Pedernales, TX
Base Level Engineering (BLE) Results

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APPROVALS

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Role	Name	Phone Extension	Title (CLIN/RMC)	Review Date	Approved Date
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CLIENT DISTRIBUTION

Name	Title/Organization	Location
FEMA's MIP	Region VI	See path above
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Executive Summary

FEMA Region 6 contracted Compass to complete a Base Level Engineering (BLE) analysis for the HUC-08 watershed Pedernales (PEDR) in Central Texas, to support FEMA's Discovery process and validation of effective Zone A Special Flood Hazard Areas (SFHAs). The BLE process involves using best available data and incorporating automated techniques with traditional model development procedures to produce regulatory-quality flood hazard boundaries for the 1-percent annual chance event as well as estimates of flood hazard boundaries for multiple recurrence intervals.

The source digital terrain data used for surface model development in support of hydrologic and hydraulic analysis as well as mapping activities were leveraged from various local, State, and Federal partners. Details regarding the different datasets used are provided below in Section 1.1.

Flood discharges for this study were calculated the United States Geological Survey (USGS) regression equations. Regression equations were obtained from the USGS Scientific Investigations Report (SIR) 2009-5087, *Regression Equations for Estimation of Annual Peak-Streamflow Frequency for Undeveloped Watersheds in Texas Using an L-moment Based, PRESS-Minimized, Residual-Adjusted Approach* (2009).

The Hydrologic Engineering Center's River Analysis System (HEC-RAS) program version 4.1.0 was used to compute water surface elevations on a stream by stream basis. All hydraulic models were computed using 1-D steady state analysis.

The stream mile network that was validated for these watersheds was compiled using FEMA's Community Needs Management Strategy (CNMS) inventory. CNMS is an inventory of flood hazard studies and flood hazard mapping needs for areas where a study is needed. This data is helpful for community officials in analyzing and depicting flood hazards to enhance the understanding of flood risks. Communities may use this information to make informed decisions on their planning and flood mitigation efforts. **Table ES-1** lists the stream miles associated with this validation analysis.

Table ES-1: Summary of Stream Miles

Source	Pedernales River Stream Miles
CNMS	539.6

The full inventory of Zone A studies in the watershed were classified in CNMS. Total miles validated in CNMS are summarized in **Table ES-2** and illustrated in **Figure ES-1** below.

Table ES-2: Aggregated Zone A Validation Results

Validation Status	Status Type	Total Miles
Valid	Being Studied	23.7
Unverified	Being Studied	516.0

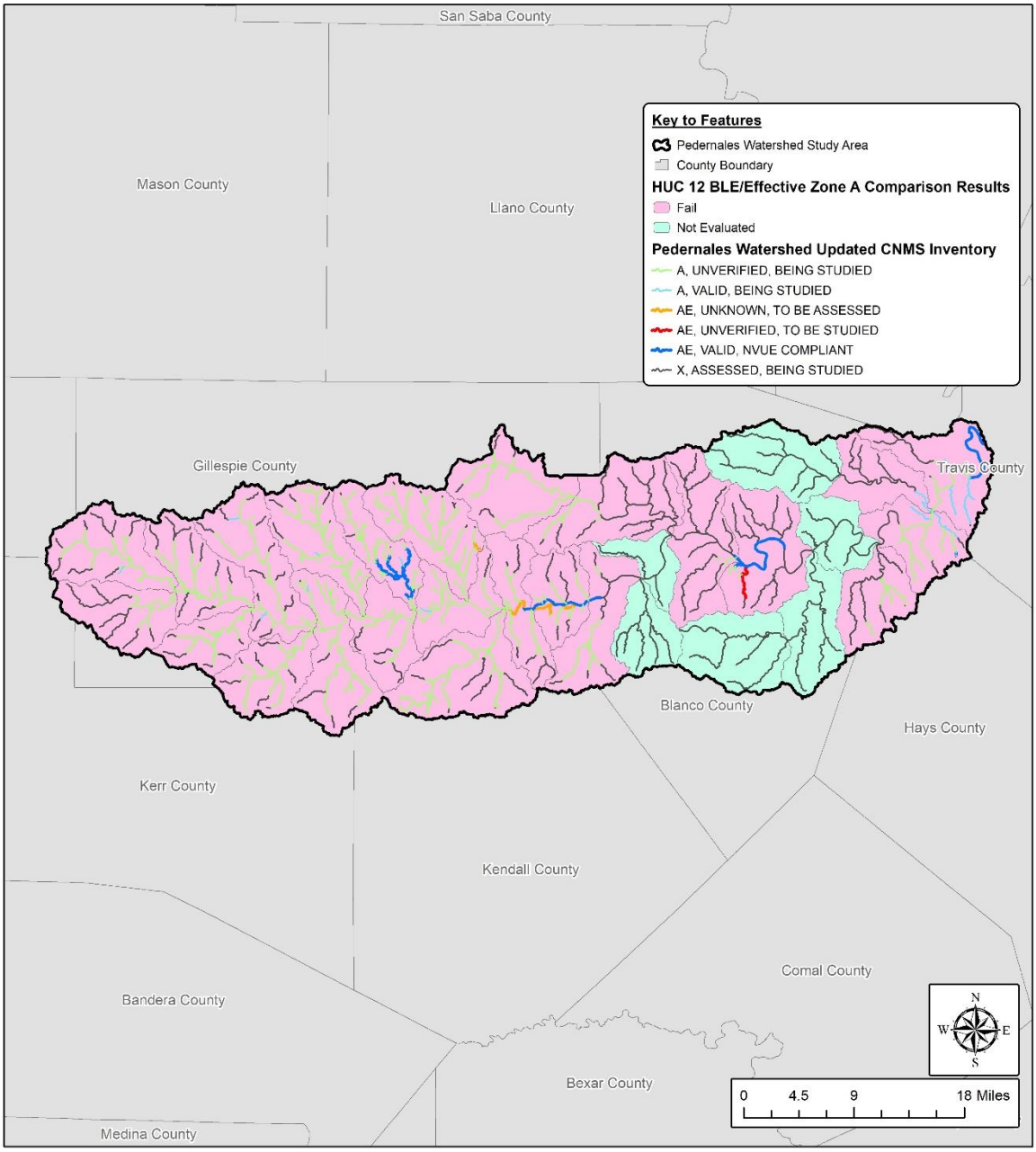

Figure ES-1: Pedernales Watershed CNMS Validation Results

An overall risk for each HUC-12 watershed was calculated using the National Flood Risk Percentages Dataset and its proportional area. The weighted risk was multiplied by the percentage of points in the watershed that failed the CNMS comparison to effective to determine the priority score. **Figure ES-2** below shows the range of the Pedernales Watershed HUC-08 priority scores which can be used to initiate discussions during the Discovery phase.

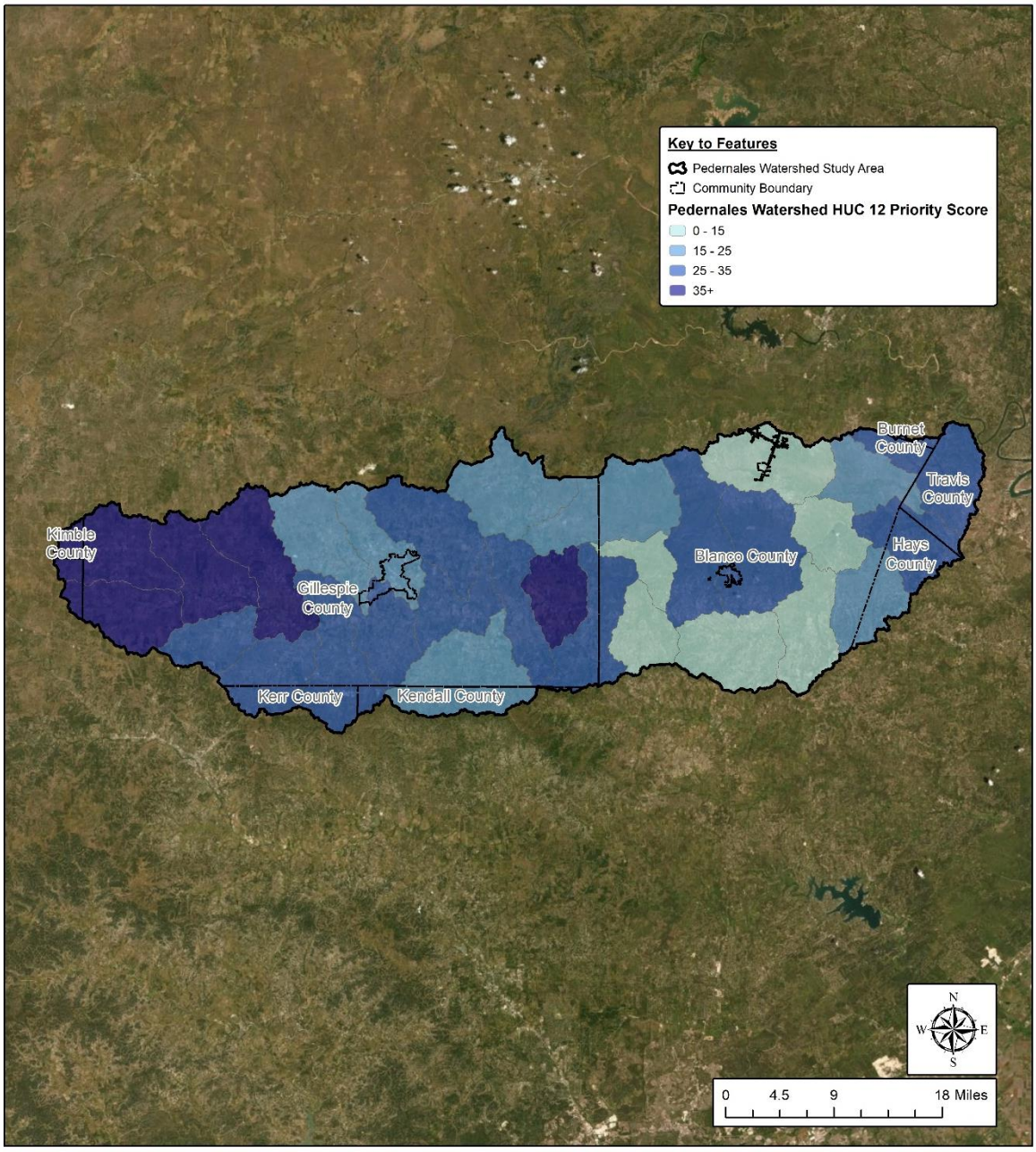

Figure ES-2: Ranking of Pedernales Watershed HUC-12

Base Level Engineering (BLE) Methodology

Recent innovations and efficiencies in floodplain mapping have allowed the U.S. Department of Homeland Security's Federal Emergency Management Agency (FEMA) to develop a process called Base Level Engineering (BLE), which can be used to address current program challenges, including the validation of Zone A studies and the availability of flood risk data in the early stages of a Flood Risk Project. The BLE process involves using best available data and incorporating automated techniques with traditional model development procedures to produce regulatory quality flood hazard boundaries for the 1-percent annual chance event as well as estimates of flood hazard boundaries for multiple recurrence intervals. The cost for developing the data and estimates resulting from the BLE process are lower than standard flood production costs. The BLE results may be used for eventual production of regulatory and non-regulatory products.

As described in Title 42 of the Code of Federal Regulations, Chapter III, Section 4101(e), once every five years, FEMA must evaluate whether the information on Flood Insurance Rate Maps (FIRMs) reflects the current risks in flood-prone areas. FEMA makes this determination of flood hazard data validity by examining flood study attributes and change characteristics, as specified in the Validation Checklist of the Coordinated Needs Management Strategy (CNMS) Technical Reference. The CNMS Validation Checklist provides a series of critical and secondary checks to determine the validity of flood hazard areas studied by detailed methods (e.g., Zone AE, AH, or AO). While the critical and secondary elements in CNMS provide a comprehensive method of evaluating the validity of Zone AE studies, a cost-effective approach for evaluating Zone A studies has been lacking.

In addition to the need for Zone A validation guidance, FEMA standards require flood risk data to be provided in the early stages of a Flood Risk Project. FEMA Program Standard SID #29 requires that during Discovery, data must be identified that illustrates potential changes in flood elevation and mapping that may result from the proposed project scope. If available data does not clearly illustrate the likely changes, an analysis is required that estimates the likely changes. This data and any associated analyses should be shared, and results should be discussed with stakeholders.

An important goal of the BLE process is the scalability of the results. Scalability means that the results of a BLE analysis can not only be used for CNMS evaluations of Zone A studies but can also be leveraged throughout the Risk MAP program. The data resulting from a BLE analysis can be updated as needed and used for the eventual production of regulatory and non-regulatory products, outreach and risk communication, and MT-1 processing. Leveraging this data outside the Risk MAP program may also be valuable to external stakeholders.

FEMA Region VI contracted Compass to complete a BLE analysis for the Pedernales Watershed in Central Texas to support FEMA's Discovery process and validation of effective Zone A Special Flood Hazard Areas (SFHA). The study extents include portions of Blanco, Burnet, Gillespie, Hays, Kendall, Kerr, Kimble, and Travis Counties, and include the following communities: Round Mountain, Briarcliff, Johnson City and Fredericksburg. The study area consists of 3 HUC-10 basins: Headwaters Pedernales River, North Grape Creek Pedernales River, and Pedernales River-Lake Travis. **Figure 1** shows the orientation of the Pedernales HUC-10 basins with respect to the counties.

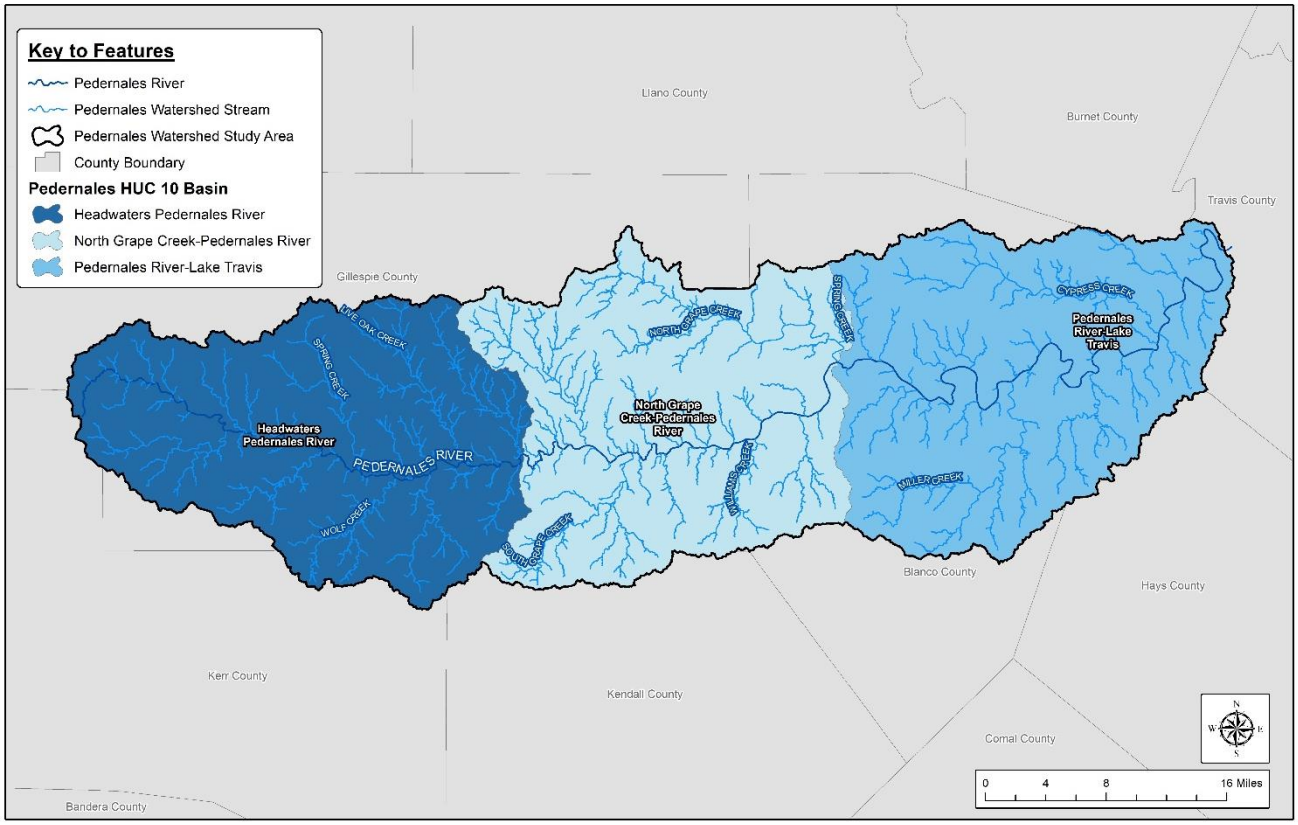

Figure 1: Pedernales Watershed HUC-10 Basins

Compass studied approximately 1,230 miles of stream reaches within the Pedernales Watershed with a minimum drainage area tolerance of one square mile. The selection and extent of stream reaches studied were based upon the number of stream miles with a minimum drainage area of one square mile and not the number of effective Zone A stream miles. Study reaches were extended above this threshold as appropriate to ensure all effective Zone A flood areas received an updated analysis. Topographic data from multiple sources were used to determine the hydrologic and hydraulic characteristics of the watershed. The following sections summarize the BLE process and discuss the results along with their recommended use.

1.1 Topographic Data

An inventory of existing topographic data was conducted for the Pedernales BLE project footprint. Figure 2 depicts the datasets identified and leveraged across the project area. FEMA, TNRIS, and other State and Federal agencies were queried to build the inventory with the most current and available data sources.

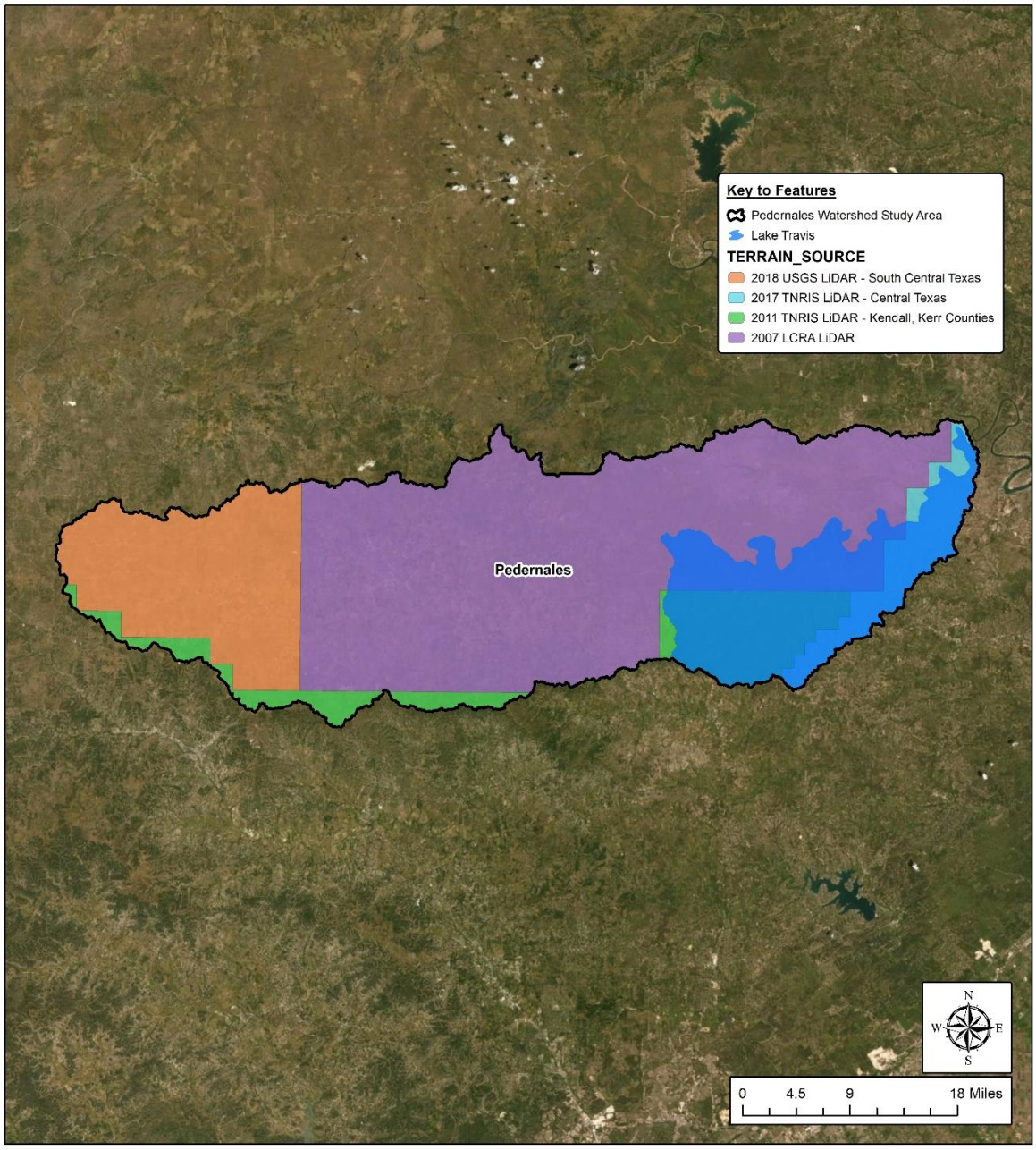

Figure 2: Extent of LiDAR Data for Pedernales Watershed

1.1.1 Evaluation

A data coverage assessment was conducted to check for data gaps, extent, accuracy, and completeness. A review of related documentation, reports, indexes, and metadata associated with the leverage datasets ensured each dataset meets FEMA accuracy requirements for topographic data. Decisions to leverage or exclude a dataset (or portion of it), were based generally on the following criteria coupled with engineering judgment:

- Data meet FEMA vertical accuracy standards (**Table 1**)
- Date of origination

- Data density and coverage

Table 1 depicts the Risk Map SID 43 vertical accuracy requirements based on flood risk and terrain slope within the floodplain being mapped.

