.42	0.52	0.70	0.87	1.08	1.20	1.58	2.07	2.71	3.27	4.17	5.18	5.90	7.73	9.41	11.78	13.79
10	0.34	0.52	0.64	0.87	1.07	1.31	1.42	1.82	2.38	3.08	3.71	4.76	5.91	6.69	8.67	10.53	13.17	15.37
25	0.44	0.68	0.84	1.13	1.40	1.68	1.77	2.19	2.86	3.60	4.32	5.58	6.91	7.73	9.88	11.96	14.97	17.38
50	0.54	0.82	1.01	1.37	1.69	2.02	2.10	2.50	3.24	3.99	4.80	6.22	7.69	8.52	10.76	13.00	16.29	18.84
100	0.65	0.99	1.23	1.65	2.04	2.42	2.50	2.85	3.66	4.41	5.28	6.89	8.50	9.30	11.62	14.03	17.58	20.25
200	0.78	1.19	1.47	1.98	2.46	2.89	2.96	3.24	4.11	4.82	5.77	7.58	9.32	10.09	12.44	15.00	18.83	21.58
500	1.00	1.52	1.88	2.53	3.13	3.65	3.72	4.01	4.79	5.39	6.43	8.51	10.43	11.11	13.48	16.23	20.41	23.26
1000	1.20	1.82	2.26	3.04	3.77	4.36	4.41	4.71	5.35	5.83	6.93	9.24	11.29	11.88	14.23	17.13	21.57	24.47

* These precipitation frequency estimates are based on a partial duration series. **ARI** is the Average Recurrence Interval.
Please refer to NOAA Atlas 14 Document for more information. NOTE: Formatting forces estimates near zero to appear as zero.

Middle Fork Ogden River Upper

POINT PRECIPITATION FREQUENCY ESTIMATES FROM NOAA ATLAS 14

Utah 41.36248 N 111.6943 W 7093 feet

from "Precipitation-Frequency Atlas of the United States" NOAA Atlas 14, Volume 1, Version 4
G.M. Bonnin, D. Martin, B. Lin, T. Parzybok, M.Yekta, and D. Riley
NOAA, National Weather Service, Silver Spring, Maryland, 2006

Extracted: Thu Jun 17 2010

Confidence Limits | Seasonality | Related Info | GIS data | Maps | Docs | Return to State Map

Precipitation Frequency Estimates (inches)

ARI* (years)	5 min	10 min	15 min	30 min	60 min	120 min	3 hr	6 hr	12 hr	24 hr	48 hr	4 day	7 day	10 day	20 day	30 day	45 day	60 day
1	0.17	0.26	0.32	0.43	0.54	0.72	0.83	1.18	1.58	2.08	2.58	3.42	4.38	5.08	6.91	8.55	10.86	12.72
2	0.22	0.33	0.41	0.55	0.68	0.90	1.03	1.45	1.94	2.56	3.18	4.22	5.42	6.28	8.53	10.54	13.36	15.66
5	0.29	0.44	0.55	0.74	0.92	1.17	1.29	1.75	2.35	3.10	3.85	5.15	6.61	7.61	10.21	12.55	15.85	18.53
10	0.36	0.55	0.68	0.91	1.13	1.41	1.53	2.02	2.70	3.55	4.42	5.93	7.60	8.68	11.52	14.12	17.81	20.73
25	0.46	0.71	0.88	1.18	1.46	1.80	1.92	2.42	3.24	4.17	5.20	7.01	8.97	10.13	13.23	16.17	20.37	23.53
50	0.56	0.85	1.06	1.42	1.76	2.16	2.27	2.76	3.68	4.66	5.82	7.87	10.06	11.24	14.50	17.68	22.28	25.57
100	0.67	1.02	1.27	1.71	2.11	2.58	2.68	3.14	4.15	5.18	6.46	8.77	11.20	12.37	15.76	19.18	24.18	27.58
200	0.80	1.22	1.52	2.04	2.53	3.07	3.16	3.57	4.66	5.71	7.12	9.70	12.37	13.51	17.00	20.64	26.05	29.51
500	1.02	1.55	1.92	2.59	3.21	3.86	3.95	4.39	5.43	6.43	8.02	10.97	13.98	15.04	18.59	22.52	28.50	31.97
1000	1.22	1.86	2.31	3.11	3.85	4.60	4.67	5.13	6.06	7.00	8.73	11.99	15.26	16.21	19.79	23.91	30.34	33.80

* These precipitation frequency estimates are based on a partial duration series. **ARI** is the Average Recurrence Interval.
Please refer to NOAA Atlas 14 Document for more information. NOTE: Formatting forces estimates near zero to appear as zero.

