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Section 4
Projected Demographic and Land Use Changes

4.1 Pre-Storm Demographics and Land Use Patterns

The Gulf Region is a diverse area including both urban and rural development. The largest cities are clustered along the coastline in Harrison and Jackson counties, but all six counties include large swaths of rural land. **Figure 4-1** presents year 2005 population estimates for the counties of the Gulf Region.

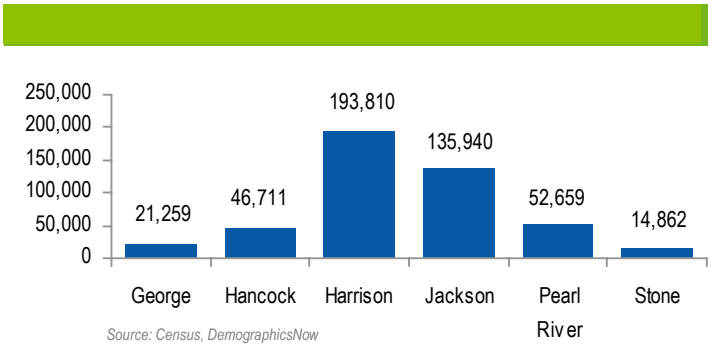

Figure 4-1 2005 Population within the Gulf Region

The Gulf Region experienced moderate-to-strong growth leading up to Katrina's impact, producing a sizable population base of 465,000. A strong regional economy and affordable cost of living attracted residents from across the South. Population historically has been clustered near major employment centers in Harrison and Jackson counties, but significant growth has occurred in the four smaller-population-base counties since 1990. **Figure 4-2** shows the population growth from 1990 to 2005 by county, with a comparison to state and national values.

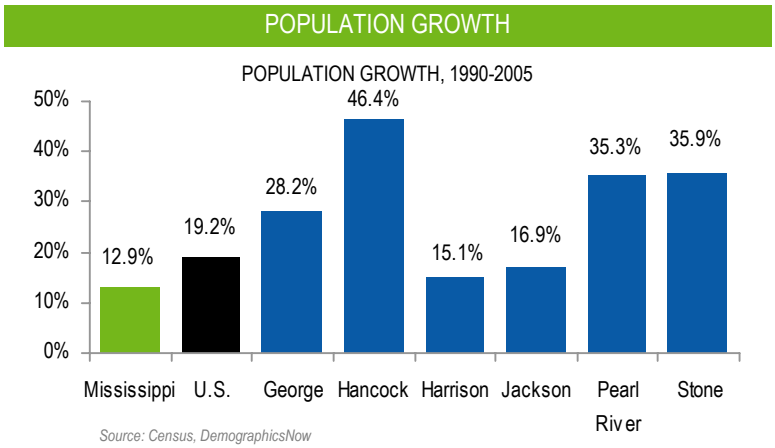

Figure 4-2 Population Growth within the Gulf Region

The educational attainment of Mississippi adults (age 25+) is below the U.S. average, with only 20 percent holding bachelor's degrees in 2005. The Gulf Region has an educational attainment even lower than the state average. **Figure 4-3** shows educational attainment by county, with a comparison to state and national values. Despite these statistics, the region has made strides toward closing the gap. The number of residents with college degrees has increased, and the region has made strides in reducing the percentage of residents with less than a high school education.

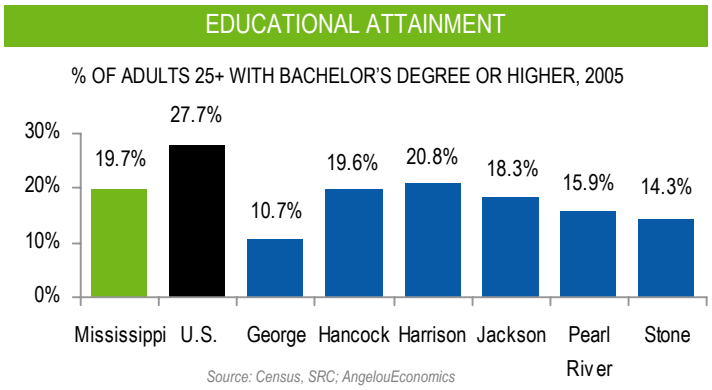

Figure 4-3 Educational Attainment within the Gulf Region

The Gulf Region population remains relatively young, with a median age of 36, which is nearly identical to the U.S. average. In 2005, 28 percent of the regional population was included in the 25-44 age group. This figure is comparable to regional competitors and is above average for a rural or suburban community. **Figure 4-4** presents the percentage of adults in the 25-44 age group by county, with a comparison to state and national values.

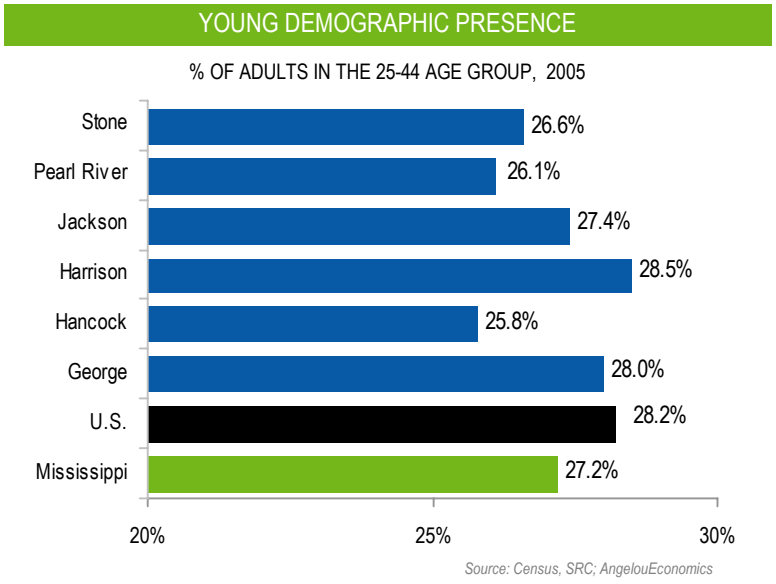

Figure 4-4 Young Demographic Presence in the Gulf Region

Considerable ethnic diversity exists within the planning area, particularly given its geography and population density. While Caucasians account for 77 percent of the area's population, other racial and ethnic groups are growing quickly. The African-American community is the second largest racial group and accounts for 19 percent of the population, and the Asian community now accounts for 2 percent of the population. Similar to trends in the rest of the nation, the Hispanic community is one of the fastest growing ethnic groups and accounts for 2 percent of the local population. **Figure 4-5** shows the racial and ethnic classification of the Gulf Region population, with national values provided in parentheses for comparison.

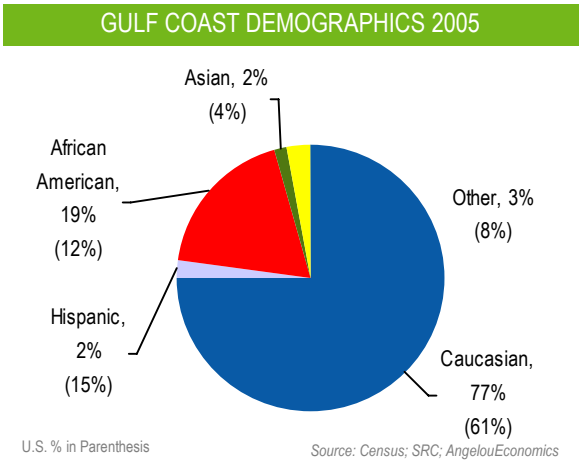

Figure 4-5 Racial and Ethnic Demographics in the Gulf Region

Median household income in Mississippi, at $34,600, is far below the U.S. average. Before the storm's impacts, the Gulf Region had median incomes above the state average but still far below the U.S. median. Mississippi and the Gulf Coast Region have retained some of the highest poverty rates nationwide; however, despite low income relative to national levels, income growth has been healthy in the Gulf Region in recent years. Economic growth has had a direct correlation to income and wage growth; and, with economic growth projected to remain above average locally, continual growth in income is expected as well. **Figure 4-6** presents median household income for the Gulf Region, with a comparison to state and national values.