Table 1: FEMA Vertical Accuracy Requirements for Leveraged Data

Level of Flood Risk	Typical Slopes	Specification Level	Vertical Accuracy*	LiDAR Nominal Pulse Spacing (NPS)
High (Deciles 1,2,3)	Flattest	Highest	24.5 cm / 36.3 cm	≤ 2 meters
High (Deciles 1,2,3)	Rolling or Hilly	High	49.0 cm / 72.6 cm	≤ 2 meters
High (Deciles 2,3,4,5)	Hilly	Medium	98.0 cm / 145 cm	≤ 3.5 meters
Medium (Deciles 3,4,5,6,7)	Flattest	High	49.0 cm / 72.6 cm	≤ 2 meters
Medium (Deciles 3,4,5,6,7)	Rolling	Medium	98.0 cm / 145 cm	≤ 3.5 meters
Medium (Deciles 3,4,5,6,7)	Hilly	Low	147 cm / 218 cm	≤ 5 meters
Low (Deciles 7,8,9,10)	All	Low	147 cm / 218 cm	≤ 5 meters

*Vertical Accuracy at 95% Confidence Level (FVA or NVA)/(CVA or VVA)

Table 2 depicts the complete list of source elevation data and attributes leveraged for the Pedernales Watershed BLE project. All the Terrain datasets used for hydrology, hydraulic analyses, and mapping meet the highest specification level defined in Table 1. Further explanation of the Table 2 datasets can be referenced in section 1.1.1.1.

Table 2: Source Topographic Data Available for the Pedernales Watershed

Year	Description	Data Type	RMSE	Source/Owner
2007	2007 TNRIS LCRA LiDAR	Airborne LiDAR	18.5cm	TNRIS
2011	2011 TNRIS LiDAR (Blanco, Caldwell, Gonzales, Kendall, Kerr)	Airborne LiDAR	9 – 18cm	TNRIS
2017	2017 TNRIS LiDAR – Central Texas	Airborne LiDAR	10 – 19.6cm	TNRIS
2018	2018 USGS LiDAR - South Central Texas	Airborne LiDAR	7.3 – 14.3cm	USGS

1.1.1.1 Pedernales Watershed Source Terrain Data

The source elevation data for the Pedernales Watershed are DEMs derived from the USGS and TNRIS LiDAR data. Only points classified as "ground" points (i.e., bare earth) were imported from the LiDAR and used for development of the project DEMs. Bare-earth LIDAR data are typically made by filtering non-ground returns (e.g. buildings, vegetation, etc.) from the raw laser returns. Figure 2 depicts the extent of the data defined in Table 2.

2007 TNRIS LCRA LiDAR - The 2007 TNRIS LCRA LiDAR was collected with a nominal pulse spacing of 1.4 meter. The RMSEz reported for the dataset was 18.5 cm at the 95% confidence level which meets project accuracy specifications of the NSSDA.

2011 TNRIS LiDAR, TX (Blanco, Caldwell, Gonzales, Kendall, Kerr) - The 2011 TNRIS LiDAR, TX (Blanco, Caldwell, Gonzales, Kendall, Kerr) was collected with a nominal pulse spacing of .4 meter. The RMSEz reported for the dataset ranged from 9 - 18 cm at the 95% confidence level which meets project accuracy specifications of the NSSDA.

2017 TNRIS LiDAR – Central Texas- The 2017 TNRIS LIDAR – Central Texas was collected with a nominal pulse spacing of 0.5 meters. The RMSEz reported for the dataset was ranged from 10 cm to 19.6 cm at the 95% confidence level which meets project accuracy specifications of the National Standard for Spatial Data Accuracy (NSSDA).

2018 USGS South Central Texas LiDAR - The 2018 USGS South Central Texas LiDAR was collected with a nominal pulse spacing of 0.63 meters. The RMSEz reported for the dataset ranged from 7 - 14 cm at the 95% confidence level which meets project accuracy specifications of the NSSDA.

1.1.1.2 Terrain Data Processing

The LiDAR data were processed in Environmental System Research Institute (ESRI) ArcGIS software to create a composite Digital Elevation Model (DEM) dataset for the project area. The DEM was used to generate hydrologically correct stream centerlines and served as a source for horizontal alignment and vertical elevation during manual revisions.

The Watershed Information System (WISE) Terrain Analyst (WTA) module software platform was utilized in order to create a Hydrologically correct DEM (HDEM) for the project area. WTA is used to identify natural sinks, peaks and flat areas in the DEM surface. The WTA module uses several routines that take localized elevations from the source topographic data and apply them to the streams. This ensures that the streams in the watershed are lower in elevation than any overbank sumps and also descend in height down to an outfall. The final generated streams file is then "burned" into DEMs to force flow through structures while preventing it from jumping out of the channel banks.

During the hydro enforcement of DEM, elevations of the cells were algorithmically calculated and the best path to route flow was determined without filling sinks in the DEM. Once all calculations were completed, the flow was checked confirming that all drainage flowed downstream correctly and routed to outside of the HUC-08 basin. The outputs from the processing described above, which included composite DEMS and HDEMs (10-ft and 50-ft cell-size), were used during the hydrology, hydraulics, and floodplain mapping processes.

In addition to the quantitative assessment of the source digital terrain, a qualitative visual inspection of the composite DEM was performed using a hillshade derived from the 10-foot DEM. The visual inspection indicated no unusual or non-terrestrial features were observed in the composite DEM, assuring the surface files used for hydrologic, hydraulic analyses, and floodplain mapping activities are sufficient for BLE analysis.

1.2 Hydrology

Flood discharges for this study were calculated using the United States Geological Survey (USGS) regression equations. Regression equations were obtained from the USGS Scientific Investigations Report (SIR) 2009-5087, *Regression Equations for Estimation of Annual Peak-Streamflow Frequency for Undeveloped Watersheds in Texas Using an L-moment Based, PRESS-Minimized, Residual-Adjusted Approach* (2009).

The Watershed Information System (WISE) software was used to delineate drainage basins in shapefile format using the 50-foot DEM. WISE was also used to calculate the main-channel slope for each basin. The basin shapefile attribution was automated by WISE with drainage area, main-channel slope, and precipitation.

Table 3 presents the published equations used in this study. In these equations, Q_i represents peak streamflow for i-recurrence interval (annual chance exceedance) in cubic feet per second (cfs), P represents mean annual precipitation in inches, S represents dimensionless main-channel slope, Ω represents the OmegaEM parameter, and A represents cumulative drainage area in square miles.

Table 3: Summary of Regression Equations in Texas (SIR 2009-5087)

Recurrence Interval	Equation
$Q_{10\%}$	$P^{1.203} \times S^{0.403} \times 10^{[0.918\Omega + 13.62 - 11.97A^{(-0.0289)}]}$
$Q_{4\%}$	$P^{1.140} \times S^{0.446} \times 10^{[0.945\Omega + 11.79 - 9.819A^{(-0.0374)}]}$
$Q_{2\%}$	$P^{1.105} \times S^{0.476} \times 10^{[0.961\Omega + 11.17 - 8.997A^{(-0.0424)}]}$
$Q_{1\%}$	$P^{1.071} \times S^{0.507} \times 10^{[0.969\Omega + 10.82 - 8.448A^{(-0.0467)}]}$
$Q_{0.2\%}$	$P^{0.988} \times S^{0.569} \times 10^{[0.976\Omega + 10.40 - 7.605A^{(-0.0554)}]}$
Variables: Q_i, peak flow for i recurrence interval annual chance exceedance in cubic feet per second; P, mean annual precipitation, in inches; S, Main-channel slope (dimensionless); Ω, OmegaEM parameter; and A, cumulative drainage area, in square miles.	

Discharges for the 1-percent plus and 1-percent minus annual chance event were calculated as $Q_{1\%+/-} = Q_{1\%} \pm 10^{1.6*0.30}$, where 0.30 is the mean residual standard error for the $Q_{1\%}$ equation.

The mean annual precipitation values for the Texas regression equations were determined based on gridded coverage obtained from the PRISM Climate Group and available for download from the following location: http://prism.oregonstate.edu/normals/. The annual precipitation values reflect data for the climatological period 1981-2010 as recorded by the Natural Resources Conservation Service (NRCS).

Main-channel slope was calculated in WISE. An automated routine determined the longest flowpath from upstream of a reach to the outlet of the sub-basin of interest. The elevations for those endpoints were based on the 10-foot DEM developed from the LiDAR.

From USGS SIR 2009-5087, the OmegaEM parameter is a generalized terrain and climate index that expresses relative differences in peak-streamflow potential. A shapefile was developed and populated with OmegaEM values based on Figure 2 in SIR 2009-5087. This shapefile was used, along with a python script in ArcCatalog, to determine OmegaEM values on a sub-basin basis. For sub-basins spanning more than one OmegaEM grid, the sub-basin's centroid determined its OmegaEM parameter.

Automated basin delineations were performed in WISE. Basin break points were set by the user with a sub-basin target size of one square mile. This criterion was adjusted for the main stem of the Pedernales River to avoid excessive and unnecessary discharge breaks. Break points were also set immediately upstream of stream confluences. Cumulative drainage area was determined based on these automated delineations performed by WISE in combination with a stream connectivity routine that defined the stream reach segments with upstream and downstream neighbors.

The sub-basin shapefile was attributed with the computed discharges, and those discharges were incorporated into the HEC-RAS models using an automated routine in WISE. Discharges, as well as water surface elevation results, were associated with the hydraulic cross-sections prior to generation of floodplain boundaries and grid mapping. Those results are available in GIS format as part of this BLE submittal package.

1.2.1 Flood Frequency Analyses

A flood frequency analysis was prepared for the Pedernales watershed. Peak annual discharge from ten USGS gages were processed to generate frequency discharges at each gage. **Table 4** presents the gages included in the flood frequency analysis including the source of the data, location of the gage, period of record, and stream the gage is located on. **Figure 3** shows the locations of USGS gages utilized in the flood frequency analyses.

Table 4: Flood Frequency Analysis Stream Gages

Gage Number	Flooding Source and Location	Published Drainage Area (mi^2)	Period of Record
USGS 08152900	Pedernales River near Fredericksburg, TX	369	1952-2020
USGS 08153500	Pedernales River near Johnson City, TX	901	1869-2020

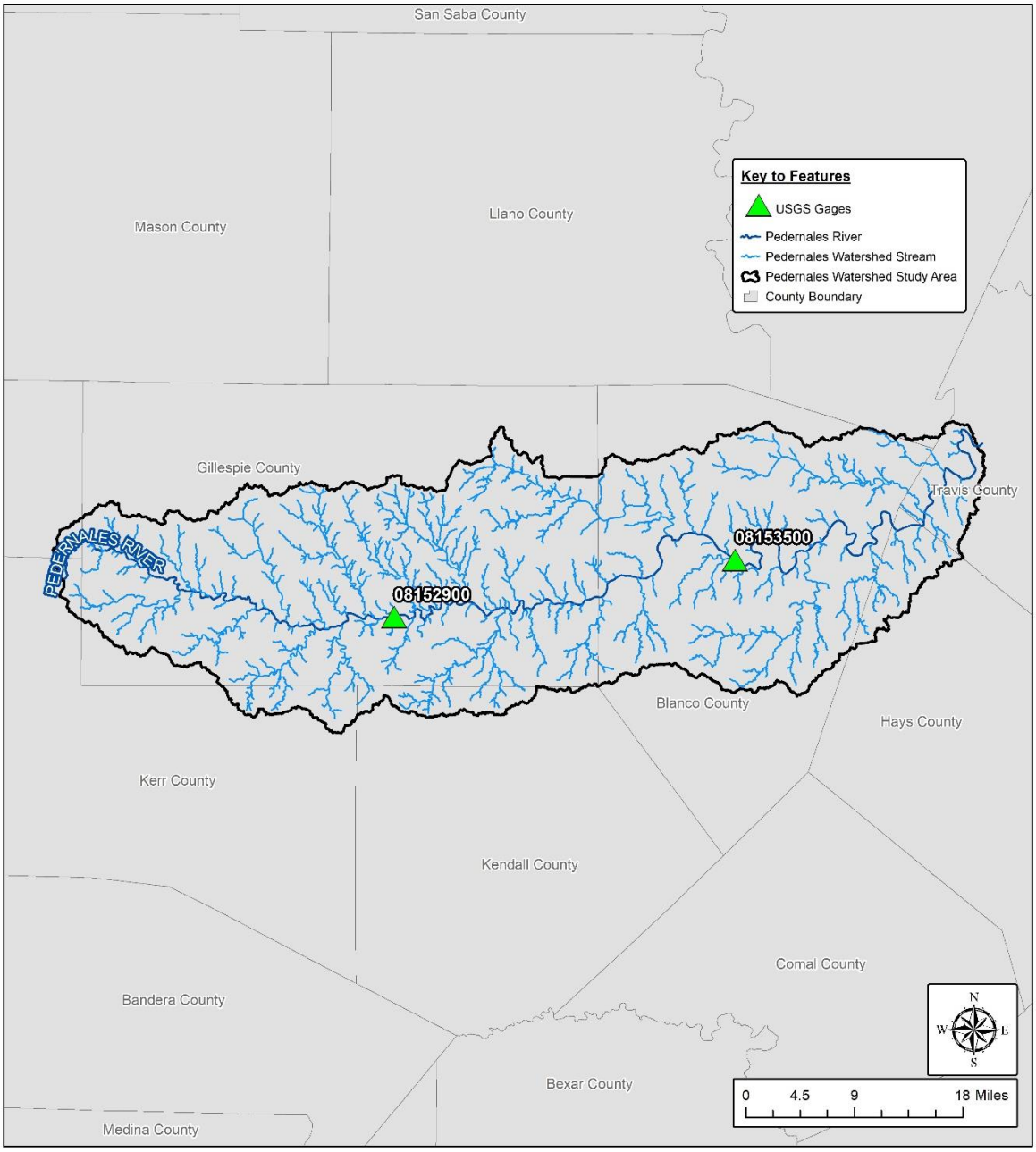

Figure 3: Locations of USGS Gages Utilized in Flood Frequency Analysis

A flood frequency analysis was computed for each USGS gage to determine the peak discharges for the Pedernales Watershed using the USGS "Guidelines for Determining Flood Flow Frequency, Bulletin #17B", revised September 1982. The 2009 regression models predict lower 1-percent and 0.2-percent annual chance event streamflow values than the flood frequency analyses on gages located along the Pedernales River. Therefore, a frequency adjustment factor is recommended for the 2009 regression equations for the mainstem. No adjustment factor was used for the rest of the Pedernales HUC-08.

The 1- and 0.2-percent annual chance event peak streamflow comparisons, as calculated with the 2009 regression model and gage data for Pedernales mainstem, are shown in **Figure 4** and **Figure 5**, respectively.

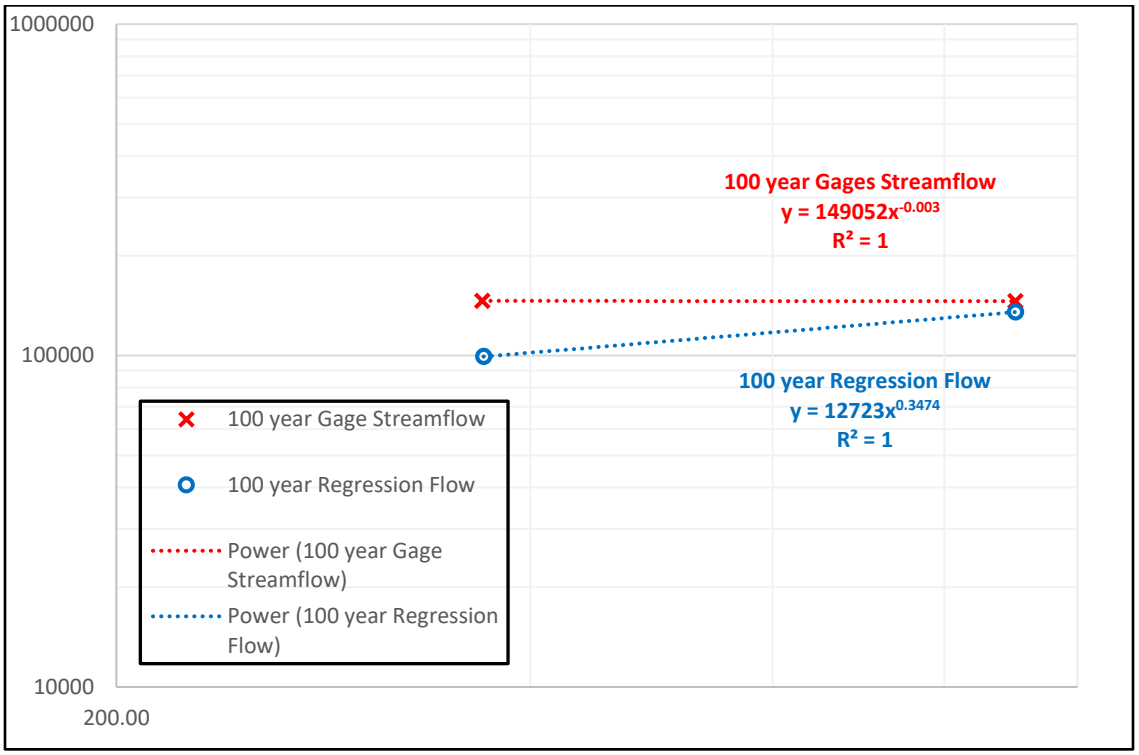

Figure 4: 1-Percent Annual Chance Event Flood Frequency Analysis for Pedernales Mainstem

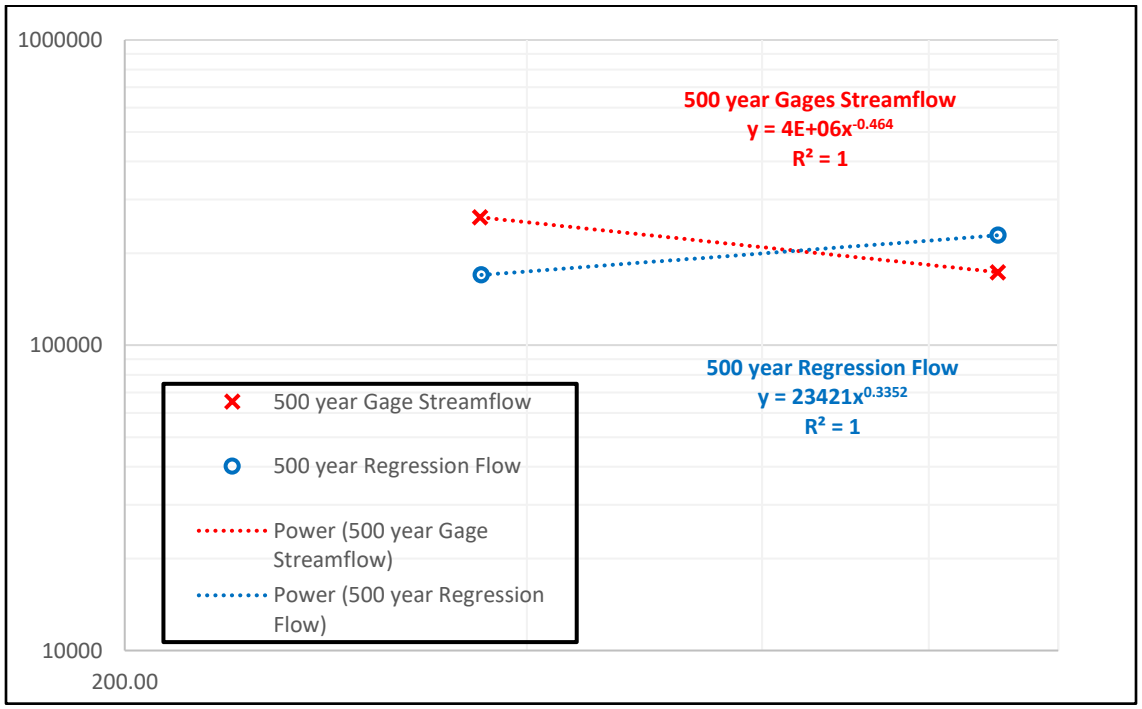

Figure 5: 0.2-Percent Annual Chance Event Flood Frequency Analysis for Pedernales River Mainstem

1.3 Hydraulics

The hydraulic approach for this BLE analysis of the Pedernales Watershed consisted of using the terrain model described in Section 1.1 in combination with the hydrologic outputs from Section 1.1.1 to establish water surface elevations using 1-D steady state analysis. The Hydrologic Engineering Center's River Analysis System (HEC-RAS) program version 4.1.0 was chosen as the computer model to compute water surface elevations on a stream by stream basis. The WISE software was used to establish model stream orientation, generate initial hydraulic cross-section layout and stationing, assign n-values to cross-sections, and develop all input files for the HEC-RAS program. ESRI's ArcMap program was used to review and refine cross-section layout orientation.