Middle Fork Ogden River Lower

POINT PRECIPITATION FREQUENCY ESTIMATES FROM NOAA ATLAS 14

Utah 41.29009 N 111.76452 W 4990 feet

from "Precipitation-Frequency Atlas of the United States" NOAA Atlas 14, Volume 1, Version 4
G.M. Bonnin, D. Martin, B. Lin, T. Parzybok, M.Yekta, and D. Riley
NOAA, National Weather Service, Silver Spring, Maryland, 2006

Extracted: Thu Jun 17 2010

Confidence Limits | Seasonality | Related Info | GIS data | Maps | Docs | Return to State Map

Precipitation Frequency Estimates (inches)

ARI* (years)	5 min	10 min	15 min	30 min	60 min	120 min	3 hr	6 hr	12 hr	24 hr	48 hr	4 day	7 day	10 day	20 day	30 day	45 day	60 day
1	0.15	0.23	0.28	0.38	0.47	0.64	0.74	1.02	1.35	1.78	2.15	2.71	3.40	3.90	5.19	6.38	8.05	9.46
2	0.19	0.29	0.36	0.48	0.60	0.80	0.91	1.25	1.65	2.18	2.63	3.34	4.18	4.80	6.38	7.83	9.86	11.61
5	0.26	0.39	0.49	0.66	0.81	1.03	1.14	1.51	1.99	2.62	3.16	4.03	5.03	5.75	7.57	9.24	11.61	13.66
10	0.32	0.49	0.60	0.81	1.01	1.25	1.36	1.75	2.30	2.98	3.59	4.60	5.74	6.51	8.50	10.32	12.98	15.23
25	0.42	0.64	0.79	1.06	1.32	1.60	1.71	2.10	2.75	3.48	4.18	5.39	6.72	7.52	9.68	11.72	14.76	17.23
50	0.51	0.78	0.96	1.29	1.60	1.93	2.02	2.40	3.12	3.86	4.64	6.02	7.48	8.28	10.54	12.74	16.06	18.68
100	0.62	0.94	1.16	1.56	1.94	2.31	2.40	2.74	3.53	4.27	5.11	6.66	8.26	9.05	11.38	13.73	17.34	20.08
200	0.74	1.13	1.40	1.89	2.33	2.77	2.85	3.12	3.96	4.67	5.58	7.33	9.06	9.80	12.20	14.67	18.57	21.41
500	0.95	1.44	1.79	2.41	2.98	3.50	3.58	3.87	4.62	5.23	6.22	8.22	10.14	10.79	13.21	15.86	20.13	23.07
1000	1.14	1.74	2.15	2.90	3.59	4.18	4.25	4.55	5.17	5.66	6.71	8.92	10.97	11.53	13.95	16.71	21.26	24.26

* These precipitation frequency estimates are based on a partial duration series. **ARI** is the Average Recurrence Interval.
Please refer to NOAA Atlas 14 Document for more information. NOTE: Formatting forces estimates near zero to appear as zero.

Dry Hollow Creek

POINT PRECIPITATION FREQUENCY ESTIMATES FROM NOAA ATLAS 14

Utah 41.28497 N 111.76484 W 4990 feet

from "Precipitation-Frequency Atlas of the United States" NOAA Atlas 14, Volume 1, Version 4
G.M. Bonnin, D. Martin, B. Lin, T. Parzybok, M.Yekta, and D. Riley
NOAA, National Weather Service, Silver Spring, Maryland, 2006

Extracted: Thu Jun 17 2010

Confidence Limits | Seasonality | Related Info | GIS data | Maps | Docs | Return to State Map

Precipitation Frequency Estimates (inches)

ARI* (years)	5 min	10 min	15 min	30 min	60 min	120 min	3 hr	6 hr	12 hr	24 hr	48 hr	4 day	7 day	10 day	20 day	30 day	45 day	60 day
1	0.15	0.22	0.28	0.37	0.46	0.61	0.71	0.98	1.29	1.67	2.01	2.51	3.12	3.58	4.75	5.82	7.33	8.63
2	0.18	0.28	0.35	0.47	0.58	0.77	0.88	1.20	1.57	2.05	2.46	3.08	3.84	4.40	5.83	7.14	8.97	10.59
5	0.25	0.38	0.47	0.64	0.79	0.99	1.10	1.45	1.90	2.45	2.94	3.71	4.61	5.25	6.91	8.41	10.54	12.43
10	0.31	0.47	0.59	0.79	0.98	1.21	1.31	1.68	2.19	2.79	3.34	4.23	5.25	5.94	7.74	9.38	11.77	13.85
25	0.41	0.62	0.77	1.04	1.29	1.55	1.65	2.03	2.63	3.25	3.88	4.95	6.12	6.84	8.80	10.63	13.36	15.65
50	0.50	0.76	0.94	1.27	1.57	1.87	1.96	2.31	2.99	3.61	4.29	5.51	6.80	7.52	9.57	11.54	14.51	16.95
100	0.60	0.92	1.14	1.53	1.90	2.24	2.33	2.64	3.37	3.98	4.72	6.09	7.50	8.20	10.32	12.41	15.63	18.20
200	0.73	1.11	1.37	1.85	2.29	2.68	2.77	3.02	3.78	4.36	5.15	6.68	8.20	8.86	11.03	13.24	16.70	19.37
500	0.93	1.42	1.76	2.36	2.93	3.40	3.48	3.74	4.42	4.86	5.72	7.48	9.15	9.72	11.92	14.28	18.04	20.82
1000	1.12	1.70	2.11	2.85	3.52	4.06	4.13	4.41	4.95	5.26	6.15	8.10	9.88	10.37	12.56	15.02	19.00	21.84

* These precipitation frequency estimates are based on a partial duration series. ARI is the Average Recurrence Interval.
Please refer to NOAA Atlas 14 Document for more information. NOTE: Formatting forces estimates near zero to appear as zero.