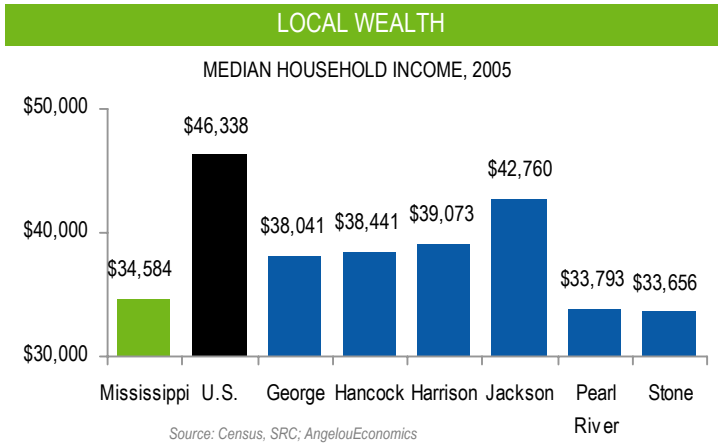

Figure 4-6 Household Income in the Gulf Region

4.2 Observed Post-Storm Demographic and Land Use Patterns

The impact of Katrina created a large-scale population migration in the Gulf Region and in the coastal areas in Louisiana and Alabama. The resulting shift in population, while temporary in many cases, will impact the area's ability to resume strong economic growth. Specific demographic data for post-Katrina conditions were not available with any degree of statistical accuracy; however, observed conditions allowed several inferences to be drawn about how this population migration has impacted the area.

- In general, residents have relocated from impacted coastal areas to temporary residences farther inland. The population has temporarily declined in the three coastal counties, and residents have relocated to the three inland counties or to other geographical regions where they could find housing and/or jobs. All three northern counties consequently have experienced population increases.
- Employment statistics in each of the three coastal counties indicate fewer people are employed than were before Katrina, ranging from 4,000 and 5,000 fewer people employed in Hancock and Jackson Counties, respectively, to 20,000 fewer people employed in Harrison County. This reduction in employment numbers may be a function of the employment reporting process, which may not account for large numbers of Federal employees and migratory construction workers.
- The demographics of impacted households, the pace and cost of redevelopment, and the availability of affordable housing are all key variables in the near-term reconstruction process. In the three costal counties, between 50 and 80 percent of destroyed or severely damaged housing was occupied by families earning below U.S. median income levels. An estimated 20 percent of destroyed and severely

damaged housing was occupied by renters. These two housing groups have limited ability to control their destiny, and they will locate where affordable housing is available.

- As a result of Hurricanes Katrina and Rita, the Federal Emergency Management Agency (FEMA) has undertaken remapping of the special flood hazard areas along the Gulf Coast. These are the areas in which flood risks and associated flood insurance premiums are the highest. The final outcome of these new flood insurance rate maps will affect decisions on where and how to rebuild. In the interim, FEMA has issued Advisory Base Flood Elevations (ABFEs) that communities may use in regulating building reconstruction; and, in many cases, the ABFEs stipulate rebuilding to elevations much higher than before, placing severe cost constraints on individual residents. Such conditions have the potential to encourage high-density housing and commercial development in many areas along the Coast, while pushing single-family residential development further inland.

Table 4-1 presents the immediate population impacts from Katrina by county, as well as for the entire Gulf Region.

Population					
County	**2000**	**2005**	**Oct 2005 (w/out Hurricane Impact)**	**Oct 2005 (with Hurricane Impact)**	**Jul 2006**
George	19,100	21,011	21,288	25,516	23,856
Hancock	42,967	46,002	46,754	30,409	38,837
Harrison	189,601	189,444	194,025	178,466	188,482
Jackson	131,420	134,950	136,949	121,187	130,668
Pearl River	48,621	51,809	52,776	64,189	59,202
Stone	13,622	14,359	14,625	18,144	16,663
Gulf Region	**445,375**	**457,575**	**466,417**	**437,911**	**457,678**

Table 4-1 Immediate Population Impact of Katrina

Source: Claritas

Following is a discussion of specific demographic conditions within each of the Gulf Region counties, keeping in mind the general observations mentioned previously.

Hancock County

Population data for Hancock County indicate that a moderate loss of population has occurred through mid-2006. Current population estimates for the county range from 36,000 to 44,000. As with the other coastal counties, a sizable population shift has occurred within Hancock County due to the lack of available housing. FEMA estimates 7,200 homes were destroyed and 4,600 severely damaged in Hancock County, primarily along the immediate coastal areas. Up to 23,600 people have been displaced from their homes and are living in temporary housing, including a significant number in FEMA trailers. Given the region-wide factors mentioned

previously, a full recovery of the job base is expected in Hancock County within two to three years, with continued above-average growth to follow.

Harrison County

Population data for Harrison County indicate that minimal loss of population has occurred through mid-2006. Current population estimates of the county range from 175,000 to 200,000, comparable to the pre-Katrina population. FEMA estimates 17,000 homes were destroyed and 7,600 severely damaged in Harrison County. Up to 60,000 people have been displaced from their homes and are living in temporary housing. FEMA was providing 9,300 trailers to families in Harrison County in July, although the number continues to decrease as people move back into permanent homes.

Jackson County

Population data for Jackson County indicate that minimal loss of population has occurred through mid-2006. Current population estimates of the county range from 130,000 to 135,000, comparable to the pre-Katrina population. FEMA estimates 14,000 homes were destroyed and 2,000 severely damaged in Jackson County, and up to 41,000 people have been displaced and are living in temporary housing, including a significant number of FEMA trailers.

A full recovery of the job base is expected within two to three years, with continued above-average growth to follow. The historically strong manufacturing base in Jackson County has recovered rapidly, and incentives are in place to attract further manufacturing development.

Pearl River County

Population data for Pearl River County indicate a 14 percent population increase as of mid-2006. Current population estimates of the county range from 55,000 to 65,000, compared to the pre-Katrina population of 51,000. This increase in population is mostly temporary; but, as development occurs in Pearl River County, there will be the opportunity to retain a significant share of this temporary population, as well as to attract additional residents.

Stone County

Population data for Stone County indicate a 14 percent population increase as of mid-2006. Current population estimates for the county range from 16,000 to 18,000, compared to the pre-Katrina population of 14,000. This increase in population is also mostly temporary; and, as development occurs, the county will have the opportunity to retain a significant share of this temporary population, as well as attracting additional residents. The lack of available housing in neighboring Harrison County will continue to provide an opportunity for developers in Stone County.

George County

Population statistics for George County indicate a 10 percent population increase over pre-Katrina conditions as of mid-2006. Current population estimates in the county

range from 22,000 to 25,000, compared to the pre-Katrina population of 21,000. This increase in population for George County is likely to be temporary; but, as development occurs, the county has the opportunity to retain a significant share of this temporary population, as well as to attract additional residents. For instance, Jackson County to the south needs 16,000 family residential units almost immediately, and development and reconstruction of these units will take years to complete.

4.3 Future Demographic and Land Use Projections

4.3.1 Projections Prior to Katrina

Steady population growth was forecast for the Gulf Region prior to Katrina's impact. Growth within the area had been accelerating over time, with a high birth rate and migration patterns that were exhibiting positive trends. As growth accelerated along the entire coastline of the Gulf of Mexico, forecasters predicted the Gulf Region would begin to see rapid development similar to areas in coastal Florida.

Within the Gulf Coast specifically, areas focused on tourism and casino development were expected to receive a significant share of total population growth. These economic engines were creating jobs, driving population growth and driving development of additional retail and commercial businesses. More rural counties and communities were also expected to receive significant growth, and the cost of living was projected to increase.

Table 4-2 presents the pre-Katrina population growth forecast by county and for the entire Gulf Region.

