

Appendix E: Comprehensive Comparative Matrix of Socioeconomic Impact Analysis Literature Review

Parameters	Weihsuan Xu	Weinstein & Clower	Norvell & Kluge	Booker
Reservoir	Marvin Nichols I	Marvin Nichols I	All Water Planning Regions	Rio Grande Basin
Objective	To assess the economic impact of the potential reduction of timber supply to the local industry and economy	To assess social, economic, and environmental effects due to the construction of the reservoir	To analyze how limited water supplies during drought might affect communities throughout the state	To develop an allocation model of basin's water resources among competing uses across political and institutional jurisdictions, and test the effect of institutional reforms, or adjustments on damage reduction caused by drought
Research: definition and model design	Methodology	Methodology	Methodology	Methodology
	<ul style="list-style-type: none"> • Analysis of impacts on timber supply due to effected forests on the reservoir • Analysis of timber supply due to mitigation restrictions • Input/output model is developed by using IMPLAN software 	<ul style="list-style-type: none"> • Analysis of impacts on: <ul style="list-style-type: none"> ○ regional economy ○ housing ○ recreational-based business ○ timber-based industry during construction and operation of the reservoir • Input/output model is developed by using IMPLAN software 	<ul style="list-style-type: none"> • Analysis of impacts of unmet water needs, including gain/losses to customers • Analysis of changes in population and school enrollment due to changes in water shortages, and impacts on migration patterns • Input/output model is developed by using IMPLAN software 	<ul style="list-style-type: none"> • Modeling of law of the river and description of drought-coping conditions by: <ul style="list-style-type: none"> ○ Analyzing and modeling of potential institutions ○ Analyzing and modeling of basin hydrology ○ Estimating economic value of water by sectors ○ Evaluating potential drought-coping institutions • Mathematical optimization model is developed to allocate resources subject to hydrology conditions and institutions
	Economic scenario, assumptions	Economic scenario, assumptions	Economic scenario, assumptions	Economic scenario, assumptions
	<ul style="list-style-type: none"> • Annual estimation of timber supply based on average prices (weighted stumpage and delivered) for timber in Northeast Texas ("NT"). Reduced output is computed as: Total output forestry sector in NT x (Total stumpage value lost/ Total stumpage value in NT) • Analysis for short/long term, periods not specified in years 	<ul style="list-style-type: none"> • Construction period of the reservoir defines temporary impacts of the project • Construction phase defined for a period of 3-4 years • Recurring local economic impacts are computed on annual basis • Recurring impacts of new developments and recreational spending are computed on annual basis 	<ul style="list-style-type: none"> • Stationary economic conditions over 50-year period • Based on current economic conditions 	<ul style="list-style-type: none"> • Annual time step model • Based on current economic conditions, consumptive use, marginal elasticities, demand for agriculture, and water-intensive labor-saving crops

Parameters		Weihuan Xu	Weinstein & Clower	Norvell & Kluge	Booker
Impacts on local area, region and landowners	Regional analysis	<ul style="list-style-type: none"> Moderate Regional impact is related only to the forestry industry Other economies outside but near to the region are not considered 	<ul style="list-style-type: none"> Moderate Consideration of impacts on surrounding areas and other than those of the counties are partially included Statewide impacts are stated but not disaggregated by area 	<ul style="list-style-type: none"> Extensive Include consideration of secondary variables that may affect production function in the model (specific contracts, skilled workers) 	<ul style="list-style-type: none"> Extensive Constraints in the model pick up the different relationships among basins in the area (diversions, reservoir contents and releases, intracompact and interstate markets, and the like)
	Local Analysis	<ul style="list-style-type: none"> Narrow Only focused on forestry industry 	<ul style="list-style-type: none"> Moderate General figures Not detailed by economic sectors or particular counties 	<ul style="list-style-type: none"> Extensive Includes figures by county, sectors, years Division of primary and secondary impacts 	<ul style="list-style-type: none"> Extensive Upper Rio Grande Basin area and relationships with surrounding basins are analyzed through the constraints of the model (inflows, stream flows, diversions, use, return flows, groundwater flows, etc)
	Mitigation requirements	<ul style="list-style-type: none"> Considered Based on habitat quality score (HQ) 	<ul style="list-style-type: none"> Not Considered 	<ul style="list-style-type: none"> N/A 	<ul style="list-style-type: none"> N/A
	Alternative sources of water	<ul style="list-style-type: none"> Not considered 	<ul style="list-style-type: none"> Not considered 	<ul style="list-style-type: none"> Considered Alternative sources in surrounding areas where the area can get it from in case of drought Corresponding costs includes transportation 	<ul style="list-style-type: none"> Considered Different constraints related to Rio Grande Compact, US-Mexico treaty take into consideration water exchange among areas
	Welfare Costs Economic value of forgone water	<ul style="list-style-type: none"> Not considered 	<ul style="list-style-type: none"> Not considered 	<ul style="list-style-type: none"> Considered Measured as the economic value of water people would have to give up in case of drought 	<ul style="list-style-type: none"> Considered Impacts of alternative water supplies is included, considering total and marginal benefits based on estimated price elasticities