Strong Gulch

POINT PRECIPITATION FREQUENCY ESTIMATES FROM NOAA ATLAS 14

Utah 41.19454 N 111.9091 W 6945 feet

from "Precipitation-Frequency Atlas of the United States" NOAA Atlas 14, Volume 1, Version 4
G.M. Bonnin, D. Martin, B. Lin, T. Parzybok, M.Yekta, and D. Riley
NOAA, National Weather Service, Silver Spring, Maryland, 2006

Extracted: Thu Jun 17 2010

Confidence Limits | Seasonality | Related Info | GIS data | Maps | Docs | Return to State Map

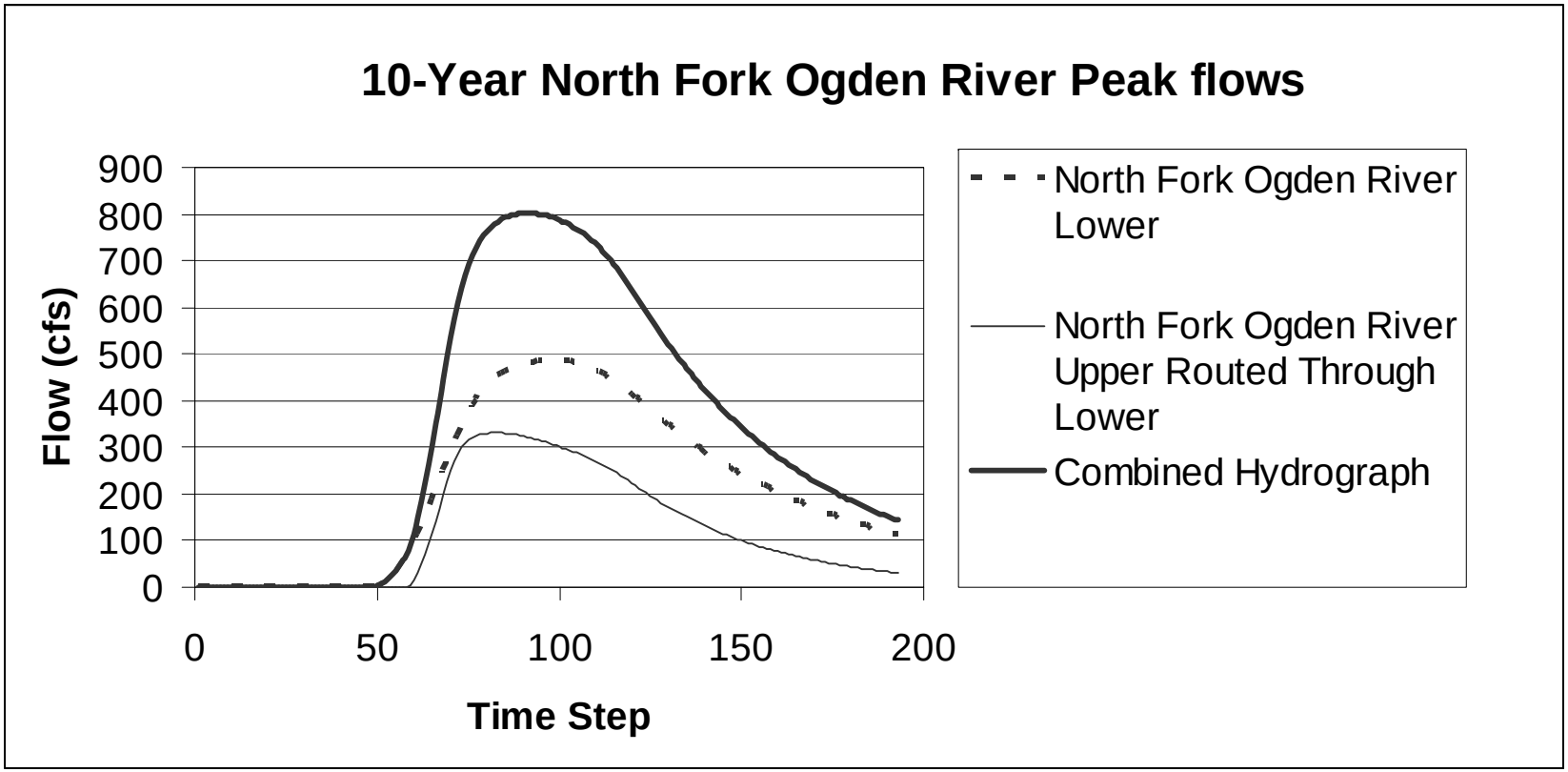
Precipitation Frequency Estimates (inches)

