Response to Public Comment
Nine Total Maximum Daily Loads for Bacteria in Clear Creek and Tributaries
August 2008

Tracking Number	Date Received	Affiliation of Commenter	Summary of Request or Comment	Summary of TCEQ Action or Explanation
001	7/3/08 7/1/08 7/3/08	Harris County Public Infrastructure Department Water Environment Association of Texas Greater Houston Builders Association	*Did not follow Bacteria TMDL Task Force Report Recommendations*: The stakeholder process did not follow the recommendations contained in the Bacteria TMDL Task Force Report and the resulting proposed document does not conform to Task Force recommendations. The Task Force was commissioned by the TCEQ and the Texas State Soil & Water Conservation Board (TSSWCB) in September 2006 and its final report was published June 4, 2007, after both TCEQ and TSSWCB approved the document in joint session. The Task Force report outlines three tiers of TMDL development and implementation and describes key decisions that must be made at the end of each development tier. At the end of each tier the Task Force recommended that the calculated load reductions be evaluated to determine if they are socially and economically attainable. The proposed TMDLs do not include this element and stakeholders were not provided with any analysis of whether the proposed load reductions were socially and economically attainable. We believe that requiring load reductions of more than 95% is not economically attainable, particularly given the high rainfall depths and intensities in the Gulf Coast region. We strongly urge TCEQ to modify the document to include consideration of these Task Force recommendations.	The project was initiated in 2005, prior to the Task Force report; however, the project used two models that are recommended in the Task Force report. The tiered framework recommended in the Task Force report is intended to be flexible to ensure it best fits the complexity of the watershed sources, available data, degree of impairment, and level of accuracy required. The TCEQ has followed this concept through the development of the TMDL and has expressed the desire to continue following it during the development and implementation of the I-Plan. Tier 3 analyses can be undertaken during the development of the implementation plan. The stakeholder-driven Bacteria Implementation Group has been formed to develop the implementation plan for *Nine Total Maximum Daily Loads for Bacteria in Clear Creek and Tributaries* as part of a plan for all other bacteria TMDLs for the Houston area. Social and economic impacts will be evaluated by the stakeholders that control the content of the plan. Priorities can be set and the plan can be long term. Adaptive management should be an integral part of the plan to provide the maximum flexibility. The current approach to the development of the Bacteria Implementation Group, the excellent resources available to develop the plan, and the experience and expertise of the organizations and individuals involved ensures the best plan for all stakeholders.

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001 (cont.)				The "Implementation and Reasonable Assurances" section of the TMDL document has been revised to better describe this process for developing the implementation plan noting that social and economic factors will be a consideration.
002	7/3/08 7/3/08	Harris County Public Infrastructure Department Greater Houston Builders Association	*Selection of TMDL Endpoint*: The TCEQ selected different endpoints within the same watershed. The end point is concentration-based in the non-tidal portion for two different indicator species using the 95 % of the geometric mean criterion for *E. coli* of 126 mpn/dL while it is load-based for Enterococci in the tidal portion.	No changes have been made based on this comment. Because load is directly proportional to concentration, a 5% reduction in concentration is equivalent to a 5% reduction in load. This means that for the non-tidal segments, the endpoint was, in effect, also load-based. The goal for both tidal and non-tidal segments is to attain the geometric mean criterion for the appropriate indicator bacteria.
003	7/3/08	Harris County Public Infrastructure Department	There are limited data for *E. coli* within the non-tidal portion of Clear Creek so the TCEQ varies the end point between fecal coliform and *E. coli*. The TCEQ applied the ratio of 126 *E. coli*/ 200 fecal coliform to convert from one indicator bacteria to the other. Harris County requests that these assumptions be refined through empirical evidence and investigation.	No changes have been made based on this comment. The 126/200 ratio was not used for non-tidal segments. TMDLs for Turkey Creek and Mud Gully were based on fecal coliform data. Nonsupport of contact recreation in both of these segments was based only on exceedances of the fecal coliform criterion because there were no exceedances of the geometric mean criterion for *E. coli*. Consequently, the reduction calculations were based on the samples collected for the indicator for which TMDLs were prepared (15 fecal coliform samples for Turkey Creek and 12 fecal coliform samples for Mud Gully). The ratios of Enterococci/*E. coli* and Enterococci /fecal coliform were used for the tidal portion of Clear Creek. As discussed in Appendix B (page B-3 of the TMDL), the Enterococci/*E. coli* and Enterococci /fecal coliform ratios applied correspond to median values obtained

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003 (cont.)				from the Alternate Indicator Study (conducted by the City of Houston and H-GAC). The TCEQ considers those ratios applicable to the bayous in the Houston area since they are derived from region-specific data. Nonetheless, the TCEQ agrees that the end points using the *E. coli* and Enterococci should be further refined during the implementation of the TMDL.
004	7/3/08	Harris County Public Infrastructure Department	40 CFR 139.2(1) states that a TMDL represents the maximum one day load; therefore this TMDL should make use of the single sample maximum, which, according Texas surface water quality standards, is 394 mpn/dL. Using the geometric mean as the end point is overly conservative. The daily maximum of 394 mpn/dL should be used instead.	No changes have been made based on this comment. Texas standards for surface water quality require that both the single-sample criterion and the geometric-mean criterion be met. The development of these TMDLs did consider both the single sample and the geometric mean results. TMDL calculations using LDCs and existing data showed that the pollutant load reduction required to meet the single-sample criterion would not result in attainment of the geometric mean criterion. As a result, the geometric mean was used to establish the TMDLs for each segment to ensure water quality standards would be met.
005	7/3/08	Harris County Public Infrastructure Department	*Limited understanding of bacteria dynamics within Texas Bayous*: Scientifically supportable identification of the sources of bacteria and the link between sources and instream levels continues to be a problem with the TMDL study to date. Local studies point to the potential for naturalized *E. coli* colonies growing within the sediments of our Bayous. The dynamics of bacteria once in the stream include a nonlinear relationship between the *E. coli* and Fecal Coliform bacteria. The true impact of naturalized bacteria on the standard as it relates to human health risks needs to be evaluated. Without establishing the link between sources and instream effects as well as identifying the site specific	No changes have been made based on this comment. The survival and replication of indicator bacteria in a natural water body is a very complex dynamic to determine. Studies have been conducted locally and nationwide and the results vary widely from increases to reductions in concentrations. The difficulty with all of these studies is that indicator bacteria survival and replication characteristics in a natural water body are affected by a very large and diverse set of conditions, such as predation, competition, and sunlight, and there is no definitive answer to the survival and replication question.