First pass cross-section layout was performed using an automated routine in WISE based on the cumulative drainage area at the cross-section location. A first draft model was created based on this initial cross-section layout, and draft boundaries were developed. At this stage, a second pass inspection for cross-section placement occurred. Significant refinement occurred during this step. To improve the hydraulic models, additional cross-sections were added as needed to better define the BLE floodplain boundary. Cross-sections were extended in locations where overtopping occurred. Orientation of cross-sections was refined to improve on the perpendicular orientation to flow. Additional cross-sections were added at floodplain constrictions and at downstream portions of tributaries to ensure a proper tie-in with receiving streams. Cross-sections were adjusted to remove sections that intersected hydraulic crossings in the floodplain. For some of the largest studied streams, cross-sections were laid out manually to have more reasonable spacing and better capture the constrictions in the floodplain.

Cross-sections were not drawn on top of roadways or railroads but were placed at the upstream and downstream face of major roads and railroads. Ineffective flow stations were placed in the hydraulic models as appropriate to account for flow constrictions and other locations deemed by the engineer to be ineffective at conveying flow downstream.

Cross-sections were drawn on dam tops for significant dams with well-defined spillways to better represent ponded water upstream of the structures. In so doing, it was assumed that most of the flow during a flood event would pass the spillway and that the hydraulic model would reasonably estimate flow across the spillway as represented in the hydraulic cross-section. The elevations used in the modeling were checked against effective Zone A boundaries, and the results were deemed reasonable.

The relationship between cumulative drainage area and assigned channel geometry is shown in **Table 5**. These default values for dimensions and spacing were subject to change based on engineering judgment.

Table 5: Cross-Section Default Parameters

Drainage area (upper limit) (mi^2)	XS Spacing (ft)	Channel Top Width (ft)		Channel Bottom Width (ft)		Channel Depth (ft)
		Minimum	Maximum	Minimum	Maximum	
1	500	5	12	4	11	0.1
2	500	5	14	4	13	0.1
4	500	9	14	8	13	0.3
6	500	11	16	10	15	0.3

Drainage area (upper limit) (mi^2)	XS Spacing (ft)	Channel Top Width (ft)		Channel Bottom Width (ft)		Channel Depth (ft)
		Minimum	Maximum	Minimum	Maximum	
10	500	12	17	11	16	0.5
20	500	14	22	13	21	0.5
30	500	16	24	15	23	0.5
40	500	17	26	16	25	0.5
50	600	17	27	16	26	0.5
75	600	19	30	18	29	0.5
100	750	19	32	18	31	0.5
200	750	22	36	21	35	0.5
300	750	23	38	22	37	0.5

In typical BLE projects, Manning's roughness coefficients (n-values) are determined using the 2016 National Land Cover Data (NLCD) dataset in combination with n-values from Chow (1959) and Calenda et al. (2005). The association between the n-values and the NLCD Classification is shown in **Table 6**.

Manning's n-value takeoffs are performed by WISE (default values taken from the "Normal" column). N-values within channel banks are constrained by the automated routine to a range of 0.030 to 0.070. Then, overbank and channel n-values are manually adjusted in certain locations based on engineering judgment. Under the current BLE task order, the n-value assignments were modified in a calibration process detailed in Section 1.1.

Table 6: Manning's "n" Roughness Based on 2016 NLCD Classification (Moore, 2011)

NLCD Classification	Minimum	Normal	Maximum	Source
Open Water	0.025	0.03	0.033	Chow 1959
Developed, Open Space	0.01	0.013	0.016	Calenda et al. 2005
Developed, Low Intensity	0.038	0.05	0.063	Calenda et al. 2005
Developed, Medium Intensity	0.056	0.075	0.094	Calenda et al. 2005
Developed, High Intensity	0.075	0.1	0.125	Calenda et al. 2005
Barren Land	0.025	0.03	0.035	Chow 1959
Deciduous Forest	0.1	0.12	0.16	Chow 1959
Evergreen Forest	0.1	0.12	0.16	Chow 1959
Mixed Forest	0.1	0.12	0.16	Chow 1959
Scrub/Shrub	0.035	0.05	0.07	Chow 1959
Grassland/Herbaceous	0.025	0.03	0.035	Chow 1959
Pasture/Hay	0.03	0.04	0.05	Chow 1959
Cultivated Crops	0.025	0.035	0.045	Chow 1959
Woody Wetlands	0.08	0.1	0.12	Chow 1959
Emergent Herbaceous Wetland	0.075	0.1	0.15	Chow 1959

The boundary condition used for most of the study streams was normal depth with a default value of 0.005 ft/ft. For streams with large drainage areas (generally greater than 8 square miles), the normal depth slope was calculated based on the channel inverts of the downstream cross-sections.

In cases where streams tie into a lake, a normal depth slope was calculated based on the channel inverts of the downstream cross-sections (typically between 0.0001 and 0.001 ft/ft). For Pedernales River mainstem, a known water surface elevation from FIS report was entered as a boundary condition to account for the normal pool elevation from Lake Travis.

Several HUC-10s within this watershed are located in urban areas with storm drain systems, which are unaccounted for in the BLE models. Simplifications of these systems may considerably affect perceived risk.

1.4 Quality Control

Following the initial BLE analysis in each watershed, the flood hazard area delineations created by the BLE process were reviewed for areas where the results were not ideal.

Quality Control (QC) results indicated that some of the models should be extended to cover the scope of effective flood hazard data. Those streams were extended farther upstream to match the extents of the SFHA data.

Typical manual editing resulting from reasonability checks included adding cross-sections, adjusting orientation of cross-sections, trimming cross-sections and reduction of the default "V" angle of cross-sections. Examples of default "V" angled cross-sections are shown in **Figure 6**. It is estimated that 75 percent of cross-sections were adjusted in some work areas while other areas did not require as much editing. Other examples of manual editing included the addition of cross-sections at confluence areas (see **Figure 7** below), modifications to improve perpendicular orientation at the channel, adjustment of discharge breaks to better represent flow addition points, revisions to dam spillways and dam tops, additional cross-sections bounding major hydraulic structures, and revisions to n-values.

A major component of the QC process was an automated check that identified locations where the 1-percent and 0.2-percent annual chance event profiles were crossed by any other frequency profile. Significant effort was made to reasonably resolve all of these instances. Another automated check identified locations where there was a drawdown of greater than 0.5 foot on the 1-percent and 0.2-percent annual chance event water surface profiles. This check is particularly useful for identifying errors in the model such as a channel that is too wide, a poorly placed cross-section, or a need for additional cross-sections. Again, significant effort was made to reasonably resolve these drawdown situations.

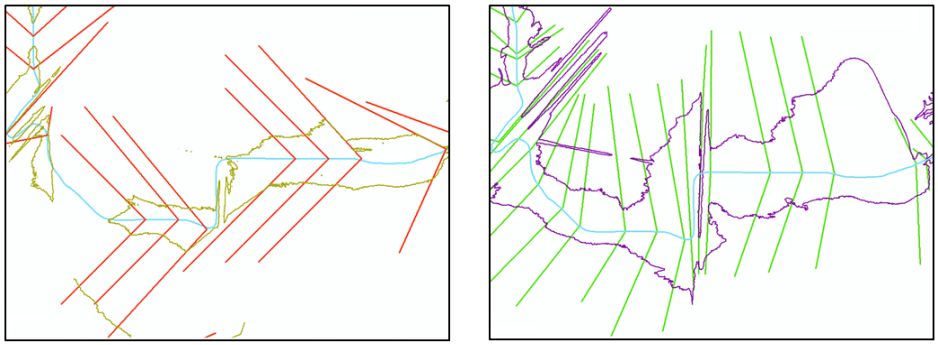

Figure 6: Default "V" angle cross-sections automated by WISE (left). Manually edited cross-sections to more accurately capture terrain (right). Resulting flood boundaries shown in gold (left) or purple (right) for clarity.

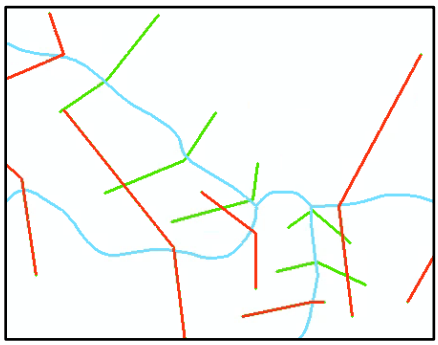

Figure 7: Manually added cross-sections (green) to improve accuracy of tie-ins at confluences.

1.5 One-Percent Special Flood Hazard Area Delineation

The 10-percent, 1-percent and 0.2-percent annual chance event boundaries were mapped using a routine that develops water surface elevation grids based on the 10-foot cell size DEM developed from the LiDAR dataset used for this project (see Section 1.1). This product was converted to a polygon for cleaning. The cleaning routine involved manual inspection of the polygons to identify and remove areas of disconnected flooding. In general, areas with a size of less than 5,000 square feet were removed and all others were investigated to determine whether they should be considered as potentially part of the SFHA. This investigation was aided by the ground DEM and aerial imagery. Manual adjustments to the polygons were made to account for spillways on dams which could not be accurately modeled using HEC-RAS as well as disconnected areas along the flooding source that should reasonably be connected.

Following the removal of disconnected flooding areas and other boundary adjustments, the small islands in the floodplain were filled. Islands with a size between roughly 5,000 and 30,000 square feet were inspected and, in general, islands that were less than 10,000 square feet were filled.

Once the island filling process was complete, the water surface raster mapping routine was run and set to conform to the polygon boundary. This ensures that the water surface raster and the floodplain boundary are consistent with each other. The depth raster product was created at the end of the process by performing a raster subtraction with the water surface elevation raster and the ground DEM.

Challenges

Challenges encountered during BLE analysis vary based on available data on which to run the analysis. The Pedernales Watershed presented challenges as summarized in the following paragraphs.

There are a significant number of small-sized dams on the tributaries throughout the watershed. Discharges calculated with the regression equations do not consider the impact of these structures. There may be need for further investigation when upgrading these models for detailed studies.

Along the Pedernales River mainstem at the downstream end of the HUC-08, Lake Travis is situated. Some of the part at the downstream end is zone AE and water surface elevations were reviewed to ensure they were reasonable with the current expected 1-percent annual chance event elevations.

A significant effort was made to improve water surface elevation tie-ins at stream confluences. As a 1D model, the cross sections were extended to contain, and multiple iterations were needed to analyze spills for mapping. Cross-sections were manually added on the downstream end of nearly every stream, some of which traverse the receiving stream, so that the water surface elevation of the tributary would be lower than that of the receiving stream. A coverage file named S_AOMI_AR, included in spatial files, identifies several spill area locations. Analysis and projects in the area of these spill will benefit from additional analysis to identify the amount and location of sub-basin interaction and spills within the analysis watershed. An S_AOMI_PT file identifies locations which contribute to flood losses or highlight flood issues and/or associated effects.

Results and Recommendations

The BLE results for this study produced a SFHA that compares reasonably well with the effective SFHA. These boundaries provide an additional estimated SFHA in areas that do not currently have an SFHA mapped. These results provide context for flood risk communication as part of the Discovery process and should be verified through community work map meetings before being applied to a regulatory product.

A map showing the BLE results is included as **Appendix B**.

1.6 CNMS Validation of Effective Zone A SFHA

The following summarizes the results of the CNMS validation assessments for the effective Zone A studies in the Pedernales Watershed.

1.6.1.1 Initial Assessment A1 – Significant Topography Update Check

The significant topography update check determines whether a topographic data source is available that is significantly better than what was used for the effective Zone A modeling and mapping. For most of the study area the effective Zone A topographic data source is unknown, but most likely would have leveraged contours from USGS 24K map products. This caused all reaches to FAIL this element because the elevation data leveraged in the BLE study represents a significant improvement from the USGS 24K map products.

1.6.1.2 Initial Assessment A2 – Check for Significant Hydrology Changes

The significant hydrology changes check determines whether new regression equations have become available from the USGS since the date of the effective Zone A study. If newer regression equations exist for the area of interest, then an engineer must determine whether these regression equations would significantly affect the 1-percent annual chance flow. All reaches but one FAIL this check because the studies did not use regression methods, or the hydrologic methods are unknown/undocumented.

1.6.1.3 Initial Assessment A3 – Check for Significant Development

The significant development check, using the National Urban Change Indicator (NUCI) dataset, assesses increased urbanization in the watershed of the BLE. If the percentage of urban area within the HUC-12 watershed containing the effective Zone A study is 15 percent or more and has increased by 50 percent or more since the effective analysis, the study would fail this check. Although the NUCI data provide year-to-year changes in urbanization, the NLCD also is needed to establish a baseline of urban land cover for this analysis. The check for significant development in the Pedernales study area was completed by evaluating percentage of urban change at the HUC-12 level. All of the watershed is classified as rural and, therefore, all reach PASS this assessment.

Table 7 presents the summarized results of checks A1 through A3.

Table 7: A1-A3 Validation Results

Assessment Checks	Pass / Fail	Notes
A1 - Topography	Fail/Pass	Available LiDAR sources in areas of effective studies that did not utilize LiDAR/Studies within Leon County utilized LiDAR for effective study
A2 - Hydrology	Pass	Regression was not used for effective studies or the most current regression equations were used
A3 - Development	Fail/Pass	>50% increase in urban since effective study in urban HUC-12/Less than 15% of study area is under urban cover

1.6.1.4 Validation Check A4 – Check of Studies Backed by Technical Data

Zone A studies that pass all initial assessment checks described above may be categorized as "Valid" in the CNMS Inventory only if the effective Zone A study is supported by modeling or sound engineering judgment and all regulatory products are in agreement. If the effective Zone A study passes all initial assessment checks, but is not supported by modeling, or if the original engineering method used is unsupported or undocumented, a comparison of the BLE results and effective Zone A's is performed. Due to lack of documentation of the original engineering methods in the Pedernales Watershed, check A4 has been marked as FAIL for all but three reaches.

1.6.1.5 Validation Check A5 – Comparison of BLE and Effective Zone A

The BLE/effective Zone A comparison method leverages the existing Floodplain Boundary Standard (FBS) certification procedures described in FEMA SID 113, but with a slight modification. This modified FBS comparison approach uses the 1-percent plus and 1-percent minus flood profiles and horizontal and vertical tolerances described in FEMA's Automated Engineering guidance document dated May 2016. For the comparison of BLE and effective Zone A in the Texas study area, the following vertical and horizontal tolerances were used to conduct the modified FBS procedure. One point was placed every 200 feet along the floodplain boundaries for comparison.

Vertical Tolerance: +/- 10 feet (one-half contour interval of assumed effective topographic source).
Horizontal Tolerance: +/- 75 feet (standard horizontal tolerance for BLE comparison testing).

Of the 529 modeled BLE streams in the study area, 363 were found to correspond (within the tolerance limits) with effective Zone A flood zones. Comparison results for these streams were grouped at the HUC-12 level and are summarized in Table 8 to better understand the general health of the HUC-12 watershed, but the validation check was performed at the stream level. Streams where the percentage of passing FBS sample points is greater than or equal to 85% are marked as "Pass", otherwise marked as "Fail".

Table 8: HUC-12 Zone A Validation Results

HUC-12 Watershed		Total FBS points	Fail	Pass	%Pass	BLE Comparison Pass? (>85%)	Priority Score
Watershed Name	Watershed Number						
Pedernales	**All Streams**	**38,892**	**19,331**	**19,561**	**50%**	**Fail**	
Banta Branch-Pedernales River	120902060101	1,944	1,011	933	48%	Fail	39.7
Klein Branch	120902060102	639	344	295	46%	Fail	43.1
Flag Creek-Pedernales River	120902060103	1,980	1,044	936	47%	Fail	42.2
White Oak Creek	120902060104	1,143	486	657	57%	Fail	34.0
Spring Creek-Pedernales River	120902060105	2,614	1,311	1,303	50%	Fail	36.1
Wolf Creek	120902060106	1,856	997	859	46%	Fail	27.2
Bear Creek-Pedernales River	120902060107	3,144	1,894	1,250	40%	Fail	30.1
Live Oak Creek	120902060108	2,789	1,229	1,560	56%	Fail	23.3
Muesebach Creek-Pedernales River	120902060109	1,817	954	863	47%	Fail	27.2

HUC-12 Watershed		Total FBS	Fail	Pass	%Pass	BLE	Priority
Barons Creek	120902060110	1,850	763	1,087	59%	Fail	23.4
Palo Alto Creek	120902060201	3,951	2,180	1,771	45%	Fail	28.5
Salt Branch-Pedernales River	120902060202	2,321	1,257	1,064	46%	Fail	31.4
South Grape Creek	120902060203	2,567	1,240	1,327	51%	Fail	24.2
Threemile Creek-Pedernales River	120902060204	1,513	1,022	491	32%	Fail	33.8
Wittington Creek-Pedernales River	120902060205	954	682	272	29%	Fail	35.8
Williams Creek-Pedernales River	120902060207	1,009	574	435	43%	Fail	28.4
Upper North Grape Creek	120902060209	1,981	771	1,210	61%	Fail	19.5
Lower North Grape Creek	120902060210	555	186	369	66%	Fail	16.8
Towhead Creek-Pedernales River	120902060301	191	132	59	31%	Fail	34.6
Cottonwood Creek-Pedernales River	120902060302	227	150	77	34%	Fail	33.0
Flat Creek	120902060306	537	155	382	71%	Fail	19.8
Roy Creek-Lake Travis	120902060307	1,708	527	1,181	69%	Fail	26.0
Lower Cypress Creek	120902060309	294	52	242	82%	Fail	16.0
Fall Creek-Lake Travis	120902060310	1,308	370	938	72%	Fail	25.5

VALIDATION RESULTS

Based on the validation assessments and BLE comparison results described above, the CNMS inventory of Zone A studies in the Pedernales Watershed has been updated as summarized in **Table 9** and illustrated in **Figure 8** below. The priority scores are illustrated in **Figure 9**.

Table 9: Aggregated Zone A Validation Results

Validation Status	Status Type	Total Miles
Valid	Being Studied	23.7
Unverified	Being Studied	516.0