ARI* (years)	5 min	10 min	15 min	30 min	60 min	120 min	3 hr	6 hr	12 hr	24 hr	48 hr	4 day	7 day	10 day	20 day	30 day	45 day	60 day
1	0.18	0.27	0.34	0.46	0.57	0.75	0.86	1.22	1.63	2.17	2.67	3.40	4.31	5.03	6.84	8.51	10.79	12.75
2	0.23	0.35	0.43	0.58	0.71	0.93	1.07	1.49	1.99	2.67	3.29	4.21	5.33	6.21	8.45	10.49	13.26	15.71
5	0.31	0.47	0.58	0.78	0.96	1.19	1.32	1.78	2.39	3.20	3.97	5.14	6.50	7.51	10.08	12.46	15.70	18.60
10	0.38	0.57	0.71	0.96	1.19	1.44	1.56	2.05	2.75	3.64	4.54	5.92	7.48	8.56	11.36	14.01	17.67	20.85
25	0.49	0.75	0.93	1.25	1.54	1.84	1.94	2.45	3.28	4.26	5.33	7.01	8.85	9.98	13.02	16.03	20.27	23.76
50	0.59	0.91	1.12	1.51	1.87	2.21	2.31	2.79	3.73	4.74	5.95	7.88	9.94	11.07	14.25	17.52	22.23	25.92
100	0.72	1.09	1.35	1.82	2.26	2.65	2.75	3.17	4.21	5.24	6.60	8.80	11.09	12.19	15.49	19.02	24.23	28.07
200	0.86	1.32	1.63	2.20	2.72	3.16	3.26	3.60	4.72	5.75	7.27	9.75	12.27	13.33	16.70	20.48	26.23	30.18
500	1.10	1.68	2.09	2.81	3.48	4.00	4.10	4.46	5.49	6.46	8.18	11.07	13.92	14.86	18.28	22.38	28.92	32.96
1000	1.33	2.03	2.52	3.39	4.20	4.78	4.88	5.24	6.11	7.00	8.90	12.12	15.24	16.05	19.48	23.81	31.02	35.08

* These precipitation frequency estimates are based on a partial duration series. ARI is the Average Recurrence Interval.
Please refer to NOAA Atlas 14 Document for more information. NOTE: Formatting forces estimates near zero to appear as zero.

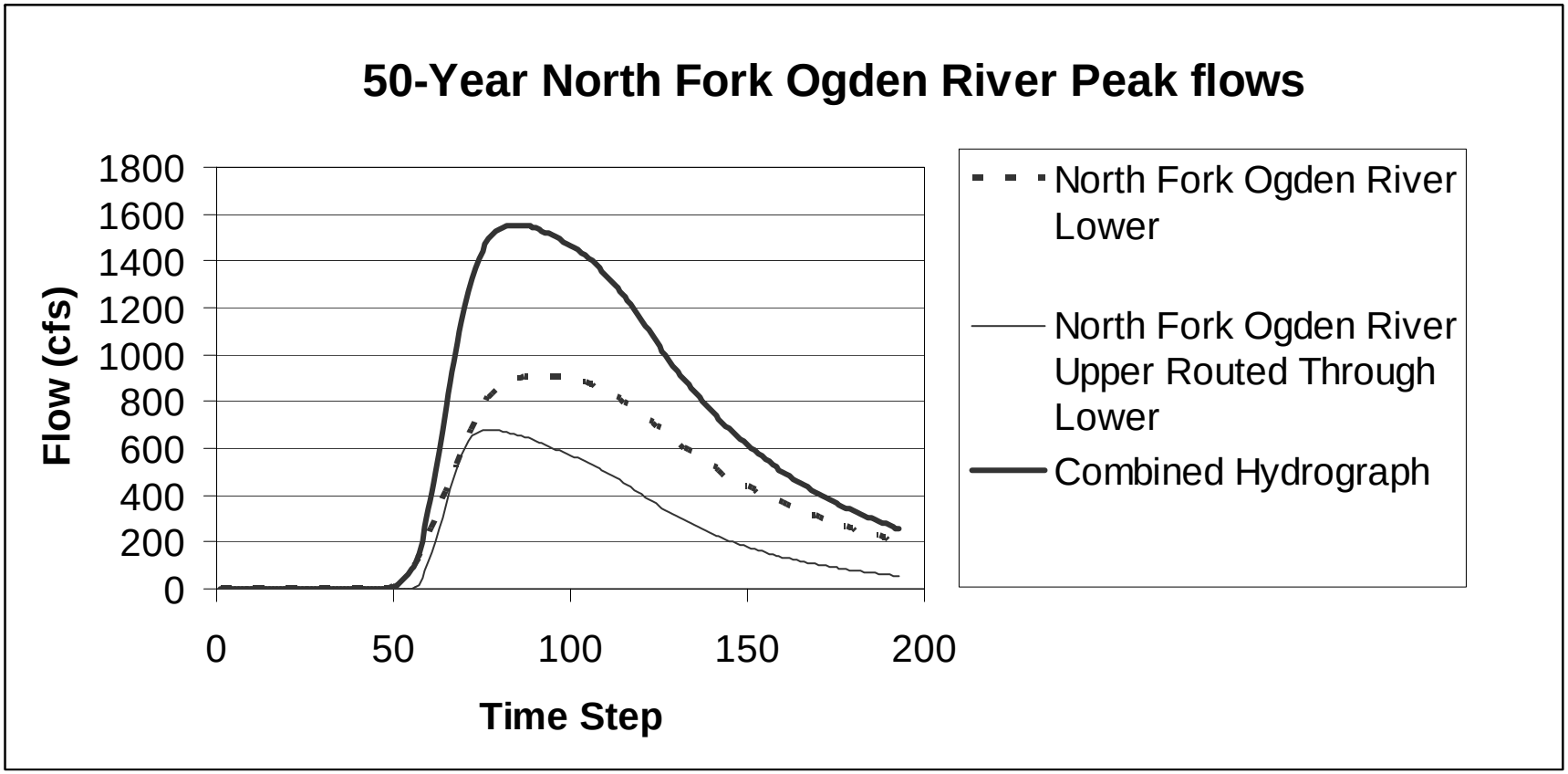
Appendix E –North Fork Ogden River Routing Calculations