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005 (cont.)			relationship between the *E. coli* and Fecal Coliform bacteria, true calibration of any model used is not feasible. Without a more accurate identification of the sources and dynamics, calculations and estimates of pollutant loads remains theoretical and the path for actually improving the water quality in the waterways remains unclear.	The strategy used in the TMDL study is to assume that all of the factors controlling indicator bacteria survival and replication are balanced. As a result, the load capacity of the water bodies is not decreased due to survival and replication.
006	7/3/08	Harris County Public Infrastructure Department	*Arbitrary modeling application*: One of the major building blocks in developing a TMDL is the ability to quantify the flow in the impaired water body correctly. For bacteria TMDLs, flow is the parameter that determines the assimilative capacity with translates into a load. The methods applied to develop flow in Clear Creek are questionable. There is limited flow data for the non-tidal portion of Clear Creek. In an attempt to resolve this issue, TCEQ used actual stream flow data from a USGS station 08075400 located on Sims Bayou as a surrogate. This station is outside of the Clear Creek Watershed. The TCEQ then added the design flow of those waste water treatment facilities (WWTFs) permitted to discharge to Clear Creek, to the surrogate flow to produce a synthetic flow or, *per* the TMDL report, "naturalized projected flows." This synthetic flow was used to develop a flow duration curve which, in turn, formed the basis for the load duration curve. This approach introduces significant error into the analysis of the system and the TMDL development. Harris County requests the TCEQ revise their approach on developing fresh water flow in the non-tidal portion of Clear Creek or detail the methodology for this flow derivation. A watershed model using local rain fall data could be developed and calibrated to the limited	No changes have been made based on this comment. A watershed model could be developed as suggested. However, there are no adequate flow data with which to calibrate such a model. The flow projection method requires that the watershed draining to the gauge that is used for projections be similar in land use distribution and weather. This method, described in *Soil Conservation Urban Hydrology*, TR-55, is widely used for runoff calculations. Therefore, using a close-by gauge (even from a different watershed) is adequate, provided that those two conditions are met. The project team compared the modeled flows using the projection method to measured flows for some bayous in the Houston Metropolitan area (see Attachment 1) and found good agreement. Using gauges from the same watershed will not necessarily result in good flow estimates if the land use composition is substantially different from that when the flow was recorded. Note that the flow projections presented in Attachment 1 were completed using a neighboring gauge that was outside the watershed for which flow is being projected.

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006 (cont.)			flow data from USGS gauge station 08076997 within the watershed. If the flow record at USGS gauge station 08076997 is adequate, TCEQ could examine the performance of the flow derivation by comparing the synthetic flow with observed flow at this station.	The suggested USGS gauge, 08076997, has data for the period 10/1/2006 to present, which is outside of the period used for TMDL development (1/1/1996 to 9/30/2006). The flow projection tool was used to obtain a flow series that could be compared to the available data for gauge 08076697. Good agreement was found between modeled and measured flows. This comparison can be seen as a verification of the tool to Clear Creek data (see Attachment 2).
007	7/3/08	Harris County Public Infrastructure Department	The dynamic tidal model that was developed for the tidal portion of Clear Creek relies on the artificial flow developed for the non-tidal portion. Errors generated in the non-tidal portion of the system will propagate through the tidal portion as well, producing unreliable results. Harris County requests the TCEQ refine the hydrodynamics of the model developed for the tidal portion of Clear Creek following the revision of their approach on developing fresh water flow in the non-tidal portion of Clear Creek. The dynamic tidal model used conductivity to verify flow balance. However, long-term conductivity was not available at the downstream boundary *(i.e.* Clear Lake) in the model. The conductivity data observed at Eagle Point was used to estimate the conductivity in Clear Lake (Page B-10 of the TMDL report). In addition, conductivity in freshwater was assumed to be 1,000 IJS/cm (Page B-10 of the TDML report). In the absence of empirical data, the flow balance constructed on the basis of assumed and estimated conductivity data is likely unreliable. The prism model constructs a conductivity balance to examine the freshwater inflows and tidal exchange (Equation B-6 on Page B-10). The calculated conduc-	No changes have been made based on this comment. The freshwater conductivity value corresponds to the average of existing measurements. Conductivity observed at Eagle Point (corrected by a factor derived from existing data) is a good representation of values expected in Clear Lake since conductivity and salinity are conservative analytes and, thus, would be affected only by flow. Bacteria loads were calibrated <u>both</u> longitudinally and temporally (see time series Figures 4-14 to 4-21 of the Technical Support Document). As the plots show, the agreement was very good. Thus, the fate of bacteria in the tidal portion is reasonably well represented in the mass-balance model. Bacteria decay, as indicated in the report, is a net rate that includes re-growth and die-off. The rates obtained from available literature (see TMDL document pg 40) were calculated by measuring changes in concentration with time; thus, they are net decay rates. Since the calibrated rates are within the ranges provided in the literature, the model accurately represents Enterococci conditions as suggested by the aforementioned time series.

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007 (cont.)			tivities are compared with observed conductivities spatially (longitudinal profile of averaged conductivity along the stream, see Figure B-4), not temporally. The model was calibrated by only adjusting bacteria decay rate for bacteria concentration spatially (longitudinal profile of averaged bacteria concentrations along the stream, see Figure B-5), not temporally (the variation of bacteria concentration over simulation time). As a time-variable model, the TMDL study should check the model simulation temporally (over the simulation period). The lack of temporal analysis makes it difficult to evaluate the performance of the dynamic model. Harris County requests clarification and resolution of this issue.	The commenter is correct that decay rate was not adjusted through the time series of the model. Data on the change in decay rate over time in a water body is not available and very little is known about the general die-off/regrowth of indicator bacteria in the environment. Lacking good information on the change in decay rate over time, the single value of decay was used in the calibration of the model.
008	7/3/08	Harris County Public Infrastructure Department	*Subjectivity and inconsistency in data manipulation and application*: Two important linked parameters are needed for determining a load, flow, and concentration. The TCEQ used synthetic flow and measured in-stream bacteria grab samples to calculate daily bacteria loads. This method is inappropriate and arbitrary. Harris County requests the TCEQ to refine the load estimates following the revision of their approach on developing fresh water flow in the non-tidal portion of Clear Creek.	No changes have been made based on this comment. See response to previous comment.
009	7/3/08	Harris County Public Infrastructure Department	The tidal prism model used for tidally influenced segments is a time-variable mass balance model. However, the loading calculations use geometric mean bacteria concentration for tributary and runoff loading calculations as model input. This approach does not reflect temporal variation in bacteria concentration *(e.g.*, a constant bacteria concentration, which is the average of observation, is used in a time-variable model simulation). Harris County requests that the TCEQ revise their approach.	No changes have been made based on this comment. The loads entered into the tidal prism model were calculated using projected daily flows and measured bacteria concentrations to calibrate to existing conditions. However, if no concentrations were available for a particular reach, loads were calculated using EC geometric means from available data on other tributaries or reaches of Clear Creek Tidal.