Parameters		Weihuan Xu	Weinstein & Clower	Norvell & Kluge	Booker
Impact on Natural resources	Wildlife Impacts	<ul style="list-style-type: none"> • Not considered 	<ul style="list-style-type: none"> • Not considered 	<ul style="list-style-type: none"> • Not considered 	<ul style="list-style-type: none"> • Considered • A constraint identifying minimum flows for endangered species is part of the model
	Analysis of Timber supply	<ul style="list-style-type: none"> • Extensive • Short/Long term analysis • Estimation based on average annual growth rates of roundwood per acre for the North East Texas area (TPWD) 	<ul style="list-style-type: none"> • Moderate • General observations of impacts on timber supply • No estimations are included 	<ul style="list-style-type: none"> • N/A 	<ul style="list-style-type: none"> • N/A
	Alternative timber supply	<ul style="list-style-type: none"> • Not considered • No alternative timber supply is assumed for the study area 	<ul style="list-style-type: none"> • Considered • Timber supply in surrounding areas with impacts on transportation costs 	<ul style="list-style-type: none"> • N/A 	<ul style="list-style-type: none"> • N/A
	Endangered species	<ul style="list-style-type: none"> • Not considered 	<ul style="list-style-type: none"> • Not considered 	<ul style="list-style-type: none"> • Not considered 	<ul style="list-style-type: none"> • Considered • A constraint related to minimum flows for endangered species is part of the optimization model
Impacts on forest industry, related sectors and inter-sector industries	Forest industry cost/benefits	<ul style="list-style-type: none"> • Partially considered • Downside effects prevail based on future shortages of timber due to the reservoir • No benefits are considered 	<ul style="list-style-type: none"> • Partially considered • Current timberland inventory could be enough to offset potential downsides due to the proposed reservoir • Additional demand for development project should offset increasing operating cost of transportation for getting the commodity from an alternative source • Losses/gains are not quantified 	<ul style="list-style-type: none"> • N/A 	<ul style="list-style-type: none"> • N/A

Parameters		Weihsuan Xu	Weinstein & Clower	Norvell & Kluge	Booker
Impacts on forest industry	Impacts on other industries	<ul style="list-style-type: none"> Not considered 	<ul style="list-style-type: none"> Considered Estimation of total economic benefits, no further disaggregation 	<ul style="list-style-type: none"> Considered Extensive analysis of Impacts on manufacturing, horticultural, electric (and impacts on local and state taxes) are shown by county (direct and indirect effects) 	<ul style="list-style-type: none"> Not considered Secondary effects such as reduction on local business are not counted
	Inter-sector benefits	<ul style="list-style-type: none"> Not considered 	<ul style="list-style-type: none"> Considered Estimation shown as total economic activity benefits 	<ul style="list-style-type: none"> Considered Disaggregation by sector, year, county, and primary and secondary effects 	<ul style="list-style-type: none"> Not considered
Impacts on taxes	Local and state tax impacts	<ul style="list-style-type: none"> Not considered 	<ul style="list-style-type: none"> Partially considered Estimation of total indirect state and local business taxes No disaggregation by area or type 	<ul style="list-style-type: none"> Considered Estimations include division by county Estimations derived from direct and secondary regional level impacts 	<ul style="list-style-type: none"> N/A
Impacts on Cities	Ongoing operations of reservoir (benefits)	<ul style="list-style-type: none"> Not considered 	<ul style="list-style-type: none"> Considered 	<ul style="list-style-type: none"> N/A 	<ul style="list-style-type: none"> N/A
	Demographics	<ul style="list-style-type: none"> N/A 	<ul style="list-style-type: none"> Based on previous studies, similar projects, other areas 	<ul style="list-style-type: none"> Based on published sources Population attributes reflect area population Births, deaths, migration rates based on U.S. Census and TSDC 	<ul style="list-style-type: none"> N/A
	Spending habits	<ul style="list-style-type: none"> N/A 	<ul style="list-style-type: none"> Based on previous studies similar projects, other areas (authors' estimation/feeling) 	<ul style="list-style-type: none"> Assumed to remain stable based on current patterns (TWDB) 	<ul style="list-style-type: none"> N/A
	Population growth	<ul style="list-style-type: none"> N/A 	<ul style="list-style-type: none"> Based on previous studies, similar projects, other areas Population patterns may differ from one area to the other 	<ul style="list-style-type: none"> Separation of population in general and special Application of survival and fertility rates to the general population Estimation of non-economic migration and ending population for a given year 	<ul style="list-style-type: none"> N/A