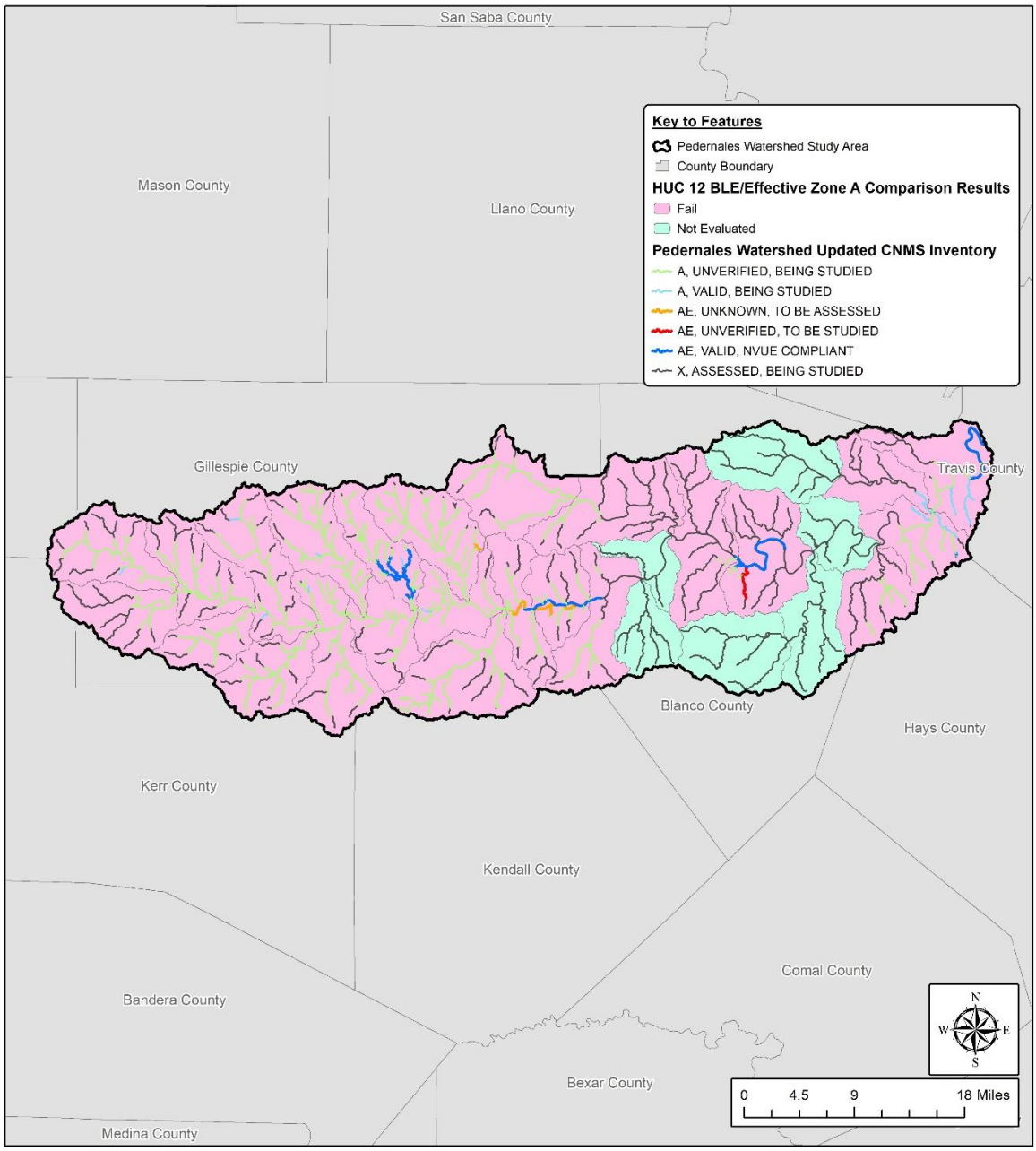

Figure 8: Pedernales Watershed CNMS Validation Result

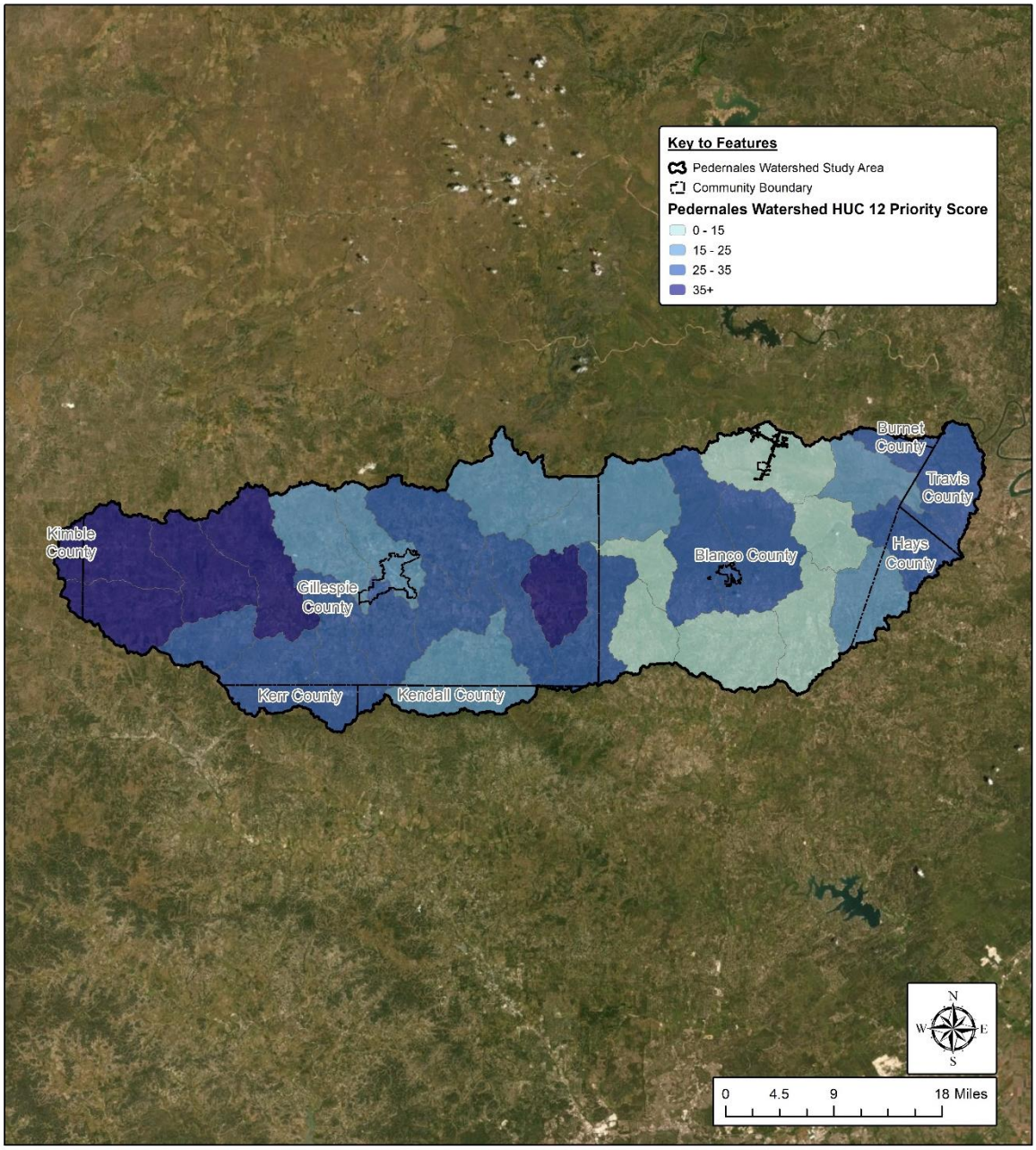

Figure 9: Ranking of Pedernales Watershed HUC-12s

1.7 Flood Risk Analysis

A flood risk analysis was performed for this project. The updated 1-percent annual chance grid (known as the 'refined' grid) was used to perform the flood risk analysis to produce the flood losses. The refined grid loss results are stored in the S_FRAC_Ar feature class.

Hazus version 4.2 was used for the basic and refined loss analysis.

The losses are reported via census blocks. It is important to note that Hazus version 4.2 uses dasymetric census blocks. Dasymetric mapping removes undeveloped areas (such as areas covered by other bodies of water, wetlands, or forests) from the Census blocks, changing their shape and reducing their size in these areas. For more information on dasymetric data visit FEMA's Media Library for the Hazus-MH Data Inventories: Dasymetric vs. Homogenous, or Hazus 3.0 Dasymetric Data Overview.

Hazus analysis was performed on a watershed level for the study area extents to ensure proper model processing. A summary of results per county for the 1-percent annual chance event scenarios are shown in **Table 10**.

Table 10: Hazus 4.2 Results for 1-Percent Annual Chance Scenario for Pedernales Watershed, TX

County	Full Replacement - Total Loss	Dollar Exposure (Replacement Value) - Buildings	Dollar Exposure (Replacement Value) - Contents
Blanco	$35,010,000	$699,664,000	$415,799,000
Burnet	$0	$63,438,000	$33,817,000
Gillespie	$121,728,000	$2,814,981,000	$1,774,051,000
Hays	$1,000,000	$326,372,000	$180,745,000
Kendall	$212,000	$77,695,000	$43,954,000
Kerr	$1,177,000	$131,178,000	$77,082,000
Kimble	$142,000	$13,434,000	$6,715,000
Travis	$23,190,000	$657,440,000	$370,994,000
Total	**$182,459,000**	**$4,784,202,000**	**$2,903,157,000**

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Appendix A Summary of Peak Qs

Table A-1: Summary of Hydrology

Stream Name	Drainage Area (sq. mi.)	1% Peak Discharge (cfs)	1%- Peak Discharge (cfs)	1%+ Peak Discharge (cfs)
Headwaters Pedernales River				
ADOBE CREEK	1.29715	2849	2106	3852
ADOBE CREEK	2.57269	4719	3490	6382
BANTA BRANCH	1.34907	2674	1977	3616
BANTA BRANCH	2.61514	4410	3261	5964
BANTA BRANCH	3.43806	5299	3918	7167
BANTA BRANCH	4.78491	6703	4956	9065
BANTA BRANCH	4.90637	7026	5195	9502
BANTA BRANCH	5.46077	7538	5574	10194
BANTA BRANCH	6.54844	8753	6472	11838
BARONS CREEK	0.43432	720	533	974
BARONS CREEK	2.16297	2859	2114	3866
BARONS CREEK	2.28779	2971	2197	4018
BARONS CREEK	4.27764	4995	3693	6755
BARONS CREEK	4.82686	5327	3939	7204
BARONS CREEK	6.29923	6398	4731	8653
BARONS CREEK	8.18205	7380	5457	9981
BARONS CREEK	10.12432	8509	6292	11507
BARONS CREEK	11.19953	9159	6773	12387
BARONS CREEK	12.45938	9927	7340	13425
BARONS CREEK	13.93785	10379	7674	14036
BARONS CREEK	14.68741	10646	7872	14397
BARONS CREEK	15.36413	11068	8184	14969
BARONS CREEK	18.08963	12009	8880	16241
BARONS CREEK	19.13166	12367	9145	16726
BARONS CREEK	19.40275	12455	9210	16845
BARONS CREEK	19.67096	12355	9135	16708
BARONS CREEK	23.17359	13924	10296	18831
BARONS CREEK	28.18804	15712	11618	21249
BARONS CREEK	30.34132	16264	12026	21996
BARONS CREEK	32.42681	16773	12403	22684
DEVILS CREEK	1.0692	2877	2127	3891
DEVILS CREEK	2.03078	4547	3362	6150
DEVILS CREEK	2.82764	5845	4322	7905
DITTMAR CREEK	1.06991	2364	1748	3198

Stream Name	Drainage Area (sq. mi.)	1% Peak Discharge (cfs)	1%- Peak Discharge (cfs)	1%+ Peak Discharge (cfs)
DITTMAR CREEK	1.5642	3056	2260	4133
DITTMAR CREEK	4.27212	6998	5175	9464
DITTMAR CREEK	5.5326	8263	6110	11175
DITTMAR CREEK	6.32353	8983	6643	12149
DITTMAR CREEK	6.92875	9681	7158	13092
DITTMAR CREEK	8.84824	11545	8537	15613
DITTMAR CREEK	9.92959	12655	9358	17115
DITTMAR CREEK	10.55432	13014	9623	17600
DRY CREEK	0.70388	1457	1077	1970
DRY CREEK	1.20918	2038	1507	2756
DRY CREEK	1.81978	2738	2024	3702
FLAG CREEK	0.91487	2322	1717	3140
FLAG CREEK	1.99222	4286	3169	5796
FLAG CREEK	2.72666	5370	3970	7262
FLAG CREEK	5.25972	8857	6549	11978
FLAG CREEK	6.3834	10232	7566	13837
FLAG CREEK	7.2835	11142	8239	15068
FLAG CREEK	8.26572	11681	8637	15797
FLAG CREEK	14.66421	16925	12515	22889
FLAG CREEK	15.45533	16765	12397	22673
GARDEN CREEK	0.4803	1011	747	1367
HONEY CREEK	1.07135	2885	2133	3902
HONEY CREEK	2.06567	4793	3544	6481
HONEY CREEK	2.95471	6069	4488	8207
HONEY CREEK	3.94079	7522	5562	10173
HONEY CREEK	5.52602	9087	6719	12289
HONEY CREEK	5.70791	9099	6728	12305
HONEY CREEK	8.32824	10628	7859	14374
HONEY CREEK	8.5256	10652	7877	14406
HONEY CREEK	9.57	11254	8322	15220
HONEY CREEK	11.07147	11756	8693	15899
HONEY CREEK	11.86725	11941	8830	16149
LIVE OAK CREEK	1.18972	3376	2496	4565
LIVE OAK CREEK	2.00056	4803	3551	6495
LIVE OAK CREEK	3.13836	6750	4991	9128
LIVE OAK CREEK	4.27813	8206	6068	11097
LIVE OAK CREEK	7.50348	11911	8808	16109
LIVE OAK CREEK	8.91667	12168	8997	16455

Stream Name	Drainage Area (sq. mi.)	1% Peak Discharge (cfs)	1%- Peak Discharge (cfs)	1%+ Peak Discharge (cfs)
LIVE OAK CREEK	10.37649	12556	9284	16981
LIVE OAK CREEK	10.83832	12504	9246	16910
LIVE OAK CREEK	19.92815	17283	12779	23373
LIVE OAK CREEK	21.3547	17924	13254	24241
LIVE OAK CREEK	22.78825	18162	13429	24561
LIVE OAK CREEK	34.79244	25595	18926	34614
LIVE OAK CREEK	35.79079	25490	18848	34472
LIVE OAK CREEK	37.16514	25835	19103	34939
LIVE OAK CREEK	38.11436	25753	19043	34828
LIVE OAK CREEK	38.81482	25772	19057	34854
LIVE OAK CREEK	40.27778	25393	18776	34341
LIVE OAK CREEK	41.30474	25279	18692	34186
LIVE OAK CREEK	44.96622	25715	19015	34777
LIVE OAK CREEK	45.35016	25501	18856	34487
MIDDLE CREEK	0.97891	2765	2045	3740
MIDDLE CREEK	1.71213	4095	3028	5538
MIDDLE CREEK	2.45306	4827	3569	6528
MOCCASIN CREEK	1.00176	1868	1381	2526
MOCCASIN CREEK	2.03294	3127	2312	4229
MUD CREEK	0.34597	798	590	1079
MUD CREEK	1.32441	3241	2397	4383
MUD CREEK	2.38725	4334	3205	5862
MUD CREEK	3.29857	4762	3521	6440
MUD CREEK	4.04767	5406	3997	7311
MUD CREEK	4.83573	5536	4093	7486
MUD CREEK	7.69467	7564	5593	10229
NASSE CREEK	0.38273	827	611	1118
NASSE CREEK	1.93671	2593	1917	3506
NASSE CREEK	3.96239	4702	3477	6359
NASSE CREEK	5.47951	5627	4161	7610
NASSE CREEK	6.46065	6192	4579	8374
NASSE CREEK	7.52141	7014	5186	9485
NORTH CREEK	1.27993	3462	2560	4683
NORTH CREEK	2.48705	5561	4112	7520
NORTH CREEK	6.66744	10381	7676	14039
NORTH CREEK	7.54769	10882	8047	14717
PECAN CREEK	0.87272	1590	1176	2150
PECAN CREEK	1.38629	2270	1679	3070

Stream Name	Drainage Area (sq. mi.)	1% Peak Discharge (cfs)	1%- Peak Discharge (cfs)	1%+ Peak Discharge (cfs)
PECAN CREEK	3.04214	4017	2970	5432
PECAN CREEK	4.16182	5126	3791	6933
PECAN CREEK	7.19814	7023	5193	9498
PECAN CREEK	8.51026	7901	5843	10686
SPRING CREEK	0.82564	2050	1516	2772
SPRING CREEK	4.40117	7278	5381	9842
SPRING CREEK	5.24053	8127	6009	10991
SPRING CREEK	8.6967	12003	8875	16232
SPRING CREEK	10.92638	14368	10624	19431
SPRING CREEK	14.05595	17200	12718	23260
SPRING CREEK	15.31993	17970	13288	24303
SPRING CREEK	15.63711	18334	13557	24794
SPRING CREEK	26.7898	26489	19587	35823
SPRING CREEK	27.93614	26900	19891	36379
SPRING CREEK	30.46723	28138	20806	38054
SPRING CREEK	32.51792	28726	21241	38849
SPRING CREEK	34.95995	30003	22186	40576
SPRING CREEK	37.5768	31441	23248	42520
SPRING CREEK	38.30519	31567	23342	42691
SPRING CREEK	39.3306	32155	23776	43485
SPRING CREEK	40.36144	32386	23947	43798
SPRING CREEK	42.54306	33429	24719	45209
STINK CREEK	0.33763	752	556	1017
STINK CREEK	1.76113	2600	1922	3516
STINK CREEK	2.63627	3340	2469	4516
STUCKENS BRANCH	1.02101	2222	1643	3005
STUCKENS BRANCH	1.79101	3497	2586	4729
STUCKENS BRANCH	2.47546	4447	3288	6014
STUCKENS BRANCH	3.42712	5617	4153	7596
STUCKENS BRANCH	4.41552	6802	5030	9199
STUCKENS BRANCH	5.02244	7461	5517	10091
TOWN CREEK	0.73623	1362	1007	1842
TOWN CREEK	2.66084	3771	2788	5100
TOWN CREEK	2.78612	3730	2758	5044
UNT 0001 IN HEWA	1.44135	3137	2319	4242
UNT 0001 IN HEWA	1.96075	3684	2724	4982
UNT 0001 IN HEWA	2.4988	4319	3193	5841
UNT 0002 IN HEWA	1.0561	2428	1795	3283

Stream Name	Drainage Area (sq. mi.)	1% Peak Discharge (cfs)	1%- Peak Discharge (cfs)	1%+ Peak Discharge (cfs)
UNT 0002 IN HEWA	2.21363	4257	3148	5757
UNT 0003 IN HEWA	0.94455	2109	1560	2852
UNT 0004 IN HEWA	1.10193	2245	1660	3037
UNT 0005 IN HEWA	0.30238	791	585	1070
UNT 0007 IN HEWA	1.17923	3336	2467	4512
UNT 0007 IN HEWA	2.3485	5365	3967	7255
UNT 0007 IN HEWA	3.52379	6764	5002	9148
UNT 0008 IN HEWA	1.33804	2008	1485	2716
UNT 0008 IN HEWA	2.0246	2468	1825	3338
UNT 0009 IN HEWA	1.03602	1856	1372	2510
UNT 0009 IN HEWA	1.99994	2931	2168	3964
UNT 0010 IN HEWA	0.2826	675	499	913
UNT 0012 IN HEWA	0.47241	945	699	1278
UNT 0013 IN HEWA	0.9919	1336	988	1806
UNT 0014 IN HEWA	1.20353	1395	1032	1887
UNT 0015 IN HEWA	0.27753	561	414	758
UNT 0016 IN HEWA	0.72933	1621	1199	2192
UNT 0017 IN HEWA	1.07045	2767	2046	3742
UNT 0018 IN HEWA	1.16138	2887	2135	3905
UNT 0018 IN HEWA	1.82821	3794	2805	5131
UNT 0019 IN HEWA	1.17519	1116	825	1509
UNT 0020 IN HEWA	1.74185	2609	1929	3529
UNT 0020 IN HEWA	2.50965	3112	2301	4209
UNT 0020 IN HEWA	3.34708	3717	2748	5027
UNT 0025 IN HEWA	0.39959	883	653	1194
UNT 0026 IN HEWA	0.16993	460	340	622
UNT 0026 IN HEWA	0.56217	1333	985	1802
UNT 0029 IN HEWA	1.05279	1955	1446	2644
UNT 0030 IN HEWA	1.10527	2014	1489	2723
UNT 0030 IN HEWA	1.38288	2231	1650	3017
UNT 0031 IN HEWA	0.44129	1020	754	1380
UNT 0033 IN HEWA	1.15977	2585	1912	3496
UNT 0034 IN HEWA	0.09518	310	230	420
UNT 0035 IN HEWA	0.82473	1776	1313	2402
UNT 0035 IN HEWA	1.45387	3255	2407	4402
UNT 0035 IN HEWA	1.58295	3378	2498	4569
UNT 0036 IN HEWA	0.62245	1623	1200	2195
UNT 0037 IN HEWA	1.0436	1775	1313	2401

Stream Name	Drainage Area (sq. mi.)	1% Peak Discharge (cfs)	1%- Peak Discharge (cfs)	1%+ Peak Discharge (cfs)
UNT 0038 IN HEWA	0.68063	1237	915	1673
UNT 0039 IN HEWA	1.06899	1853	1370	2506
UNT 0039 IN HEWA	1.35248	2148	1588	2904
UNT 0040 IN HEWA	0.60828	1231	910	1664
UNT 0041 IN HEWA	0.40716	855	633	1157
UNT 0041 IN HEWA	0.60073	1144	846	1547
UNT 0042 IN HEWA	0.8998	1632	1207	2207
UNT 0043 IN HEWA	0.53823	1120	828	1514
UNT 0045 IN HEWA	0.449	783	579	1059
UNT 0046 IN HEWA	1.14784	3365	2488	4551
UNT 0048 IN HEWA	0.92339	2677	1980	3621
UNT 0049 IN HEWA	0.70891	1292	955	1747
UNT 0050 IN HEWA	0.26337	631	467	854
UNT 0051 IN HEWA	1.05996	1753	1296	2370
UNT 0051 IN HEWA	1.5955	2355	1741	3185
UNT 0051 IN HEWA	2.38177	3127	2313	4229
UNT 0053 IN HEWA	1.16237	1870	1383	2529
UNT 0054 IN HEWA	1.04463	1776	1313	2402
UNT 0055 IN HEWA	0.84169	1510	1117	2042
UNT 0056 IN HEWA	1.08068	1824	1349	2466
UNT 0056 IN HEWA	1.85161	2851	2108	3856
UNT 0057 IN HEWA	0.67068	1244	920	1683
UNT 0058 IN HEWA	1.03037	1746	1291	2362
UNT 0059 IN HEWA	0.82689	1401	1036	1894
UNT 0059 IN HEWA	1.23707	1946	1439	2631
UNT 0060 IN HEWA	0.37341	776	574	1049
UNT 0062 IN HEWA	0.10196	285	210	385
UNT 0063 IN HEWA	0.37287	802	593	1084
UNT 0064 IN HEWA	0.2067	607	449	821
UNT 0064 IN HEWA	1.09516	1994	1475	2697
UNT 0065 IN HEWA	0.15819	487	360	659
UNT 0067 IN HEWA	1.02857	1850	1368	2502
UNT 0067 IN HEWA	1.77503	2606	1927	3525
UNT 0067 IN HEWA	2.51099	3340	2469	4516
UNT 0067 IN HEWA	3.49204	4102	3033	5547
UNT 0067 IN HEWA	3.88939	4406	3258	5959
UNT 0068 IN HEWA	0.72957	1540	1138	2082
UNT 0069 IN HEWA	0.16053	476	352	644

