7.0 POTENTIAL SURFACE WATER PROJECTS

7.1 Previously Proposed Reservoirs

Seventeen previously proposed reservoir projects, fourteen in the Upper Sabine Basin and three in the Lower Basin, were reviewed to identify potential surface water alternatives for additional supply in the Sabine Basin. Project locations, yield, potential conflicts, environmental concerns and hindrances to development were assessed based on available data.

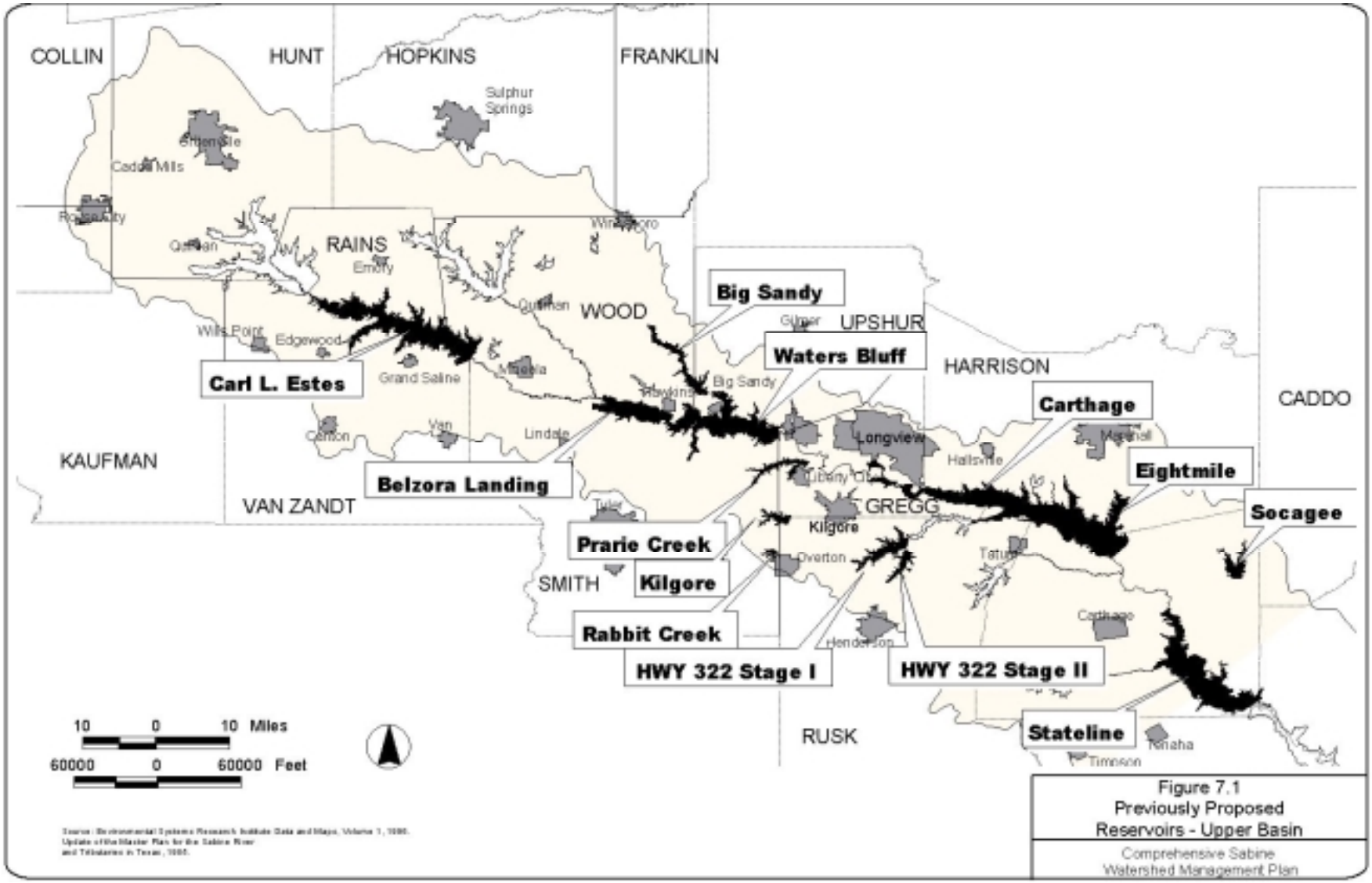
Seven potential reservoir projects are located on the main stem of the Sabine River (Carl L. Estes, Belzora Landing, Waters Bluff, Fredonia Lake, Carthage, Stateline and Bon Wier). The other ten reservoir sites are located on tributaries to the Sabine: Prairie Creek, Big Sandy, Kilgore, Rabbit Creek, Eightmile, Cherokee No. 2, State Highway 322, Socogee, Burkeville and Big Cow. Figures 7.1 and 7.2 show most of these potential reservoir sites. The largest reservoirs, based on projected yield, are Waters Bluff, Carthage and Bon Wier. These are all proposed main stem reservoirs that would be used as a major regional water supply. The reservoirs with the lowest yields are Rabbit Creek and Kilgore Reservoirs. These sites, if developed, would probably be considered for local supply.

Water supply and demand analyses show there is sufficient supply to meet the projected future needs in the Sabine Basin. However, the majority of the supply is located in the Lower Basin and is not available for upstream use without a major pipeline. The total supply located in the Lower Basin is 920,000 acre-ft per year, and the projected Lower Basin demand in the year 2050 is 164,000 acre-ft per year. Proposed reservoirs located in the Lower Basin (Bon Wier, Big Cow and Burkeville) cannot be justified based on projected local water supply needs. Existing sources in the Upper Basin have a total estimated supply of approximately 768,000 acre-feet per year, with 333,000 acre-feet per year of that amount being exported to other basins. That leaves 435,000 acre-feet per year for in-basin needs. This is sufficient to meet the Upper Basin needs until about the year 2010**.** To provide for projected demands through 2050, it will be necessary to develop approximately 93,000 acre-feet per year of additional supply in the Upper Basin. This can be accomplished through reservoir development, importation from other basins or transfer of water from Toledo Bend Reservoir by pipeline to the areas of need. Proposed large reservoirs, such as Waters Bluff and Carthage, that provide estimated yields of 324,000 and 537,000 acre-feet per year, respectively, will be able to provide for projected needs well beyond

2050. However, development of these large-scale projects may not be completed in time to provide for the anticipated shortfall by 2010. Smaller scale projects, such as Prairie Creek, Rabbit Creek and Big Sandy reservoirs, will provide only a portion of the estimated need in 2050. Additional water supplies need to be developed to meet the growing demands of the Upper Basin. The advantages of the smaller projects are that they could be staged to meet the demands as needed, can be completed in a shorter time frame, and can be located near local areas of need.

Preliminary findings of developmental concerns associated with each of the reservoir sites indicate that the main stem reservoir projects typically have several concerns with environmental and permitting issues. Due to the basic nature of a reservoir, some natural habitats located along the Sabine River bottoms will be lost; however, reservoir construction also has positive benefits such as fisheries and increased nesting and feeding areas for other known species in the area (e.g., the bald eagle and alligator). Preliminary screening indicates the presence of priority bottomland hardwoods in the sites for Waters Bluff, Carthage, Stateline and Bon Wier reservoirs (see Section 10.0). Lignite deposits, mineral rights and cultural resources affect three other proposed reservoirs in the Upper Basin (Carl L. Estes, Big Sandy and Highway 322). Many of the smaller reservoir projects are located outside the most environmentally sensitive areas and may have fewer hindrances to development. However, there is typically less information available on the smaller reservoirs to adequately assess the developmental concerns. A summary of known concerns is presented on Table 7.1. Several of the reservoir-siting considerations (active mines, oil and gas well fields and priority bottomland hardwoods) are illustrated on Figure 7.3. All bottom land hardwood data was taken from the 1984 U.S. Fish and Wildlife Service report, Texas Bottomland Hardwood Preservation Program. A brief description of each previously proposed reservoir project follows.