Parameters		Weihuan Xu	Weinstein & Clower	Norvell & Kluge	Booker
Study Advantages/ Disadvantages/ Gaps	Time Value of Money	<ul style="list-style-type: none"> Not considered (1999 dollars) 	<ul style="list-style-type: none"> Not considered (2002 dollars) 	<ul style="list-style-type: none"> Not considered 	<ul style="list-style-type: none"> Not considered
	Data sources	<ul style="list-style-type: none"> IMPLAN software databases were utilized for the projections Data related to quantity and quality of habitats in the reservoir no current 	<ul style="list-style-type: none"> Databases were not properly identified 	<ul style="list-style-type: none"> Texas State Data Center and TWDB databases U.S. Census Bureau's Public Use Microdata Samples Texas Department of Health Current and updated 	<ul style="list-style-type: none"> Farm cost and return enterprise budgets (New Mexico Univ. and Texas A&M) U.S. Department of Interior 1906 U.S. Mexico treaty 1938 Rio Grande Compact Several research-based papers Current and updated
	Inflation	<ul style="list-style-type: none"> Not considered 	<ul style="list-style-type: none"> Not considered 	<ul style="list-style-type: none"> Not considered 	<ul style="list-style-type: none"> Not considered
	Cost of reservoir/Cost benefits	<ul style="list-style-type: none"> Not considered 	<ul style="list-style-type: none"> Considered Dam, pipeline and pump station costs are included on the temporary effects of the reservoir (first 4 years) Analysis of recurring annual impacts (local/regional) includes dam and pipeline ongoing operations 	<ul style="list-style-type: none"> N/A The study is focused on impacts of unmet water needs in case of drought conditions, considering current infrastructure 	<ul style="list-style-type: none"> N/A The study considers current state of reservoirs, alternative existing sources of water
	Other assumptions	<ul style="list-style-type: none"> No alternative timber supply available 	<ul style="list-style-type: none"> Disposable income assumed to be 85% Population growth based on population at other reservoirs Economic impacts to the timber industry based on just three counties Pipeline costs estimation is based on potential routing (no final design) 	<ul style="list-style-type: none"> Total sales tend to overestimate economic benefits (inter-sector sale) Point estimators look of limited significance Elimination of all outdoor activities in case of drought 	<ul style="list-style-type: none"> River depletions due to bosque vegetation and relationships with river flows are poorly understood by the model Parameterization of maximum and minimum changes to consumptive use with evolving river and groundwater conditions potentially inaccurate

References: TWC – Texas Water Commission; TWDB – Texas Water Development Board ; TSDC - Texas State Data Center; PUMS - U.S. Census: Public Use of Microdata; TDH - Texas Department of Health ; FWC - Fish and Wildlife Service; TPWD - Texas Park and Wildlife Department; TNRIS - Texas Natural Resources Information System; HEP - Habitat Evaluation Procedure; WHAP - Wildlife Habitat Appraisal Procedure