Stream Name	Drainage Area (sq. mi.)	1% Peak Discharge (cfs)	1%- Peak Discharge (cfs)	1%+ Peak Discharge (cfs)
UNT 0069 IN HEWA	0.91298	1702	1258	2301
UNT 0069 IN HEWA	1.665	2841	2101	3842
UNT 0070 IN HEWA	0.11316	316	234	427
UNT 0071 IN HEWA	0.71265	939	694	1269
UNT 0072 IN HEWA	1.22382	1726	1276	2334
UNT 0072 IN HEWA	1.67477	2120	1567	2867
UNT 0074 IN HEWA	1.31867	2987	2209	4040
UNT 0074 IN HEWA	2.59089	5013	3707	6780
UNT 0075 IN HEWA	1.00194	2768	2047	3744
UNT 0075 IN HEWA	1.60698	3892	2878	5264
UNT 0076 IN HEWA	1.03566	2792	2064	3775
UNT 0076 IN HEWA	1.63648	3976	2940	5377
UNT 0078 IN HEWA	1.10265	2296	1697	3105
UNT 0078 IN HEWA	1.38952	2697	1994	3648
UNT 0079 IN HEWA	0.57939	1535	1135	2076
UNT 0080 IN HEWA	1.27805	3389	2506	4583
UNT 0080 IN HEWA	2.25013	5115	3782	6918
UNT 0081 IN HEWA	1.03853	2990	2211	4044
UNT 0081 IN HEWA	1.41149	3766	2785	5093
UNT 0082 IN HEWA	1.0579	3066	2267	4146
UNT 0082 IN HEWA	2.25694	4986	3687	6743
UNT 0083 IN HEWA	1.30172	3723	2753	5035
UNT 0083 IN HEWA	1.84578	4737	3503	6406
UNT 0084 IN HEWA	1.25267	3170	2344	4286
UNT 0085 IN HEWA	1.02176	2196	1624	2970
UNT 0085 IN HEWA	2.27049	3966	2933	5364
UNT 0085 IN HEWA	4.36635	6668	4930	9017
UNT 0085 IN HEWA	5.87699	8253	6103	11161
UNT 0085 IN HEWA	6.8493	8970	6633	12131
UNT 0086 IN HEWA	1.01037	2137	1580	2889
UNT 0086 IN HEWA	1.39346	2657	1965	3594
UNT 0087 IN HEWA	0.99495	2393	1770	3236
UNT 0089 IN HEWA	1.26071	2863	2117	3871
UNT 0089 IN HEWA	1.53362	3202	2368	4331
UNT 0091 IN HEWA	0.39018	953	705	1289
UNT 0092 IN HEWA	0.76879	1621	1199	2193
UNT 0094 IN HEWA	0.92016	2093	1548	2831
UNT 0095 IN HEWA	0.71516	1660	1228	2245

Stream Name	Drainage Area (sq. mi.)	1% Peak Discharge (cfs)	1%- Peak Discharge (cfs)	1%+ Peak Discharge (cfs)
UNT 0096 IN HEWA	0.3518	874	646	1182
UNT 0097 IN HEWA	0.31503	769	569	1040
UNT 0098 IN HEWA	0.11371	344	254	465
UNT 0099 IN HEWA	0.20231	508	376	687
UNT 0100 IN HEWA	0.56379	1357	1004	1835
UNT 0101 IN HEWA	0.59614	1052	778	1422
UNT 0102 IN HEWA	0.01739	48	36	65
UNT 0103 IN HEWA	0.38202	1192	881	1612
WALNUT CREEK	1.06238	1877	1388	2538
WALNUT CREEK 2	1.03539	2856	2111	3862
WALNUT CREEK 2	1.80637	4309	3186	5827
WALNUT CREEK 2	2.42168	5214	3855	7051
WALNUT CREEK 2	3.17701	5993	4431	8104
WINFRIED CREEK	0.43986	1004	743	1358
WINFRIED CREEK	0.82878	1623	1200	2195
BARNETT BRANCH	1.31365	3319	2454	4488
BARNETT BRANCH	2.17166	4495	3324	6079
BEAR CREEK	0.98015	1633	1208	2209
BEAR CREEK	2.18592	2997	2216	4053
BEAR CREEK	4.97787	5500	4067	7438
BEAR CREEK	7.18944	7221	5339	9765
BEAR CREEK	8.34607	7682	5680	10389
BEAR CREEK	12.14247	10049	7430	13589
BEAR CREEK	13.3277	10707	7917	14479
BEAR CREEK	14.1589	11071	8187	14973
BEAR CREEK	15.16739	11620	8592	15715
BEAR CREEK	16.07149	11662	8623	15771
BEAR CREEK	17.01183	11680	8636	15795
BEAR CREEK	28.67166	17446	12900	23593
BEAR CREEK	29.63387	17699	13088	23936
BEAR CREEK	31.11665	17914	13246	24226
BEAR CREEK	32.12882	17696	13085	23932
BEAR CREEK	36.6688	18978	14033	25665
BURR OAK CREEK	0.3934	1401	1036	1894
BURR OAK CREEK	1.19779	3598	2660	4866
BURR OAK CREEK	2.61735	6596	4877	8920
BURR OAK CREEK	3.61633	7396	5469	10003
BURR OAK CREEK	5.23757	9185	6792	12422

Stream Name	Drainage Area (sq. mi.)	1% Peak Discharge (cfs)	1%- Peak Discharge (cfs)	1%+ Peak Discharge (cfs)
BURR OAK CREEK	8.01387	12830	9487	17352
DELAWARE CREEK	1.00544	2990	2211	4044
DELAWARE CREEK	1.91986	4672	3455	6319
DELAWARE CREEK	3.28528	7171	5303	9698
DELAWARE CREEK	3.8393	7667	5669	10369
KLEIN BRANCH	1.00042	2145	1586	2900
KLEIN BRANCH	3.78976	5444	4026	7363
KLEIN BRANCH	6.40164	8450	6248	11427
KLEIN BRANCH	8.84403	10890	8053	14728
KLEIN BRANCH	9.69478	11200	8282	15147
KLEIN BRANCH	12.82005	13560	10027	18339
KLEIN BRANCH	13.9201	14351	10612	19408
KLEIN BRANCH	15.06489	15043	11124	20344
KLEIN BRANCH	15.86703	15383	11375	20804
KLEIN BRANCH	16.45925	15584	11524	21076
KLEIN BRANCH	25.60199	22169	16392	29981
KLEIN BRANCH	26.59272	22287	16480	30141
KLEIN BRANCH	27.6351	22594	16707	30555
KLEIN BRANCH	38.01196	28842	21327	39006
KLEIN BRANCH	41.43064	29619	21901	40056
LEFT BEAR CREEK	1.11484	1659	1227	2244
LEFT BEAR CREEK	2.4685	3252	2405	4398
LEFT BEAR CREEK	3.65059	4076	3014	5513
LEFT BEAR CREEK	6.22301	6130	4533	8291
LEFT BEAR CREEK	7.1342	6506	4811	8799
LEFT BEAR CREEK	10.91015	8947	6615	12099
LEFT BEAR CREEK	11.65167	9149	6765	12372
MIDDLE CREEK	1.00015	2773	2051	3750
MIDDLE CREEK	1.5375	3831	2835	5185
MIDDLE CREEK	2.04039	4546	3361	6148
MIDDLE CREEK	2.66694	5345	3952	7228
MUESEBACH CREEK	1.51114	2519	1862	3406
MUESEBACH CREEK	2.1522	3078	2276	4162
MUESEBACH CREEK	7.84886	9186	6793	12423
MUESEBACH CREEK	10.58512	11063	8180	14962
MUESEBACH CREEK	11.36189	10973	8114	14839
MUESEBACH CREEK	13.68098	11743	8683	15882
NOTT BRANCH	1.08094	2356	1742	3186

Stream Name	Drainage Area (sq. mi.)	1% Peak Discharge (cfs)	1%- Peak Discharge (cfs)	1%+ Peak Discharge (cfs)
NOTT BRANCH	3.76331	6355	4699	8595
NOTT BRANCH	4.83313	7431	5495	10049
NOTT BRANCH	8.23335	10583	7825	14312
NOTT BRANCH	10.28771	12738	9419	17227
PECAN CREEK	0.98992	2146	1587	2902
PECAN CREEK	1.79897	3735	2762	5051
PECAN CREEK 2	1.10803	1888	1396	2553
PECAN CREEK 2	1.54752	2336	1727	3159
SALT CREEK	0.4225	824	610	1115
SALT CREEK	1.43754	2029	1500	2744
SALT CREEK	1.92905	2577	1906	3485
SPANISH OAK CREEK	1.06086	2399	1774	3244
SPANISH OAK CREEK	1.86838	3781	2796	5113
SPANISH OAK CREEK	3.17118	5603	4143	7578
STEVENS CREEK	1.00983	2429	1796	3285
STEVENS CREEK	2.24385	4224	3123	5713
STEVENS CREEK	3.50764	5934	4388	8025
STEVENS CREEK	4.35507	6698	4953	9059
STEVENS CREEK	8.15174	10732	7936	14514
TROUGH CREEK	1.18228	3062	2264	4142
TROUGH CREEK	2.33855	5051	3735	6831
TROUGH CREEK	3.46899	6861	5073	9279
TROUGH CREEK	4.76803	8250	6100	11157
UNT 1003 IN HEWA	0.99486	2575	1904	3483
UNT 1004 IN HEWA	1.17214	3055	2259	4132
UNT 1004 IN HEWA	2.12019	4796	3546	6486
UNT 1004 IN HEWA	2.91274	5855	4329	7918
UNT 1004 IN HEWA	4.86398	8204	6066	11095
UNT 1005 IN HEWA	1.33876	3225	2384	4361
UNT 1006 IN HEWA	1.26065	3282	2427	4438
UNT 1006 IN HEWA	1.83716	3932	2907	5317
UNT 1007 IN HEWA	1.06669	3039	2247	4110
UNT 1007 IN HEWA	2.121	5481	4053	7412
UNT 1007 IN HEWA	3.11029	6994	5171	9458
UNT 1008 IN HEWA	1.02983	3378	2498	4569
UNT 1009 IN HEWA	0.39654	1472	1088	1990
UNT 1010 IN HEWA	0.82178	2320	1715	3137
UNT 1012 IN HEWA	1.10215	2099	1552	2839

Stream Name	Drainage Area (sq. mi.)	1% Peak Discharge (cfs)	1%- Peak Discharge (cfs)	1%+ Peak Discharge (cfs)
UNT 1013 IN HEWA	1.35436	3306	2444	4471
UNT 1013 IN HEWA	2.48571	5264	3892	7119
UNT 1014 IN HEWA	1.00696	2135	1578	2887
UNT 1014 IN HEWA	2.29461	4063	3004	5495
UNT 1014 IN HEWA	3.28166	5189	3837	7017
UNT 1014 IN HEWA	4.10802	6043	4468	8172
UNT 1014 IN HEWA	5.30796	7108	5256	9613
UNT 1015 IN HEWA	1.06552	2891	2138	3910
UNT 1015 IN HEWA	2.26394	5265	3893	7120
UNT 1015 IN HEWA	2.91444	5768	4265	7800
UNT 1017 IN HEWA	0.59275	1516	1121	2051
UNT 1018 IN HEWA	1.23133	2187	1617	2957
UNT 1018 IN HEWA	2.74756	4158	3075	5624
UNT 1018 IN HEWA	4.72951	6494	4802	8782
UNT 1019 IN HEWA	1.22496	2230	1649	3016
UNT 1020 IN HEWA	1.00288	1862	1377	2518
UNT 1020 IN HEWA	1.89452	3046	2252	4119
UNT 1023 IN HEWA	1.07234	2049	1515	2771
UNT 1023 IN HEWA	1.4287	2482	1835	3356
UNT 1025 IN HEWA	1.20227	2990	2211	4043
UNT 1028 IN HEWA	1.34235	3868	2860	5231
UNT 1028 IN HEWA	2.38109	5318	3932	7191
UNT 1028 IN HEWA	2.48015	5431	4016	7345
UNT 1030 IN HEWA	0.22724	848	627	1147
UNT 1031 IN HEWA	0.62907	2125	1571	2874
UNT 1033 IN HEWA	0.16751	693	513	938
UNT 1034 IN HEWA	1.30199	2742	2028	3709
UNT 1034 IN HEWA	2.41585	4493	3322	6076
UNT 1035 IN HEWA	1.29948	2290	1693	3097
UNT 1035 IN HEWA	1.85708	2908	2150	3933
UNT 1037 IN HEWA	1.1413	3202	2368	4331
UNT 1039 IN HEWA	1.27697	2427	1794	3282
UNT 1039 IN HEWA	2.39989	3966	2933	5364
UNT 1040 IN HEWA	1.25079	2470	1827	3341
UNT 1041 IN HEWA	1.08615	2460	1819	3327
UNT 1041 IN HEWA	2.02128	3602	2663	4871
UNT 1043 IN HEWA	1.00705	2242	1658	3033
UNT 1043 IN HEWA	1.98003	3705	2739	5010

Stream Name	Drainage Area (sq. mi.)	1% Peak Discharge (cfs)	1%- Peak Discharge (cfs)	1%+ Peak Discharge (cfs)
UNT 1043 IN HEWA	2.58955	4511	3335	6100
UNT 1044 IN HEWA	1.19833	2726	2016	3687
UNT 1044 IN HEWA	1.73226	3563	2635	4819
UNT 1047 IN HEWA	1.05557	2606	1927	3524
UNT 1047 IN HEWA	1.99348	4098	3031	5543
UNT 1048 IN HEWA	1.01252	2604	1926	3522
UNT 1048 IN HEWA	1.56465	3560	2632	4814
UNT 1050 IN HEWA	1.08265	1704	1260	2304
UNT 1050 IN HEWA	1.63334	2259	1671	3055
UNT 1051 IN HEWA	0.92643	1421	1051	1922
UNT 1051 IN HEWA	1.70652	2361	1746	3193
UNT 1052 IN HEWA	1.18192	2327	1721	3147
UNT 1052 IN HEWA	2.17597	3224	2384	4360
UNT 1052 IN HEWA	3.26256	4051	2996	5479
UNT 1054 IN HEWA	0.97558	1523	1126	2060
UNT 1054 IN HEWA	1.68338	2475	1830	3347
UNT 1055 IN HEWA	1.27168	2006	1483	2712
UNT 1055 IN HEWA	2.66281	3566	2637	4823
UNT 1056 IN HEWA	0.93737	1574	1164	2128
UNT 1057 IN HEWA	0.5654	986	729	1334
UNT 1058 IN HEWA	1.33311	2099	1552	2839
UNT 1058 IN HEWA	2.79001	3712	2745	5020
UNT 1058 IN HEWA	3.4742	4228	3126	5718
UNT 1059 IN HEWA	0.19622	765	566	1035
UNT 1060 IN HEWA	1.00813	1782	1318	2410
UNT 1060 IN HEWA	1.83493	2576	1905	3483
UNT 1060 IN HEWA	4.16855	4820	3564	6519
UNT 1060 IN HEWA	6.37918	6479	4791	8762
UNT 1061 IN HEWA	1.03745	1540	1139	2083
UNT 1061 IN HEWA	1.77835	2035	1504	2751
UNT 1062 IN HEWA	1.01243	1933	1429	2614
UNT 1062 IN HEWA	1.45014	2277	1683	3079
UNT 1063 IN HEWA	1.01109	3521	2604	4762
UNT 1063 IN HEWA	1.67459	4804	3552	6496
UNT 1064 IN HEWA	1.0023	3630	2684	4909
UNT 1064 IN HEWA	1.93205	5806	4293	7852
UNT 1065 IN HEWA	0.54549	2139	1581	2892
UNT 1066 IN HEWA	1.00033	2325	1719	3144

Stream Name	Drainage Area (sq. mi.)	1% Peak Discharge (cfs)	1%- Peak Discharge (cfs)	1%+ Peak Discharge (cfs)
UNT 1066 IN HEWA	1.87215	3596	2659	4864
UNT 1066 IN HEWA	3.02501	5287	3909	7150
UNT 1067 IN HEWA	0.75175	1856	1373	2510
UNT 1068 IN HEWA	0.48747	1377	1018	1862
UNT 1069 IN HEWA	0.84797	2013	1489	2723
UNT 1070 IN HEWA	0.65158	1582	1170	2139
UNT 1071 IN HEWA	1.00042	2055	1519	2779
UNT 1071 IN HEWA	1.65415	3003	2220	4061
UNT 1072 IN HEWA	0.90339	1686	1247	2280
UNT 1073 IN HEWA	0.7426	3567	2637	4824
UNT 1074 IN HEWA	0.06039	273	202	370
UNT 1075 IN HEWA	0.58531	1631	1206	2206
UNT 1076 IN HEWA	0.60109	1246	921	1685
UNT 1077 IN HEWA	0.80196	1500	1109	2029
UNT 1078 IN HEWA	0.27988	1027	759	1389
UNT 1079 IN HEWA	0.42784	1627	1203	2201
UNT 1080 IN HEWA	0.27311	829	613	1121
UNT 1081 IN HEWA	0.30328	1025	758	1387
UNT 1082 IN HEWA	0.56217	1599	1182	2162
UNT 1083 IN HEWA	0.55054	1172	867	1585
UNT 1084 IN HEWA	0.44532	1000	739	1352
UNT 1085 IN HEWA	0.23084	935	691	1265
UNT 1086 IN HEWA	0.18798	794	587	1074
WALNUT CREEK	1.13717	3398	2512	4595
WALNUT CREEK	2.06091	4955	3664	6701
WHITE OAK CREEK	1.03126	2269	1678	3068
WHITE OAK CREEK	1.79897	3502	2590	4737
WHITE OAK CREEK	2.56005	4607	3407	6231
WHITE OAK CREEK	3.5949	6036	4463	8162
WHITE OAK CREEK	4.05457	6550	4843	8858
WHITE OAK CREEK	5.8461	8286	6127	11206
WHITE OAK CREEK	9.69451	11998	8872	16226
WHITE OAK CREEK	10.44052	12222	9037	16528
WHITE OAK CREEK	11.52541	13096	9684	17711
WHITE OAK CREEK	16.86691	17033	12595	23035
WHITE OAK CREEK	19.34227	18699	13827	25288
WHITE OAK CREEK	20.35214	19394	14341	26228
WHITE OAK CREEK	21.23956	19452	14383	26306

Stream Name	Drainage Area (sq. mi.)	1% Peak Discharge (cfs)	1%- Peak Discharge (cfs)	1%+ Peak Discharge (cfs)
WHITE OAK CREEK	24.53934	21697	16043	29343
WHITE OAK CREEK	26.55219	22450	16600	30360
WHITE OAK CREEK	27.67555	22868	16910	30927
WOLF CREEK	0.54558	1588	1175	2148
WOLF CREEK	1.34378	3489	2580	4718
WOLF CREEK	2.01993	4568	3378	6178
WOLF CREEK	3.23952	6917	5115	9355
WOLF CREEK	4.20051	8173	6043	11053
WOLF CREEK	5.43279	9318	6890	12602
WOLF CREEK	10.21588	15624	11553	21129
WOLF CREEK	13.4849	18625	13772	25189
WOLF CREEK	14.10877	17987	13300	24326
WOLF CREEK	16.71943	20165	14910	27270
WOLF CREEK	26.1552	27384	20249	37034
WOLF CREEK	29.75395	27868	20606	37688
WOLF CREEK	31.75046	28337	20954	38323
WOLF CREEK	35.61905	30611	22635	41398
WOLF CREEK	36.88761	30361	22450	41059
WOLF CREEK	37.80194	30546	22587	41310
WOLF CREEK	38.30669	30002	22184	40574
WOLF CREEK	38.82888	29987	22173	40554
North Grape Creek – Pedernales River				
BASIN SPRING BRANCH	1.10247	1378	1019	1863
BASIN SPRING BRANCH	2.31183	2551	1886	3449
BASIN SPRING BRANCH	3.32372	3419	2528	4624
BASIN SPRING BRANCH	4.57083	4788	3541	6476
CAVE CREEK	1.01593	2120	1568	2867
CAVE CREEK	1.6473	2692	1991	3641
CAVE CREEK	4.39759	5458	4036	7382
CAVE CREEK	5.1409	6224	4602	8417
CAVE CREEK	5.70298	6421	4748	8684
CAVE CREEK	10.53584	10557	7806	14277
CAVE CREEK	12.92085	11920	8814	16120
CAVE CREEK	13.54785	12050	8910	16296
CAVE CREEK	14.46474	12416	9181	16792
DRY HOLLOW CREEK	1.17304	2061	1524	2788
DRY HOLLOW CREEK	1.59945	2513	1858	3398
DRY HOLLOW CREEK	3.03631	4084	3020	5523

Stream Name	Drainage Area (sq. mi.)	1% Peak Discharge (cfs)	1%- Peak Discharge (cfs)	1%+ Peak Discharge (cfs)
DRY HOLLOW CREEK	4.84802	5507	4072	7447
DRY HOLLOW CREEK	5.70334	5985	4426	8094
DRY HOLLOW CREEK	10.19983	9315	6888	12597
DRY HOLLOW CREEK	11.1868	9626	7118	13018
GAMENTHALER CREEK	1.23904	2285	1690	3090
GAMENTHALER CREEK	2.66811	3857	2852	5216
HICKORY CREEK	0.47922	1138	842	1539
IRON ROCK CREEK	1.18658	2168	1603	2932
IRON ROCK CREEK	2.66712	4391	3247	5938
IRON ROCK CREEK	3.54513	5460	4037	7384
IRON ROCK CREEK	4.93796	6560	4850	8871
KIEHNE CREEK	1.07377	2156	1594	2915
KIEHNE CREEK	1.09448	1772	1311	2397
KIEHNE CREEK	2.01653	3033	2243	4102
KIEHNE CREEK	2.72388	3472	2567	4695
KIEHNE CREEK	5.08243	5804	4291	7849
KNOTT BRANCH	1.38759	2022	1495	2735
KNOTT BRANCH	2.1514	2728	2017	3690
KNOTT BRANCH	2.82046	3122	2309	4222
KUHLMAN CREEK	0.72816	1553	1148	2100
KUHLMAN CREEK	1.05844	2032	1502	2748
KUHLMAN CREEK	1.93349	3304	2443	4469
KUHLMAN CREEK	3.31995	4199	3105	5679
KUHLMAN CREEK	4.28405	5132	3795	6940
MARSCHALL CREEK	0.82689	1745	1290	2359
MARSCHALL CREEK	1.47901	2880	2129	3894
MARSCHALL CREEK	3.06859	4368	3230	5907
MARSCHALL CREEK	5.81579	7325	5416	9906
MARSCHALL CREEK	7.27247	7913	5851	10702
MARSCHALL CREEK	7.49173	7919	5856	10710
MARSCHALL CREEK	12.65873	11006	8138	14884
MAYER CREEK	0.16106	404	299	546
MAYER CREEK	0.63947	1355	1002	1832
MAYER CREEK	2.46136	3571	2640	4829
MIDDLE CREEK	0.67337	1446	1069	1956
MIDDLE CREEK	1.58913	2932	2168	3965
MIDDLE CREEK	2.84781	4035	2984	5457
MIDDLE CREEK	3.96813	4906	3628	6635