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009 (cont.)				Once calibrated, the model was used to simulate different loading scenarios to determine TMDLs. Because the freshwater segments were addressed using LDCs, it was assumed that the criterion of 126 counts/100mL will be met all the time (as required by the Texas Water Quality Standards) at the point where freshwater reaches flow into the tidally influenced reach.
010	7/3/08	Harris County Public Infrastructure Department	On Page A-10, the report states that a "... bacteria sample was then considered a wet weather sample if the three-day rainfall total was greater than or equal to S." The equation for runoff calculation is Q = (P-0.2S/(P+0.8S). Runoff would be produced when P>0.2S. The report does not explain why 3-day total is used. There is no mention of the travel time of flow through the stream segments. Harris County requests clarification and resolution of this issue.	No changes have been made based on this comment. The decision to analyze indicator bacteria data samples using an LDC, characterized as influenced by dry or wet weather conditions, was made only to allow inferences to be made from the LDC plot about whether the source of bacteria as having a point or nonpoint source. The characterization of ambient water quality samples in relation to dry or rainfall conditions was not a step aimed at quantifying or allocating bacteria loads to discrete source categories. A three-day period was considered a reasonable timeframe for examining the relationship that rainfall events can have on the movement of bacteria in overland flow to a receiving stream, and between stream segments and assessment units.
011	7/3/08	Harris County Public Infrastructure Department	Bacteria are treated as conservative sources (no change after loaded into the Clear Creek). However, bacteria decay is included in the prism method used for the tidally influenced segment. This study should either include bacteria regrowth/decay in LDC allocation analysis or explain why it is not necessary to include it. Harris County requests clarification and resolution of this issue.	No changes have been made based on this comment. *E. coli* concentrations are reduced by increases in salinity. Literature values for the decay of E .coli were used in the tidal prism model to represent the effects of the increase in salinity. The rates obtained from available literature (see TMDL document pg 40) were calculated by measuring changes in concentration with time; thus,

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011 (cont.)				they are net decay rates. Since the calibrated rates are within the ranges provided in the literature, the model accurately represents Enterococci conditions. LDCs do not simulate the fate of contaminants; rather, they calculate allowable loading for a given flow. Since LDCs do not link the loading to specific sources, processes affecting the fate of bacteria are not included.
012	7/3/08	Harris County Public Infrastructure Department	*Inconsistencies and Subjectivity in load allocations*: On Page A-12, the TMDL report states "...for each of the three flow regimes, existing loads were determined by calculating the median flow and the geometric mean concentration of historical bacteria data." This calculation for existing load does not match the recommendation in EPA document *An Approach for Using Load Duration Curves in the Development of TMDLs* (EPA 841-B-07-006). Harris County requests that the TCEQ follow the EPA recommendation.	No changes have been made based on this comment. The EPA document provides guidance on the use of LDCs. The document does not include a recommendation for calculating bacteria TMDLs based on geometric means. However, the State of Texas requires that both standards—the single sample and geometric mean criteria—be met. Thus, TMDLs for Clear Creek were developed using geometric mean concentrations rather than single sample concentrations, as explained in further detail in the response to comment #002.
013	7/3/08 7/3/08	Harris County Public Infrastructure Department Greater Houston Builders Association	*Excessive Conservatism and Margin of Safety*: The TMDL document states that the TMDL equation includes an explicit 5% margin of safety and an endpoint set to 95% of the geometric mean. Although the margin of safety (MOS) is quantified, there are significant overly-conservative assumptions that are part of the implicit margin of safety. According to EPA, typical types of MOS are broken into two groups that include: <u>Explicit</u> • Set numeric targets at more conservative levels than analytical results indicate;	No changes have been made based on this comment. The margin of safety is set at five percent because the loads were analyzed using only the LDC method for fresh water and the tidal prism mass balance method for tidally influenced water bodies. Under today's conditions, particularly if using WWTF actual loads, there is even more margin of safety available. Nonetheless, it is necessary to establish allocations based on full permitted loadings. Under that predicted loading, the assumption becomes much less conservative.

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013 (cont.)			• Add a safety actor to pollutant loading estimates; • Do not allocate a part of available capacity, reserve for MOS. <u>Implicit</u> • Conservative assumptions in derivation of numeric targets; • Conservative assumptions when developing numeric model applications. Some of the conservative assumptions that make this TMDL overly-restrictive include: 1) TMDL load calculated using the geometric mean as an end point not single sample; 2) assuming WWTF discharge at design flow; 3) assuming WWTF bacteria concentrations equal the surface water quality standard concentration; 4) holding back additional load for future WWTF growth; and 5) limiting the load to a three-step flow scenario which in turn leaves additional capacity unavailable for use.	
014	7/3/08	Harris County Public Infrastructure Department	*Inconsistencies between this Bacteria TMDL and others*: Harris County has noted major inconsistencies between this TMDL and other bacteria TMDLs throughout the state, and requests that the TCEQ develop a consistent approach. Such inconsistencies include: different endpoints for different subwatersheds for the Buffalo Bayou/White Oak Bayou Watershed; the Upper Gulf Coast Oyster Water Bacteria TMDL was concentration-based using the median bacteria concentration; Gilleland Creek Bacteria TMDL endpoint was load-based using both single sample and geomean values.	No changes have been made based on this comment. The approach used to develop a TMDL is based on the available data, the magnitude of the problem, conditions within the watershed, and stakeholder input. The LDC and tidal prism methods are appropriate for this watershed and are used in other TMDLs developed or in development by TCEQ. These modeling approaches are among the recommended methods of the Bacteria Task Force.
015	7/3/08	Harris County Public	*Implementation Flexibility Hindrances*: All TMDLs need to allocate a portion of the load to Wasteload Al-	No changes have been made based on this comment.