Parameters		Frye & Curtis	RW Beck	RW Beck
Research: definition and model design	Reservoir	Cooper, Upper Guadalupe, Stacy, Applewhite, Wallisville, Retamal, Rio Grande Channel Dam A, Paluxy, Justiceburg, Eastex, Palo Duro, Big Sandy, Big Pin, Sweetwater Creek, Bosque, Post, South Fork, Lindenau, South Bend, Caldwell, Ringgold, Clopton Crossing, Millican, Prairie Creek, Bédias, Cleveland, Shaw's Bend, Liberty Hill, Lake Creek, Lockhart, Little Cypress, Tehuacana, George Parkhouse I, Rockland, Weches, Cuero, Cibolo, Breckenridge, Goliad, George Parkhouse II, Bon Wier, Carl Estes, Tennessee Colony, Marvin Nichols I	Bédias, Toledo Bend, Lower Guadalupe,	Lake Ralph Hall
	Objective	To determine quantity/quality of wildlife habitat in each reservoir, establish resource categories for the habitats, calculate terrestrial wildlife resource compensation requirements, determine possibility of rare, unique flora/fauna be threatened, and identify the reservoirs of major concern	To assess the socioeconomic impact of interbasin transfers and the effects of new legislation being imposed on water management strategies utilized by regional water planning groups in Texas	To assess the socioeconomic impact of construction of Lake Ralph Hall Reservoir
	Methodology	<ul style="list-style-type: none"> • Wildlife habitats: current status in Texas and inventory of cover types within proposed reservoirs • Wildlife habitat quality evaluation for impacted sites • Determination of resource categories (FWS Mitigation Policy) • Compensation requirements calculation • Assessment of significant flora/fauna • Vegetation inventory data (TPWD) • Computer-assisted approach and multi-temporal analysis 	<ul style="list-style-type: none"> • Analysis of interbasin transfers • Comparison of current interbasin transfers with alternative strategies • Analysis of key factors considered by regional planning groups to select interbasin transfer • Cost analysis and impact of strategies on economic variables • Socioeconomic analysis and estimation of interbasin transfer net impacts on its respective region Input/output model using IMPLAN software	<ul style="list-style-type: none"> • Analysis of construction costs associated to Basin of Origin, receiving basin and economic impacts • Basin of Origin: estimation of short and long term economic impacts • Receiving Basin: estimation of short and long term economic impacts • Input/output model using IMPLAN software

Parameters		Frye & Curtis	RW Beck	RW Beck
Research: definition and model design	Economic scenario, assumptions	<ul style="list-style-type: none"> • N/A • The study is focused on assessing impacts to wildlife habitat from future development projects 	<ul style="list-style-type: none"> • Reservoir construction period 4-5 years • 50-year projection period • Based on current economic conditions • Costs measured in 2002 dollars • Cost adjusted to 2005 by applying the Construction Cost Index (ENR), Producer Price Index (PPI), TWDB reports, and Handy-Whitman Index of Public Utility Construction cost • Construction costs beyond 2005 adjusted by the historical average percentage increase in the ENR index • Considerations of annual debt service, operation and maintenance, and water source costs included for the projected period for each transfer • Electricity and chemical costs adjusted by PPI for each industrial sector • Treatment costs for desalinated water adjusted by average annual increase in NARUC Account 320 (Handy-Whitman Index of Public Utility Construction Costs) • Costs that cannot be unbundled adjusted by an assumed 3% inflation factor • Time-lag for pipeline construction: 3 years, desalination plants 5 years, construction of reservoirs 20 years 	<ul style="list-style-type: none"> • 30-year projection period • Multipliers based on current economic conditions • Costs measured in 2004 dollars • Annual loss of land assumed to be 1% starting in 2015 • Agricultural prices expressed in 1997 dollars • Disposable income estimated to be 85.6% • Inflation rate of 3% • Spending habits based on current trends