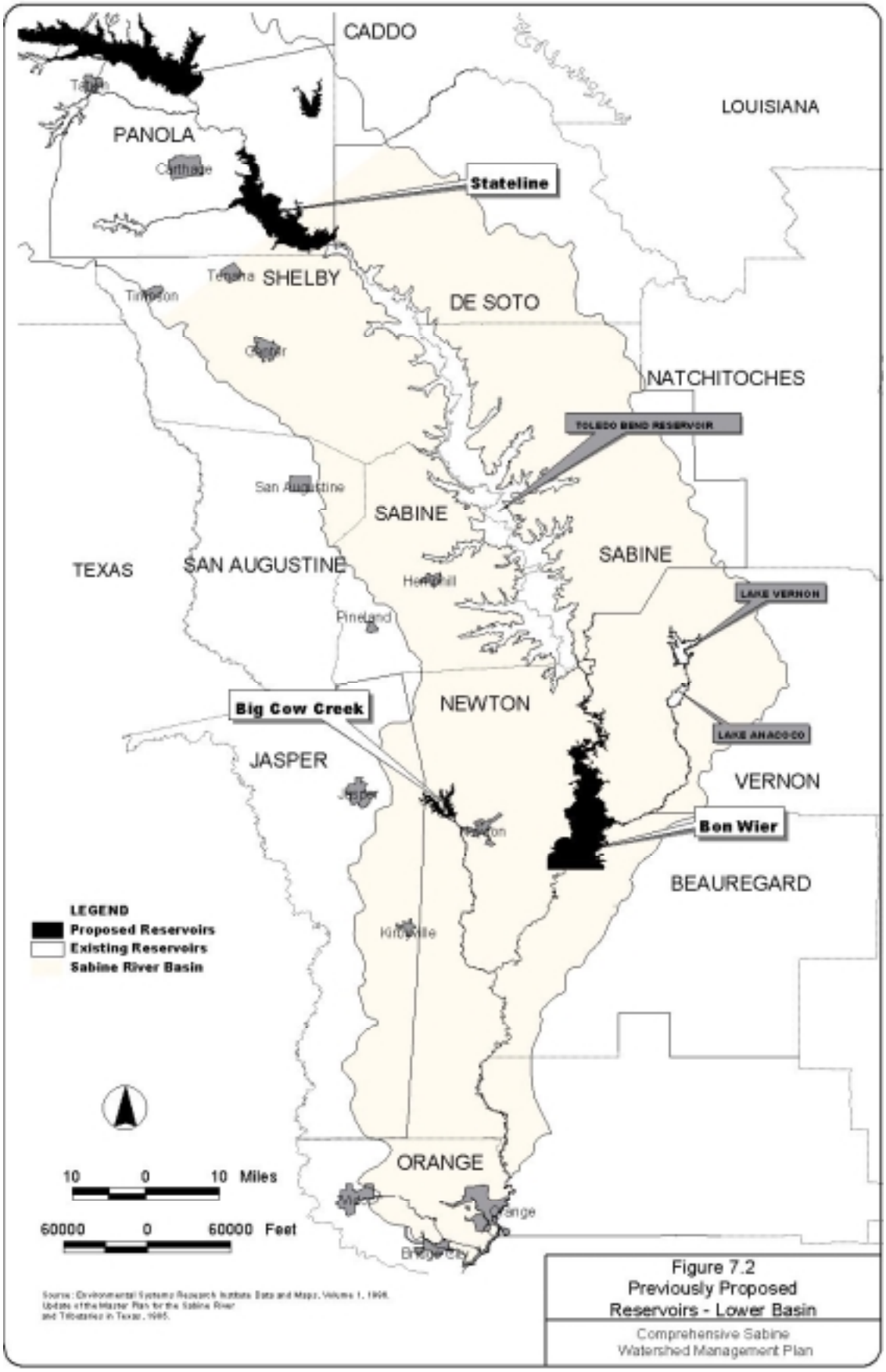
These analyses were based on the best information available at the time of this study. It is strongly recommended that new studies of flood plain vegetation and wildlife within the Sabine Basin be conducted. More current estimates of the quality, extent, and economic value of bottomland hardwood areas and threatened and endangered species would play an important role in future planning activities of SRA.



Source: Environmental Systems Research Institute Data and Maps, Volume 1, 1990.
Update of the Master Plan for the Sabine River and Tributaries in Texas, 1990.

Figure 7.1
Previously Proposed
Reservoirs - Upper Basin

Comprehensive Sabine
Watershed Management Plan



Source: Environmental Systems Research Institute Data and Maps, Volume 1, 1998.
Update of the Master Plan for the Sabine River and Tributaries in Texas, 1985.