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015 (cont.)		Infrastructure Department	location (WLA) and the other to Load Allocation (LA). Since WWTF and municipal separate storm sewer system (MS4) loads fall under the WLA portion of the equation, Harris County recommends leaving the division between the various Texas Pollutant Discharge Elimination System (TPDES) permit holders -*i.e.* WWTF and MS4 -to the implementation portion of the TMDL. EPA has written many papers about water quality trading credits between point sources. Data collected during the development of this TMDL show that some of the larger WWTFs perform well in removing bacteria while others do not. In such cases, credits could be traded between well-and poorly performing WWTFs. Likewise, under this approach credits could be traded between WWTFs and MS4s, the latter of which manage discharges using Best Management Practices (BMPs) and which may not be able to meet the restrictive load identified in these TMDLs.	Currently, the EPA requires separate waste load allocations for all individual waste water treatment facilities (WWTFs) and individual allocations for all storm water permits (MS4, industrial, and construction). This TMDL is only establishing an aggregate WLA value for storm water in the TMDL. Further discrimination should be done by the stakeholders. The TCEQ readily revises the WLA components of the TMDL in order to develop permits consistent with the TMDL. Updates to the Water Quality Management Plan reflect minor changes to TMDLs to accommodate re-allocation between individual permits. Updates are processed quarterly by the TCEQ's executive director.
016	7/3/08	Harris County Public Infrastructure Department	*Alternative approaches*: There are two endpoint options for this TMDL that should be explored as an alternative approach to this TMDL: 1) Establish the TMDL as a concentration-based TMDL similar to the Upper Coast Oyster Waters Bacteria TMDL. Federal regulations allow for the establishment of a concentration based TMDL for a pollutant that is not readily controllable on a mass basis; or 2) Follow the guidance in the United States Environmental Protection Agency's 2007 documents, *Approach for Using Load Duration Curves* and *Options for Expressing Daily Loads in TMDLs*, by establishing the "90% of the daily maximum concentration" as the end point and increase the number of flow categories to five.	No changes have been made based on this comment. 1) The approach used to develop a TMDL is based on the available data, the magnitude of the problem, conditions within the watershed, and stakeholder input. The load allocation TMDL is appropriate for this watershed. The concentration-based TMDL was used in the Upper Coast Oyster Waters Bacteria TMDL because of the very low bacteria concentrations and the localized nature of the exceedances. 2) The water quality standards include provisions for single sample and geometric mean criteria in support of recreational uses, both of which need to be met in order to conclude that the water body is attaining uses. Application of the 90th percentile as the end point (Texas allows for a 75th percentile) does not ensure compli-

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016 (cont.)				ance with a geometric mean and would thus not be protective. The use of the geometric mean endpoint provides additional certainty that all criteria will be met, even at a 75th percentile. As an example the following hypothetical E. coli sample set meets the 90th percentile but would exceed the geometric mean (150 cfu, 180 cfu, 220 cfu, 290 cfu, 300 cfu, 310 cfu, 315 cfu, 350 cfu, 375cfu, 380 cfu). An analysis was done using the 75th percentile rather than the 90th. It found that the single-sample TMDLs were less restrictive, and in most cases, the 75th percentile did not result in attainment of the geometric mean criterion. If the 90th of the concentrations were to be used, exceedances of the geometric mean criterion would be even higher. The three flow categories used in the TMDL indicate the conditions that are influenced by storm water runoff and WWTF discharges. High flow (wet conditions) are influenced predominately by storm water runoff and low flow (dry conditions) are influenced by predominately WWTF discharges. Intermediate flow is a mixture of the two dominant sources. Five categories would not improve this general analysis.
017	6/16/08	Texas Parks and Wildlife	TPWD recognizes that water is the basis for a significant recreational resource in Texas that includes boating, fishing, swimming, sailing, diving, bird watching, and paddle sports. TPWD has established as one of its major goals to maintain or improve water quality and quantity to support the needs of fish, wildlife, and recreation. We support TCEQ's efforts to improve and restore water quality through the TMDL process. Within the scope of its authority, TPWD is committed to assisting TCEQ in its efforts to restore full use of water bodies for which the contact recreation use is impaired. Specifically, TPWD has resources to assist	No changes have been made based on this comment. The TCEQ appreciates the TPWD’s willingness to assist rural and urban communities during the implementation phase of this project. Cooperation among agencies, communities, and stakeholders is a key element in our shared goal of improving water quality.

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017 (cont.)			both rural and urban communities in the implementation phase. For rural areas, TPWD Wildlife Division Technical Guidance biologists are available to assist landowners concerning local wildlife populations and habitat management. Staff can provide comprehensive wildlife habitat management plans for landowners wishing to improve wildlife populations and habitat on their property. These plans contain a comprehensive treatment of past and existing management and habitat conditions and recommendations that detail how to achieve goals on a specific parcel. See the TPWD "Landowner Services" brochure at <www.tpwd.state.tx.us/publications/owdoubs/ media/pwd br w7000 0189.pdf>. For urban areas, TPWD administers a park grants program that helps to build new parks and conserve natural resources. See <www.tpwd.state.tx.us/business/grants/>. An example of the type of situation where the Department might assist TCEQ could occur where unusual concentrations of wildlife contribute atypical amounts of fecal material to a river. The Department addressed this type of problem with a bat colony in a bridge over the San Antonio River on the River Walk. The Department assisted with making the bridge less attractive to bats so the colony would move from the site.	
018	6/16/08	Texas Parks and Wildlife	TPWD staff have reviewed the "Source Analysis" section of the TMDL report. The subsection "Wildlife and Unmanaged Animal Contributions" addresses inputs from wildlife. We appreciate the distinction being drawn between wildlife and feral or exotic animals through the use of	No changes have been made based on this comment.

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018 (cont.)			the term "wildlife and unmanaged animals." We note that this TMDL does not attempt to estimate wildlife populations and instead states that, "... currently there are insufficient data available to estimate populations and spatial distribution of wildlife and avian species by watershed. Consequently, it is difficult to assess the magnitude of indicator bacteria contributions from wildlife species as a general category." We agree with this statement.	
019	6/11/08	Ty Kelly, President Bayou Preservation Association (Public comment meeting)	We generally agree that this is a good job. Our only comment is that although there is good measurement of the amount of the various bacteria in the water, there is not really a percentage estimate of each source of bacteria. We would like to see a little more fine detail as to what is the source for each type of bacteria and then some goals for percentage reductions of each source.	No changes have been made based on this comment. The load allocations described in the TMDL provide goals for developing an implementation plan with strategies to control all sources. Further investigation of specific sources will be developed by the implementation committee. The Bacteria Implementation Group in the Houston area convened in July 2008 and will address all the bacteria TMDLs in the Houston area, including the Clear Creek bacteria TMDL.
020	7/1/08	Water Environment Association of Texas	Adjust Water Quality Target: The proposed TMDLs are based on an inapplicable standard. The current water quality standard for contact recreation is based on fresh water lake studies; however, it has been inappropriately applied to creeks, streams, and bayous. The current standard is based on 9 experimental trials measuring lake bacteria levels, swimmer illness rates, and non-swimmer illness rates conducted in Oklahoma (keystone Lake) and Pennsylvania (Lake Erie) with different climate and aquatic conditions than those found in the Houston region. Seven of the 9 trials did not show a statistically significant difference in illness rates between swimmers and non-swimmers, yet these trials were used by EPA to derive the existing national criterion.	TCEQ must develop TMDLs for the water quality standards currently approved. We agree that the standards should be reviewed. The water quality targets are reviewed approximately every three years for all parameters. An ongoing stakeholder advisory group is working with the TCEQ to consider revisions to recreational use categories and numerical criteria. It is TCEQ policy to review all completed TMDLs after each revision of the Texas Surface Water Quality Standards and to revise TMDLs as necessary. The “Implementation and Reasonable Assurances” section of the TMDL report was modified as requested to mention how implementation can be adjusted based on standards changes.