10-Year Peak Hydrograph Addition



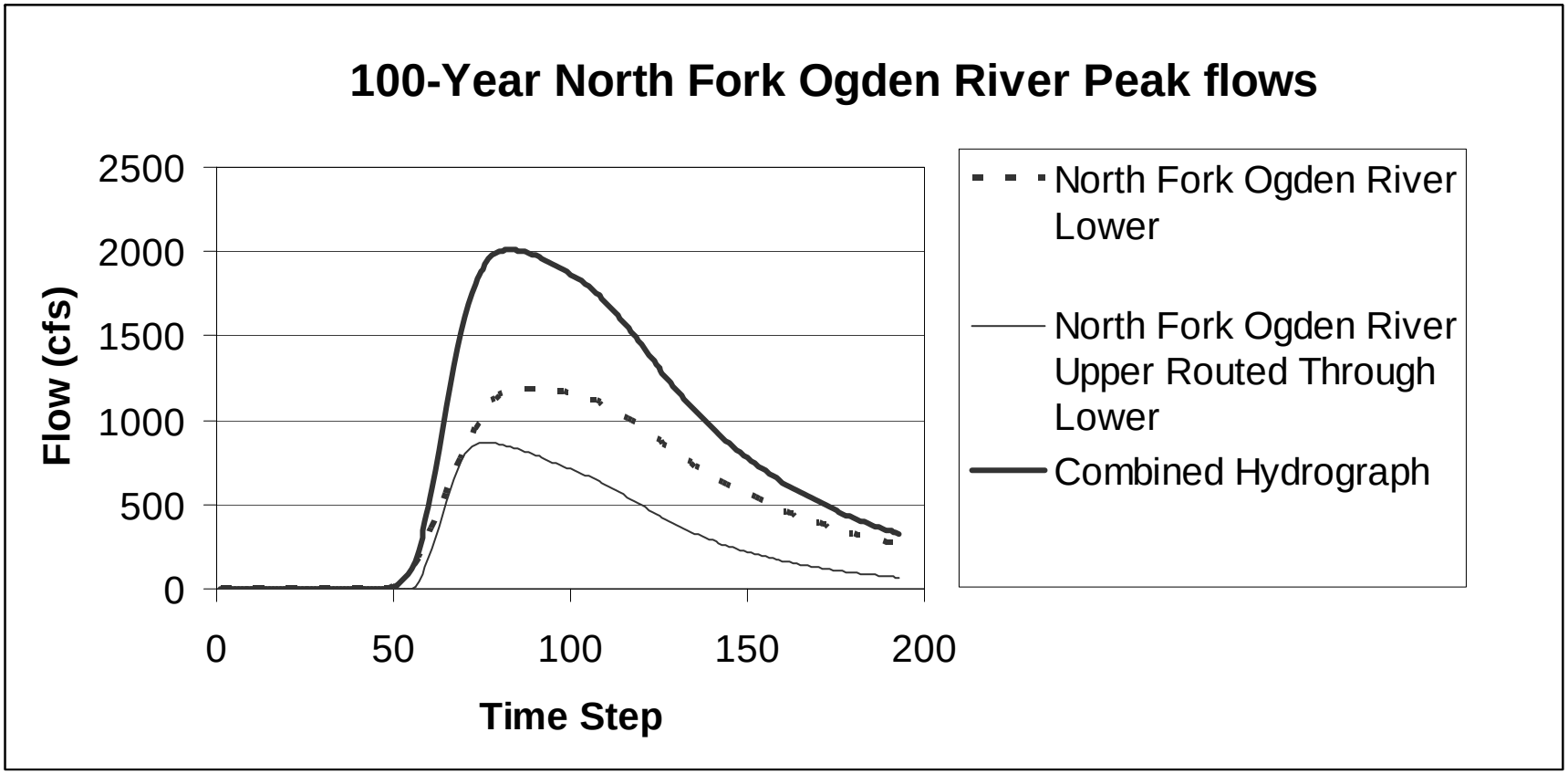
Appendix E –North Fork Ogden River Routing Calculations