Figure 7.2
Previously Proposed Reservoirs - Lower Basin

Comprehensive Sabine Watershed Management Plan

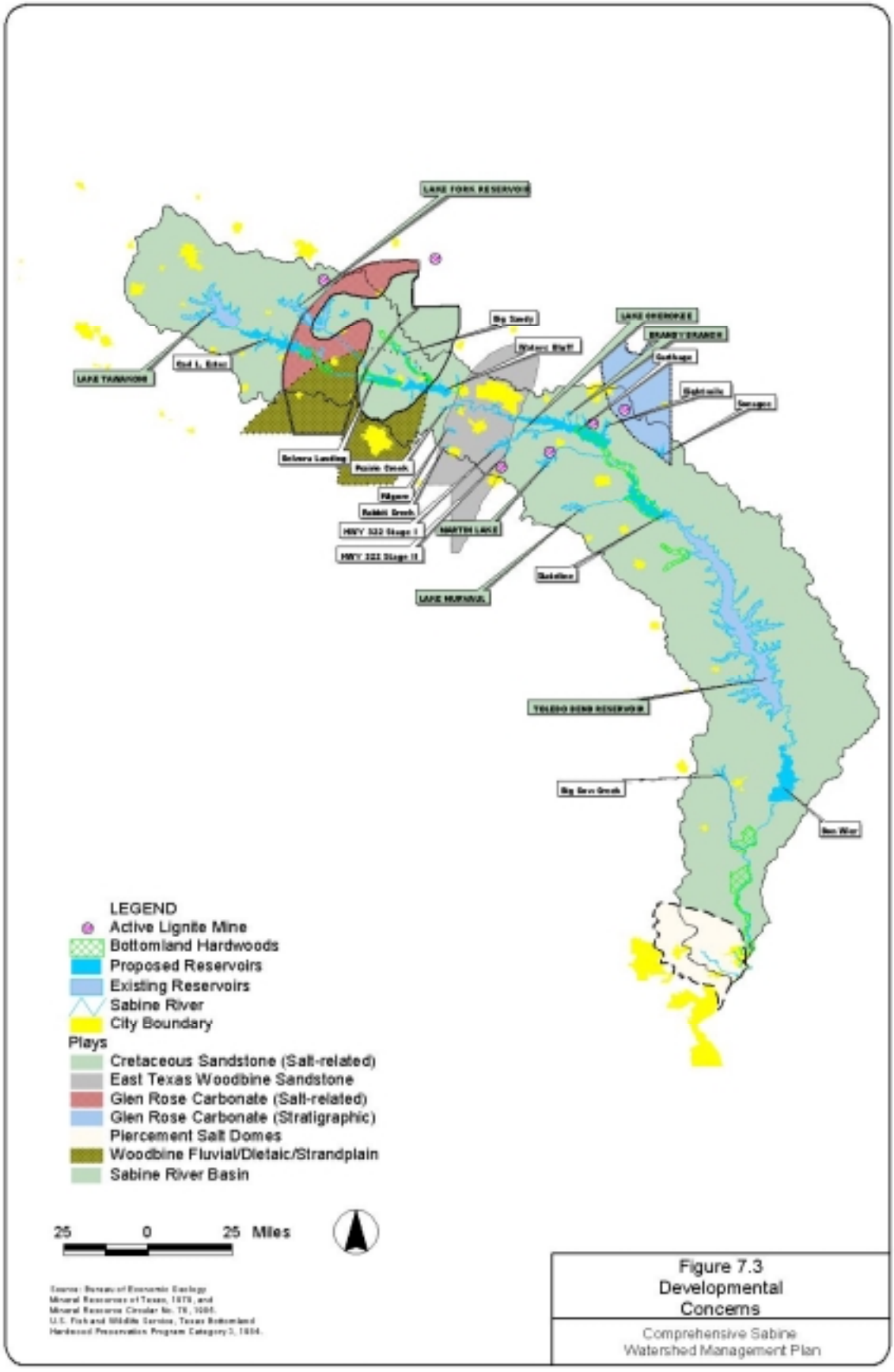


Figure 7.3
Developmental Concerns

Comprehensive Sabine Watershed Management Plan

Table 7.1: Previously Proposed Water Supply Reservoirs

				Development Concerns								
Reservoir	**County**	**Stream**	**Yield (ac-ft/yr)**	**B.L.H./ wetlwnds**	**T&E species**	**oil/ gas wells**	**lignite**	**cultural resources**	**permitting**	**water quality**	**other**	**Comments**
Carl L. Estes	Rains/Wood/Van Zandt	Sabine	94,000	◎		○	●	◎		◎		substantial lignite deposits
Belzora Landing	Smith/Wood	Sabine	106,400	●	○		○	◎	●		●	non-development conservation easement
Waters Bluff	Upshur/Smith/Wood	Sabine	324,000	●	○	○	○	◎	●		●	significant development and permitting issues
Big Sandy	Wood	Big Sandy	46,600	◎		◎		●		○		pre-historic/ historic sites
Prairie Creek	Gregg/Smith	Prairie Creek	19,700	◎	○	○	○				○	hardwood-pine forests
Kilgore	Rusk/Smith/Gregg	Wilds Creek	5,500	x	x	x	○	x	x	x	x	no environmental studies conducted
Rabbit Creek	Rusk/Smith	Rabbit Creek	3,500	◎	○		○					new study completed 9-24-98, yield estimated at 3,500 AF/Y
Fredonia	Gregg	Sabine	NA	◎	○	x	○	○	◎	◎	●	could flood parts of Longview, land costs are premium
Carthage	Rusk/Panola/Harrison Gregg	Sabine	537,000	●	○	◎	◎	○	◎	◎		priority 1 bottomland hardwoods (FWS study, 1984)
Eightmile	Harrison	Eightmile	42,030	x	x	x	○	x	x	◎	x	Located near Carthage, but may have fewer environmental concerns
Cherokee	Rusk/Gregg	Cherokee	57,248	x	x	x	x	x	x	x	x	no environmental studies conducted
Hwy 322 - Stage I	Rusk	Tiawichi Creek	22,000	x	x	x	●	x	x	x	x	no environmental studies conducted, lignite mining permit in proposed reservoir site
Hwy 322 - Stage II	Rusk	Mill Creek	35,000	x	x	x	●	x	x	x	x	no environmental studies conducted, lignite mining permit in proposed reservoir site
Socagee	Panola	Socagee Creek	39,131	x	x	x	◎	○	x	x	x	Lake Murvaul meets local needs
Stateline	Panola	Sabine	280,000	●	○	●		○	●	◎	●	proposed mitigation bank in site, priority 1 BLH
Bon Wier	Newton/ Beauregard/Vernon	Sabine	440,000	●	○	x		○	●	◎		located in lower basin, significant acreage of bottomland hardwoods
Burkeville	Newton	Little Cow Creek	NA	x	x	x	x	x	x	x	x	Little data, located in lower basin
Big Cow Creek	Newton	Big Cow Creek	61,700	x	x	x	x	x	x	x	x	located in lower basin, has sufficient local supply

blank	no known occurrence or no impact	B.L.H.	Bottomland hardwoods
○	potential or known occurrence, low concern	T&E	Threatened and Endangered
◎	known occurrence, moderate concern	NA	Not Available
●	known occurrence, significant concern	x	No Data

Carl L. Estes

The Carl L. Estes Reservoir, formerly known as the Mineola Reservoir, is a proposed main stem project along the Sabine River in Rains, Wood and Van Zandt counties. The dam would be located on the Sabine upstream of Highway 80. If constructed, this reservoir would provide a yield of approximately 94,000 acre-ft per year at a conservation pool elevation of 379 feet msl. The capacity would be 372,600 acre-feet, and the area would be 24,900 acres.

Developmental concerns regarding the Carl L. Estes Reservoir site include bottomland hardwoods, oil and gas rights, lignite deposits, cultural resources and the water quality of the stream segment. Bottomland hardwoods are located in the Lower third of the proposed site and are listed by the U.S. Fish and Wildlife Services (USFWS) as a Priority 2 bottomland hardwood area (USFWS, 1984). The numerous mineral rights in the area affect the acquisition of the property; but there are no known operating mines within or near the reservoir site. In 1986 there were 85 cultural resources on record (U.S. Bureau of Reclamation, 1986), and the Texas Clean Rivers Program (CRP) Water Quality data identified possible concerns for chlorides, pH and total dissolved solids (TDS).

The advantages to this reservoir are that it would be able to provide nearly all of the projected need in the Upper Basin, and it could be operated jointly with Lake Tawakoni or Lake Fork to increase the yield of the reservoir system. Carl L. Estes is located upstream of the area of need in the Upper Basin and water could be released down the Sabine to existing intake locations for distribution.

Belzora Landing

The Belzora Landing site on the Sabine River is the first stage project for the proposed larger Waters Bluff Reservoir. It is located in Smith and Wood counties, immediately upstream of FM Road 14 and about 2 miles south of Hawkins, Texas. The proposed dam at Belzora Landing is upstream of the proposed Waters Bluff dam and would form a reservoir with the same conservation level as Waters Bluff Reservoir (303 feet msl). This first phase reservoir would provide an expected yield of 106,400 acre-feet per year. The surface area would be 13,020 acres and the capacity would be 114,996 acre-feet.

Since this project was first proposed in 1985, various developments have made the initiation of this project more difficult. In 1986, a 3,802-acre non-development conservation

easement (Little Sandy National Wildlife Refuge) within the project area was accepted by the USFWS. In addition, approximately 5,000 acres within and adjacent to the proposed reservoir were purchased and deeded to Texas Parks and Wildlife Department to operate as a wildlife management area. This area serves as mitigation land for the Texas Department of Transportation. As a result, construction has been deferred and development will require Congress to override the Little Sandy Refuge easement.

Other developmental concerns for the Belzora Landing site include bottomland hardwoods, cultural resources and wildlife. There is no known active mining in the area or water quality issues.

Waters Bluff Reservoir

The Waters Bluff Reservoir is a proposed main stem project on the Sabine River about 3.5 miles upstream of the Highway 271 crossing. The reservoir extends upstream into Smith, Upshur and Wood Counties, and when fully constructed would yield 324,000 acre-feet per year with a conservation pool elevation of 303 feet msl. The capacity of the entire reservoir (including the Belzora Landing portion) would be 525,163 acre-feet and the area would be 36,396 acres.

Since the initial feasibility studies, subsequent property developments have deferred construction of this reservoir in the foreseeable future (see Belzora Landing description). There are a total of four mitigation banks and one non-development conservation easement (Little Sandy National Wildlife Refuge) within the Waters Bluff boundary. Also, portions of the reservoir site lie within a USFWS-designated Priority 1 bottomland hardwood area (USFWS, 1984), and this segment of the Sabine River is highly valued for its scenic and recreational qualities. Seven prehistoric cultural sites have been identified within the project boundary. There are no known active mines in the area and no water quality issues.

Construction of Waters Bluff reservoir will require an act of Congress to override the Little Sandy easement and Congressional approval for construction of the dam since it is located on navigable interstate waters of the U.S. (Rivers and Harbors Act, 1899). The major advantage to this reservoir is the projected yield. Waters Bluff, if constructed, would provide for all the projected need in the Upper Basin through 2050 and beyond.