Parameters		Frye & Curtis	RW Beck	RW Beck
Impacts on local area, region and landowners	Regional Analysis	<ul style="list-style-type: none"> • Extensive • Through a detailed mapping and classification of areas based on Landsat satellite system and several databases (TNIS, TWDB, TWC) the study includes statewide inventories, potential impacts, and mitigation effects 	<ul style="list-style-type: none"> • Extensive • Consideration of variables with economic impact like acres lost to mitigation, reservoir construction, long term benefits to local/regional commerce, employment, and housing due to population increase 	<ul style="list-style-type: none"> • Extensive • Consideration of variables with economic impact like acres lost to reservoir construction, long term benefits to local/regional commerce, employment, and housing due to population increase
	Local Analysis	<ul style="list-style-type: none"> • Extensive • Current state of reservoirs (construction phase, pool elevation, type of field, etc.) along with determination of mitigation requirements, endangered/threatened species, resource categories, and assessment of unique flora /fauna is included in the area of each reservoir 	<ul style="list-style-type: none"> • Extensive • Economic impacts of the reservoirs (construction phase, operations) • Impacts on farm production, forestry, agricultural subsidies, and local mitigation effects and acres lost by reservoir • Short and long term benefits due to direct construction and commerce, lake-related activities and commerce for new residents in the Basin of Origin and the Receiving Basin 	<ul style="list-style-type: none"> • Extensive • Economic impacts of the reservoir construction phase • Impacts on farm production and agricultural subsidies • Short and long term benefits due to direct construction and commerce, lake-related activities and commerce for new residents in the Basin of Origin and the Receiving Basin
	Mitigation requirements	<ul style="list-style-type: none"> • Considered • Mitigation alternative management options based on FWS Mitigation Policy 	<ul style="list-style-type: none"> • Considered • Mitigation requirements based on Frye & Curtis (FWS Mitigation Policy) 	<ul style="list-style-type: none"> • Partially considered • Mitigation requirements appear to be included as part of the direct cost associated to acreage removed, but this is not clearly stated • Source linked to mitigation requirements is not present
	Alternative sources of water	<ul style="list-style-type: none"> • N/A 	<ul style="list-style-type: none"> • Considered • Alternatives sources are considered and their economic impacts evaluated for the three interbasin water transfer 	<ul style="list-style-type: none"> • Not considered
	Welfare Costs Economic value of forgone water	<ul style="list-style-type: none"> • N/A 	<ul style="list-style-type: none"> • Not considered 	<ul style="list-style-type: none"> • Not considered

Parameters		Frye & Curtis	RW Beck	RW Beck
Impact on Natural resources	Wildlife Impacts	<ul style="list-style-type: none"> • Considered • Identification of endangered/threatened species as well as bottomland hardwood forests/forested riparian vegetation by referencing TPWD and TPWD and TNHP 	<ul style="list-style-type: none"> • Not considered 	<ul style="list-style-type: none"> • Not considered
	Analysis of Timber supply	<ul style="list-style-type: none"> • N/A 	<ul style="list-style-type: none"> • Partial, not extensive • General observations of forestry production, no particular estimations are included 	<ul style="list-style-type: none"> • Not considered
	Alternative Timber supply	<ul style="list-style-type: none"> • N/A 	<ul style="list-style-type: none"> • Not considered 	<ul style="list-style-type: none"> • Not considered
	Endangered species	<ul style="list-style-type: none"> • Considered • Extensive information regarding endangered/threatened species analyzed under TPWD or THNP databases • Detailed classification of site priorities, identification of compensation requirements according to different scenarios 	<ul style="list-style-type: none"> • Not considered 	<ul style="list-style-type: none"> • Not considered
Impacts on forest industry, related sectors and inter-sector industries	Forest industry cost/benefits	<ul style="list-style-type: none"> • N/A 	<ul style="list-style-type: none"> • Partially considered • Loss of income from forestry production is estimated based on acres lost to the construction of the reservoir and mitigation 	<ul style="list-style-type: none"> • Not considered
	Impacts on other industries	<ul style="list-style-type: none"> • N/A 	<ul style="list-style-type: none"> • Extensive • Impacts identified for commerce due to lake visitors and new residents, employment rate for lake-related activities, and construction related benefits are included 	<ul style="list-style-type: none"> • Moderate • General comments about impacts on local economy due to lake visitors and new residents, employment rate for lake-related activities, and construction related benefits are included
	Inter-sector benefits	<ul style="list-style-type: none"> • N/A 	<ul style="list-style-type: none"> • Considered • Disaggregation by sectors, years, or counties are provided • General figures for related sectors such as tourism, housing, commerce 	<ul style="list-style-type: none"> • Partially considered • Economic impacts included for commerce and farm activity • No detailed analysis of impacts by sectors or related industries