Stream Name	Drainage Area (sq. mi.)	1% Peak Discharge (cfs)	1%- Peak Discharge (cfs)	1%+ Peak Discharge (cfs)
MIDDLE CREEK	4.93805	5174	3826	6998
NORTH CAVE CREEK	1.41059	2220	1641	3002
NORTH CAVE CREEK	1.83475	2582	1909	3492
NORTH GRAPE CREEK	1.00326	1592	1177	2153
NORTH GRAPE CREEK	1.94496	2520	1863	3408
NORTH GRAPE CREEK	2.9209	3463	2560	4683
NORTH GRAPE CREEK	5.84143	5869	4339	7937
NORTH GRAPE CREEK	6.20966	6082	4497	8225
NORTH GRAPE CREEK	8.42478	7658	5663	10357
NORTH GRAPE CREEK	10.42824	8972	6634	12134
NORTH GRAPE CREEK	13.44445	10515	7775	14220
NORTH GRAPE CREEK	14.54836	10897	8058	14737
NORTH GRAPE CREEK	15.73476	10945	8093	14802
NORTH GRAPE CREEK	17.23002	11578	8561	15658
NORTH GRAPE CREEK	17.86822	11635	8603	15735
NORTH GRAPE CREEK	53.42003	24879	18397	33647
NORTH GRAPE CREEK	64.8772	28740	21251	38868
NORTH GRAPE CREEK	67.91566	30072	22236	40669
NORTH GRAPE CREEK	68.89034	30483	22540	41225
NORTH GRAPE CREEK	75.57984	32795	24250	44352
NORTH GRAPE CREEK	79.58491	34178	25272	46222
NORTH GRAPE CREEK	83.44848	35203	26031	47609
NORTH GRAPE CREEK	85.75241	35595	26320	48137
NORTH GRAPE CREEK	89.33619	36604	27067	49503
NORTH GRAPE CREEK	90.6815	36713	27147	49650
NORTH GRAPE CREEK	100.1364	39021	28853	52771
NORTH GRAPE CREEK	101.3709	38611	28551	52217
NORTH GRAPE CREEK	107.8286	39880	29488	53933
NORTH GRAPE CREEK	115.6878	41145	30424	55644
PALO ALTO CREEK	0.88348	1654	1223	2237
PALO ALTO CREEK	1.84731	3174	2347	4293
PALO ALTO CREEK	3.62028	5326	3938	7202
PALO ALTO CREEK	4.35337	5955	4404	8054
PALO ALTO CREEK	6.30802	7793	5762	10539
PALO ALTO CREEK	7.05744	8237	6091	11140
PALO ALTO CREEK	11.43376	12202	9023	16502
PALO ALTO CREEK	13.96242	14057	10395	19011
PALO ALTO CREEK	16.30429	15230	11262	20597

Stream Name	Drainage Area (sq. mi.)	1% Peak Discharge (cfs)	1%- Peak Discharge (cfs)	1%+ Peak Discharge (cfs)
PALO ALTO CREEK	17.3273	15204	11242	20562
PALO ALTO CREEK	18.92102	15864	11730	21454
PALO ALTO CREEK	19.88794	15924	11775	21535
PALO ALTO CREEK	20.60717	15991	11824	21625
PALO ALTO CREEK	21.2939	15972	11810	21601
PALO ALTO CREEK	33.95398	23015	17018	31124
PALO ALTO CREEK	35.46294	23462	17349	31730
PALO ALTO CREEK	36.24257	23167	17130	31330
PALO ALTO CREEK	38.17848	23018	17020	31129
PALO ALTO CREEK	43.69521	24691	18257	33391
PALO ALTO CREEK	48.48969	26195	19369	35425
PALO ALTO CREEK	49.09527	26269	19424	35525
PALO ALTO CREEK	51.29321	26471	19574	35799
POST OAK CREEK	1.01028	2025	1498	2739
POST OAK CREEK	2.18081	3468	2565	4691
POST OAK CREEK	3.13199	4265	3154	5768
POST OAK CREEK	4.26979	5244	3878	7092
POST OAK CREEK	5.52067	6268	4635	8476
SALT BRANCH	0.75462	1164	861	1574
SALT BRANCH	1.29022	1707	1262	2308
SALT BRANCH	3.49339	4378	3237	5920
SMITH SPRING BRANCH	1.00131	1966	1454	2659
SMITH SPRING BRANCH	2.24412	3611	2670	4884
SMITH SPRING BRANCH	2.64102	4056	2999	5486
SMITH SPRING BRANCH	3.5054	5324	3937	7200
SOUTH BRANCH WILLOW CREEK	0.82667	1507	1115	2039
SOUTH BRANCH WILLOW CREEK	2.28905	3472	2567	4695
SOUTH BRANCH WILLOW CREEK	2.76231	3730	2758	5044
SOUTH BRANCH WILLOW CREEK	3.54545	4338	3208	5867
SOUTH BRANCH WILLOW CREEK	4.15398	4912	3632	6643
SOUTH BRANCH WILLOW CREEK	5.10001	5104	3774	6903
SPRING CREEK	1.13896	1870	1383	2529
SPRING CREEK	2.48804	3489	2580	4719
SPRING CREEK	3.49518	4422	3270	5980
SPRING CREEK	4.48681	5225	3864	7067
SPRING CREEK	5.23667	5546	4101	7500
SPRING CREEK	6.47822	6628	4901	8964
SPRING CREEK	6.74366	6722	4970	9090

Stream Name	Drainage Area (sq. mi.)	1% Peak Discharge (cfs)	1%- Peak Discharge (cfs)	1%+ Peak Discharge (cfs)
SPRING CREEK 2	1.06956	1636	1210	2213
SPRING CREEK 2	2.19095	2662	1968	3600
TANK WATER CREEK	1.10435	2270	1679	3070
TANK WATER CREEK	2.7724	4637	3429	6271
TREIBS CREEK	1.07323	2145	1586	2901
TREIBS CREEK	1.71782	2927	2164	3958
TREIBS CREEK	3.11384	4510	3335	6099
TREIBS CREEK	4.28307	5104	3774	6902
UNT001 IN NNOGR	1.16348	1429	1057	1933
UNT002 IN NNOGR	1.00275	2411	1783	3260
UNT002 IN NNOGR	1.44	3009	2225	4070
UNT004 IN NNOGR	0.28248	589	435	796
UNT005 IN NNOGR	0.45232	929	687	1257
UNT006 IN NNOGR	1.07045	2067	1529	2796
UNT007 IN NNOGR	1.0648	1978	1463	2675
UNT007 IN NNOGR	1.7742	2474	1829	3346
UNT009 IN NNOGR	0.2501	422	312	571
UNT011 IN NNOGR	1.02092	2126	1572	2876
UNT012 IN NNOGR	1.08915	1611	1191	2179
UNT013 IN NNOGR	1.39911	2273	1680	3073
UNT013 IN NNOGR	2.53646	3439	2543	4651
UNT014 IN NNOGR	1.08588	1114	824	1506
UNT014 IN NNOGR	1.74284	1621	1199	2192
UNT016 IN NNOGR	0.86698	1700	1257	2299
UNT017 IN NNOGR	0.96212	1824	1349	2467
UNT018 IN NNOGR	0.95441	1872	1384	2531
UNT018 IN NNOGR	1.68769	3008	2224	4068
UNT019 IN NNOGR	0.35842	839	620	1135
UNT019 IN NNOGR	0.57015	1223	904	1653
UNT020 IN NNOGR	0.10449	317	235	429
UNT021 IN NNOGR	0.4438	1163	860	1573
UNT023 IN NNOGR	0.79479	1546	1143	2091
UNT024 IN NNOGR	0.18987	517	383	700
UNT025 IN NNOGR	0.25394	591	437	799
UNT027 IN NNOGR	0.53904	1177	870	1591
UNT028 IN NNOGR	0.51868	1089	805	1473
UNT028 IN NNOGR	1.31715	2343	1732	3168
UNT029 IN NNOGR	0.51518	1328	982	1796

Stream Name	Drainage Area (sq. mi.)	1% Peak Discharge (cfs)	1%- Peak Discharge (cfs)	1%+ Peak Discharge (cfs)
UNT031 IN NNOGR	0.35709	912	674	1233
UNT033 IN NNOGR	0.55912	1253	927	1695
UNT034 IN NNOGR	0.68503	1735	1283	2346
UNT036 IN NNOGR	0.79856	1602	1185	2167
UNT038 IN NNOGR	0.31333	779	576	1054
UNT038 IN NNOGR	0.90222	1790	1324	2421
UNT039 IN NNOGR	0.2475	648	479	876
UNT041 IN NNOGR	0.31126	674	498	911
UNT042 IN NNOGR	0.56137	1182	874	1598
UNT043 IN NNOGR	0.18608	496	367	670
UNT044 IN NNOGR	1.18021	2195	1623	2969
UNT044 IN NNOGR	1.40655	2425	1793	3279
UNT045 IN NNOGR	0.35529	593	438	802
UNT046 IN NNOGR	0.81954	1355	1002	1833
UNT049 IN NNOGR	1.28823	2545	1882	3441
UNT049 IN NNOGR	2.29909	3412	2523	4615
UNT050 IN NNOGR	0.47949	1251	925	1692
UNT051 IN NNOGR	0.26364	756	559	1023
UNT053 IN NNOGR	0.15496	356	263	481
UNT054 IN NNOGR	0.36543	487	360	659
UNT054 IN NNOGR	1.26227	1318	975	1783
UNT055 IN NNOGR	0.23952	338	250	457
UNT056 IN NNOGR	0.72574	915	676	1237
UNT056 IN NNOGR	1.43283	1705	1261	2306
UNT057 IN NNOGR	1.00239	2421	1790	3274
UNT057 IN NNOGR	1.68132	3153	2332	4264
UNT057 IN NNOGR	4.21626	6114	4521	8269
UNT057 IN NNOGR	5.19928	6343	4690	8577
UNT057 IN NNOGR	7.8655	8849	6543	11968
UNT058 IN NNOGR	1.28621	2709	2003	3663
UNT058 IN NNOGR	1.63935	3013	2228	4075
UNT059 IN NNOGR	1.00418	1732	1281	2342
UNT059 IN NNOGR	1.80157	2499	1848	3380
UNT059 IN NNOGR	2.64551	3404	2517	4604
UNT062 IN NNOGR	1.00212	1637	1211	2214
UNT062 IN NNOGR	1.67744	2389	1767	3231
UNT064 IN NNOGR	0.45474	881	651	1192
UNT065 IN NNOGR	0.40256	813	601	1100

Stream Name	Drainage Area (sq. mi.)	1% Peak Discharge (cfs)	1%- Peak Discharge (cfs)	1%+ Peak Discharge (cfs)
UNT066 IN NNOGR	0.47974	868	642	1174
UNT066 IN NNOGR	0.58429	1048	775	1417
UNT067 IN NNOGR	0.19908	465	344	629
UNT069 IN NNOGR	1.19537	2022	1495	2735
UNT069 IN NNOGR	1.76696	2660	1967	3598
UNT070 IN NNOGR	0.168	358	265	484
UNT071 IN NNOGR	1.15259	1600	1183	2164
UNT071 IN NNOGR	1.49599	1906	1409	2578
UNT072 IN NNOGR	0.99252	1200	887	1623
UNT072 IN NNOGR	1.39937	1485	1098	2008
UNT073 IN NNOGR	1.08973	2029	1501	2745
UNT073 IN NNOGR	2.20404	3301	2441	4464
UNT073 IN NNOGR	2.81306	3699	2735	5002
UNT074 IN NNOGR	1.02346	1800	1331	2434
UNT074 IN NNOGR	1.52633	2271	1679	3071
UNT075 IN NNOGR	1.28027	1960	1449	2651
UNT076 IN NNOGR	0.48747	768	568	1038
UNT077 IN NNOGR	0.19011	364	269	492
UNT078 IN NNOGR	0.16491	272	201	368
UNT079 IN NNOGR	0.22418	416	308	563
UNT080 IN NNOGR	0.68539	1026	759	1388
UNT081 IN NNOGR	1.00302	1183	875	1600
UNT081 IN NNOGR	1.36253	1435	1061	1941
UNT084 IN NNOGR	0.27128	607	449	821
UNT086 IN NNOGR	1.03091	1805	1335	2441
UNT086 IN NNOGR	1.87504	2658	1966	3595
UNT087 IN NNOGR	1.43283	2225	1645	3009
UNT087 IN NNOGR	1.75548	2445	1808	3307
UNT089 IN NNOGR	0.64961	966	715	1307
UNT091 IN NNOGR	1.13107	2047	1514	2769
UNT094 IN NNOGR	0.91881	1631	1206	2205
UNT095 IN NNOGR	2.02521	2892	2139	3911
UNT095 IN NNOGR	3.21315	3929	2905	5314
UNT096 IN NNOGR	0.97997	1417	1048	1917
UNT096 IN NNOGR	2.11239	2551	1886	3450
UNT098 IN NNOGR	1.00158	1873	1385	2534
UNT098 IN NNOGR	2.01186	3557	2630	4810
UNT099 IN NNOGR	1.01736	1887	1395	2552

Stream Name	Drainage Area (sq. mi.)	1% Peak Discharge (cfs)	1%- Peak Discharge (cfs)	1%+ Peak Discharge (cfs)
UNT099 IN NNOGR	2.1132	3634	2687	4915
UNT101 IN NNOGR	1.18658	2531	1871	3422
UNT101 IN NNOGR	1.64016	2984	2206	4035
UNT104 IN NNOGR	1.0066	1909	1412	2582
UNT104 IN NNOGR	1.7927	2981	2204	4031
UNT104 IN NNOGR	2.39621	3507	2593	4743
UNT107 IN NNOGR	1.00598	1542	1140	2085
UNT107 IN NNOGR	1.57066	2176	1609	2942
UNT108 IN NNOGR	1.00176	2032	1502	2748
UNT108 IN NNOGR	1.64918	2713	2006	3669
UNT110 IN NNOGR	1.00221	1949	1442	2636
UNT110 IN NNOGR	1.87816	3128	2313	4230
UNT110 IN NNOGR	3.88033	5149	3807	6963
UNT110 IN NNOGR	4.76399	6019	4451	8140
UNT111 IN NNOGR	1.10946	1964	1452	2656
UNT112 IN NNOGR	1.1256	1570	1161	2123
UNT112 IN NNOGR	1.42332	1886	1395	2551
UNT114 IN NNOGR	0.1702	248	183	335
UNT115 IN NNOGR	0.42192	725	536	980
UNT116 IN NNOGR	0.37744	505	373	683
UNT117 IN NNOGR	0.80474	995	735	1345
UNT118 IN NNOGR	1.02454	1763	1304	2384
UNT118 IN NNOGR	1.41723	2075	1534	2806
UNT118 IN NNOGR	3.48884	4153	3071	5616
UNT118 IN NNOGR	4.70678	5016	3709	6784
UNT118 IN NNOGR	5.45377	5494	4063	7430
UNT119 IN NNOGR	1.20308	1871	1384	2531
UNT120 IN NNOGR	0.45779	609	450	823
UNT121 IN NNOGR	0.35299	649	480	878
UNT997 IN NNOGR	0.1763	266	197	360
UNT998 IN NNOGR	0.5932	677	500	915
UNT999 IN NNOGR	0.09766	207	153	281
WALKER BRANCH	1.004	1753	1296	2371
WALKER BRANCH	1.99922	3172	2345	4289
WALKER BRANCH	2.72146	3750	2773	5072
WALKER BRANCH	5.87901	6684	4942	9039
WHITE OAK CREEK	0.98741	1877	1388	2539
WHITE OAK CREEK	2.23166	3758	2779	5082

Stream Name	Drainage Area (sq. mi.)	1% Peak Discharge (cfs)	1%- Peak Discharge (cfs)	1%+ Peak Discharge (cfs)
WHITE OAK CREEK	3.33879	4808	3555	6502
WHITE OAK CREEK	6.89656	8237	6091	11140
WHITE OAK CREEK	7.75224	8564	6333	11582
WILLOW CREEK	1.13986	2084	1541	2819
WILLOW CREEK	1.79869	2826	2090	3822
WILLOW CREEK	2.67133	3852	2848	5209
WILLOW CREEK	3.68121	4480	3313	6059
WILLOW CREEK	6.26471	6674	4935	9026
WILLOW CREEK	7.4616	6856	5070	9272
WILLOW CREEK	12.5635	10516	7776	14221
WILLOW CREEK	16.67007	12105	8951	16370
WILLOW CREEK	18.66238	13126	9706	17752
WILLOW CREEK	20.38542	13696	10128	18523
WILLOW CREEK	22.77315	14443	10680	19533
WILLOW CREEK	23.32959	14355	10615	19413
WILLOW CREEK	26.64141	15726	11628	21267
WILLOW CREEK	29.00446	16534	12226	22361
WILLOW CREEK	30.45289	17098	12643	23123
WILLOW CREEK	30.96821	17302	12793	23398
WILLOW CREEK	31.22175	17306	12796	23404
WILLOW CREEK	31.4394	17205	12722	23267
WILLOW CREEK	31.69748	17208	12724	23272
WILLOW CREEK	33.3181	17494	12935	23658
WILLOW CREEK	34.73334	17988	13301	24327
WITTINGTON CREEK	1.26137	2596	1920	3511
WITTINGTON CREEK	2.295	3632	2686	4912
WITTINGTON CREEK	4.38314	5616	4153	7595
WITTINGTON CREEK	5.58612	6812	5037	9213
EAST FORK HUNTERS CREEK	1.19026	2518	1862	3405
EAST FORK HUNTERS CREEK	1.91465	3243	2398	4386
EAST FORK HUNTERS CREEK	3.79559	5392	3987	7292
EAST FORK HUNTERS CREEK	5.47906	7032	5200	9510
EAST FORK HUNTERS CREEK	6.31905	7634	5645	10325
EAST FORK HUNTERS CREEK	12.54905	11859	8769	16038
EAST FORK ROCKY CREEK	1.14372	2686	1986	3633
EAST FORK ROCKY CREEK	1.75754	3402	2516	4601
EAST FORK ROCKY CREEK	2.66246	4721	3491	6385
EAST FORK ROCKY CREEK	3.91549	6291	4652	8508

Stream Name	Drainage Area (sq. mi.)	1% Peak Discharge (cfs)	1%- Peak Discharge (cfs)	1%+ Peak Discharge (cfs)
EAST FORK ROCKY CREEK	5.06055	6657	4922	9002
EAST FORK ROCKY CREEK	7.48203	9054	6695	12245
EAST FORK ROCKY CREEK	9.52895	10430	7712	14105
EAST FORK ROCKY CREEK	10.57309	11142	8238	15068
EAST FORK THREEMILE CREEK	1.00786	1911	1413	2585
EAST FORK THREEMILE CREEK	4.62831	6066	4486	8204
EAST FORK WILLIAMS CREEK	1.37077	2970	2196	4017
EAST FORK WILLIAMS CREEK	1.65962	3223	2383	4359
EAST FORK WILLIAMS CREEK	4.4782	6557	4849	8868
EAST FORK WILLIAMS CREEK	4.94702	6665	4929	9014
EAST FORK WILLIAMS CREEK	5.49242	6873	5082	9295
HOPFS CREEK	0.88447	1671	1236	2260
HOPFS CREEK	1.2507	2273	1680	3073
HOPFS CREEK	5.1582	5495	4064	7432
HUNTERS CREEK	19.18349	16150	11942	21841
HUNTERS CREEK	20.12678	15941	11787	21558
MIDDLE FORK HUNTERS CREEK	0.44335	960	710	1298
MIDDLE FORK HUNTERS CREEK	1.21976	2339	1730	3163
MIDDLE FORK HUNTERS CREEK	3.19853	4325	3198	5849
MIDDLE FORK HUNTERS CREEK	5.41351	6467	4782	8746
MIDDLE FORK HUNTERS CREEK	5.96438	6688	4946	9045
MIDDLE FORK ROCKY CREEK	1.12946	2295	1697	3103
MIDDLE FORK ROCKY CREEK	2.36429	4273	3159	5779
MIDDLE FORK ROCKY CREEK	2.93525	4491	3321	6073
MIDDLE FORK ROCKY CREEK	5.00874	6685	4943	9041
MIDDLE FORK ROCKY CREEK	5.78963	6786	5018	9177
MIDDLE FORK ROCKY CREEK	6.52694	7211	5332	9752
MIDDLE FORK ROCKY CREEK	12.3631	11639	8607	15741
MIDDLE FORK ROCKY CREEK	13.42262	11951	8837	16162
MIDDLE FORK THREEMILE CREEK	1.04992	2222	1643	3005
MIDDLE FORK THREEMILE CREEK	1.96442	3488	2579	4718
MIDDLE FORK THREEMILE CREEK	2.38617	3840	2840	5194
MIDDLE FORK WILLIAMS CREEK	1.12614	2521	1864	3409
MIDDLE FORK WILLIAMS CREEK	2.34563	4308	3185	5826
MIDDLE FORK WILLIAMS CREEK	3.44384	5079	3756	6869
ROCKY CREEK	24.74157	18783	13889	25402
ROCKY CREEK	25.76138	18721	13843	25319
ROCKY CREEK	26.94313	19210	14204	25979