50-Year Peak Hydrograph Addition



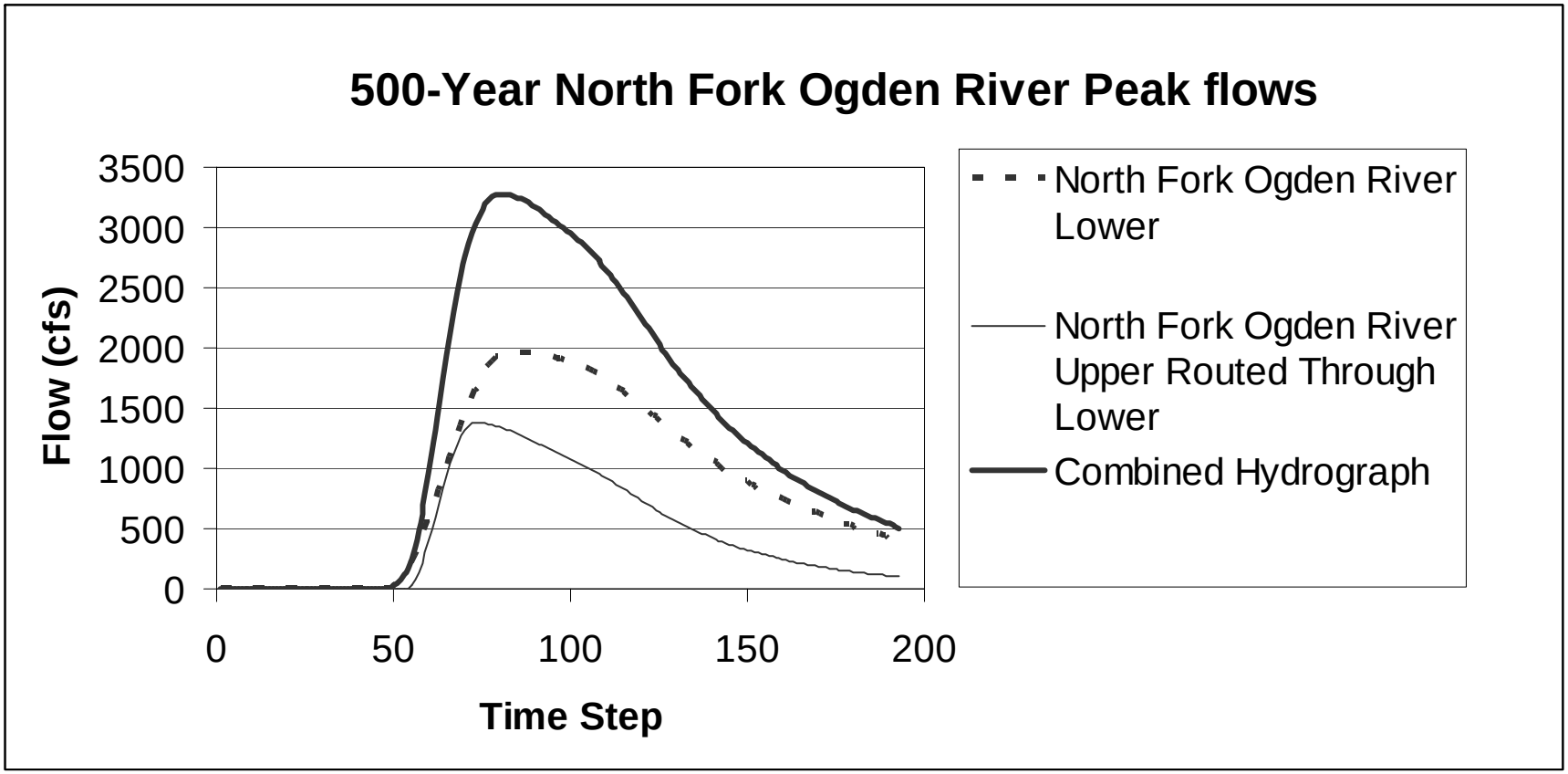
Appendix E –North Fork Ogden River Routing Calculations