Parameters		Frye & Curtis	RW Beck	RW Beck
Impacts on taxes	Local and state tax impacts	<ul style="list-style-type: none"> N/A 	<ul style="list-style-type: none"> Not considered 	<ul style="list-style-type: none"> Not considered
Impacts on Cities	Ongoing operations of reservoir (benefits)	<ul style="list-style-type: none"> N/A 	<ul style="list-style-type: none"> Considered Analysis of recurring annual impacts (local/regional) is included in operation and maintenance cost of each reservoir 	<ul style="list-style-type: none"> Not considered
	Demographics	<ul style="list-style-type: none"> N/A 	<ul style="list-style-type: none"> Based on published sources Population attributes, potential increments and future water demand/shortages are based on TWDB Regional Water Plans and reflect local area features 	<ul style="list-style-type: none"> Based on published sources Population attributes, visitor profiles based on U.S. Army Engineer Research and Development Center, and TWDB Regional Water Plans
	Spending habits	<ul style="list-style-type: none"> N/A 	<ul style="list-style-type: none"> Based on current patterns (TWDB Regional Water plans) and IMPLAN Professional Software Analysis and Data Guide 	<ul style="list-style-type: none"> Based on current patterns (TWDB Regional Water plans), IMPLAN Professional Software Analysis and Data Guide, Texas A&M Recreation, Park & Tourism Sciences survey results
	Population growth	<ul style="list-style-type: none"> N/A 	<ul style="list-style-type: none"> Annual population increase is based on TWDB Regional Water demand projections 	<ul style="list-style-type: none"> Annual population increase is based on TWDB Regional Water demand projections, Hydrologic and Hydraulic Studies of Lake Ralph Hall (R.J. Brandes Company, 2004)

Parameters		Frye & Curtis	RW Beck	RW Beck
Study Advantages Disadvantages Gaps	Data sources	<ul style="list-style-type: none"> Habitat Evaluation Procedures Mitigation policy based on FWS Mitigation Policy, TPWD, EPA and NMFS Compensation requirements based on quantification of habitat units (HU), quality, and quantity Assessment of endangered species based on TPWD data and TNHP Current databases 	<ul style="list-style-type: none"> Texas Water Code and related legislation 2001-2006 Regional Water Plans 	<ul style="list-style-type: none"> U.S. Department of Agriculture 1997 Census of Agriculture Environmental Working Group Farm Subsidy database RS Means Manuals (2003) and Preliminary Feasibility Studies of Proposed Ralph Hall (Upper Trinity Regional Water District) by Chiang, Patel & Yerby, Inc. U.S. Army Engineer Research and Development Center TWDB 2006 Regional Water Projections Hydrologic and Hydraulic Studies of Lake Ralph Hall, by R.J. Brandes Company
	Time Value of Money	<ul style="list-style-type: none"> N/A 	<ul style="list-style-type: none"> Considered 30-year Treasury interest rate for 2005 was used as the discount rate 	<ul style="list-style-type: none"> Considered 30-year Treasury interest rate for 2005 was used as the discount rate
	Inflation	<ul style="list-style-type: none"> N/A 	<ul style="list-style-type: none"> Considered Prices and costs adjusted by an assumed 3% inflation rate 	<ul style="list-style-type: none"> Considered Prices and costs adjusted by an assumed 3% inflation rate
	Cost of reservoir/Cost benefits	<ul style="list-style-type: none"> N/A 	<ul style="list-style-type: none"> Considered Reservoir, pipelines, pipeline crossings, stilling basins, operation and maintenance, and pump station costs are included Cost benefits (local/regional) includes direct construction benefits (payroll and materials) and indirect impacts on commerce and related activities 	<ul style="list-style-type: none"> Considered Estimation of costs based on Preliminary Feasibility Studies of Proposed Ralph Hall, Upper Trinity Water District Cost benefits (local/regional) includes direct construction benefits, indirect and induced impacts on commerce and related activities

Parameters			US Army Corps			
Parameters			Frye & Curtis	RW Beck	US Army Corps	RW Beck
Research: definition and model design	Study	Reservoir	Cypress Valley Watershed Texas	<ul style="list-style-type: none"> Downside effects of the projects, which could translate into higher costs or negative externalities in the related areas are not fully quantified due to the level of water use 	US Army Corps	<ul style="list-style-type: none"> Ongoing operations of the reservoir could trigger additional impacts on the region. However, it is not clear this item is fully included in the cost analysis
		Objective	To determine existing conditions in the Cypress Valley Watershed and to identify potential water resources improvements. Findings related to opportunities for environmental restoration, recreation improvements, flood damage reduction, stream bank erosion, source water protection and water quality improvements are also discussed	<ul style="list-style-type: none"> Assumptions about demographics are generally sound however, a slight variation in demographics for the study area 	US Army Corps	<ul style="list-style-type: none"> Data used to project long term benefits in commerce from lake-visitors, new residents is based on data from Cooper Lake, Navarro Mills Lake, and Lake Bardwell.
		Methodology	<ul style="list-style-type: none"> Identification of existing conditions in the study area Identification of social and economic conditions in the study area 	<ul style="list-style-type: none"> Assumptions about demographics in the study area (county area) could provide different estimates about population growth, per capita income, and economic benefits as a result 	US Army Corps	<ul style="list-style-type: none"> Data may not fully reflect population's profile in the lake Ralph Hall area Impacts on taxes and housing are not included even though they may be of considerable relevance in deciding about the viability of the project Analysis of inter-sector impacts, forestry industry, natural resources may be relevant to the study but they are not included Environmental impacts are not measured
Advantages	Other assumptions					
Disadvantages						
Gaps						