Stream Name	Drainage Area (sq. mi.)	1% Peak Discharge (cfs)	1%- Peak Discharge (cfs)	1%+ Peak Discharge (cfs)
ROCKY CREEK	28.31525	19568	14469	26464
SALT BRANCH	1.00033	1532	1133	2072
SALT BRANCH	1.37983	1866	1380	2523
SALT BRANCH	2.66443	3379	2499	4570
SALT BRANCH	2.89812	3545	2621	4794
SCHOOL CREEK	1.09108	1930	1427	2609
SCHOOL CREEK	1.49605	2372	1754	3208
SCHOOL CREEK	4.39144	5610	4148	7586
SNAKE CREEK	1.00669	1454	1075	1966
SNAKE CREEK	1.9021	2470	1827	3341
SNAKE CREEK	2.98367	3512	2597	4750
SNAKE CREEK	4.39821	4677	3458	6325
SNAKE CREEK	5.45978	5297	3917	7164
SOUTH GRAPE CREEK	0.36292	720	533	974
SOUTH GRAPE CREEK	1.48043	2103	1555	2844
SOUTH GRAPE CREEK	2.11809	2747	2031	3714
SOUTH GRAPE CREEK	3.99126	4574	3382	6186
SOUTH GRAPE CREEK	4.77592	4938	3652	6679
SOUTH GRAPE CREEK	6.1666	6167	4560	8340
SOUTH GRAPE CREEK	7.22011	6682	4941	9037
SOUTH GRAPE CREEK	8.12242	7259	5368	9817
SOUTH GRAPE CREEK	9.85665	8274	6118	11190
SOUTH GRAPE CREEK	14.51352	11072	8187	14974
SOUTH GRAPE CREEK	15.70082	11293	8350	15272
SOUTH GRAPE CREEK	17.00228	12031	8896	16270
SOUTH GRAPE CREEK	23.00531	14978	11075	20256
SOUTH GRAPE CREEK	24.72609	15537	11488	21012
SOUTH GRAPE CREEK	26.66863	16206	11983	21917
SOUTH GRAPE CREEK	27.31223	16025	11849	21672
SOUTH GRAPE CREEK	33.27043	18447	13640	24947
SOUTH GRAPE CREEK	36.02991	19524	14436	26403
SOUTH GRAPE CREEK	56.85284	27052	20003	36585
SOUTH GRAPE CREEK	59.14826	27809	20563	37608
SOUTH GRAPE CREEK	62.07238	28064	20751	37953
SOUTH GRAPE CREEK	63.13719	27898	20629	37728
STOLLES CREEK	1.04391	1602	1184	2166
STOLLES CREEK	2.27084	2613	1932	3534
THREEMILE CREEK	7.06595	8055	5956	10894

Stream Name	Drainage Area (sq. mi.)	1% Peak Discharge (cfs)	1%- Peak Discharge (cfs)	1%+ Peak Discharge (cfs)
THREEMILE CREEK	8.08753	8580	6344	11604
THREEMILE CREEK	8.5264	8867	6556	11991
THREEMILE CREEK	9.33133	9211	6811	12457
THREEMILE CREEK	10.12397	9191	6796	12430
UNT002 IN SNOGR	1.10982	1492	1103	2018
UNT002 IN SNOGR	1.79861	2048	1514	2770
UNT002 IN SNOGR	2.39002	2767	2046	3742
UNT003 IN SNOGR	0.99952	2003	1481	2708
UNT003 IN SNOGR	2.03051	3114	2302	4211
UNT003 IN SNOGR	2.94771	4080	3017	5518
UNT004 IN SNOGR	1.1291	2077	1536	2809
UNT005 IN SNOGR	0.92034	1766	1306	2389
UNT005 IN SNOGR	1.76059	2811	2078	3801
UNT005 IN SNOGR	2.73778	3600	2662	4868
UNT006 IN SNOGR	1.47964	2405	1779	3253
UNT006 IN SNOGR	2.22251	2938	2172	3973
UNT006 IN SNOGR	2.80179	3472	2567	4696
UNT007 IN SNOGR	1.21456	2247	1662	3039
UNT007 IN SNOGR	2.41881	3194	2362	4319
UNT007 IN SNOGR	3.4898	3893	2878	5264
UNT011 IN SNOGR	0.37215	771	570	1043
UNT013 IN SNOGR	1.10749	2153	1592	2911
UNT015 IN SNOGR	1.00086	2238	1655	3027
UNT015 IN SNOGR	1.64599	3038	2247	4109
UNT017 IN SNOGR	1.25258	2504	1851	3386
UNT017 IN SNOGR	2.02492	3291	2433	4450
UNT017 IN SNOGR	2.3266	3542	2619	4790
UNT018 IN SNOGR	1.00741	2518	1862	3405
UNT018 IN SNOGR	1.49506	3174	2347	4293
UNT019 IN SNOGR	0.95626	1914	1415	2588
UNT020 IN SNOGR	1.04185	1996	1476	2700
UNT020 IN SNOGR	1.96598	3301	2441	4465
UNT020 IN SNOGR	3.00519	4412	3262	5966
UNT021 IN SNOGR	1.04014	1597	1181	2159
UNT023 IN SNOGR	0.19193	450	333	609
UNT024 IN SNOGR	1.07619	1636	1210	2212
UNT024 IN SNOGR	1.74268	2384	1763	3224
UNT025 IN SNOGR	0.62575	1214	898	1642

Stream Name	Drainage Area (sq. mi.)	1% Peak Discharge (cfs)	1%- Peak Discharge (cfs)	1%+ Peak Discharge (cfs)
UNT025 IN SNOGR	1.39005	2248	1662	3040
UNT026 IN SNOGR	0.51088	959	709	1296
UNT027 IN SNOGR	0.92796	1582	1170	2140
UNT028 IN SNOGR	1.2737	2254	1667	3049
UNT028 IN SNOGR	2.55211	3846	2844	5201
UNT031 IN SNOGR	1.25958	2332	1724	3153
UNT032 IN SNOGR	1.32917	2338	1729	3162
UNT032 IN SNOGR	2.26394	3225	2384	4361
UNT032 IN SNOGR	3.56028	4239	3134	5733
UNT034 IN SNOGR	0.31826	708	524	957
UNT035 IN SNOGR	1.20039	2220	1642	3003
UNT036 IN SNOGR	1.00104	1899	1404	2568
UNT038 IN SNOGR	1.04884	1746	1291	2361
UNT038 IN SNOGR	2.09383	2958	2187	4000
UNT038 IN SNOGR	2.68398	3395	2511	4592
UNT040 IN SNOGR	1.08922	2079	1537	2811
UNT041 IN SNOGR	0.92563	1844	1363	2494
UNT042 IN SNOGR	1.13	1993	1473	2695
UNT042 IN SNOGR	1.36575	2296	1697	3104
UNT043 IN SNOGR	0.67947	1447	1070	1957
UNT045 IN SNOGR	1.01754	2295	1697	3103
UNT045 IN SNOGR	1.42763	2759	2040	3731
UNT046 IN SNOGR	1.07655	2313	1710	3128
UNT046 IN SNOGR	1.98352	3193	2361	4318
UNT048 IN SNOGR	1.00562	1753	1296	2370
UNT048 IN SNOGR	1.80588	2653	1962	3588
UNT049 IN SNOGR	1.07852	1922	1421	2599
UNT049 IN SNOGR	2.04693	2867	2120	3877
UNT049 IN SNOGR	2.47629	3114	2302	4211
UNT051 IN SNOGR	1.22855	2620	1937	3543
UNT051 IN SNOGR	1.68053	3172	2345	4289
UNT052 IN SNOGR	1.20918	2195	1623	2969
UNT052 IN SNOGR	2.98511	4544	3360	6146
UNT053 IN SNOGR	1.16551	2124	1571	2873
UNT054 IN SNOGR	1.08776	2260	1671	3056
UNT054 IN SNOGR	1.37508	2571	1901	3477
UNT054 IN SNOGR	1.66258	3003	2221	4062
UNT057 IN SNOGR	1.65083	3115	2303	4213

Stream Name	Drainage Area (sq. mi.)	1% Peak Discharge (cfs)	1%- Peak Discharge (cfs)	1%+ Peak Discharge (cfs)
UNT057 IN SNOGR	2.45482	3708	2742	5015
UNT058 IN SNOGR	1.21124	2003	1481	2709
UNT059 IN SNOGR	0.97513	1830	1353	2475
UNT059 IN SNOGR	1.40907	2293	1695	3101
UNT060 IN SNOGR	1.14228	2131	1576	2882
UNT060 IN SNOGR	2.07141	3063	2265	4142
UNT060 IN SNOGR	3.1033	3819	2824	5164
UNT060 IN SNOGR	3.77984	4346	3213	5877
UNT060 IN SNOGR	4.19716	4626	3421	6256
UNT061 IN SNOGR	0.88402	1590	1176	2151
UNT062 IN SNOGR	0.49671	1065	787	1440
UNT063 IN SNOGR	1.17088	1855	1372	2509
UNT064 IN SNOGR	0.3214	733	542	991
UNT065 IN SNOGR	0.70861	1386	1025	1874
UNT066 IN SNOGR	0.72458	1392	1029	1883
UNT067 IN SNOGR	0.46739	865	640	1170
UNT068 IN SNOGR	1.01458	1362	1007	1842
UNT068 IN SNOGR	1.40718	1730	1279	2340
UNT068 IN SNOGR	1.63263	1858	1374	2513
UNT068 IN SNOGR	2.03724	2341	1731	3166
UNT069 IN SNOGR	0.38246	499	369	675
UNT070 IN SNOGR	0.47707	539	398	728
UNT071 IN SNOGR	0.4994	1068	790	1445
UNT073 IN SNOGR	0.05277	143	106	193
WEST FORK HUNTERS CREEK	0.92356	1865	1379	2522
WEST FORK HUNTERS CREEK	3.7799	5053	3736	6833
WEST FORK HUNTERS CREEK	4.58715	5723	4232	7739
WEST FORK HUNTERS CREEK	5.56443	6276	4641	8488
WEST FORK ROCKY CREEK	1.02032	2023	1496	2735
WEST FORK ROCKY CREEK	1.91474	3052	2257	4128
WEST FORK ROCKY CREEK	4.85787	6202	4586	8387
WEST FORK THREEMILE CREEK	1.26612	2766	2045	3740
WEST FORK THREEMILE CREEK	1.64258	2989	2210	4042
WEST FORK WILLIAMS CREEK	1.00086	2151	1591	2909
WEST FORK WILLIAMS CREEK	2.09741	3329	2462	4502
WEST FORK WILLIAMS CREEK	4.14147	5507	4072	7447
WEST FORK WILLIAMS CREEK	5.51991	6546	4840	8853
WEST FORK WILLIAMS CREEK	8.68042	9225	6822	12476

Stream Name	Drainage Area (sq. mi.)	1% Peak Discharge (cfs)	1%- Peak Discharge (cfs)	1%+ Peak Discharge (cfs)
WEST FORK WILLIAMS CREEK	10.12204	10210	7550	13808
WILLIAMS CREEK	10.02653	9852	7285	13323
WILLIAMS CREEK	21.23394	17596	13011	23797
WILLIAMS CREEK	22.2884	17465	12914	23620
WILLIAMS CREEK	23.01325	17393	12861	23522
WILLIAMS CREEK	25.59499	18619	13768	25181
WILLIAMS CREEK	27.56067	19256	14239	26042
WILLIAMS CREEK	28.33798	19059	14093	25775
WILLIAMS CREEK	29.90209	19610	14500	26520
Pedernales River – Lake Travis				
BUFFALO CREEK	0.91262	1720	1272	2327
BUFFALO CREEK	3.18804	4627	3421	6257
BUFFALO CREEK	4.26576	5644	4174	7633
BUFFALO CREEK	5.4431	6635	4906	8973
CLEVELAND BRANCH	1.2264	2008	1485	2716
CLEVELAND BRANCH	3.95647	4757	3518	6433
COTTONWOOD CREEK	1.42951	2960	2189	4003
COTTONWOOD CREEK	2.17104	3894	2879	5266
COTTONWOOD CREEK	3.13553	4941	3654	6683
COTTONWOOD CREEK	3.62906	5096	3768	6892
COTTONWOOD CREEK	5.73262	7372	5451	9970
COTTONWOOD CREEK	5.92538	7366	5446	9961
COTTONWOOD CREEK	10.44231	11330	8378	15323
COTTONWOOD CREEK	14.48648	14564	10769	19697
CYPRESS CREEK	1.27626	2341	1731	3166
CYPRESS CREEK	2.57341	3619	2676	4895
CYPRESS CREEK	4.85788	6018	4450	8138
CYPRESS CREEK	6.94534	7562	5592	10227
CYPRESS CREEK	9.01755	8921	6596	12064
CYPRESS CREEK	10.01376	9343	6909	12636
CYPRESS CREEK	10.75887	9529	7046	12887
CYPRESS CREEK	14.6965	11967	8848	16183
CYPRESS CREEK	16.0002	12514	9253	16924
CYPRESS CREEK	16.86906	12867	9514	17401
CYPRESS CREEK	17.78115	13305	9838	17993
CYPRESS CREEK	19.41503	14266	10549	19293
CYPRESS CREEK	29.87232	19578	14477	26477
CYPRESS CREEK	33.69859	21188	15667	28654

Stream Name	Drainage Area (sq. mi.)	1% Peak Discharge (cfs)	1%- Peak Discharge (cfs)	1%+ Peak Discharge (cfs)
CYPRESS CREEK	36.75954	22656	16753	30639
CYPRESS CREEK	38.29972	22997	17005	31101
CYPRESS CREEK	39.38378	23265	17203	31464
CYPRESS CREEK	43.5741	24830	18360	33579
CYPRESS CREEK	45.5592	25265	18682	34168
CYPRESS CREEK	49.88405	26948	19926	36443
CYPRESS CREEK	51.50448	27488	20326	37175
CYPRESS CREEK	53.99404	28357	20968	38350
CYPRESS CREEK	55.20712	28678	21205	38783
CYPRESS CREEK	62.73423	31512	23301	42616
CYPRESS CREEK	65.68123	31698	23438	42867
CYPRESS CREEK	71.26736	33422	24713	45199
CYPRESS CREEK	76.78222	34962	25852	47282
CYPRESS CREEK	78.11783	35358	26145	47818
CYPRESS CREEK	79.56509	35406	26180	47882
CYPRESS CREEK	80.5421	35679	26382	48251
CYPRESS CREEK	81.6122	35575	26305	48111
FALL CREEK	1.23563	2428	1795	3284
FALL CREEK	2.14288	3391	2507	4585
FALL CREEK	2.68461	4029	2979	5448
FALL CREEK	6.01173	7592	5614	10267
FALL CREEK	6.93279	8083	5977	10932
FALL CREEK	8.9781	9666	7147	13072
FALL CREEK	10.32251	10654	7878	14408
FALL CREEK	11.53626	11887	8790	16076
FALL CREEK	12.63936	12523	9260	16935
FALL CREEK	16.04459	14727	10890	19917
FALL CREEK TRIB 1	1.08139	2300	1701	3110
FALL CREEK TRIB 1	2.0471	3656	2703	4944
FALL CREEK TRIB 1	2.66425	4424	3271	5982
HARDIN RUSSELL CREEK	1.0414	2105	1557	2847
HARDIN RUSSELL CREEK	2.022	3023	2235	4088
HARDIN RUSSELL CREEK	4.48062	5702	4216	7711
HARDIN RUSSELL CREEK	4.74875	5801	4290	7846
HARDIN RUSSELL CREEK	7.21697	8242	6094	11146
HICKORY CREEK	1.02705	2184	1615	2954
HICKORY CREEK	2.0133	3560	2633	4815
HICKORY CREEK	2.77957	4257	3148	5757

Stream Name	Drainage Area (sq. mi.)	1% Peak Discharge (cfs)	1%- Peak Discharge (cfs)	1%+ Peak Discharge (cfs)
HICKORY CREEK	7.8716	8392	6206	11350
HICKORY CREEK	10.45415	9972	7374	13486
HICKORY CREEK	12.79028	11206	8286	15154
HICKORY CREEK	14.46868	12093	8942	16354
HICKORY CREEK	15.23832	12384	9157	16748
NORTH CYPRESS CREEK	1.49049	2699	1995	3650
NORTH CYPRESS CREEK	2.10342	3361	2485	4545
NORTH CYPRESS CREEK	2.98197	4098	3030	5542
NORTH CYPRESS CREEK	5.16359	6362	4704	8604
NORTH CYPRESS CREEK	6.0025	6805	5032	9202
NORTH CYPRESS CREEK	8.06341	8379	6196	11332
NORTH CYPRESS CREEK	9.11288	9222	6819	12471
PEDERNALES TRIB 1	1.06893	1337	989	1808
PEDERNALES TRIB 1	2.04074	2108	1558	2850
PEDERNALES TRIB 1	2.64156	3182	2353	4303
PEDERNALES TRIB 2	0.89496	2027	1499	2742
PEDERNALES TRIB 2	1.75225	3696	2733	4998
PEDERNALES TRIB 4	1.01871	2166	1601	2929
PEDERNALES TRIB 4	2.79473	4176	3088	5648
PEDERNALES TRIB 4	3.43599	4784	3538	6470
PEDERNALES TRIB 5	1.28684	2493	1843	3372
PERDANALES TRIB 4 1	0.95639	1806	1335	2442
SALTER SPRING CREEK	0.99441	1742	1288	2355
SALTER SPRING CREEK	1.57667	2440	1804	3300
STRIBLING CREEK	0.98132	1889	1397	2555
STRIBLING CREEK	1.54752	2656	1964	3592
UNT 0002 IN LATR	1.07512	2151	1591	2909
UNT 0002 IN LATR	2.11517	3389	2506	4583
UNT 0003 IN LATR	1.01781	1992	1473	2694
UNT 0003 IN LATR	1.55837	2677	1980	3621
UNT 0004 IN LATR	1.15385	2292	1695	3100
UNT 0005 IN LATR	1.05574	2276	1683	3078
UNT 0005 IN LATR	2.24545	3984	2946	5388
UNT 0005 IN LATR	2.69698	4168	3082	5636
UNT 0008 IN LATR	0.47259	933	690	1262
UNT 0010 IN LATR	1.36557	2470	1826	3341
UNT 0011 IN LATR	1.21304	1901	1406	2571
UNT 0012 IN LATR	1.22093	1950	1442	2637

Stream Name	Drainage Area (sq. mi.)	1% Peak Discharge (cfs)	1%- Peak Discharge (cfs)	1%+ Peak Discharge (cfs)
UNT 0012 IN LATR	2.32851	3219	2380	4353
UNT 0013 IN LATR	1.3045	2279	1685	3082
UNT 0013 IN LATR	2.55132	3544	2621	4793
UNT 0013 IN LATR	3.04527	3956	2925	5350
UNT 0014 IN LATR	1.00347	1410	1042	1906
UNT 0015 IN LATR	1.00024	1828	1352	2473
UNT 0015 IN LATR	2.21847	3285	2429	4443
UNT 0015 IN LATR	3.30321	4148	3067	5610
UNT 0016 IN LATR	1.30149	1973	1459	2668
UNT 0017 IN LATR	1.30002	2293	1696	3101
UNT 0017 IN LATR	1.91322	2752	2035	3722
UNT 0019 IN LATR	1.36082	1897	1402	2565
UNT 0020 IN LATR	1.00885	1899	1404	2568
UNT 0020 IN LATR	1.46197	2361	1746	3193
UNT 0022 IN LATR	1.20721	2464	1822	3333
UNT 0022 IN LATR	1.60994	2599	1922	3515
UNT 0022 IN LATR	3.96003	4700	3475	6356
UNT 0022 IN LATR	6.4168	6893	5097	9321
UNT 0022 IN LATR	7.50182	7762	5739	10497
UNT 0023 IN LATR	1.29876	1738	1285	2351
UNT 0023 IN LATR	1.48831	1823	1348	2465
UNT 0024 IN LATR	1.55524	3356	2481	4538
UNT 0024 IN LATR	2.00248	3520	2603	4760
UNT 0025 IN LATR	1.01719	1430	1057	1934
UNT 0026 IN LATR	1.12964	2352	1739	3181
UNT 0026 IN LATR	1.52313	2815	2082	3808
UNT 0027 IN LATR	1.13215	2259	1670	3055
UNT 0027 IN LATR	2.32752	3449	2550	4664
UNT 0027 IN LATR	3.79218	5060	3741	6843
UNT 0027 IN LATR	5.34285	6673	4935	9025
UNT 0028 IN LATR	1.12148	1769	1308	2393
UNT 0029 IN LATR	1.00373	1589	1175	2149
UNT 0029 IN LATR	1.35338	2022	1495	2735
UNT 0031 IN LATR	1.01907	2101	1553	2841
UNT 0031 IN LATR	1.381	2407	1780	3255
UNT 0032 IN LATR	1.46816	2420	1790	3273
UNT 0032 IN LATR	2.37029	3621	2677	4896
UNT 0034 IN LATR	1.03781	1809	1338	2446