100-Year Peak Hydrograph Addition



Appendix E –North Fork Ogden River Routing Calculations

500-Year Peak Hydrograph Addition



Appendix F –LPIII Flood Frequency Results

South Fork Ogden River North Branch – 44 Year Record

```
1
  Program PeakFq           U. S. GEOLOGICAL SURVEY            Seq.000.000
  Ver. 5.2            Annual peak flow frequency analysis     Run Date / Time
  11/01/2007          following Bulletin 17-B Guidelines      11/11/2009 15:47

                         --- PROCESSING OPTIONS ---

                      Plot option         = None
                      Basin char output   = None
                      Print option        = Yes
                      Debug print         = No
                      Input peaks listing = Long
                      Input peaks format  = WATSTORE peak file

                      Input files used:
                         peaks (ascii)  - C:\TEMP\WEBER COUNTY\GAGE INFORMATION\10137500 - SOUTH FORK
OGDEN RIVER NEAR HUN
                         specifications - PKFQWPSF.TMP
                      Output file(s):
                         main - C:\TEMP\WEBER COUNTY\GAGE INFORMATION\10137500 - SOUTH FORK OGDEN RIVER
NEAR HUN

1


  Program PeakFq           U. S. GEOLOGICAL SURVEY            Seq.001.001
  Ver. 5.2            Annual peak flow frequency analysis     Run Date / Time
  11/01/2007          following Bulletin 17-B Guidelines      11/11/2009 15:47

        Station - 10137500  SOUTH FORK OGDEN RIVER NEAR HUNTSVILLE, UT


                    I N P U T   D A T A   S U M M A R Y

               Number of peaks in record           =       87
               Peaks not used in analysis          =       43
               Systematic peaks in analysis        =       44
               Historic peaks in analysis          =        0
               Years of historic record            =        0
               Generalized skew                    =   -0.290
                    Standard error                 =    0.550
                    Mean Square error              =    0.303
               Skew option                         =   WEIGHTED
               Gage base discharge                 =      0.0
               User supplied high outlier threshold =   --
               User supplied low outlier criterion  =   --
               Plotting position parameter         =     0.00


  *********  NOTICE  --  Preliminary machine computations.        *********
  *********  User responsible for assessment and interpretation.  *********

  **WCF109W-PEAKS WITH MINUS-FLAGGED DISCHARGES WERE BYPASSED.      43
  **WCF113W-NUMBER OF SYSTEMATIC PEAKS HAS BEEN REDUCED TO NSYS =   44
    WCF134I-NO SYSTEMATIC PEAKS WERE BELOW GAGE BASE.                   0.0
    WCF198I-LOW OUTLIERS BELOW FLOOD BASE WERE DROPPED.       1       125.7
    WCF163I-NO HIGH OUTLIERS OR HISTORIC PEAKS EXCEEDED HHBASE.      3665.4
    WCF002J-CALCS COMPLETED.  RETURN CODE =  2
1


  Program PeakFq           U. S. GEOLOGICAL SURVEY            Seq.001.002
  Ver. 5.2            Annual peak flow frequency analysis     Run Date / Time
  11/01/2007          following Bulletin 17-B Guidelines      11/11/2009 15:47
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Station - 10137500 SOUTH FORK OGDEN RIVER NEAR HUNTSVILLE, UT

ANNUAL FREQUENCY CURVE PARAMETERS -- LOG-PEARSON TYPE III

	FLOOD BASE		LOGARITHMIC		
	DISCHARGE	EXCEEDANCE PROBABILITY	MEAN	STANDARD DEVIATION	SKEW
SYSTEMATIC RECORD	0.0	1.0000	2.8591	0.2795	-1.032
BULL.17B ESTIMATE	125.7	0.9773	2.8691	0.2598	-0.644

ANNUAL FREQUENCY CURVE -- DISCHARGES AT SELECTED EXCEEDANCE PROBABILITIES

ANNUAL EXCEEDANCE PROBABILITY	BULL.17B ESTIMATE	SYSTEMATIC RECORD	'EXPECTED PROBABILITY' ESTIMATE	95-PCT CONFIDENCE LIMITS FOR BULL. 17B ESTIMATES LOWER	UPPER
0.9950	--	75.2	--	--	--
0.9900	--	102.0	--	--	--
0.9500	251.0	215.3	239.9	189.0	310.9
0.9000	333.7	305.1	325.0	263.7	401.1
0.8000	459.7	445.1	453.9	380.3	538.7
0.6667	605.2	607.0	602.3	514.8	702.2
0.5000	788.4	805.9	788.4	679.2	919.0
0.4292	873.5	895.5	874.9	753.1	1024.0
0.2000	1235.0	1250.0	1246.0	1052.0	1500.0
0.1000	1510.0	1487.0	1533.0	1266.0	1887.0
0.0400	1826.0	1726.0	1870.0	1503.0	2353.0
0.0200	2039.0	1866.0	2102.0	1659.0	2677.0
0.0100	2234.0	1980.0	2318.0	1799.0	2980.0
0.0050	2413.0	2073.0	2520.0	1926.0	3264.0
0.0020	2628.0	2171.0	2767.0	2076.0	3612.0

1

Program PeakFq Ver. 5.2 11/01/2007 — U. S. GEOLOGICAL SURVEY — Annual peak flow frequency analysis following Bulletin 17-B Guidelines — Seq.001.003 Run Date / Time 11/11/2009 15:47

Station - 10137500 SOUTH FORK OGDEN RIVER NEAR HUNTSVILLE, UT