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020 (cont.)			The 9 trials revealed a moderate correlation between *E. coli* levels in the water and illness rates (0.72). However, the correlation between swimmer and non-swimmer illness rates was similar (0.67), suggesting that illness transmission could have occurred via routes other than from water exposure. This and other published criticisms of the EPA fresh water criteria (Haas, 2006; suggest that Texas and regional stakeholders should conduct research into this area to improve the technical basis for our contact water quality standards. WEAT urges the TCEQ to modify the content of the *Implementation and Reasonable Assurances* section to include a brief mention of future research activities and the TCEQ's intent to modify the TMDL and the Water Quality Management Plan if new criterion is developed and adopted as a result of future research.	
021	7/1/08	Water Environment Association of Texas	Consider Correct Use Designation: The proposed TMDLs are based on a presumed use of contact recreation: swimming with a large risk of water ingestion. Recent census work funded by TCEQ and conducted by the Houston-Galveston Area Council (H-GAC), illustrates that even at riparian parks during favorable weather conditions there are no swimmers in Whiteoak Bayou or Buffalo Bayou. We believe Houston area bayous are an important environmental and quality-of-life amenity to the city and region. We support improved park facilities and greater access to all bayous in the Houston area, however, we believe that current and future public enjoyment of these resources consists and will consist of boating and bank activities and do not and will not include full-immersion swimming. We encourage the TCEQ to add "secondary contact recreation" to the state surface water quality standards framework, to develop a technically based criterion to protect the secondary contact use (based on the ratio of	No changes have been made based on this comment. The commenter correctly notes that TCEQ has funded and is developing methods for recreational use attainability analyses (UAAs). A UAA can be conducted at any time, and the results can be submitted during the review of the Texas Surface Water Quality Standards. The Standards are reviewed approximately every three years for all parameters. Current proposals include a two-tier contact recreation standard. Federal requirements do not allow adoption of a provisional TMDL or one that does not meet water quality standards.

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021 (cont.)			ingestion rates), and to develop a recreational use attainability analysis protocol. We urge the TCEQ to add language to the proposed TMDL that identifies the TMDL as provisional, explicitly notes the intent of the agency to assess the appropriateness of the use designations, to conduct use attainability analysis, and to modify the TMDL and the Water Quality management Plan if the use changes in the future.	
022	7/1/08	Water Environment Association of Texas	Make all Waste Load Allocations Non-Binding: Individual waste load allocations for permitted wastewater treatment plants are presented in the report, however, the report states that these individual waste load allocations are "non-binding until implemented via a separate TPDES permitting action." This flexibility is welcomed and applauded; however, we believe that this type of flexibility is more necessary for permitted storm water discharges, since they have no control over volume, timing, and flow rate of their discharges or the bacteria concentrations in the discharges. Wastewater treatment plants are significantly more consistent and are subject to direct operator control. We urge the TCEQ to include a similar statement in the discussion of the storm water waste load allocations.	All allocations in the TMDL become part of the state's Water Quality Management Plan and serve as the guide for permitting actions. The storm water component of the waste load allocations is no more binding than the WWTF allocation. As described in a previous response, the TCEQ updates the Water Quality Management Plan to adapt to changing conditions and standards. As requested, a statement has been added to the "Waste Load Allocation" section of the report.
023	7/1/08 7/3/08	Water Environment Association of Texas Greater Houston Builders Association	Add Discussion of Implementation Approach for Permitted Storm Water: WEAT believes that achieving significant reductions in indicator bacteria in permitted storm water discharges will pose a huge fiscal burden on the region and, based on current storm water best management practices (BMPs), may represent a huge engineering and technical challenge. See Clary, J., et. Al., 2008, "Can Stormwater BMPs Remove Bacteria?" Stormwater Magazine, May 2008, for an assessment of how well current storm water BMPs can remove bacte-	No changes have been made based on this comment. The strategy for managing permitted storm water sources will be developed by the Bacteria Implementation Group and other stakeholders in the Houston area. The current approach to the development of the Bacteria Implementation Group, the excellent resources available to develop the plan, and the experience and expertise of the organizations and individuals involved ensures the best plan for all stakeholders.