	Forecasted Population Growth Rate for Designated Time Period		
County	**2005-2010**	**2010-2015**	**2015-2020**
George	3%	9%	14%
Hancock	8%	13%	18%
Harrison	4%	6%	8%
Jackson	4%	8%	10%
Pearl River	7%	11%	15%
Stone	9%	13%	18%
Gulf Region	**5%**	**8%**	**11%**

Table 4-2 Pre-Katrina Baseline Forecast (Total 5-year Growth)
Source: Mississippi Institutions of Higher Learning

4.3.2 Observed Recovery Trends from Similar Areas

Recovery trends from similarly impacted areas in North America provide insight into likely scenarios for recovery in the Gulf Region. Due to a variety of factors, natural disasters in the United States no longer result in long-term population decline or stagnation. Such was not the case, however, in the early part of the 20th century. For example, Galveston, Texas never recovered from the devastating hurricane of 1900. At the time, the city equaled Houston and Dallas in population size and economic significance, but population growth stopped immediately following the storm. In more recent times, earthquakes in California, terrorist attacks in New York City, and numerous hurricane impacts on the Gulf Coast and Atlantic Coast have not affected long-term population growth trends of the impacted areas. Charleston County, South Carolina, was devastated by Hurricane Hugo in 1989; but population growth recovered, and the population increased from 295,000 in 1989 to 330,000 in 2005. The population of coastal Florida, an area impacted by dozens of large scale hurricanes, increased 487 percent from 1950 to 2000.

Many issues affect the re-population of disaster areas, but the single consistent issue that also has parallels on the Gulf Coast is affordable housing. This issue typically is the most difficult aspect of long-term recovery in impacted communities. The residential market tends to recover fastest in high-income neighborhoods, with affordable housing typically a secondary priority. As this recovery takes place over time, with moderate to expensive development the priority, the quantity of affordable homes will decline. A number of factors contribute to the phenomenon, including:

- Low-income families obviously lack necessary financial resources;
- Low-income residents are often renters, and multi-family properties receive less financial assistance from the federal government for rebuilding, forcing them to consider increasing rents to pay for repairs;

- Affordable housing is more susceptible to damage due to high-risk locations and the age of structures; and
- Many affordable housing options are older and not built to current code.

4.3.3 Near-Term Development Projections and Patterns

As with the discussion of existing conditions and post-storm development patterns, certain common traits characterize projections of future development within the Gulf Region. While each county faces its own distinct circumstances and may respond in different magnitudes to a given set of conditions, commonalities do exist that will impact future growth in similar ways. Each of the counties is expected to experience return to pre-Katrina population prior to, or by the year 2010, due to several of these common factors, as described hereafter.

- The migratory work force connected with the coastal rebuilding effort should result in a temporary population boost in the three coastal counties; however, this effect is not anticipated to translate into a long-term impact on housing purchases.
- Short-term demand for homes to replace those damaged and destroyed should support strong economic growth and provide the related construction workforce with greater reason to remain for some time.
- Construction costs and timeline are both important redevelopment factors. Construction costs have risen significantly across the Gulf Region in the storm's aftermath. FEMA currently is paying high average-wage rates for short-term work, and this factor has resulted in increased wages across the construction industry. Expectations are that costs will remain above the historical norm through 2010.
- Most new development likely will occur where water and wastewater utilities are already in place or where service can be delivered without excessive time or costs. This condition will have the potential to increase development density of many projects.

Conditions specific to each county and associated impacts on projected levels of redevelopment are discussed hereafter.

Hancock County

Population growth is expected to regain pace to pre-Katrina levels, and employment as well is expected to increase and stabilize to a similar pre-storm growth rate. The presence of Stennis Space Center will be a continued driver of such growth. Condominium development should be driven moderately by casino and tourism projects within the county. Steady overall regional recovery should drive continued population growth. For instance, with strong employment growth in Harrison County, Hancock could generate a commuter workforce, as transportation access allows.

Residential reconstruction should drive significant economic growth in the near term. With 11,800 homes in Hancock County no longer in livable condition, homes need to be repaired or reconstructed and new residences developed. The Interstate 10 corridor likely will capture the vast majority of development, specifically around Bay St. Louis. The Kiln area and the Highway 90 corridor southeast of I-10 should also experience significant development. Major projects already identified include a casino-related housing development near the coast and the Diamondhead expansion.

Harrison County

The population of Harrison County is projected to grow at an above-average rate for the near term. The short-term demand for 25,000 homes to replace those damaged and destroyed should support strong economic growth and force the construction workforce to remain for some time, boosting their ties to the community. Condominium development likely will be strongest in Harrison County, where it is being encouraged, and could deliver 10,000 to 15,000 retiree or investor units in the near term to moderate term.

Employment should increase and stabilize to a higher growth rate than pre-Katrina. This trend will initially be driven by the large increase in migratory construction workers, later converting to stable, long-term jobs by 2010 as the employment base comes back on-line.

As in Hancock County, the Interstate 10 corridor likely will capture the vast majority of development from west to east. Highways 49, 67, 53, and 15, north of I-10, should constitute secondary corridors for development. Major projects already identified include a housing development north of Bay of St. Louis, various projects in Gulfport and Biloxi, and a large development north of D'Iberville.

Jackson County

The population is projected to grow in Jackson County at an above-average rate and to surpass pre-Katrina growth by 2010. Short-term demand for 16,000 homes to replace those damaged and destroyed should support steady economic growth. Further economic growth in Jackson County likely will be more traditional, not driven by gaming or condominium markets, based on the current philosophy and attitudes of the county residents.

Employment should increase and stabilize at levels similar to pre-Katrina. The county's manufacturing sector has recovered quickly, and incentives offered through the GO Zone program have the potential to attract additional employers as a workforce becomes available.

Pearl River County

Pearl River County has the potential to see the fastest growth rate of all the Gulf Region counties if the requisite infrastructure is developed. Population growth is expected to increase dramatically in relation to pre-Katrina trends, due to relocations from Louisiana and impacted areas in Mississippi. While the entire county should

continue to see growth, the majority of new population should likely settle in the southern part of the county. The county is well positioned to support a commuter workforce from New Orleans and the Gulf Region, particularly given the lack of new housing construction in New Orleans and given the presence of the Stennis Space Center and the casinos in Hancock County.

The significant increase in construction costs in coastal areas potentially could encourage developers of affordable housing to consider alternatives in Pearl River County. Further, the volume of construction required in Hancock and Harrison Counties will extend the redevelopment timeline significantly, again driving residents and developers to consider the northern counties.

Stone County

Population growth in Stone County is expected to increase from the pre-Katrina trend. The short-term population boost due to relocations should have a positive impact on growth in the county, and new growth should continue as well. As redevelopment continues on the Coast, the number of temporary residents who will become permanent residents will increase. The expansion of U.S. Highway 49 and a new interchange at U.S. Highway 49 and MS Highway 67 should improve transportation access for Stone County residents. These transportation improvements also should have the potential to spur development of a larger commuter population in Stone County.

Up to five subdivisions are currently in the planning stages of development along East McHenry Road and U.S. Highway 49 in Stone County. Highway 15 in the eastern part of the county likely will attract new growth and development due to available infrastructure in the area. Large parcels of land available near Perkinston, in southern Stone County, lack required utility infrastructure but have excellent transportation access and are prime candidates for new development.

George County

Population growth in George County is expected to increase slightly over pre-Katrina levels. The county has experienced a short-term population boost due to relocations; and the longer redevelopment takes on the Coast, particularly in Jackson County, the larger the number of temporary residents that likely will become permanent residents. The relative population increase, while significant, likely will be less so than in neighboring Stone County.

George County has attracted interest from residential developers but primarily for small projects. Developments have been planned in South George County around Barton and Agricola. Lucedale also shows growth potential.

4.3.4 Long-Term Development Projections and Patterns

The observable recovery underway in the Gulf Region is projected to continue and even accelerate through 2025. Pre-Katrina economic and population projections for the Gulf Region are expected to be exceeded by wide margins in some cases. Transportation, utility, and economic development infrastructure components are being repaired and reconstructed daily. As reconstruction is completed, new development should increase, due to the area's strong asset base and attractive incentives for development.