References: TWC – Texas Water Commission; TWDB – Texas Water Development Board ; TSDC - Texas State Data Center; PUMs - U.S. Census: Public Use of Microdata; TDH - Texas Department of Health ; FWC - Fish and Wildlife Service; TPWD - Texas Park and Wildlife Department; TNRIS - Texas Natural Resources Information System; HEP - Habitat Evaluation Procedure; WHAP - Wildlife Habitat Appraisal Procedure

		<ul style="list-style-type: none"> resources, environmental setting, threatened species, cultural resources, recreational resources • Problem identification on restoration of environment, forest, wetland, water quality, factors affecting water quality and pollution in the Cypress basin • Identification of recreational needs: recreation travel patterns, projected visitors, needed facilities and resources, lake operations, basin-wide operating plan, water supply needs • Identification of future water uses, regional and local water-related problems and needs • Economic development analysis: market assessment, visitation local and regional input, site analysis, public education, environmental education, regional economic development • Travel-cost method models (TCM) and CrossMatch analysis used to project economic benefits and estimate impacts on industries and local economies • Mathematical, regression models, simulation/sensitivity analysis used to project recreational trends and urban flood damage
Research: definition and model design	Economic scenario, assumptions	<ul style="list-style-type: none"> • Economic feasibility measured as a relationship of benefits-to-costs (benefit/cost ratio) • Economical feasibility defined as benefit/cost ratio equal to or greater than 1.0 • Flood damage reduction benefits defined as the monetary savings due to damages prevented, reduction in the cost of emergency services, and reduced disruption of the local economy • Project benefits subsequently annualized to represent a yearly benefit applicable to the life of the project • The project cost, which includes the construction cost, the interest on the first cost during construction, the operation and maintenance costs, and the interest to amortize the project cost over the life of the project, is annualized to represent an annual project cost applicable to the time period of the project • Economic metrics based on current economic conditions for the area • 50-year time horizon
Parameters		US Army Corps
Impacts on local area, region and landowners	Regional Analysis	<ul style="list-style-type: none"> • Extensive • Consideration of secondary and induced effects that may affect populated areas included • Areas affected (approximately 90 miles around the basin) include three states (Texas, Louisiana, Arkansas)
	Local Analysis	<ul style="list-style-type: none"> • Extensive • Figures by county, sector, year included
	Mitigation Requirements	<ul style="list-style-type: none"> • Extensive • Analysis of requirements depending on each area included
	Alternative	<ul style="list-style-type: none"> • Considered

	sources of water	<ul style="list-style-type: none"> • Analysis of potential, viable alternative water sources investigated for the Cypress Valley watershed area
	Welfare Costs Economic value of forgone water	<ul style="list-style-type: none"> • Considered • Included for analysis of flood damage (monetary savings/spending from success/failure of flood management techniques)
Impact on Natural resources	Wildlife Impacts	<ul style="list-style-type: none"> • Considered
	Analysis of Timber supply	<ul style="list-style-type: none"> • N/A
	Alternative Timber supply	<ul style="list-style-type: none"> • N/A
	Endangered species	<ul style="list-style-type: none"> • Considered
Impacts on forest industry, related sectors and inter-sector industries	Forest industry cost/benefits	<ul style="list-style-type: none"> • Considered • Projected growth for industries (forestry and/or related industries) included
	Impacts on other industries	<ul style="list-style-type: none"> • Extensive • Impacts on and growth opportunities for manufacturing, agricultural, and tourism industries identified by county, region, and state
	Inter-sector benefits	<ul style="list-style-type: none"> • Considered • Extensive disaggregation of potential development for existing and new manufacturing, manufacturing-related, agricultural, and tourism industries by area, county, and state
Parameters		US Army Corps
Impacts on taxes	Local and state tax impacts	<ul style="list-style-type: none"> • Not Considered
Impacts on Cities	Ongoing operations of reservoir (benefits)	<ul style="list-style-type: none"> • Considered • Operation and maintenance costs included as variables with impacts on the benefits of the project (local/regional areas)
	Demographics	<ul style="list-style-type: none"> • Based on published sources • Population attributes reflect area population based on Bureau of Economic Analysis, Department of Commerce (projections to 2040) and Texas Water Development Plan • Births, deaths, migration rates based on U.S. Census