I N P U T D A T A L I S T I N G

WATER YEAR	DISCHARGE	CODES	WATER YEAR	DISCHARGE	CODES
1922	1380.0		1966	-919.0	K
1923	1450.0		1967	-1040.0	K
1924	618.0		1968	-622.0	K
1925	523.0		1969	-901.0	K
1926	508.0		1970	-951.0	K
1927	1220.0		1971	-1070.0	K
1928	1180.0		1972	-822.0	K
1929	1060.0		1973	-812.0	K
1930	412.0		1974	-1230.0	K
1931	184.0		1975	-1200.0	K
1932	1480.0		1976	-748.0	K
1933	876.0		1977	-94.0	K
1934	113.0		1978	-963.0	K
1935	516.0		1979	-780.0	K
1936	1780.0		1980	-1140.0	K
1937	1090.0		1981	-286.0	K
1938	944.0		1982	-1290.0	K
1939	397.0		1983	-1470.0	K
1940	282.0		1984	-1660.0	K
1941	353.0		1985	-1080.0	K
1942	597.0		1986	-1240.0	K
1943	995.0		1987	-248.0	K

1944	611.0	1988	-226.0	K
1945	985.0	1989	-623.0	K
1946	1430.0	1990	-203.0	K
1947	778.0	1991	-632.0	K
1948	1280.0	1992	-85.0	K
1949	1020.0	1993	-980.0	K
1950	1300.0	1994	-701.0	K
1951	1000.0	1995	-572.0	K
1952	1890.0	1996	-740.0	K
1953	611.0	1997	-1440.0	K
1954	409.0	1998	-1020.0	K
1955	788.0	1999	-968.0	K
1956	678.0	2000	-315.0	K
1957	969.0	2001	-337.0	K
1958	870.0	2002	-433.0	K
1959	329.0	2003	-269.0	K
1960	458.0	2004	-307.0	K
1961	149.0	2005	-964.0	K
1962	1060.0	2006	-915.0	K
1963	713.0	2007	-352.0	K
1964	1150.0	2008	-920.0	K
1965	1080.0			

Explanation of peak discharge qualification codes

PeakFQ CODE	NWIS CODE	DEFINITION
D	3	Dam failure, non-recurrent flow anomaly
G	8	Discharge greater than stated value
X	3+8	Both of the above
L	4	Discharge less than stated value
K	6 OR C	Known effect of regulation or urbanization
H	7	Historic peak

- Minus-flagged discharge -- Not used in computation
  -8888.0 -- No discharge value given
- Minus-flagged water year -- Historic peak used in computation

1

Program PeakFq U. S. GEOLOGICAL SURVEY Seq.001.004
Ver. 5.2 Annual peak flow frequency analysis Run Date / Time
11/01/2007 following Bulletin 17-B Guidelines 11/11/2009 15:47

Station - 10137500 SOUTH FORK OGDEN RIVER NEAR HUNTSVILLE, UT

EMPIRICAL FREQUENCY CURVES -- WEIBULL PLOTTING POSITIONS

WATER YEAR	RANKED DISCHARGE	SYSTEMATIC RECORD	BULL.17B ESTIMATE
1952	1890.0	0.0222	0.0222
1936	1780.0	0.0444	0.0444
1932	1480.0	0.0667	0.0667
1923	1450.0	0.0889	0.0889
1946	1430.0	0.1111	0.1111
1922	1380.0	0.1333	0.1333
1950	1300.0	0.1556	0.1556
1948	1280.0	0.1778	0.1778
1927	1220.0	0.2000	0.2000
1928	1180.0	0.2222	0.2222
1964	1150.0	0.2444	0.2444
1937	1090.0	0.2667	0.2667
1965	1080.0	0.2889	0.2889
1929	1060.0	0.3111	0.3111
1962	1060.0	0.3333	0.3333
1949	1020.0	0.3556	0.3556

1951	1000.0	0.3778	0.3778
1943	995.0	0.4000	0.4000
1945	985.0	0.4222	0.4222
1957	969.0	0.4444	0.4444
1938	944.0	0.4667	0.4667
1933	876.0	0.4889	0.4889
1958	870.0	0.5111	0.5111
1955	788.0	0.5333	0.5333
1947	778.0	0.5556	0.5556
1963	713.0	0.5778	0.5778
1956	678.0	0.6000	0.6000
1924	618.0	0.6222	0.6222
1944	611.0	0.6444	0.6444
1953	611.0	0.6667	0.6667
1942	597.0	0.6889	0.6889
1925	523.0	0.7111	0.7111
1935	516.0	0.7333	0.7333
1926	508.0	0.7556	0.7556
1960	458.0	0.7778	0.7778
1930	412.0	0.8000	0.8000
1954	409.0	0.8222	0.8222
1939	397.0	0.8444	0.8444
1941	353.0	0.8667	0.8667
1959	329.0	0.8889	0.8889
1940	282.0	0.9111	0.9111
1931	184.0	0.9333	0.9333
1961	149.0	0.9556	0.9556
1934	113.0	0.9778	0.9778
1992	-85.0	--	--
1977	-94.0	--	--
1990	-203.0	--	--
1988	-226.0	--	--
1987	-248.0	--	--
2003	-269.0	--	--
1981	-286.0	--	--
2004	-307.0	--	--
2000	-315.0	--	--
2001	-337.0	--	--
2007	-352.0	--	--
2002	-433.0	--	--
1995	-572.0	--	--
1968	-622.0	--	--
1989	-623.0	--	--
1991	-632.0	--	--
1994	-701.0	--	--
1996	-740.0	--	--
1976	-748.0	--	--
1979	-780.0	--	--
1973	-812.0	--	--
1972	-822.0	--	--
1969	-901.0	--	--
2006	-915.0	--	--
1966	-919.0	--	--
2008	-920.0	--	--
1970	-951.0	--	--
1978	-963.0	--	--
2005	-964.0	--	--
1999	-968.0	--	--
1993	-980.0	--	--
1998	-1020.0	--	--
1967	-1040.0	--	--
1971	-1070.0	--	--
1985	-1080.0	--	--
1980	-1140.0	--	--
1975	-1200.0	--	--
1974	-1230.0	--	--
1986	-1240.0	--	--
1982	-1290.0	--	--
1997	-1440.0	--	--
1983	-1470.0	--	--
1984	-1660.0	--	--

1

```
 End PeakFQ analysis.
   Stations processed :       1
   Number of errors   :       0
   Stations skipped   :       0
   Station years      :      87


Data records may have been ignored for the stations listed below.
(Card type must be Y, Z, N, H, I, 2, 3, 4,  or *.)
(2, 4, and * records are ignored.)

 For the station below, the following records were ignored:

 FINISHED PROCESSING STATION:  10137500       USGS SOUTH FORK OGDEN RIVER NEAR H


 For the station below, the following records were ignored:

 FINISHED PROCESSING STATION:
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