Population projections through the long-term planning period were developed and are detailed in **Table 4-3** for the six Gulf Region counties. For each target year, the median population projection is reported, with a high and low projection shown on either side. As the recovery continues to unfold over the next few years, Mississippi leaders will need to re-evaluate the data on an ongoing basis. In order to support preparation of projected utility demands and flows, the population projections include transient residents, such as temporary residents living in condominiums, and visitors staying in hotel rooms.

	Census Data	Permanent plus Transient Population with +/- 15% Variable and Re-Population to Census Level if Required											
County	2005	(-15%)	2010	(+15%)	(-15%)	2015	(+15%)	(-15%)	2020	(+15%)	(-15%)	2025	(+15%)
George	21,011	22,462	26,426	30,390	24,079	28,329	32,578	25,813	30,368	34,923	27,671	32,554	37,437
Hancock	46,002	44,718	52,610	60,501	50,612	59,544	73,714	55,855	65,712	78,102	58,982	69,391	81,070
Harrison	189,444	216,075	254,206	292,337	243,618	286,609	343,829	264,736	311,454	370,576	282,870	332,788	394,315
Jackson	134,950	126,618	148,963	171,307	142,071	167,143	192,214	155,530	182,976	210,422	164,570	193,612	222,654
Pearl River	51,809	57,481	67,624	77,768	65,034	76,511	87,988	71,102	83,649	96,197	77,736	91,454	105,172
Stone	14,359	16,505	19,418	22,331	19,603	23,062	26,522	22,725	26,736	30,746	24,846	29,230	33,615
Total	457,575	483,860	569,247	654,634	545,018	641,197	756,844	595,761	700,895	820,966	636,674	749,029	874,263

Table 4-3 Population Projections for the Gulf Region

County projections at the census tract and block group level are provided in **Tables 4-4** through **4-9**. The locations of the census tracts and blocks referenced in the tables are shown in **Figures 4-7** through **4-12**. In specific census tracts where current data indicated long-term population loss, the 2005 Census population number was considered the population floor.

	Census Data	Permanent plus Transient Population with +/- 15% Variable and Re-Population to Census Level if Required											
Census Block Group	2005	(-15%)	2010	(+15%)	(-15%)	2015	(+15%)	(-15%)	2020	(+15%)	(-15%)	2025	(+15%)
280399501001	3,034	3,221	3,789	4,358	3,441	4,048	4,655	3,691	4,342	4,993	3,958	4,656	5,355
280399501002	1,336	1,401	1,649	1,896	1,542	1,814	2,086	1,652	1,944	2,236	1,771	2,083	2,396
280399501003	3,754	4,222	4,967	5,712	4,370	5,141	5,912	4,680	5,506	6,332	5,014	5,899	6,784
280399501004	1,579	1,663	1,956	2,250	1,791	2,107	2,423	1,921	2,260	2,599	2,060	2,423	2,787
280399502001	1,384	1,461	1,719	1,977	1,598	1,880	2,161	1,712	2,014	2,316	1,835	2,158	2,482
280399502002	965	1,000	1,177	1,353	1,113	1,310	1,506	1,193	1,403	1,614	1,278	1,504	1,729
280399503001	1,051	1,111	1,307	1,503	1,213	1,427	1,641	1,300	1,529	1,758	1,393	1,639	1,885
280399503002	1,660	1,813	2,133	2,453	1,882	2,214	2,546	2,019	2,375	2,731	2,165	2,547	2,929
280399503003	3,479	3,737	4,396	5,056	3,980	4,682	5,384	4,266	5,019	5,772	4,574	5,381	6,188
280399503004	1,143	1,143	1,345	1,547	1,307	1,538	1,768	1,401	1,649	1,896	1,502	1,767	2,032
280399503005	1,626	1,690	1,988	2,286	1,844	2,170	2,495	1,978	2,327	2,676	2,121	2,496	2,870
Total	21,011	22,462	26,426	30,390	24,079	28,329	32,578	25,813	30,368	34,923	27,671	32,554	37,437

Table 4-4 George County Population Projections

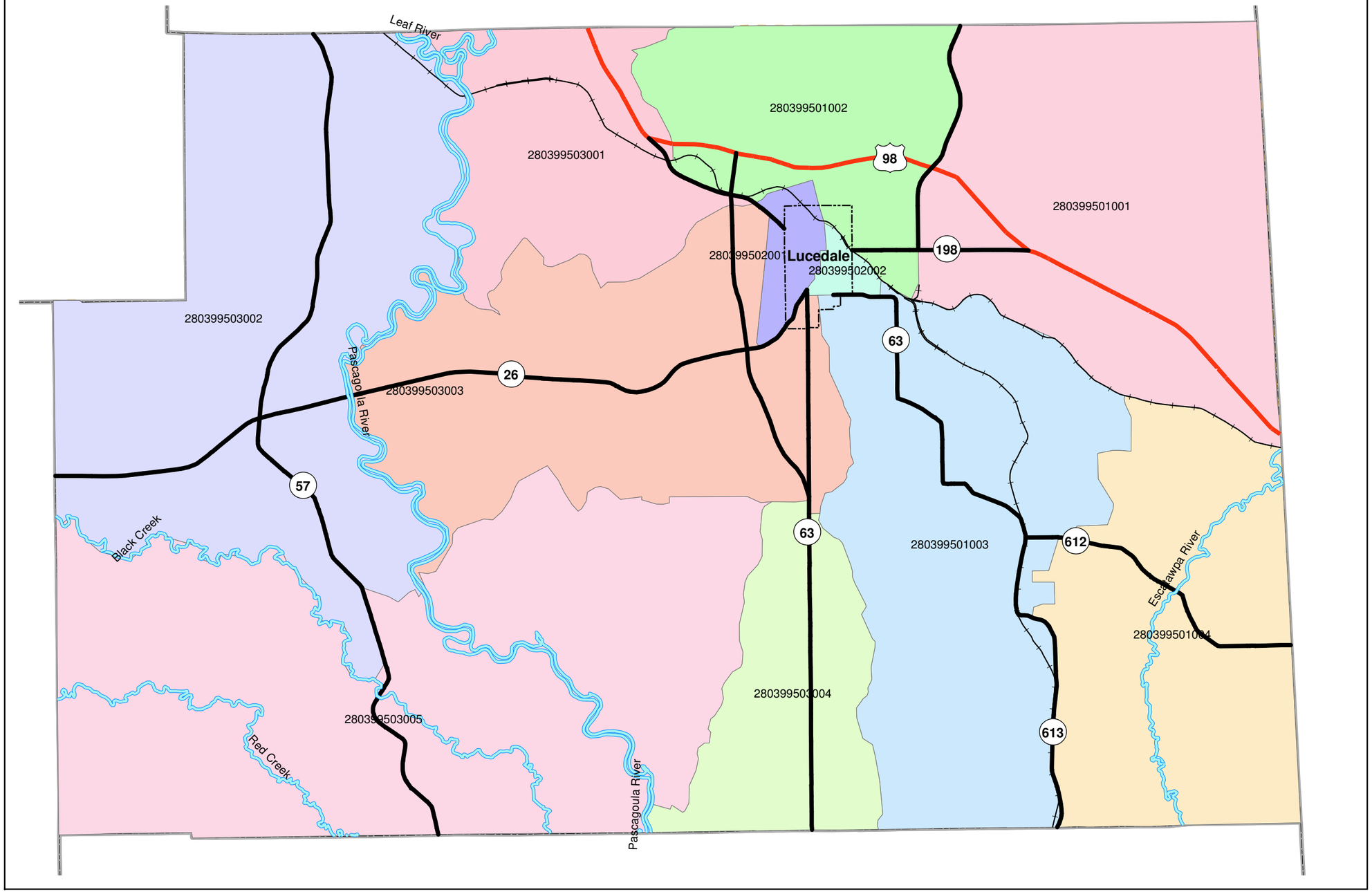

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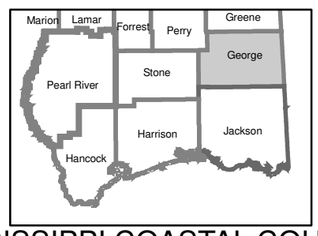
Figure 4-7
George County
Census Block Information