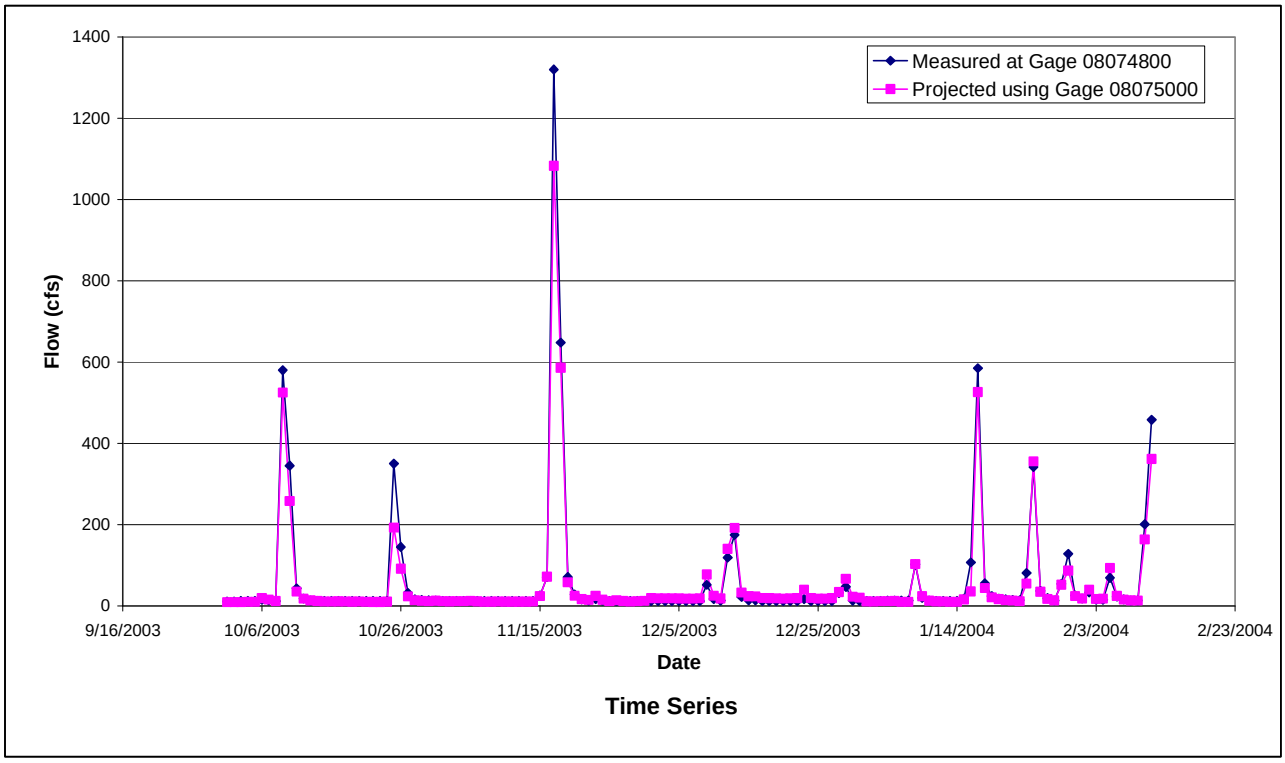
Tracking Number	Date Received	Affiliation of Commenter	Summary of Request or Comment	Summary of TCEQ Action or Explanation
023 (cont.)			ria. Do to these issues, WEAT urges the TCEQ to include a discussion of how storm water permits will be modified to address requirements. WEAT urges TCEQ to include provisions of EPA's *Questions and Answers Regarding Implementation of an Interim Permitting Approach for Water Quality-Based Effluent Limitations in Storm Water Permits* (Federal Register: November 6, 1996, Vol. 61, No. 216) and EPA Office of Water memorandum entitled: *Establishing TMDL WLAs for Storm Water Sources and NPDES Permit Requirements Based on Those WLAs*, from Robert Wayland and James Hanlon to Water Division Directors, Dated November 22, 2002.	
024	7/3/08	Greater Houston Builders Association	Remove specific waste load allocations from the TMDL: All TMDLs require allocation of a portion of the load to WLA and the other to LA. Since WWTF and MS4 loads fall under the WLA portion of the equation we recommend leaving the division between the various TPDES permit holders (WWTF and MS4) to the implementation portion of the TMDL. The Clean Water Act allows for some flexibility when writing individual permits but the inclusion of loads limits this flexibility. The permitted storm water discharges need flexibility as well. One option available to the regulated community for meeting the TMDL limits is load allocation trading. EPA has written many papers about water quality trading where there have been discussions about point source trading. Data collected during the development of this TMDL show that some of the larger WWTF perform well with the removal of bacteria and others do not. In addition to trading between plants there is the potential to shift the allocation towards the MS4 permit where loads are managed with BMPs such as outreach and may not be able to meet the restrictive load identified in the TMDL. We	No changes have been made based on this comment. In order to approve the TMDL, the EPA requires separate waste load allocations for WWTFs. TCEQ is also required to break out the WLA into continuous (WWTF) and non-continuous (storm water) loads. The TCEQ readily revises the WLA components of the TMDL in order to develop permits consistent with the TMDL. Updates to the Water Quality Management Plan reflect minor changes to TMDLs to accommodate re-allocation between individual permits. Updates are processed quarterly by the TCEQ's executive director. Trading can occur between varieties of loading sources. The TCEQ encourages the exploration of this concept during implementation discussions.

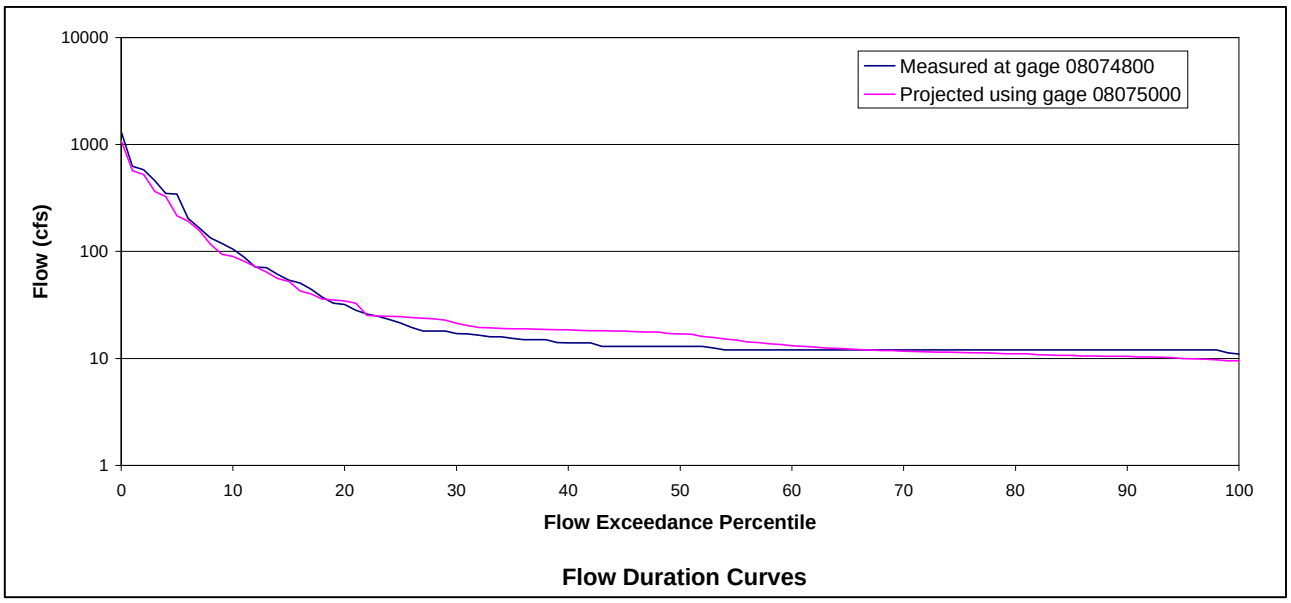
Tracking Number	Date Received	Affiliation of Commenter	Summary of Request or Comment	Summary of TCEQ Action or Explanation
024 (cont.)			strongly urge the TCEQ to remove specific waste load allocations and evaluate the possibility of load allocation trading during the implementation of this TMDL.	
025	7/3/08	Greater Houston Builders Association	Add analysis of concentrations vs. flow prior to adoption of the TMDL: A preliminary analysis of bacteria concentrations and their associated bayou flow rates indicates that during dry weather, when recreational activities such as boating would be more likely, bacteria levels range from 1,000 to 3,000 colonies per 100 milliliter at most monitored stations. During wet weather conditions, bacteria levels can reach 100,000 colonies per 100 milliliter due to the contributions from wet-weather sources. This suggests that during dry weather, indicator bacteria levels are safe for boating (assuming that boating ingestion rates are 100 times less than swimming ingestion rates) and during wet weather, when recreational activities would not be occurring, bacteria levels are temporarily elevated, but public exposure is minimized. To explore this issue more thoroughly, HCEC suggests that the TCEQ plot bacteria concentrations vs. the associated bayou flow rate (on the day of sample collection) to assess the differences in standards attainment during wet and dry weather conditions. This analysis will assist the TCEQ and stakeholders with assigning appropriate load reductions for both dry and wet weather sources.	No changes have been made based on this comment. The load duration curves in the "Load Duration Curve Results" section present the indicator bacteria loads versus flow rates for each freshwater segment. Although these are not concentrations, the bacteria levels for high and low flows can be observed relative to the contact recreation criterion. Should the Bacteria Implementation Group decide that concentration versus flow analysis is helpful, the analysis can be performed. The current water quality standards for contact recreation do not distinguish between degrees of immersion and the difference in risks to human health from them. Currently proposed changes to the water quality standards are attempting to address those concerns.