Big Sandy Reservoir

The Big Sandy reservoir is a proposed regional water project to supply Gregg and Harrison Counties and nearby cities in the Upper Sabine Basin. The dam site is located at stream mile 10.6 on Big Sandy Creek, north of the town of Big Sandy. The expected reservoir yield is 46,600 acre-feet per year, with a storage capacity of 67,200 acre-feet and an area of 4,405 acres at the conservation level of 340 feet msl.

The primary developmental concern with this reservoir site is the many cultural resources located within the site boundary. A cultural resource survey performed in 1985 by Prewitt and Associates identified 140 prehistoric and historic sites. The impacts to these resources can be mitigated through a comprehensive plan for cultural resources; however, there will most likely be some unavoidable losses. In addition, bottomland hardwoods have been identified in previous studies covering approximately 50 percent of the reservoir area. The CRP Water Quality data indicated a possible concern for total phosphorus in Big Sandy Creek. There are no known threatened and endangered species that would be affected by this project, and there are no active mines in the reservoir site.

The advantage to this reservoir site is its location immediately upstream of the City of Longview, which is an area of projected growth. Its firm yield will provide for approximately one half of the projected need in the Upper Basin.

Prairie Creek Reservoir

To supplement the water demands of the City of Longview and surrounding areas, a small reservoir was proposed on Prairie Creek in Gregg and Smith counties, just upstream of FM 2207. With a conservation pool elevation of 318 feet msl, the proposed Prairie Creek Reservoir would yield 19,700 acre-feet per year. The capacity would be 45,164 acre-feet and the area would be 2,280 acres. To increase the expected yield, flows from the Sabine River could be diverted to Prairie Creek Reservoir. Previous studies indicate that diversions could increase the reservoir yield to 38,400 acre-feet per year (Espey, 1985a).

There are few developmental concerns regarding this reservoir site. There are no priority-designated bottomland hardwoods, no known active mines and no identified water quality issues in the reservoir area. This is a major advantage to this reservoir site. Another advantage is the location near the areas of expected need. The Prairie Creek Reservoir, if

constructed, could not meet all of the projected future demands. It could be used to supplement the water supply of the surrounding areas and/or provide terminal storage for a regional transmission pipeline.

Kilgore Reservoir

The Kilgore Reservoir is a proposed local water supply project located on the Upper Wilds Creek in Rusk, Gregg and Smith counties. It was originally proposed to supplement the City of Kilgore's water supply. The project would provide a yield of 5,500 acre-feet per year at the normal operating elevation of 398 feet msl. At that level, the area and capacity would be 817 acres and 16,270 acre-feet, respectively.

Construction of this reservoir has never been initiated, and the City of Kilgore is using diversions from the Sabine (purchased from SRA and released from Lake Fork) and ground water for its water supply. However, this project still has the potential as a local water supply source in the Kilgore area should other proposed projects not be developed. Only preliminary studies have been performed for the Kilgore Reservoir and no environmental impacts have been assessed. Based on preliminary screening data, the site is not located within a priority bottomland hardwood area; there are no known water quality issues and no active mines within the reservoir site.

Rabbit Creek Reservoir

Several reservoir projects have been proposed on Rabbit Creek for local water supply. The latest proposal for the City of Overton and surrounding communities was completed in 1998 (Burton, 1998). The proposed reservoir project is located on Rabbit Creek in Smith and Rusk counties, and would have a firm yield of 3,500 acre-feet per year. This is considerably less yield than the previous studies, which is due in part to the smaller storage capacity and conservative inflows that were assumed for the study. In the latest study, the area would be 520 acres and the capacity would be 8,000 acre-feet at a conservation level of 406 ft msl. However, this yield is considered satisfactory to meet the regional demands of the area. Environmental review of the site reports no significant concerns that would preclude development. There are also no significant cultural resources in the area, no known water quality issues, and no active mining within the reservoir area.

The advantages of this reservoir site are the few developmental concerns. However, it was rejected as a water supply alternative in the 1998 study due to costs. A large percentage of the total costs were associated with a water treatment and distribution system. Due to the relatively low yield of Rabbit Reservoir, this project could only be considered for local water supply.

Fredonia Lake

Fredonia Lake was originally proposed in 1995 by local interest as a potential reservoir site located on the Sabine River in Gregg County between the proposed Waters Bluff and Carthage reservoirs. The exact location and boundaries were not defined, and firm yield was not determined. The approximate area covered by the reservoir surface would be 9,550 acres

The developmental concerns for this site include bottomland hardwoods, water quality, aquatic life and close proximity to the City of Longview. Approximately 30 percent of the proposed site are bottomland hardwoods/wetlands; this stream segment receives discharges from several municipalities and industry and is home to several protected aquatic species. Fredonia Lake, if constructed, could potentially flood parts of the City of Longview and costs for land and conflict resolution would most likely be a premium due to the proximity to Longview and local improvements. Permitting for this reservoir will require an act of Congress since the dam is located on navigable interstate waters of the U.S. The advantage for this reservoir site is that it would have a considerable yield due to the large drainage area.

Carthage Reservoir

The Carthage Reservoir is a proposed main stem project on the Sabine River in Panola, Harrison, Rusk and Gregg counties. It is located immediately upstream of the U.S. Highway 59 crossing and downstream of the City of Longview. The yield of this reservoir, if constructed, would be approximately 537,000 acre-feet per year at a conservation pool elevation of 244 feet msl. The area and capacity would be 41,200 acres and 651,914 acre-feet, respectively.

Developmental concerns for Carthage Reservoir include bottomland hardwoods, aquatic life, lignite deposits and cultural resources. The downstream half of the site encompasses a USFWS Priority 1 bottomland hardwood area. This portion of the Sabine River is designated a significant stream segment and is home to several protected aquatic species (Bauer, 1991). Other

potential conflicts with this site include oil and gas wells. Permitting for this reservoir will require an act of Congress since the dam is located on navigable interstate waters of the U.S. There is one active lignite mine, South Hallisville Mine No. 1, near the reservoir boundary.

The water quality assessment of the Sabine River (SRA, 1996a) indicates this segment of the river has possible concerns for nutrients, but the water quality is improving. The advantage of this reservoir is its large yield. The estimated yield of 537,000 acre-feet per year would provide for all projected needs well beyond the year 2050.

Eightmile Reservoir

The Eightmile Reservoir site was initially proposed in the 1955 Master Plan. It is located in the southern portion of Harrison County on Eightmile Creek about six miles upstream of the mouth and 14 miles south of Marshall. This project site abuts the proposed Carthage Reservoir on the Sabine River. The total storage associated with this reservoir is 160,000 acre-feet, and the expected yield would be 42,030 acre-feet per year.

The Eightmile site is located upstream of the identified bottomland hardwoods and there may be fewer environmental concerns than nearby Carthage Reservoir. The only water quality concern identified is potential elevated nutrient levels from municipal and industrial discharges, which can affect the taste and odor of the water.

The Eightmile site is located downstream of the identified area of need, and the estimated yield would only provide for a portion of the additional supply needed in the Upper Basin. This site, if constructed, would be used to meet local demands.

Cherokee Dam No. 2

To supplement the yield from Lake Cherokee, a second dam on Cherokee Bayou was proposed in the 1955 Master Plan. This dam would be located approximately 4.25 miles upstream of the existing Lake Cherokee dam in Rusk County. These two reservoirs would be operated as a system to provide water supply and minimize water level fluctuations in Lake Cherokee. No engineering data was developed for this proposal. In the 1962 Supplement to the Master Plan, the State Highway 322 - Stage II Reservoir was proposed in lieu of the Cherokee dam No. 2. Further discussion of this potential reservoir site is included with State Hwy 322-Stage II.

State Highway 322 Stage I

The Highway 322 Reservoir is a proposed local water supply project in Rusk County, upstream of Lake Cherokee. The project, as originally proposed, was to be developed in two stages: 1) a dam and reservoir on Tiawichi Creek (Stage I), and 2) a separate dam and reservoir on Mill Creek (Stage II). The reservoirs were to be joined by a connecting channel that would allow one spillway to serve both dams.