Legend

- State Highway
- U.S. Highway
- Railroads
- County Boundary
- City Limits
- Rivers



MISSISSIPPI COASTAL COUNTIES

GEORGE COUNTY, MISSISSIPPI
CENSUS BLOCK INFORMATION

0 2.5 5 10 15 20 Miles

MSEG
MISSISSIPPI ENGINEERING GROUP, INC.
143-A LeFleurs Square • Jackson, MS 39211
601-355-3518 • Fax 601-352-3945

MDEQ

	Census Data	Permanent plus Transient Population with +/- 15% Variable and Re-Population to Census Level if Required											
Census Tract	2005	(-15%)	2010	(+15%)	(-15%)	2015	(+15%)	(-15%)	2020	(+15%)	(-15%)	2025	(+15%)
030100	5,834	2,213	2,604	2,995	2,811	3,308	5,834	3,446	4,054	5,834	3,787	4,455	5,834
030200	7,983	8,402	9,885	11,368	9,221	10,848	12,475	10,939	12,869	14,799	11,559	13,599	15,639
030300	10,124	4,031	4,743	5,454	5,112	6,014	10,124	6,477	7,621	10,124	7,069	8,317	10,124
030400	2,951	3,377	3,973	4,568	3,707	4,361	5,016	3,776	4,442	5,109	3,912	4,603	5,293
030500	6,701	9,443	11,110	12,776	10,613	12,486	14,359	11,829	13,916	16,003	12,597	14,820	17,043
030600	12,409	17,251	20,295	23,340	19,148	22,527	25,906	19,389	22,811	26,232	20,058	23,598	27,137
Total	46,002	44,718	52,610	60,501	50,612	59,544	73,714	55,855	65,712	78,102	58,982	69,391	81,070

Table 4-5 Hancock County Population Projections

	Census Data	Permanent plus Transient Population with +/- 15% Variable and Re-Population to Census Level if Required											
Census Block Group	2005	(-15%)	2010	(+15%)	(-15%)	2015	(+15%)	(-15%)	2020	(+15%)	(-15%)	2025	(+15%)
281310201001	1,777	1,879	2211	2,542	2,359	2776	3,192	2,669	3140	3,611	2,861	3365	3,870
281310201002	950	1,054	1240	1,425	1,295	1524	1,752	1,427	1678	1,930	1,501	1766	2,031
281310201003	577	628	739	850	766	901	1,036	873	1027	1,182	942	1108	1,274
281310202001	1,375	1,551	1825	2,099	1,810	2130	2,449	2,048	2410	2,771	2,197	2584	2,972
281310202002	1,601	1,775	2088	2,402	2,108	2479	2,851	2,385	2806	3,227	2,557	3009	3,460
281310202003	965	1,099	1293	1,487	1,281	1507	1,733	1,449	1704	1,960	1,553	1827	2,101
281310202004	2,506	2,786	3278	3,770	3,298	3880	4,462	3,733	4391	5,050	4,002	4709	5,415
281310202005	2,657	3,138	3692	4,246	3,497	4115	4,732	3,958	4656	5,355	4,244	4993	5,742
281310202006	1,950	2,594	3052	3,510	3,189	3752	4,314	4,184	4922	5,661	4,989	5869	6,750
Total	14,359	16,505	19,418	22,331	19,603	23,062	26,522	22,725	26,736	30,746	24,846	29,230	33,615

Table 4-6 Stone County Population Projections

	Census Data	Permanent plus Transient Population with +/- 15% Variable and Re-Population to Census Level if Required											
Census Tract	2005	(-15%)	2010	(+15%)	(-15%)	2015	(+15%)	(-15%)	2020	(+15%)	(-15%)	2025	(+15%)
950100	5,353	5,224	6,146	7,068	5,378	6,326	7,275	5,603	6,592	7,581	5,911	6,954	7,997
950200	5,740	5,589	6,575	7,561	5,743	6,756	7,769	5,978	7,032	8,087	6,301	7,413	8,525
950300	3,095	3,608	4,244	4,881	4,211	4,954	5,698	4,671	5,496	6,320	5,151	6,061	6,970
950401	7,524	7,359	8,658	9,956	7,589	8,928	10,268	7,915	9,312	10,709	8,355	9,830	11,304
950402	5,957	6,481	7,624	8,768	7,237	8,514	9,791	7,862	9,250	10,637	8,543	10,050	11,558
950500	12,654	13,230	15,565	17,900	14,366	16,902	19,437	15,394	18,111	20,828	16,564	19,487	22,410
950600	4,379	7,996	9,407	10,818	11,384	13,393	15,402	13,657	16,067	18,477	15,941	18,754	21,567
950700	7,106	7,994	9,405	10,816	9,127	10,738	12,348	10,021	11,790	13,558	10,971	12,907	14,843
Total	51,809	57,481	67,624	77,768	65,034	76,511	87,988	71,102	83,649	96,197	77,736	91,454	105,172

Table 4-7 Pearl River County Population Projections

Stone

Pearl River

Harrison

030600

030500

030300

030400

030400

030200

030100

NASA

Bay St. Louis

Waveland

53

603

43

607

10

603

90

604

90

N

W

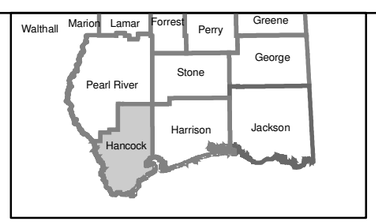
E

S

Figure 4-8
Hancock County
Census Tract Information

Legend

- Interstate Highway
- State Highway
- U.S. Highway
- Railroads
- County Boundary
- City Limits
- Stennis Space Center
- NASA
- Rivers
- Gulf of Mexico