Attachments

Attachment 1 - Comparison of Measured and Projected Flows in Houston Bayous

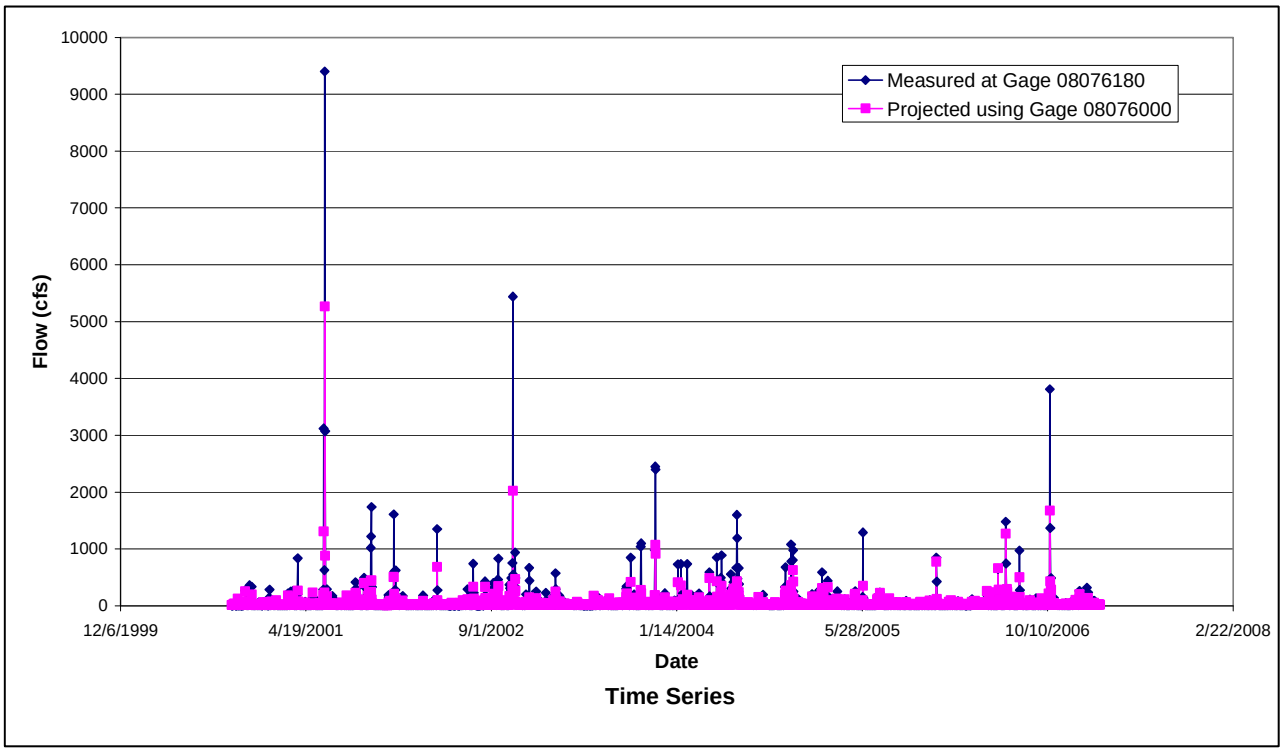
Flow Projections for Keegans Bayou

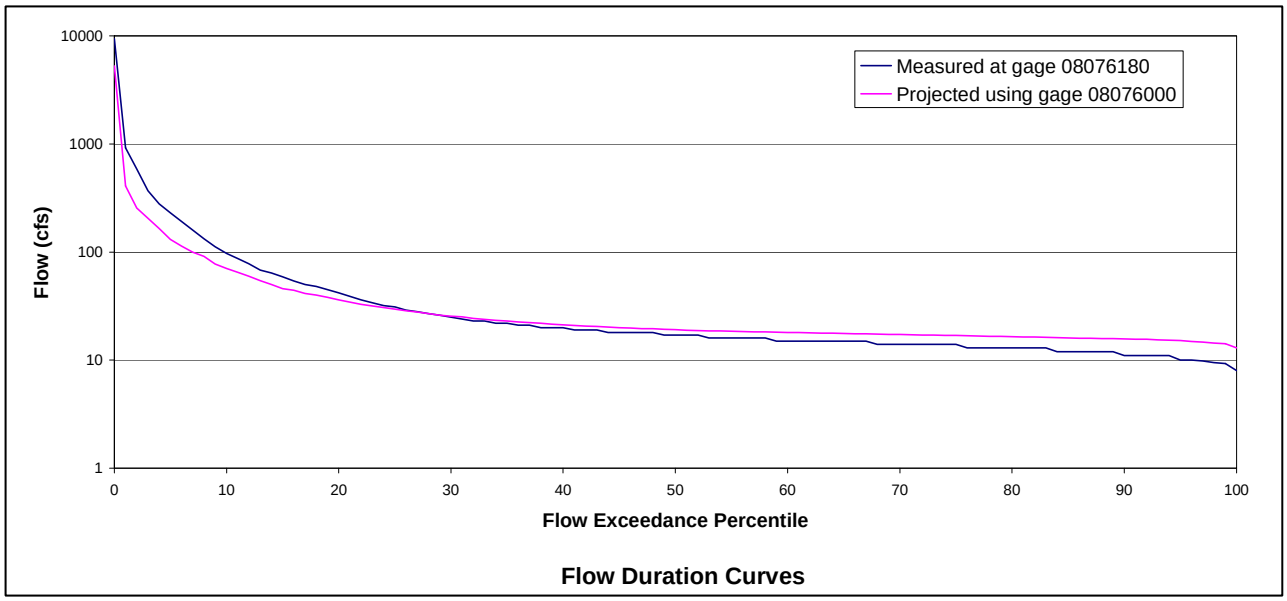




Gauge 08075000 is located in Brays Bayou at South Main

Flow Projections for Garners Bayou