The proposed Stage I dam is located on Tiawichi Creek, approximately one mile upstream of its confluence with the Upper end of Lake Cherokee. The reservoir, at its normal operating elevation of 330 ft msl, would provide a net yield of 22,000 acre-feet per year. Its area and capacity would be 4,450 acres and 82,450 acre-feet, respectively. If Stage I is operated independently from Lake Cherokee, the firm yield of the reservoir would be reduced due to Lake Cherokee's superior water rights.

The primary developmental concern for the Stage I reservoir is active lignite mining. In 1995, the Oak Hill Mine expanded its current permit area to include approximately one third of the proposed Stage I reservoir area. There have been no environmental studies conducted for this site. Based on preliminary screening, the site is located outside priority bottomland hardwood areas, and there are no known water quality issues.

The advantage to this reservoir site is its location near Harrison County, which has the greatest projected need. If operated with Lake Cherokee, there is existing infrastructure for distribution of water to the City of Longview and local industry.

State Highway 322 Stage II

The State Highway 322 - Stage II reservoir is the second phase of the State Highway 322 water supply project in Rusk County. The Stage II dam would be located on Mill Creek, approximately one mile upstream of the existing Lake Cherokee. Operated at the same level as Stage I (330 feet msl), this project would provide an increased yield to the Cherokee Lake system of 13,000 acre-feet per year with added storage capacity of 112,000 acre-feet. Stage II surface area would be 2,060 acres. The State Highway 322 project (Stages I and II) and Lake Cherokee could be operated as a system to provide a total yield of 53,000 acre-feet per year and maintain the recreational and aesthetic benefits currently provided by Lake Cherokee. If State

Highway 322 project is operated independently from Lake Cherokee, the firm yield would be reduced due to Lake Cherokee's superior water rights.

The primary developmental concern for Stage II is the active lignite mining. Surface mining records indicate that the Oak Hill Mine permit encompasses much of the Stage II reservoir. Preliminary screening indicates no priority bottomland hardwoods in the reservoir area, and there are no known water quality issues. The advantages to this reservoir site is its location near the areas with projected water needs and the possibility that when mining is completed, the site will already be cleared and ready for reservoir development.

Socogee Reservoir

The Socagee Reservoir site is located in the eastern portion of Panola County on Socagee Creek, approximately six miles upstream of its mouth. The reservoir, at normal pool elevation, would have a yield of 39,131 acre-feet per year. The reservoir area would be approximately 9,100 acres and the capacity would be about 160,000 acres.

Approximately 40 percent of the site overlies existing lignite deposits. As of 1986, there was no known exploitation of the lignite deposits, and there currently are no active mines within the area. One cultural resource site is reported in the reservoir boundary. There are no known water quality issues or priority bottomland hardwoods that affect this reservoir site. Socogee Reservoir could be used to meet the local needs of Panola County; however, Lake Murvaul, which has been designated for Panola County use only, has adequate yield to meet the future needs of Panola County.

Stateline Reservoir

The Stateline Reservoir is a proposed main stem project on the Sabine River, approximately eight miles upstream of Logansport, Louisiana and about four miles upstream from the headwaters of Toledo Bend Reservoir. The project site is located in the southeastern section of Panola County and would have an estimated yield of 280,000 acre-feet per year. At the conservation level of 187 feet msl, the area and capacity would be 24,100 acres and 268,330 acre-feet, respectively.

Developmental concerns for this site include bottomland hardwoods, oil and gas wells, water quality, and permitting issues. The northern half of the site lies in a USFWS designated

Priority 1 hardwood area. The southern half is a high quality wetland area and currently being considered for a wetland mitigation bank by the SRA. The mineral rights associated with the Carthage Oilfield significantly affect land acquisition for the reservoir. The CRP Water Quality data indicated possible concerns for elevated nutrient levels, metals, low dissolved oxygen and fecal coliform. This segment of the stream is also a known habitat for several protected aquatic species. Permitting for this reservoir will require an act of Congress since the dam is located on navigable interstate waters of the U.S. (Rivers and Harbors Act, 1899). Construction of the dam and reservoir may also require consent of Louisiana for the part that will impact the state of Louisiana (Sabine River Compact). As currently proposed, the dam site is located immediately upstream of the stateline reach and there is minimal impact to Louisiana lands. However, due to the close proximity of Toledo Bend Reservoir, it is unlikely that Stateline Reservoir would be more economical than Toledo Bend in meeting the needs of the Upper Basin.

Bon Wier Reservoir

The Bon Wier dam site is located on the state line reach of the Sabine River in Newton County, Texas and Beauregard Parish, Louisiana. The reservoir will extend from about 5 miles upstream of U.S. Hwy 190 to approximately Highway 63. It was originally proposed for re-regulation of the hydropower discharges from Toledo Bend Reservoir and for the generation of hydropower. The reservoir, if constructed, would yield 440,000 acre-feet per year at a normal operating elevation of 90 feet above mean sea level. The area and capacity would be 34,540 acres and 353,960 acre-feet, respectively.

It is estimated that the Bon Wier Reservoir would affect 35,000 acres of wildlife habitat (Frye, 1990). This includes several acid bogs/baygalls, which are unique and sensitive areas of the region. Several threatened and endangered species are known to occur in this area. No cultural resource survey has been conducted, but the site is expected to impact numerous archeological and historical sites in both Texas and Louisiana. The CRP Water Quality data reported possible concerns for elevated TDS and low dissolved oxygen during the summer months. The site also requires congressional approval for construction of a dam, because it is on interstate navigable water of the U.S.

The advantages to this site is the large reservoir yield and potential for hydropower; however, it is located in the Lower Basin which has sufficient existing water supply for the planning period.

Burkeville Reservoir

The Burkeville Reservoir is located in Newton County on Little Cow Creek, approximately three miles southeast of Burkeville, Texas. The estimated storage capacity would be about 30,000 acre-feet. Project yield and area/capacity data was not determined.

The location of this site is outside priority bottomland hardwoods and known lignite deposits. There are perennial streams that would be a continual source of inflow to the reservoir. This area receives the greatest amount of rainfall in the State. However, it is located in the Lower Basin, which has sufficient supply for its projected future needs.

Big Cow Reservoir

The Big Cow Reservoir is a proposed local water supply project on Big Cow Creek in Newton County. The Big Cow Creek dam site is located about one-half mile upstream from U.S. Hwy 190, west-northwest of the Town of Newton. It is in the Lower Sabine Basin. The expected yield of the reservoir is 61,700 acre-feet per year with a storage capacity of 79,852 acre-feet and area of 4,618 acres. The conservation level would be 212 ft msl.

No environmental assessment has been conducted for this site. It appears that this site is located outside priority bottomland hardwoods and known lignite deposits. CRP Water Quality assessments reported possible concerns for fecal coliform and dissolved aluminum.

The perennial streams that feed Big Cow Creek and abundant rainfall should provide sufficient inflow for considerable yield for a reservoir of this size. Nevertheless, for this planning period (through 2050), there are no identified needs in the Lower Basin that cannot be met with existing supplies.

7.2 New Reservoirs

Potential new reservoir sites in the Upper Sabine Basin were identified from area topographic maps and reviewed for further consideration. Two sites were located on the Sabine River and five sites were identified on tributaries or off-channel streams. Several of these

tributary sites were previously identified during preliminary studies for the City of Lindale. A summary of the new reservoir sites is presented in Table 7.2.

The initial screening of the potential new reservoir sites found that both main stem sites have significant development concerns. Alternative Site A, located between Carl L. Estes and Belzora Landing, was identified as an alternative site to Carl L. Estes to avoid substantial lignite deposits in the area. However, the proposed site almost entirely encompasses priority 2-designated bottomland hardwoods and extends upstream into the near-surface recoverable lignite formation. There are also several water quality concerns associated with natural deposits in the area. Due to these water quality issues, development conflicts, and the relatively shallow depth of the Upper third of the reservoir (5 to 10 ft), no further analyses were conducted for this site.