MISSISSIPPI COASTAL COUNTIES

HANCOCK COUNTY, MISSISSIPPI
CENSUS TRACT INFORMATION

0 2.5 5 10 15 20 Miles

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MDEQ

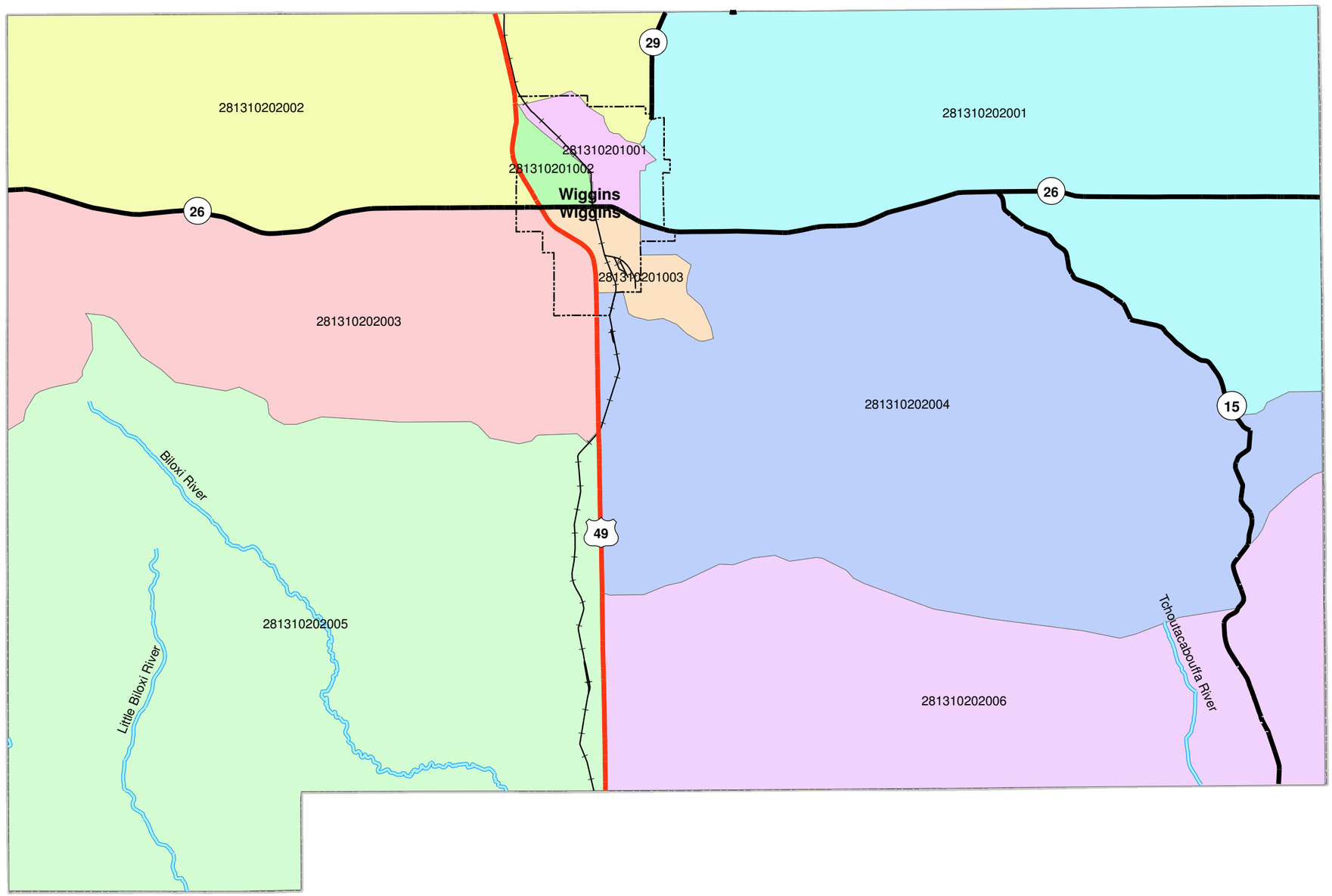

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Figure 4-9
Stone County
Census Block Information

Legend

- Interstate Highway
- State Highway
- U.S. Highway
- Railroads
- County Boundary
- City Limits
- Rivers

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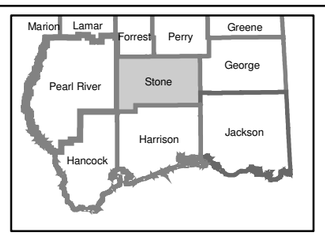


MISSISSIPPI COASTAL COUNTIES

STONE COUNTY, MISSISSIPPI
CENSUS BLOCK INFORMATION

0 2.5 5 10 15 20 Miles

MDEQ

Walthall
Marion
Lamar
Forrest
Stone
Hancock
Harrison

950200
950300
950100
950401
950402
950500
950600
950700

Poplarville
Picayune

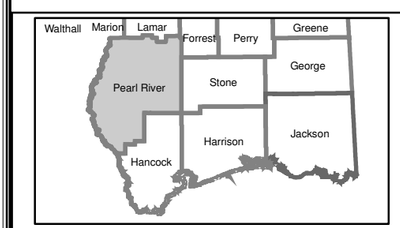
13
59
11
26
43
53

N
W
E
S

Figure 4-10
Pearl River County
Census Tract Information

Legend

- Interstate
- State Highway
- U.S. Highway
- Railroads
- County Boundary
- City Limits
- Rivers



MISSISSIPPI COASTAL COUNTIES

PEARL RIVER COUNTY, MISSISSIPPI
CENSUS TRACT INFORMATION

0 2.5 5 10 15 20 Miles

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	Census Data	Permanent plus Transient Population with +/- 15% Variable and Re-Population to Census Level if Required											
Census Tract	2005	(-15%)	2010	(+15%)	(-15%)	2015	(+15%)	(-15%)	2020	(+15%)	(-15%)	2025	(+15%)
000100	1,284	3,283	3,863	4,442	4,989	5,870	6,750	5,813	6,839	7,865	6,130	7,212	8,293
000200	2,229	1,680	1,977	2,273	2,031	2,389	2,747	2,496	2,936	3,376	2,618	3,080	3,542
000300	2,665	1,928	2,268	2,608	2,110	2,483	2,855	2,651	3,119	3,587	2,688	3,162	3,637
000400	1,378	2,213	2,604	2,994	2,645	3,111	3,578	2,957	3,478	4,000	3,333	3,921	4,509
000500	151	2,521	2,966	3,411	3,202	3,767	4,332	3,624	4,264	4,903	4,259	5,010	5,762
000600	2,443	943	1,109	1,275	954	1,122	2,443	904	1,064	2,443	860	1,012	2,443
000700	1,553	1,513	1,781	2,048	1,861	2,189	2,517	2,169	2,552	2,935	2,311	2,719	3,127
000800	1,592	593	698	803	601	707	1,592	568	669	1,592	539	635	1,592
000900	4,970	2,469	2,904	3,340	3,213	3,780	4,347	3,041	3,578	4,115	2,887	3,396	3,905
001000	2,720	1,351	1,590	1,828	1,759	2,069	2,720	1,665	1,958	2,720	1,580	1,859	2,720
001100	205	102	120	138	132	156	205	125	147	205	119	140	205
001201	5,003	2,485	2,924	3,363	3,235	3,806	5,003	3,062	3,602	5,003	2,906	3,419	5,003
001202	5,903	6,587	7,750	8,912	7,897	9,290	10,684	8,117	9,550	10,982	8,529	10,034	11,539
001300	3,678	9,020	10,612	12,204	10,312	12,132	13,951	10,716	12,607	14,498	12,490	14,695	16,899
001400	3,927	4,863	5,721	6,579	5,731	6,742	7,754	5,907	6,949	7,991	6,426	7,560	8,694
001500	8,540	3,712	4,367	5,022	5,962	7,014	8,540	6,671	7,848	9,026	7,235	8,511	9,788
001600	3,472	3,018	3,550	4,083	3,554	4,181	4,808	3,633	4,274	4,915	3,655	4,300	4,945
001700	5,926	2,958	3,480	4,002	3,618	4,256	5,926	4,063	4,780	5,926	4,395	5,171	5,946
001800	2,902	4,307	5,067	5,828	4,840	5,695	6,549	4,991	5,872	6,753	5,095	5,994	6,893
001900	2,753	1,197	1,408	1,619	1,483	1,745	2,753	1,685	1,982	2,753	1,839	2,163	2,753
002000	4,346	1,889	2,223	2,556	2,342	2,755	4,346	2,660	3,129	4,346	2,903	3,415	4,346
002100	32	267	314	361	352	414	476	436	513	590	436	513	590
002200	1,932	2,505	2,947	3,389	2,599	3,057	3,516	2,815	3,311	3,808	2,949	3,470	3,990
002300	2,334	1,014	1,193	1,372	1,257	1,479	2,334	1,428	1,680	2,334	1,559	1,834	2,334
002400	3,859	1,678	1,974	2,270	2,080	2,447	3,859	2,362	2,778	3,859	2,578	3,033	3,859
002500	1,959	852	1,002	1,152	1,056	1,242	1,959	1,199	1,411	1,959	1,309	1,540	1,959
002600	3,343	1,453	1,709	1,966	1,801	2,119	3,343	2,046	2,407	3,343	2,233	2,627	3,343
002700	6,228	2,320	2,730	3,139	4,027	4,737	6,228	3,811	4,483	6,228	3,617	4,255	6,228
002800	4,775	1,441	1,695	1,950	1,799	2,116	4,775	1,767	2,079	4,775	1,693	1,991	4,775
002900	2,669	1,164	1,370	1,575	1,642	1,932	2,669	1,565	1,841	2,669	1,496	1,760	2,669
003000	4,388	1,635	1,923	2,212	2,364	2,781	4,388	2,238	2,632	4,388	2,124	2,499	4,388
003101	7,445	10,595	12,465	14,335	10,940	12,870	14,801	11,361	13,366	15,371	11,403	13,415	15,427
003102	5,703	9,516	11,195	12,874	10,320	12,142	13,963	11,947	14,055	16,164	13,358	15,715	18,072
003203	8,417	11,132	13,097	15,062	10,657	12,538	14,418	11,151	13,119	15,086	11,294	13,287	15,280
003204	4,084	5,072	5,967	6,862	4,841	5,696	6,550	4,998	5,880	6,763	5,068	5,962	6,856
003205	5,880	7,303	8,591	9,880	6,970	8,200	9,431	7,197	8,467	9,737	7,297	8,584	9,872
003206	4,972	8,644	10,170	11,695	9,376	11,031	12,685	10,141	11,931	13,721	10,657	12,538	14,419
003301	7,904	12,988	15,280	17,572	15,070	17,730	20,389	15,470	18,200	20,930	15,918	18,727	21,536
003302	8,010	11,622	13,673	15,724	11,038	12,986	14,934	10,976	12,913	14,850	10,845	12,759	14,673
003401	8,096	20,150	23,706	27,262	24,669	29,023	33,376	32,554	38,299	44,044	40,076	47,148	54,220
003402	8,097	14,460	17,012	19,564	15,695	18,464	21,234	16,941	19,930	22,920	17,781	20,919	24,057
003501	8,016	12,582	14,803	17,023	13,027	15,326	17,625	14,650	17,235	19,820	15,868	18,668	21,468
003502	4,541	6,204	7,299	8,393	5,873	6,909	7,945	6,253	7,356	8,459	6,491	7,637	8,782
003503	9,121	12,843	15,109	17,376	13,694	16,111	18,528	13,914	16,369	18,824	14,024	16,499	18,974
Total	189,444	216,075	254,206	292,337	243,618	286,609	343,829	264,736	311,454	370,576	282,870	332,788	394,315