	Spending habits	<ul style="list-style-type: none"> • Based on current patterns (TWDB), U.S. Census, Bureau of Economic Analysis - Department of Commerce
	Population growth	<ul style="list-style-type: none"> • Based on published sources • Bureau of Economic Analysis - Department of Commerce (databases and projections to 2040) • Texas Water Development Plan and U.S. Census
Study Advantages/ Disadvantages Gaps	Data sources	<ul style="list-style-type: none"> • Texas Parks and Wildlife Department and TWDB databases • U.S. Census • Bureau of Outdoor Recreation - U.S. Department of Interior databases • Bureau of Economic Analysis - Department of Commerce databases • Outdoor Recreation Plan for Texas, Louisiana, and Arkansas • Current and updated
	Time Value of Money	<ul style="list-style-type: none"> • Considered • Federal discount rate (US Department of Treasury)
	Inflation	<ul style="list-style-type: none"> • Not considered
	Cost of reservoir/Cost benefits	<ul style="list-style-type: none"> • Considered • The study reflects potential impacts from reservoir construction, secondary and induced benefits
Study Advantages/ Disadvantages Gaps	Other assumptions	<ul style="list-style-type: none"> • CrossMatch model used to estimate impacts on industries and local economies is heavily focused on manufacturing sectors, it may overlook economic potential in other sectors • To consider an industrial sector as potential industrial target for the analysis, the CrossMatch model requires the sector to have a projected annual growth rate of at least 5 percent, for the next five years. Sectors with lower expected growth rates are left aside even if prospective growth still exists

Citations for Literature Review Studies

1. Weihuan, Xu., "The Economic Impact of the Proposed Marvin Nichols I Reservoir to the Northeast Texas Forest Industry." Prepared by the Texas Forest Service of the Texas A&M University System. Publication 162. August, 2002.
2. Weinstein, L.B. and Clower, T.L. "The Economic, Fiscal and Developmental Impacts of the Proposed Marvin Nichols Reservoir Project." Prepared for the Sulphur River Basin Authority. March, 2003.
3. Norvell, Stuart and Kluge, K. "Socioeconomic Impact of Unmet Water Needs." Individual Reports for 16 Regional Water Planning Regions. Prepared by the Texas Water Development Board's Office of Water Resource Planning in support of the Northeast Water Planning Group and the 2006 Texas State Water Plan. May, 2005.
4. Booker, J.F., Michelsen A.M., and Ward F.A. "Economic Impact of Alternative Policy Responses to Prolonged Severe Drought in the Rio Grande Basin." Prepared for Water Resources Research, VOL. 41, W02026, doi:10.1029/2004WR003486. February, 2005.
5. R.G. and Curtis D.A. "Texas Water and Wildlife. An Assessment of Direct Impacts to Wildlife Habitat from Future Water Development Projects." Prepared by Wildlife Division - Texas Parks and Wildlife Department, and Ecological Services Division - U.S. Fish and Wildlife Service. May, 1990.
6. Stowe, Jack. "Socioeconomic Analysis of Selected Interbasin Transfers in Texas." Prepared by R.W. Beck and Associates for the Texas Water Development Board. October, 2007.
7. Stowe, Jack. "Economic Impact of Lake Ralph Hall." Prepared by R.W. Beck for Chiang, Patel & Yerby, Inc. June, 2004.
8. U.S. Army Corps of Engineers. "Cypress Valley Watershed Texas. Reconnaissance Report." Prepared for U.S. Army Corp of Engineers, Fort Worth District in response to investigation requested by Congressman Jim Chapman (Congressional District Number 1), with support from the city of Jefferson, Texas, and other. September, 1995 (Revised November, 1998).
9. Perryman, Dr. Ray. Technical memorandum reviewing and critiquing the draft economic impact analysis of the proposed Marvin Nichols Reservoir conducted by Weinstein, L.B. and Clower T.L. (March 2003) and a review of the economic impact analysis conducted Weihuan, Xu of the Texas Forest Service (August 2002). Prepared for Mr. John Rutledge of Freese and Nichols, Inc. December, 2002.