Alternative Site B is located between the proposed Waters Bluff and Carthage reservoirs, and downstream of the Little Sandy National Wildlife Refuge non-development conservation easement. To limit impacts to this property, a conservation pool elevation of 280 feet msl was assumed. This resulted in an average reservoir depth of 8.4 feet and would still slightly impact the Little Sandy property. In addition, this reservoir, if constructed, would flood hundreds of active and inactive oil well sites located in the East Texas Oilfield, an existing sewage disposal facility, salt water disposal well, and possibly flood part of the Gladewater Municipal Airport. The estimated yield of Site B Reservoir is 175,000 acre-feet per year, but due to the shallow depth and other conflicts this site does not appear more feasible than the previously proposed reservoir sites in the area.

Five tributary reservoir projects were reviewed as potential local water supplies. Several of these sites (North Prairie Creek, Mill Creek and Hatley Creek) have relatively small drainage areas that do not support reservoir development. The two largest reservoir sites, Duck Creek and Saline Creek, have estimated yields of approximately 13,000 acre-feet per year each, and could be considered for scalping to enhance yield. There are few developmental concerns identified for these tributary reservoirs and they should be considered for potential local water supply in the Lindale area.

Table 7.2: Newly Proposed Water Supply Reservoirs

				Development Concerns								
Reservoir	**County**	**Stream**	**Yield* (ac ft/yr)**	**B.L.H.**	**wetlands**	**T&E species**	**lignite**	**cultural resources**	**permitting**	**water quality**	**other**	**Comments**
Sabine Site A	Van Zandt, Wood, Rains	Sabine	NA	●	●	○	◎	◎	○	●		Priority 2 bottomland hardwoods; WQ concerns for chlorides,
Sabine Site B	Gregg, Smith, Upshur	Sabine	175,000	●	●	○		○	●	○	●	Would flood oil wells and several mitigation banks.
North Prairie Creek	Smith	North Prairie Creek	3,100	x	x	x	x	x	x	x		Small drainage area.
Duck Creek	Smith	Duck Creek	13,250	x	x	x	x	x	x	x		Could be local water supply reservoir
Mill Creek	Smith	Mill Creek	NA	x	x	x	x	x	x	x		Small drainage area.
Saline Creek	Smith	Saline Creek	13,400	x	x	x	x	x	x	x		Could be local water supply reservoir
Hatley Creek	Harrison	Hatley Creek	NA	x	x	x	x	x	x	x	●	Small drainage area. Affects I-20.

* Yield was determined from operation studies with no downstream releases.
Reservoir yield was reduced 15 to 20% when TNRCC recommended downstream releases were made.

blank	no known occurrence or no impact
○	potential or known occurrence, low concern
◎	known occurrence, moderate concern
●	known occurrence, significant concern

B.L.H.	Bottomland hardwoods
T&E	Threatened and Endangered
NA	Not Available
x	No Data

7.3 Pipeline from Toledo Bend Reservoir to the Upper Basin

One potential water supply project for the Sabine River Basin is the transfer of water from the Lower Basin to the Upper Basin. Water transfers can be made directly to the demand center (e.g., water treatment plant) or to a reservoir system. Pumping to a reservoir system would allow storage of water for use during high demand periods and could increase the available yield of the receiving reservoir system. Direct pumping is less flexible.

Since such a transfer would be an effective means of maximizing water resources in the Basin, two transmission pipeline routes from Toledo Bend Reservoir to the Upper Basin were reviewed. As shown on Figure 7.4, both routes are similar, with one terminating at the proposed State Highway 322 Reservoir, and the other route continuing to the proposed Prairie Creek Reservoir. Three different flow rates were considered for transmission intended to supply 50,000, 75,000 and 100,000 acre-feet per year. Pipelines for each flow rate and route were sized based on economic conceptual design. The pump station at Toledo Bend Reservoir was located approximately 25 miles downstream of the reservoir headwaters to ensure available water during dry seasons. A minimum of one additional pump station along the route was assumed. A summary of the transmission pipeline analyses is presented on Table 7.3.

The Toledo Bend pipeline option has become particularly attractive in recent months. Tenaska, a power generating company, is building a power generating facility in Rusk County and has contracted to purchase Toledo Bend water from SRA for their facility. Tenaska is now building a water supply pipeline from Toledo Bend to about half way to Prairie Creek Reservoir. In their contract with Tenaska, SRA has stipulated that they be able to share the right-of-way for the pipeline. This represents a substantial cost savings to SRA in purchasing easements. It would decrease the cost of this option even below the amount presented in this report.

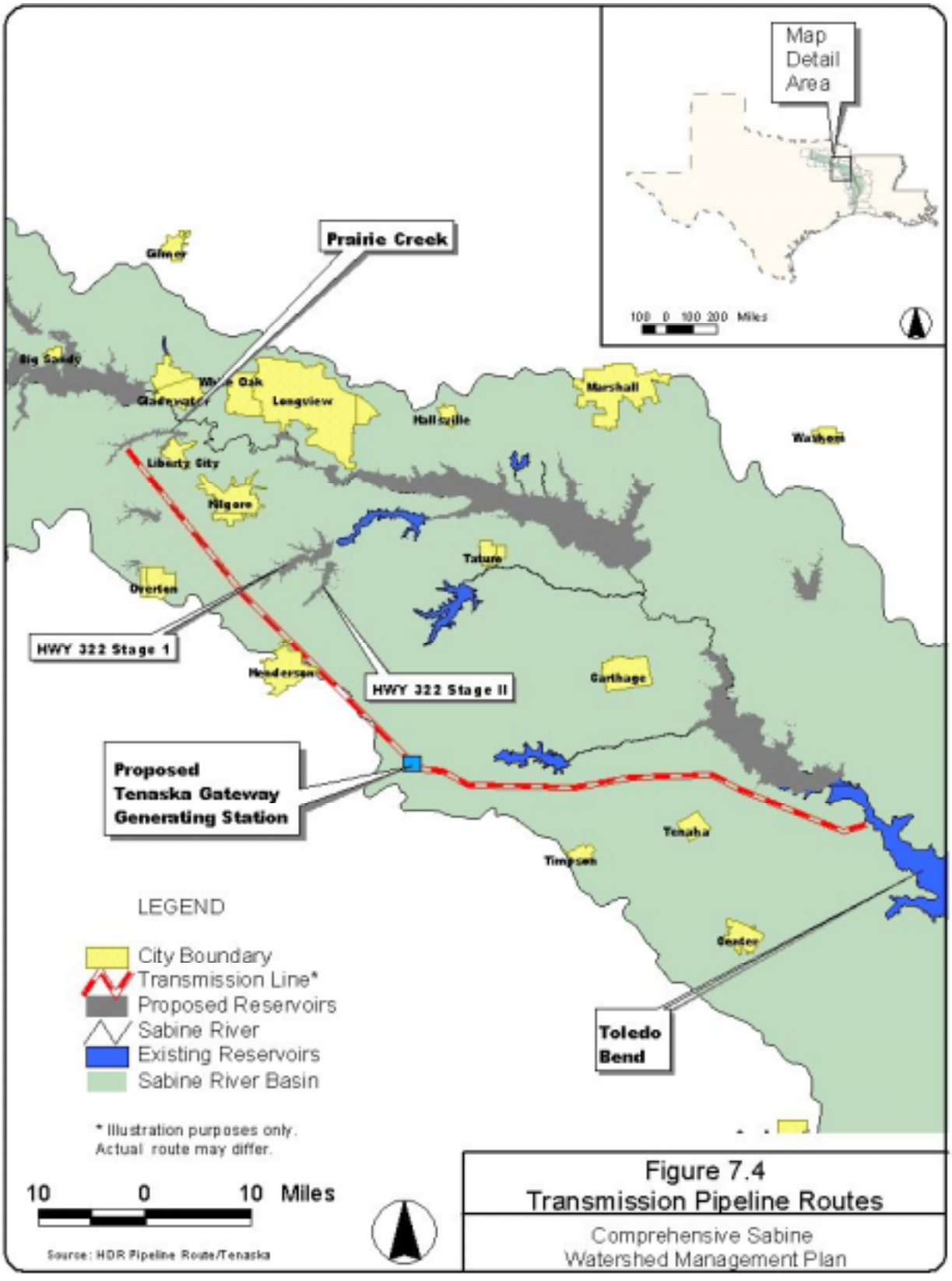


Figure 7.4
Transmission Pipeline Routes

Comprehensive Sabine Watershed Management Plan

Table 7.3: Transmission Pipeline Analyses

Terminus	Length (miles)	Supply (ac-ft/yr)	Pipe Diameter (inches)	Peak Flow Velocity (f/s)	Combined Yield[1] (ac-ft/yr)
Prairie Creek	87	50,000	60	3.71	67,890
		75,000	66	4.57	90,468
		100,000	90	3.30	115,000
Hwy 322 Stage I&II	65	50,000	60	3.71	88,300
		75,000	78	3.27	110,600
		100,000	90	3.30	131,900
Hwy 322 Stage II only	65	50,000	60	3.71	70,300
		75,000	78	3.27	94,800
		100,000	90	3.30	119,100