Table 4-8 Harrison County Population Projections

Pearl River

Stone

Jackson

Hancock

003501

003401

003502

003206

003402

003503

003205

003204

003203

003301

003302

D'Iberville

Biloxi

Gulfport

001800

001600

001500

001201

001100

000900

000400

001202

001000

000800

000700

000300

003101

002400

001700

001300

000600

000200

000100

003102

002500

002300

002100

001900

001400

000500

Biloxi

Long Beach

002600

002200

002700

002800

003000

Pass Christian

002900

N

W

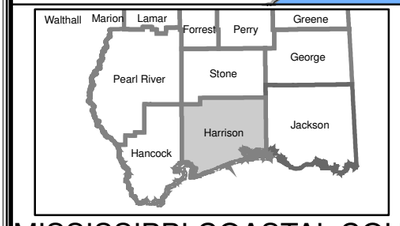
E

S

Figure 4-11
Harrison County
Census Tract Information

Legend

- Interstate Highway
- U.S. Highway
- Railroads
- State Highway
- County Boundary
- City Limits
- Gulf of Mexico
- Rivers



MISSISSIPPI COASTAL COUNTIES

HARRISON COUNTY, MISSISSIPPI
CENSUS TRACT INFORMATION

0 2.5 5 10 15 20 Miles

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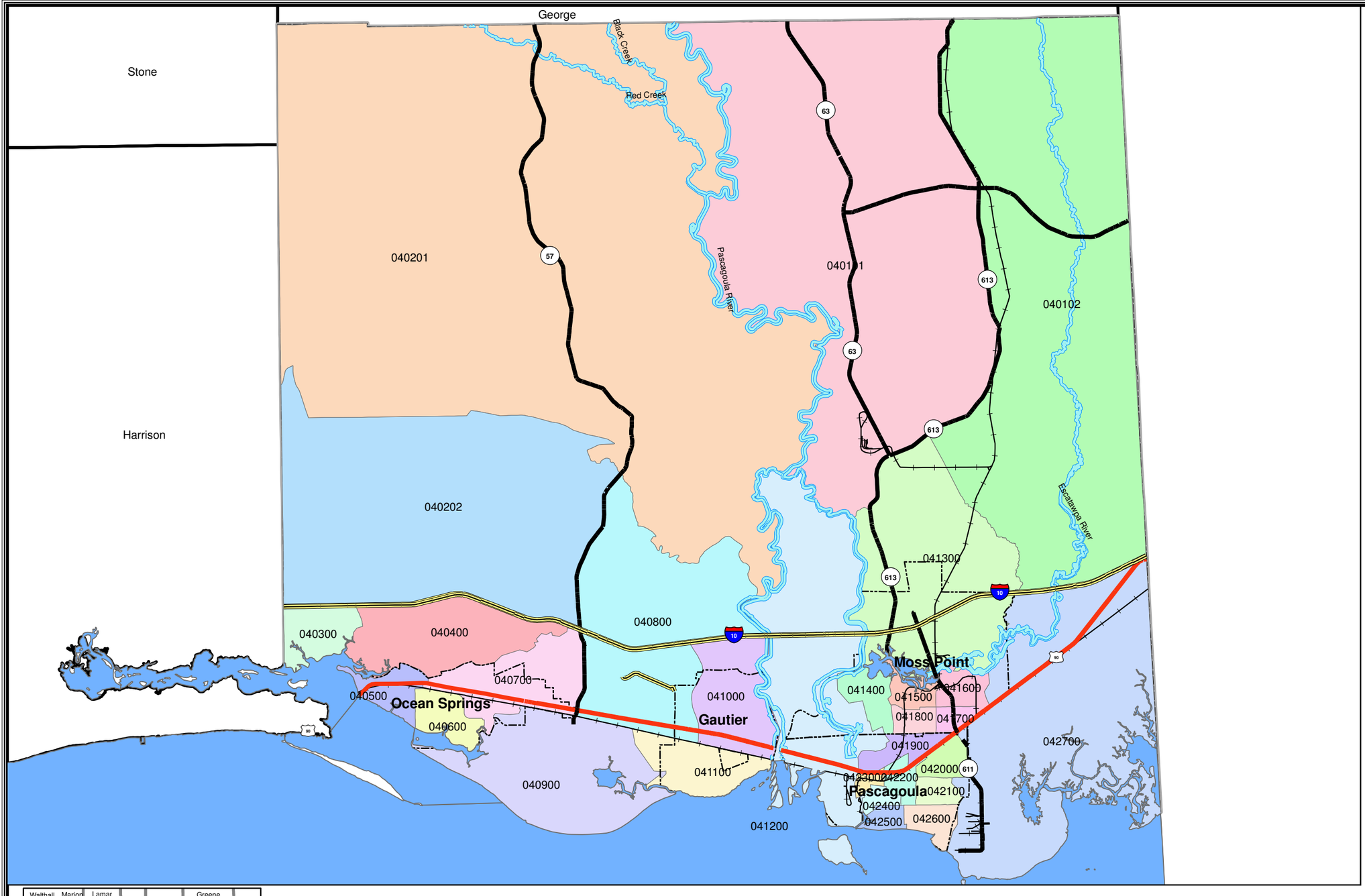
	Census Data	Permanent plus Transient Population with +/- 15% Variable and Re-Population to Census Level if Required											
Census Tract	2005	(-15%)	2010	(+15%)	(-15%)	2015	(+15%)	(-15%)	2020	(+15%)	(-15%)	2025	(+15%)
040101	6,654	6,688	7,869	9,049	6,997	8,231	9,466	7,505	8,830	10,154	7,869	9,257	10,646
040102	7,095	7,118	8,374	9,630	7,446	8,760	10,074	7,988	9,397	10,807	8,374	9,852	11,330
040201	7,269	7,124	8,382	9,639	7,453	8,768	10,083	7,995	9,406	10,816	8,382	9,861	11,340
040202	8,676	9,747	11,467	13,187	12,586	14,807	17,029	14,089	16,575	19,061	15,128	17,797	20,467
040300	6,694	7,635	8,983	10,330	9,118	10,727	12,336	10,454	12,299	14,144	11,528	13,562	15,596
040400	6,131	5,895	6,936	7,976	7,103	8,356	9,610	8,158	9,598	11,038	9,001	10,590	12,178
040500	4,160	3,758	4,421	5,084	4,041	4,755	5,468	4,327	5,091	5,855	4,531	5,331	6,131
040600	5,575	4,954	5,829	6,703	5,183	6,097	7,012	5,560	6,541	7,522	5,829	6,857	7,886
040700	8,596	8,405	9,888	11,371	8,962	10,544	12,125	9,776	11,501	13,226	10,233	12,038	13,844
040800	5,469	5,635	6,630	7,624	6,065	7,135	8,205	6,702	7,884	9,067	7,008	8,245	9,481
040900	8,644	8,788	10,338	11,889	9,192	10,815	12,437	9,861	11,601	13,341	10,339	12,163	13,987
041000	5,549	5,040	5,929	6,819	5,272	6,203	7,133	5,656	6,654	7,652	5,930	6,976	8,022
041100	7,065	6,640	7,811	8,983	6,946	8,171	9,397	7,451	8,766	10,080	7,812	9,190	10,569
041200	949	965	1,135	1,306	1,009	1,188	1,366	1,083	1,274	1,465	1,135	1,336	1,536
041300	6,493	5,799	6,822	7,846	6,491	7,637	8,782	7,357	8,656	9,954	7,927	9,326	10,725
041400	3,140	2,596	3,054	3,513	3,018	3,550	4,083	3,237	3,808	4,380	3,394	3,993	4,592
041500	1,440	1,191	1,401	1,611	1,384	1,628	1,872	1,484	1,746	2,008	1,556	1,831	2,106
041600	2,922	2,505	2,947	3,389	2,897	3,408	3,920	3,101	3,649	4,196	3,247	3,820	4,393
041700	2,524	2,087	2,455	2,824	2,426	2,854	3,282	2,602	3,062	3,521	2,728	3,210	3,691
041800	3,155	2,609	3,069	3,529	3,032	3,567	4,102	3,253	3,827	4,401	3,410	4,012	4,614
041900	2,380	1,968	2,315	2,662	2,712	3,191	3,670	3,304	3,887	4,470	3,482	4,096	4,711
042000	5,440	4,498	5,292	6,085	5,228	6,151	7,073	5,608	6,598	7,588	5,880	6,917	7,955
042100	3,590	2,969	3,493	4,017	3,451	4,060	4,669	3,702	4,355	5,008	3,881	4,566	5,251
042200	5,096	4,214	4,958	5,701	5,110	6,012	6,914	5,713	6,721	7,730	5,968	7,021	8,074
042300	477	394	464	533	458	539	620	491	578	665	515	606	697
042400	1,861	1,539	1,811	2,082	1,789	2,105	2,420	1,919	2,258	2,596	2,012	2,367	2,722
042500	3,044	2,097	2,467	2,838	2,486	2,925	3,364	2,690	3,164	3,639	2,838	3,339	3,840
042600	3,187	2,196	2,584	2,971	2,603	3,063	3,522	2,816	3,313	3,810	2,972	3,496	4,021
042700	1,677	1,564	1,840	2,116	1,612	1,896	2,181	1,647	1,937	2,228	1,663	1,957	2,250
Total	134,950	126,618	148,963	171,307	142,071	167,143	192,214	155,530	182,976	210,422	164,570	193,612	222,654