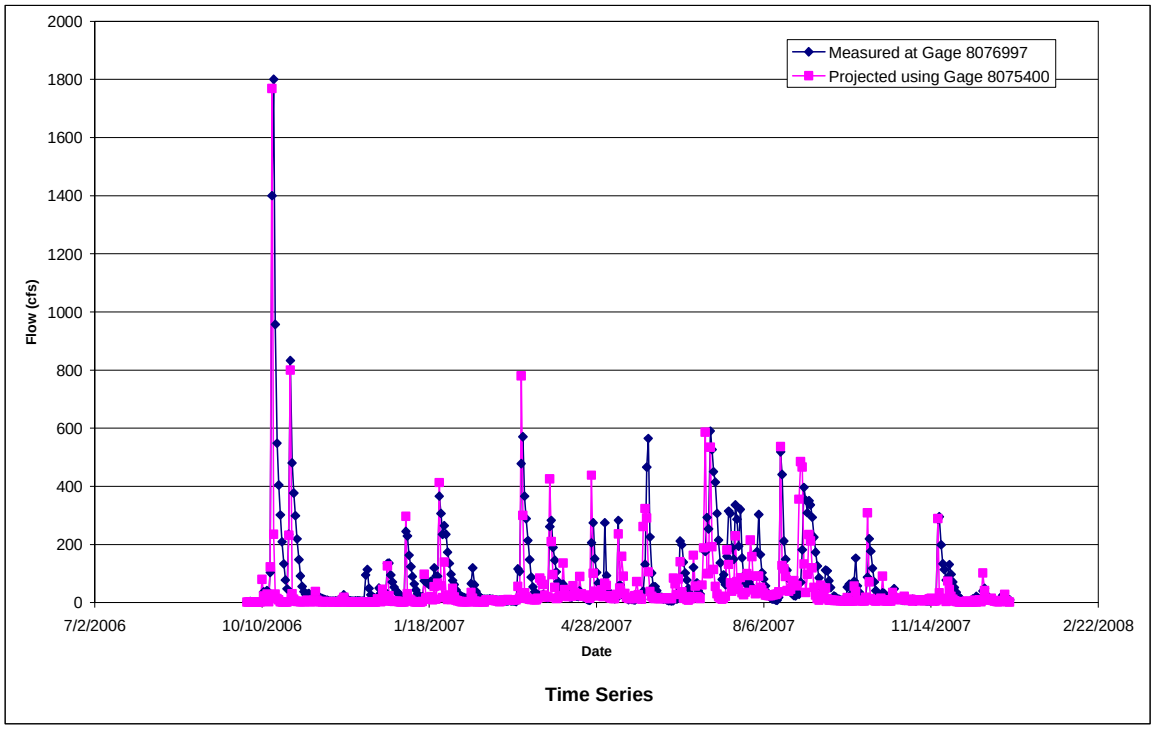


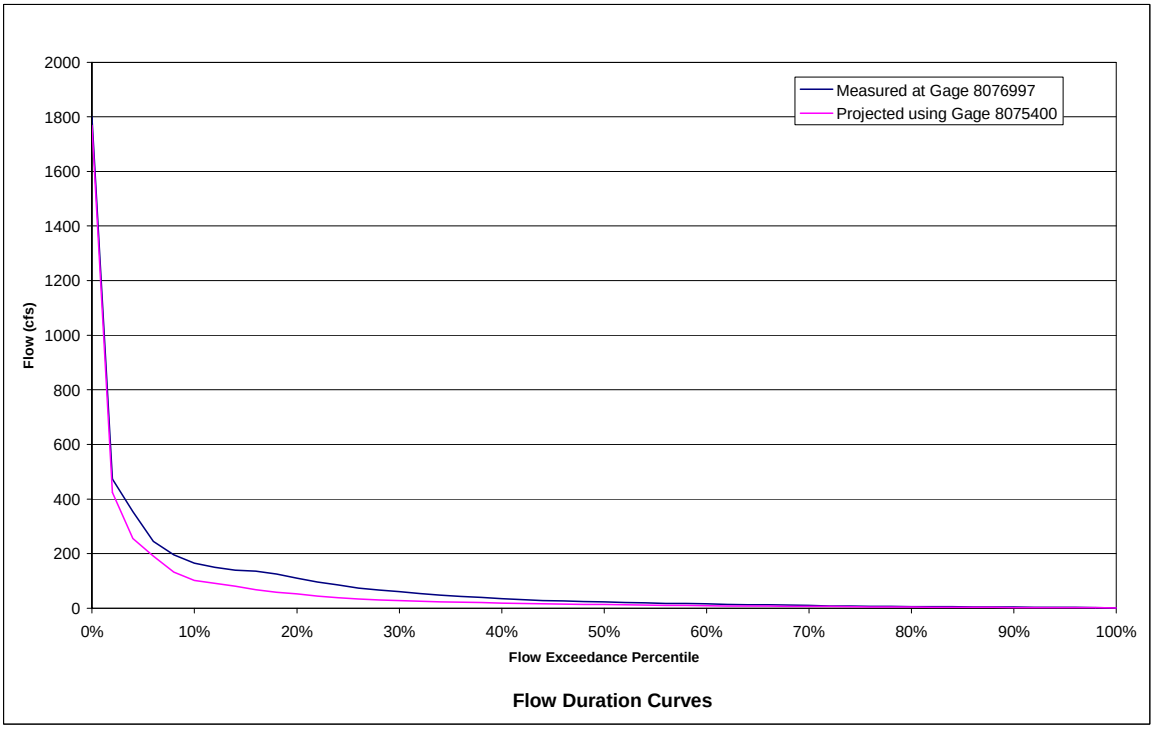


Gauge 08076000 is located in Greens Bayou at US Highway 59

Attachment 2 - Comparison of Measured and Projected Flows in the Study Area

Flow Projections for Clear Creek





Gauge 08075400 is located in Sims Bayou at US Highway 59 at Hiram Clark Street