1. Combined yield was determined from operation studies for reservoir and transmission flow rate.

7.4 Diversions from the Sabine River

Diversions from the Sabine River to off-channel reservoirs would increase the firm yield of the reservoirs. In the 1985 analysis of the Prairie Creek reservoir, such diversions were projected to increase the estimated yield by 18,700 acre-feet per year, nearly doubling the yield. Since scalping operations are most easily implemented near the main stem of the Sabine River, tributary reservoirs located near the Sabine are the most likely candidates for scalping.

Diversions from the Sabine River were evaluated for three proposed off-channel reservoirs: Big Sandy, Prairie Creek and State Highway 322 (Stage I). Operation studies were conducted for these reservoirs with varying diversions. The Lyons method, which is TNRCC's preferred method, was used to determine when there was sufficient flow for diversions (Lyons, 1979). This method recommends minimum streamflows of 40 percent of the monthly median flows for October through February and 60 percent of the monthly median flows for March through September. The recommended diversion for each reservoir site was based on economic considerations (i.e., lowest annual cost per acre-feet per year). The results of the operation studies with the recommended diversions are summarized on Table 7.4.

Table 7.4: Diversion Operations for Proposed Reservoirs

Reservoir	Big Sandy	Prairie Creek	Hwy 322 (Stage I)
Average diverted (ac-ft/yr)	11,943	13,024	18,438
Maximum diverted (ac-ft/yr)	30,163	34,239	65,489
Pipe diameter (inches)	60	66	78
Flow rate (cfs)	137	137	137
Average pumping time (%)	12%	13%	19%
Combined yield (ac-ft/yr)	61,373	29,685	43,762

7.5 Importation

Importation of water from outside the Basin is a water supply option presently used in the Sabine Basin, and could be expanded if proposed reservoirs in adjacent Basins are constructed. The City of Longview is currently building a pipeline to Lake O' the Pines for water supply. The cities of Gladewater and Marshall are also considering importing water from Cypress Basin. Review of the adjudication rights authorized for Lake O' the Pines indicates that under critical drought conditions, the total amount of available uncommitted water is approximately 46,500 acre-feet per year. This is relatively a small amount of reserves and the local water districts would most likely be reluctant to commit this supply to an out of basin transfer. On a smaller scale, Gilmer Lake may be a viable source for future importation for areas located near Gladewater.

7.6 Opinion of Estimated Costs

Based on the preliminary screening of the previously proposed reservoirs and discussions with SRA staff, six Upper Basin reservoirs were retained for further review and cost comparisons: Carl L. Estes, Big Sandy, Waters Bluff, Prairie Creek, State Highway 322 and Carthage. Each of these sites is located in the area of identified need and provides sufficient yield to be considered for regional supply. None of the new reservoir sites identified warranted further review as a regional water supply source. The two largest new tributary reservoirs, Duck Creek and Saline Creek, could be developed for local supply and should be further reviewed by local authorities.

For each of the reservoir sites, a cost estimate was prepared based on the previously proposed engineering designs. Conflicts associated with each site were identified; mitigation costs were assumed equal to the land acquisition costs; and permitting costs were assigned a percentage of the land acquisition and construction costs based on identified conflicts and permit issues. Cost estimates were also developed for the two transmission pipeline routes from Toledo Bend Reservoir to the Upper Basin and the different alternatives for diversions from the Sabine River. A summary of the estimated capital and annual costs for each project is presented on Table 7.5. Details of the cost estimates for each alternative and a description of the costs are included in Appendix F.

These estimated costs were used as a tool to assess the relative economic feasibility of the surface water projects. Actual costs for mitigation and permitting may vary considerably from the assumptions. Accurate mitigation costs require detailed environmental evaluations and coordination with the appropriate government agencies. Costs associated with the transmission systems from the surface water projects to areas of need were not evaluated. Depending on the location of the water supply project, these costs may significantly impact the final delivery cost of the water. Also, no dollar values were assigned to recreational benefits, hydropower, or exportation of surplus water supplies.

In light of these considerations, the different surface water projects provide raw water at an estimated cost of $0.21 to $0.92 per 1,000 gallons. Based on the total annual yield, the two largest reservoirs, Waters Bluff and Carthage, provide water at the lowest costs per 1,000 gallons. However, the yields of these reservoirs are significantly greater than the identified Upper Basin need of 93,000 acre-feet per year. If the costs were adjusted for the amount of water needed (shown on Figure 7.5), the estimated cost per 1000 gallons in 2050 would increase to $1.20. This indicates that the development of these large projects would require an out-of-Basin partner to use a substantial portion of the supply. Without such a partner, the most economical reservoir (without diversions) for projected needs is Big Sandy with a cost of $0.41 per 1,000 gallons.

The most economical source of additional raw water is diversions from the Sabine. These diversions increase reservoir yield at a relatively low cost. Based on the diversion operation assumptions, the reservoirs located further downstream (e.g., Hwy 322) can divert a larger quantity of water than those located upstream (Big Sandy). The unit costs for reservoirs