Stream Name	Drainage Area (sq. mi.)	1% Peak Discharge (cfs)	1%- Peak Discharge (cfs)	1%+ Peak Discharge (cfs)
UNT 0034 IN LATR	1.94487	2830	2092	3827
UNT 0035 IN LATR	1.0058	1848	1367	2500
UNT 0035 IN LATR	2.06692	2898	2143	3919
UNT 0035 IN LATR	3.83687	4826	3568	6526
UNT 0035 IN LATR	4.14452	5090	3764	6883
UNT 0036 IN LATR	1.01378	1807	1336	2444
UNT 0036 IN LATR	1.50511	2399	1774	3245
UNT 0037 IN LATR	1.21283	2182	1614	2951
UNT 0037 IN LATR	1.33266	2238	1655	3027
UNT 0037 IN LATR	3.00475	4159	3075	5625
UNT 0037 IN LATR	3.85693	5075	3753	6863
UNT 0040 IN LATR	1.09565	1932	1429	2613
UNT 0041 IN LATR	1.11009	1928	1426	2608
UNT 0042 IN LATR	1.12614	2556	1890	3457
UNT 0043 IN LATR	1.10919	1843	1363	2493
UNT 0044 IN LATR	1.01638	2106	1558	2849
UNT 0044 IN LATR	2.10539	3541	2618	4788
UNT 0044 IN LATR	3.22553	4781	3535	6466
UNT 0044 IN LATR	4.34835	5383	3981	7281
UNT 0046 IN LATR	1.05449	2243	1659	3033
UNT 0046 IN LATR	1.56923	2730	2018	3692
UNT 0047 IN LATR	1.19026	2089	1545	2826
UNT 0047 IN LATR	1.81861	2730	2019	3693
UNT 0048 IN LATR	0.94374	1619	1197	2189
UNT 0050 IN LATR	1.17591	2243	1659	3034
UNT 0050 IN LATR	2.36563	3403	2516	4602
UNT 0051 IN LATR	1.17591	1618	1196	2188
UNT 0051 IN LATR	1.90479	2562	1894	3465
UNT 0054 IN LATR	1.14686	1895	1401	2563
UNT 0055 IN LATR	1.00302	2054	1519	2778
UNT 0055 IN LATR	1.42575	2928	2165	3960
UNT 0057 IN LATR	1.15152	1872	1384	2532
UNT 0057 IN LATR	1.45884	2199	1626	2974
UNT 0060 IN LATR	1.21097	2363	1748	3196
UNT 0060 IN LATR	2.4666	3697	2734	5000
UNT 0060 IN LATR	5.27433	7097	5248	9598
UNT 0061 IN LATR	1.08902	2414	1785	3265
UNT 0061 IN LATR	2.01563	3383	2501	4575

Stream Name	Drainage Area (sq. mi.)	1% Peak Discharge (cfs)	1%- Peak Discharge (cfs)	1%+ Peak Discharge (cfs)
UNT 0063 IN LATR	1.02588	2381	1761	3220
UNT 0063 IN LATR	2.2886	4071	3010	5505
UNT 0064 IN LATR	1.07171	2156	1594	2916
UNT 0064 IN LATR	1.38763	2545	1882	3441
UNT 0065 IN LATR	0.97809	1698	1255	2296
WALLACE BRANCH	1.00983	2514	1859	3400
WALLACE BRANCH	1.65128	3327	2460	4499
WALLACE BRANCH	3.8879	6384	4720	8633
WILSON HOLLOW	1.01198	2119	1567	2866
BATES CREEK	1.04597	2295	1697	3104
BATES CREEK	1.81278	3406	2519	4607
BROCK HOLLOW	0.97966	2577	1906	3486
BROCK HOLLOW	2.00182	4206	3110	5688
BROCK HOLLOW	3.13926	5437	4020	7353
BROCK HOLLOW	7.60876	9356	6918	12653
CALOHAN CREEK	1.09251	2622	1938	3545
CALOHAN CREEK	1.36181	2876	2127	3889
CALOHAN CREEK	1.71094	3323	2457	4493
CALOHAN CREEK	1.99976	3625	2680	4902
CALOHAN CREEK	3.84435	5882	4349	7954
CALOHAN CREEK	4.98702	6983	5164	9444
CALOHAN CREEK	5.75652	7635	5645	10325
CALOHAN CREEK	6.5106	7906	5846	10691
DEER CREEK	1.01961	2657	1965	3594
DEER CREEK	1.73306	3390	2507	4585
DEER CREEK	3.59282	5839	4317	7896
DEER CREEK	4.32857	6660	4925	9007
DEER CREEK	4.55003	6658	4923	9004
DEER CREEK	5.81319	7632	5643	10321
FLAT CREEK	1.0022	2192	1621	2965
FLAT CREEK	1.88824	3417	2527	4621
FLAT CREEK	3.14885	5128	3792	6935
FLAT CREEK	4.35606	5900	4363	7979
FLAT CREEK	6.92427	8164	6036	11040
FLAT CREEK	7.92379	8879	6566	12008
FLAT CREEK	9.00688	9339	6905	12630
FLAT CREEK	10.10845	10141	7498	13714
FLAT CREEK	17.60198	15187	11230	20538

Stream Name	Drainage Area (sq. mi.)	1% Peak Discharge (cfs)	1%- Peak Discharge (cfs)	1%+ Peak Discharge (cfs)
FLAT CREEK	19.04611	15974	11812	21603
FLAT CREEK	30.75661	22667	16761	30654
FLAT CREEK	31.75496	22779	16844	30807
FLAT CREEK	32.71341	22769	16837	30793
FLAT CREEK	36.89299	24633	18215	33314
FLAT CREEK 2	1.09753	2908	2150	3933
FLAT CREEK 2	2.08889	4159	3075	5624
FLAT CREEK 2	3.0147	5319	3933	7193
FLAT CREEK 2	3.99628	6401	4733	8657
FLAT CREEK 2	4.71593	6926	5121	9367
FLAT CREEK 2	8.36503	10643	7870	14393
FLAT CREEK 2	9.20713	11119	8222	15037
FLAT CREEK 2	10.18889	11560	8548	15634
HAMILTON CREEK	1.03808	2428	1795	3283
HAMILTON CREEK	1.60752	3424	2532	4631
HAMILTON CREEK	4.56482	6276	4641	8488
HAMILTON CREEK	8.64657	10592	7832	14325
HAMILTON CREEK TRIB 1	1.02911	2156	1594	2916
HAMILTON CREEK TRIB 1	2.19399	3614	2672	4888
HAMILTON CREEK TRIB 2	1.01494	2139	1582	2892
HAMILTON CREEK TRIB 2	2.01384	3428	2535	4636
HAMILTON CREEK TRIB 2	2.80513	4379	3238	5922
LICK CREEK	1.00176	2070	1530	2799
LICK CREEK	2.28176	3614	2673	4888
LICK CREEK	3.3326	4785	3538	6471
LICK CREEK	5.17076	6829	5049	9235
LICK CREEK	7.16047	8470	6263	11454
MCCALL CREEK	1.07655	2475	1830	3347
MCCALL CREEK	1.34638	2780	2056	3760
MCCALL CREEK	2.54704	4345	3213	5876
MCCALL CREEK	3.50711	5439	4022	7356
MCCALL CREEK	4.79511	6743	4986	9118
MCCALL CREEK	7.56966	9410	6958	12726
MCCALL CREEK	10.1517	11837	8752	16008
MCCALL CREEK	11.00783	12287	9085	16617
MCCALL CREEK	12.06169	12922	9555	17476
MCCALL CREEK	13.1482	13429	9930	18161
MCCALL CREEK	13.95527	13932	10302	18841

Stream Name	Drainage Area (sq. mi.)	1% Peak Discharge (cfs)	1%- Peak Discharge (cfs)	1%+ Peak Discharge (cfs)
MCCALL CREEK	14.60829	14151	10464	19137
MIDDLE CREEK	1.00006	2535	1875	3428
MIDDLE CREEK	1.74185	3745	2769	5065
MIDDLE CREEK	2.61139	4665	3449	6309
MIDDLE CREEK	3.05981	5008	3703	6773
MIDDLE CREEK	5.41414	7319	5412	9899
MIDDLE CREEK	5.7706	7560	5590	10224
MIDDLE CREEK	8.58066	9920	7335	13415
MIDDLE CREEK	9.57139	10197	7540	13790
MILLER CREEK	0.94858	2022	1495	2734
MILLER CREEK	3.20427	4711	3484	6372
MILLER CREEK	5.74755	7391	5465	9996
MILLER CREEK	6.89728	8349	6174	11291
MILLER CREEK	7.6779	8831	6530	11943
MILLER CREEK	8.56326	9496	7022	12843
MILLER CREEK	9.56726	10090	7461	13646
MILLER CREEK	10.22925	10442	7721	14122
MILLER CREEK	18.74211	16374	12107	22144
MILLER CREEK	22.23944	18155	13424	24552
MILLER CREEK	24.65668	19156	14165	25907
MILLER CREEK	26.40848	19751	14604	26711
MILLER CREEK	29.44365	20922	15470	28294
MILLER CREEK	31.40108	21980	16253	29725
MILLER CREEK	33.59292	22736	16812	30748
MILLER CREEK	49.19405	29712	21970	40183
MILLER CREEK	50.53384	29682	21948	40141
MILLER CREEK	61.1781	33444	24730	45229
MILLER CREEK	62.38907	33781	24978	45684
MILLER CREEK	63.24968	33345	24656	45095
MILLER CREEK	66.72056	34140	25244	46170
MILLER CREEK	79.96074	38841	28721	52528
MILLER CREEK	80.93049	38550	28505	52135
MILLER CREEK	81.91907	38450	28431	51999
MILLER CREEK	86.25908	39203	28988	53017
MILLER CREEK	87.59362	39058	28881	52821
MILLER CREEK	88.68165	38707	28621	52347
MILLSEAT BRANCH	0.99997	2192	1621	2965
MILLSEAT BRANCH	1.40064	2812	2079	3803

Stream Name	Drainage Area (sq. mi.)	1% Peak Discharge (cfs)	1%- Peak Discharge (cfs)	1%+ Peak Discharge (cfs)
PEDERNALES TRIB 3	1.1664	2038	1507	2756
PEDERNALES TRIB 3	2.17005	3114	2302	4211
PEDERNALES TRIB 3	3.24131	4457	3296	6028
ROUGH HOLLOW	1.07614	2430	1797	3286
ROUGH HOLLOW	2.21013	4173	3086	5644
ROUGH HOLLOW	3.1954	4925	3642	6660
ROY CREEK	1.00364	2225	1645	3010
ROY CREEK	2.00263	3839	2839	5192
ROY CREEK	3.0182	4982	3684	6737
ROY CREEK	3.83774	5657	4183	7651
ROY CREEK	5.18852	7301	5398	9873
SYCAMORE CREEK	1.07942	2296	1697	3104
SYCAMORE CREEK	2.05141	3979	2942	5382
SYCAMORE CREEK	3.12353	5424	4011	7335
SYCAMORE CREEK	3.99039	6215	4596	8405
SYCAMORE CREEK	6.07657	8656	6401	11707
SYCAMORE CREEK	11.16169	13205	9764	17859
TOWHEAD CREEK	1.02023	2440	1804	3300
TOWHEAD CREEK	1.37508	2934	2169	3968
TOWHEAD CREEK	3.70107	5751	4252	7777
TOWHEAD CREEK	4.33041	6238	4612	8436
TOWHEAD CREEK	5.1669	6710	4962	9075
TOWHEAD CREEK	5.94492	7102	5251	9604
TOWHEAD CREEK	7.11595	8162	6035	11038
TOWHEAD CREEK	8.14717	8977	6638	12141
TOWHEAD CREEK	8.73884	9009	6662	12184
TOWHEAD CREEK	11.05309	10424	7708	14097
TOWHEAD CREEK	21.53917	17685	13077	23917
TOWN CREEK	1.1899	1966	1454	2658
TOWN CREEK	1.92316	2781	2056	3760
TOWN CREEK	2.14539	2989	2210	4042
TOWN CREEK	2.44072	3207	2371	4337
TOWN CREEK	2.87104	3690	2729	4991
TRIBUTARY DC 1	1.02893	2034	1504	2751
TRIBUTARY DC 1	1.45866	2580	1908	3489
TURKEY CREEK	1.00055	2128	1573	2877
TURKEY CREEK	1.29756	2584	1911	3495
TURKEY CREEK	1.91061	3431	2537	4641

Stream Name	Drainage Area (sq. mi.)	1% Peak Discharge (cfs)	1%- Peak Discharge (cfs)	1%+ Peak Discharge (cfs)
TURKEY CREEK	2.63051	4286	3169	5796
UNT 1002 IN LATR	1.11063	2243	1658	3033
UNT 1002 IN LATR	1.85744	3112	2301	4209
UNT 1003 IN LATR	1.00203	2234	1652	3021
UNT 1003 IN LATR	1.96792	3616	2674	4890
UNT 1004 IN LATR	0.90629	1667	1233	2255
UNT 1004 IN LATR	1.58837	2642	1953	3572
UNT 1004 IN LATR	2.24654	3281	2426	4438
UNT 1004 IN LATR	3.54181	4802	3551	6494
UNT 1005 IN LATR	1.1942	1929	1427	2609
UNT 1006 IN LATR	1.00544	1546	1143	2091
UNT 1006 IN LATR	1.414	2177	1609	2944
UNT 1008 IN LATR	1.10668	2031	1502	2747
UNT 1008 IN LATR	1.57353	2636	1949	3565
UNT 1009 IN LATR	1.00535	1857	1373	2511
UNT 1010 IN LATR	1.03736	1951	1443	2639
UNT 1011 IN LATR	0.19881	685	507	927
UNT 1013 IN LATR	1.28442	2663	1969	3602
UNT 1015 IN LATR	0.14659	465	344	629
UNT 1016 IN LATR	1.45839	3046	2252	4120
UNT 1016 IN LATR	1.74696	3333	2465	4508
UNT 1016 IN LATR	1.99531	3606	2667	4877
UNT 1017 IN LATR	0.12303	390	289	528
UNT 1018 IN LATR	1.0336	2162	1599	2924
UNT 1018 IN LATR	2.24287	4040	2988	5464
UNT 1018 IN LATR	3.01685	4721	3491	6385
UNT 1018 IN LATR	4.00095	5639	4170	7626
UNT 1019 IN LATR	1.03001	1869	1382	2528
UNT 1019 IN LATR	1.94819	3060	2263	4138
UNT 1019 IN LATR	2.81822	3968	2934	5366
UNT 1019 IN LATR	3.77918	5213	3855	7050
UNT 1020 IN LATR	1.00086	2081	1539	2814
UNT 1020 IN LATR	1.39961	2539	1877	3433
UNT 1022 IN LATR	1.3193	3105	2296	4199
UNT 1022 IN LATR	1.71459	3696	2733	4998
UNT 1023 IN LATR	1.29975	2787	2061	3769
UNT 1023 IN LATR	2.29622	4271	3158	5777
UNT 1023 IN LATR	3.4993	5222	3861	7062

Stream Name	Drainage Area (sq. mi.)	1% Peak Discharge (cfs)	1%- Peak Discharge (cfs)	1%+ Peak Discharge (cfs)
UNT 1023 IN LATR	7.79044	9642	7130	13040
UNT 1024 IN LATR	1.30047	2759	2040	3732
UNT 1024 IN LATR	2.36787	4219	3120	5706
UNT 1024 IN LATR	3.08841	4897	3621	6623
UNT 1025 IN LATR	1.27473	2982	2205	4033
UNT 1025 IN LATR	1.96039	3679	2721	4976
UNT 1026 IN LATR	1.09704	2723	2013	3682
UNT 1026 IN LATR	1.79587	3674	2717	4969
UNT 1027 IN LATR	1.10821	2496	1845	3375
UNT 1030 IN LATR	1.31231	2577	1905	3485
UNT 1030 IN LATR	1.64536	2817	2083	3809
UNT 1032 IN LATR	1.09727	2355	1741	3185
UNT 1032 IN LATR	1.95008	3750	2773	5071
UNT 1032 IN LATR	2.53781	4188	3096	5663
UNT 1033 IN LATR	1.01862	1932	1428	2612
UNT 1033 IN LATR	1.79431	2878	2128	3892
UNT 1036 IN LATR	1.21501	2731	2020	3694
UNT 1038 IN LATR	0.98734	2146	1587	2902
UNT 1038 IN LATR	2.16646	3780	2795	5113
UNT 1040 IN LATR	1.03656	2153	1592	2912
UNT 1041 IN LATR	1.00696	2347	1736	3175
UNT 1041 IN LATR	2.16772	4201	3106	5681
UNT 1041 IN LATR	3.02376	5132	3795	6940
UNT 1042 IN LATR	1.20416	2246	1661	3037
UNT 1043 IN LATR	1.00015	1703	1259	2303
UNT 1043 IN LATR	1.70993	2652	1961	3586
UNT 1043 IN LATR	2.98269	4116	3044	5566
UNT 1046 IN LATR	0.98649	1732	1280	2342
UNT 1046 IN LATR	1.71109	2918	2158	3947
UNT 1047 IN LATR	1.02714	2401	1775	3247
UNT 1047 IN LATR	1.6598	3088	2283	4176
UNT 1049 IN LATR	1.20003	1848	1366	2499
UNT 1049 IN LATR	1.36943	1904	1408	2575
UNT 1051 IN LATR	1.12426	2086	1543	2821
UNT 1051 IN LATR	2.60677	5153	3810	6969
UNT 1051 IN LATR	2.7342	5131	3794	6938
UNT 1052 IN LATR	1.04274	2645	1956	3577
UNT 1054 IN LATR	1.22066	2259	1670	3055

Stream Name	Drainage Area (sq. mi.)	1% Peak Discharge (cfs)	1%- Peak Discharge (cfs)	1%+ Peak Discharge (cfs)
UNT 1055 IN LATR	1.15914	2150	1590	2907
UNT 1055 IN LATR	1.53201	2993	2213	4047
UNT 1056 IN LATR	1.07915	2260	1671	3056
UNT 1056 IN LATR	2.24376	4171	3084	5641
UNT 1060 IN LATR	1.04427	1912	1414	2586
UNT 1060 IN LATR	2.09481	3263	2413	4413
UNT 1060 IN LATR	2.9791	4193	3100	5670
UNT 1060 IN LATR	5.87435	7258	5367	9815
UNT 1060 IN LATR	6.4932	7921	5857	10712
UNT 1060 IN LATR	8.32517	9638	7127	13034
UNT 1061 IN LATR	1.22514	2451	1812	3315
UNT 1061 IN LATR	1.592	2808	2077	3798
UNT 1061 IN LATR	2.1905	3565	2636	4821
UNT 1062 IN LATR	0.24517	671	496	908
UNT 1063 IN LATR	0.62557	1476	1091	1996
UNT 1063 IN LATR	0.91352	2170	1604	2934
UNT 1064 IN LATR	0.1529	500	370	676
UNT 1066 IN LATR	0.23782	442	327	598
UNT 1069 IN LATR	0.49501	904	668	1222
UNT 1070 IN LATR	1.25482	1861	1376	2517
UNT 1070 IN LATR	1.55936	2294	1697	3103
UNT 1071 IN LATR	0.27459	664	491	898
UNT 1073 IN LATR	0.82089	1970	1457	2664
UNT 1074 IN LATR	0.63101	1442	1066	1950
UNT 1076 IN LATR	0.18066	504	373	681
YEAGER CREEK	1.0006	2332	1725	3154
YEAGER CREEK	1.86614	3501	2589	4734
YEAGER CREEK	2.60282	4394	3249	5942
YEAGER CREEK	4.43892	6558	4849	8869
YEAGER CREEK	5.36526	7195	5320	9730
YEAGER CREEK	9.16937	10760	7956	14551
YEAGER CREEK	10.12329	11369	8406	15375
YEAGER CREEK	10.92575	11654	8617	15760
YEAGER CREEK	11.84528	11606	8582	15696
YEAGER CREEK	13.10737	12540	9273	16959
Pedernales River - Mainstem				
PEDERNALES RIVER	5.30418	8954	6621	12110
PEDERNALES RIVER	8.43485	12273	9075	16598

Stream Name	Drainage Area (sq. mi.)	1% Peak Discharge (cfs)	1%- Peak Discharge (cfs)	1%+ Peak Discharge (cfs)
PEDERNALES RIVER	12.16815	16428	12147	22217
PEDERNALES RIVER	21.89625	24459	18086	33078
PEDERNALES RIVER	29.85779	30167	22307	40798
PEDERNALES RIVER	48.74383	40975	30298	55413
PEDERNALES RIVER	90.7636	65007	48068	87914
PEDERNALES RIVER	110.6571	73317	54213	99153
PEDERNALES RIVER	134.9513	79095	58486	106967
PEDERNALES RIVER	166.7407	90436	66872	122305
PEDERNALES RIVER	214.0025	107245	79301	145036
PEDERNALES RIVER	264.7042	117800	87105	159311
PEDERNALES RIVER	310.3559	121987	90202	164974
PEDERNALES RIVER	369.9018	127076	93964	171855
PEDERNALES RIVER	390.5959	126684	93674	171325
PEDERNALES RIVER	428.4383	128651	95129	173985
PEDERNALES RIVER	500.7309	133024	98363	179900
PEDERNALES RIVER	572.4726	140647	103999	190208
PEDERNALES RIVER	617.0997	140852	104151	190486
PEDERNALES RIVER	675.9906	148263	109631	200509
PEDERNALES RIVER	730.0227	157148	116201	212525
PEDERNALES RIVER	845.7212	169257	125155	228901
PEDERNALES RIVER	901.2946	173161	128041	234180
PEDERNALES RIVER	959.7226	178972	132338	242039
PEDERNALES RIVER	1051.391	189031	139776	255643
PEDERNALES RIVER	1141.897	194636	143920	263222
PEDERNALES RIVER	1237.088	200651	148368	271357
PEDERNALES RIVER	1281.01	194985	144178	263694

Appendix B BLE Map