Table 7.5: Estimated Costs for Proposed Reservoir Projects

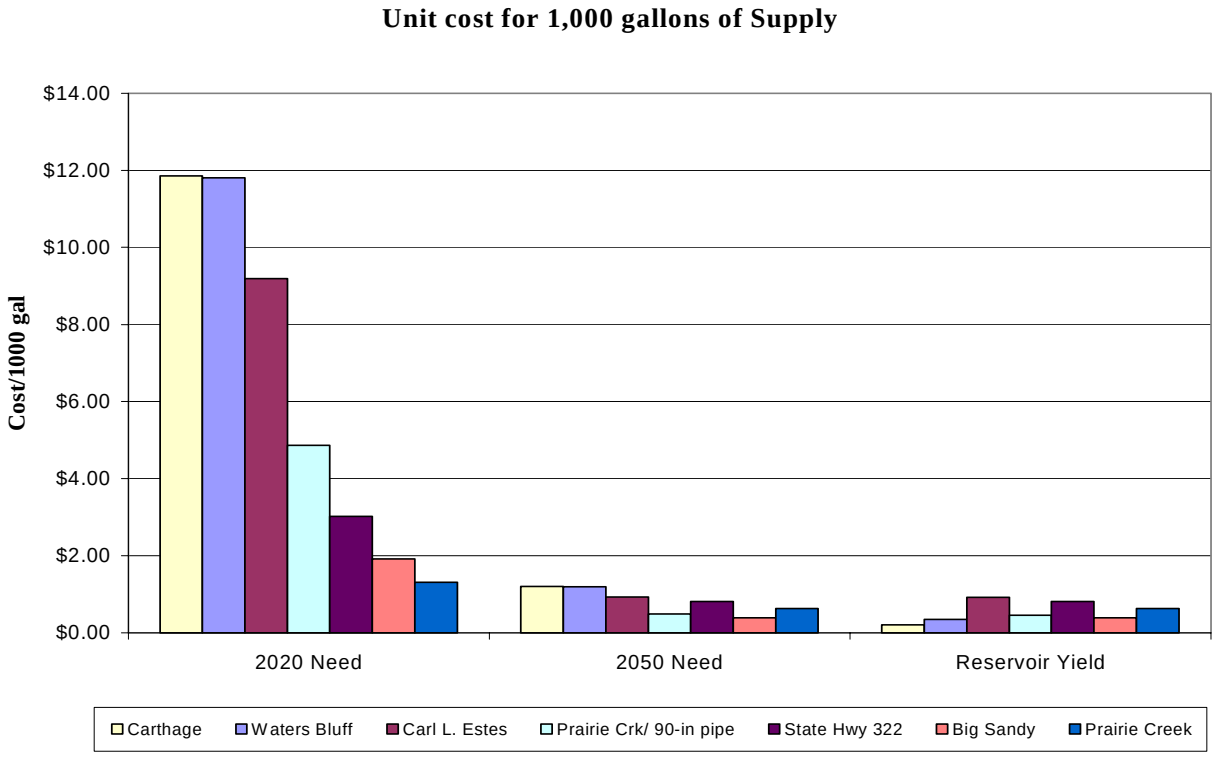
		CAPITAL COSTS				
Reservoir	**Yield (ac-ft/yr)**	**Total**	**Annualized**	**O&M**	**Total Annual**	**Cost/1000 gal**
Carl L. Estes	94,000	$373,815,200	$27,157,267	$1,098,447	$28,255,714	$0.92
Big Sandy	46,600	$82,817,644	$6,016,612	$141,458	$6,158,070	$0.41
Waters Bluff	324,000	$489,531,800	$35,563,952	$719,746	$36,283,698	$0.34
Prairie Creek	19,700	$55,696,190	$4,046,268	$181,844	$4,228,112	$0.66
State Hwy 322 (Stages I & II)	35,000	$127,469,820	$9,260,544	$438,442	$9,698,986	$0.85
Carthage	537,000	$495,837,500	$36,022,055	$423,092	$36,445,147	$0.21
Big Sandy w/ diversion	61,373	$87,559,324	$6,361,090	$396,902	$6,757,991	$0.34
Prairie Creek w/diversion	29,685	$60,247,790	$4,376,936	$414,745	$4,791,681	$0.50
Hwy 322 (I) w/ diversion[1]	43,762	$74,111,710	$5,384,135	$849,094	$6,233,229	$0.44
87-Mi pipeline (Prairie Crk)						
60-in pipe	50,000	$86,738,608	$6,301,465	$3,976,447	$10,277,913	$0.63
66-in pipe	75,000	$107,719,373	$7,825,695	$6,469,223	$14,294,918	$0.58
90-in pipe	100,000	$118,856,553	$8,634,799	$6,316,323	$14,951,122	$0.46
65-Mi pipeline (Hwy 322)						
60-in pipe	50,000	$66,180,398	$4,807,934	$3,585,644	$8,393,578	$0.52
78-in pipe	75,000	$101,579,764	$7,379,659	$4,625,192	$12,004,852	$0.49
90-in pipe	100,000	$116,007,816	$8,427,842	$4,606,472	$13,034,314	$0.40
Reservoir & pipeline from Toledo Bend						
Prairie Crk & 60-in pipe	67,890	$142,434,798	$10,347,733	$4,158,291	$14,506,024	$0.66
Prairie Crk & 66-in pipe	90,468	$163,415,563	$11,871,963	$6,651,067	$18,523,030	$0.63
Prairie Crk & 90-in pipe	115,000	$174,552,743	$12,681,067	$6,498,167	$19,179,234	$0.51
Hwy 322 & 60-in pipe	88,300	$193,650,218	$14,068,478	$4,024,086	$18,092,563	$0.63
Hwy 322 & 78-in pipe	110,600	$229,049,584	$16,640,203	$5,063,634	$21,703,837	$0.60
Hwy 322 & 90-in pipe	131,900	$243,477,636	$17,688,385	$5,044,914	$22,733,299	$0.53
Hwy 322 (II) & 60-in pipe[1]	70,300	$129,915,308	$9,438,206	$3,804,865	$13,243,070	$0.58
Hwy 322 (II) & 78-in pipe[1]	94,800	$165,314,674	$12,009,931	$4,844,413	$16,854,344	$0.55
Hwy 322 (II) & 90-in pipe[1]	119,100	$179,742,726	$13,058,113	$4,825,693	$17,883,807	$0.46

1. Yield was determined from operation studies with only one stage of the reservoir completed. Capital costs for one stage were estimated at 50 percent of both Stage I & II.

with diversions range from $0.34 to $0.50 per 1,000 gallons of water, which are typically lower than the other alternatives. However, these diversions individually do not produce enough water to meet the identified need.

The costs for the transmission pipeline alternatives from Toledo Bend Reservoir were evaluated for two different terminal points and three different flow rates (supplying 50,000, 75,000 and 100,000 acre-feet per year). The estimated transmission costs for the Toledo Bend water alone range from $0.40 to $0.63 per 1000 gallons. The costs associated with the transmission line and a new terminal storage reservoir range from $0.46 to $0.66, an increase of 3 to 15 percent. The costs for additional water supply via a transmission line with terminal storage at an existing reservoir, such as Lake Cherokee, would be similar.

Figure 7.5 Cost Comparison for Projected Need



7.7 Recommendations

To meet the future water supply needs in the Sabine Basin, it is recommended that SRA develop potential surface water projects in stages over the planning period. This approach

provides the supply as needed, and allows flexibility for adjustments if projected needs change. Large-scale projects, such as Carl Estes, Waters Bluff, and Carthage, will provide for all the future need, but will require large initial capital costs and may not be completed in time to provide for the anticipated shortfall in 2010. Since these capital costs may not be recovered if the water need does not increase, the cost per 1,000 gallons of needed supply for the large reservoirs would be much higher than the costs associated with some of the smaller reservoirs. Also, the developmental issues associated with Waters Bluff and Carthage reservoirs pose significant obstacles to land acquisition and permitting. Construction of Waters Bluff Reservoir will require an Act of Congress to override the Little Sandy National Wildlife Refuge non-development conservation easement; Carthage Reservoir affects a significant area of priority-designated bottomland hardwoods and is located downstream of the areas with future needs. The development of either of these two reservoirs is potentially feasible only if there is an out-of-Basin customer that is willing to support initial capital costs in return for surplus supply.

The most economical reservoir development alternatives appear to be Big Sandy (with or without diversions), Prairie Creek with diversions, and State Highway 322 (Stage I) with diversions. Each of these sites is located in or near areas identified with future needs. The primary developmental concerns with Big Sandy are the numerous cultural resource sites and bottomland hardwoods. Prairie Creek is located in an area with fewer environmental concerns and is centrally placed in the Upper Basin. The firm yield of Prairie Creek is the lowest of the three tributary reservoirs. Diversions from the Sabine make this reservoir a viable water supply alternative. State Highway 322 is located further downstream and shares the same watershed with Lake Cherokee. This reservoir site is currently being mined for lignite and may not be available for reservoir development prior to the anticipated shortfall in 2010. The advantage to this site is it offers terminal storage for potentially large diversions from the Sabine, resulting in an increase in yield of approximately 25,000 acre-feet per year.

The transmission pipelines from Toledo Bend to the Upper Basin also offer alternatives to provide water supply in a staged program. When considering capital costs only, the most economical means of transporting water would be to deliver directly to a water treatment facility. Construction of a reservoir and a transmission pipeline will slightly increase the unit cost of providing raw water. However, terminal storage provides the most flexibility in operating the pipeline system by lowering peak pumping rates, and would Lower the yearly operating costs of

the pipeline. A proposed reservoir such as Prairie Creek or Highway 322 could be used as terminal storage for the pipeline. Some of the advantages to a transmission pipeline are that it can provide water to points along the route; the line can be routed to avoid conflicts; and it can be staged to meet future demands as needed. A transmission pipeline from Toledo Bend Reservoir should be seriously considered as part of the future water supply for the Upper Basin.