Table 4-9 Jackson County Population Projections



MISSISSIPPI COASTAL COUNTIES

JACKSON COUNTY, MISSISSIPPI
CENSUS TRACT INFORMATION

0 2.5 5 10 15 20 Miles

N
W E
S

Figure 4-12
Jackson County
Census Tract Information

Legend

- Interstate Highway
- State Highway
- U.S. Highway
- Railroads
- County Boundary
- City Limits
- City Limits
- Gulf of Mexico
- Rivers

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MDEQ

4.4 Existing Capacity and Future Infrastructure Needs

The demographic projections described in Section 4.3 were used to project water demand, wastewater flow, and stormwater runoff in the Gulf Region throughout the planning period. The current section summarizes the methodologies used to establish these utility estimates and to use them to evaluate the effects of new development on infrastructure needs.

4.4.1 Water Demand Projections

An evaluation of existing water supply, treatment, and distribution infrastructure in each county of the Gulf Region was conducted, in order to assess the ability of that infrastructure to address projected needs. The evaluation included preparation of projections of potable water demand and comparison of those projections to the capacity of existing supply and distribution facilities in each county. **Tables 4-10** through **4-15** summarize the estimated water demands for each county, given in million gallons per day (MGD).

Year	Population	Public Water Usage, (MGD)	Other Water Usage, (MGD)	Total Water Usage, (MGD)
2005	21,011	2.10	0.17	**2.27**
2010	26,426	2.64	0.29	**2.93**
2015	28,329	2.83	0.30	**3.13**
2020	30,368	3.04	0.33	**3.38**
2025	32,554	3.26	0.36	**3.62**

Table 4-10 Projected Water Demand for George County

Year	Population	Public Water Usage, (MGD)	Other Water Usage, (MGD)	Total Water Usage, (MGD)
2005	46,002	4.60	1.01	5.61
2010	52,610	5.26	1.48	6.74
2015	59,544	5.95	1.67	7.62
2020	65,712	6.57	1.74	8.31
2025	69,391	6.94	1.84	8.78

Table 4-11 Projected Water Demand for Hancock County

Year	Population	Public Water Usage, (MGD)	Other Water Usage, (MGD)	Total Water Usage, (MGD)
2005	189,444	18.94	21.36	40.30
2010	254,206	25.42	32.36	57.78
2015	286,609	28.66	34.08	62.74
2020	311,454	31.15	35.13	66.28
2025	332,788	33.28	37.53	70.81

Table 4-12 Projected Water Demand for Harrison County

Year	Population	Public Water Usage, (MGD)	Other Water Usage, (MGD)	Total Water Usage, (MGD)
2005	134,950	13.50	2.76	16.26
2010	148,963	14.90	3.05	17.95
2015	167,143	16.71	3.67	20.38
2020	182,976	18.30	4.02	22.32
2025	193,612	19.36	4.25	23.61

Table 4-13 Projected Water Demand for Jackson County

Year	Population	Public Water Usage, (MGD)	Other Water Usage, (MGD)	Total Water Usage, (MGD)
2005	51,809	5.18	1.14	6.32
2010	67,624	6.76	1.38	8.14
2015	76,511	7.65	1.45	9.10
2020	83,649	8.36	1.59	9.95
2025	91,454	9.15	2.43	11.58

Table 4-14 Projected Water Demand for Pearl River County

Year	Population	Public Water Usage, (MGD)	Other Water Usage, (MGD)	Total Water Usage, (MGD)
2005	14,359	1.44	0.88	2.32
2010	19,418	1.94	1.24	3.18
2015	23,062	2.31	1.48	3.79
2020	26,736	2.67	1.78	4.45
2025	29,230	2.92	1.87	4.79

Table 4-15 Projected Water Demand for Stone County

Although total capacity of water supply facilities in a given county may exceed the projected demand for potable water, the decentralized location of the infrastructure typically is not conducive to serving areas where new growth and development is expected to occur. In addition, many of the water supply and treatment facilities in the three coastal counties are located near the coastline, where the potential is increased for catastrophic loss of supply capacity, if only short-term, if another major storm event were to impact the region.

Subsequent sections of the Plan address the development of alternatives for providing sufficient supply and treatment capacity to meet the potable demands of the Gulf Region through the planning period. The Plan also considers alternatives for hardening or locating such new facilities out of areas that are most susceptible to the greatest risk of damage from future storms.

In addition to more centralized supply and treatment facilities, the distribution networks maintained by potable water service providers may require modifications, in order to support projected demands in localized areas. Modifications may include upgrading line sizes or expanding the scope of the existing system to accommodate projected shifts in population and demand.

4.4.2 Wastewater Flow Projections

Centralized wastewater collection and treatment systems are, for the most part, located in and around populated areas of higher density throughout the planning area. Within the past year, most municipal treatment facilities have recovered their pre-Katrina capabilities and are adequate to support existing flow requirements. While not all facilities have been able to provide accurate data, the trend indicated in **Table 4-16** clearly indicates a sizable percentage decrease in customer flow from both private and public treatment works.

Requirements for treatment capacity were calculated based on a 120-gallon-per-day per capita flow rate.[1] **Table 4-17** provides existing and projected population and average daily and peak hourly flow rates through the planning period at five-year milestones. Projections are given by drainage basin for each county. Calculated flows include adjustments for transient populations, such as tourism and business travelers,[2] as well as unsewered residences. The tables also indicate the treatment capacities of existing facilities for reference.

[1] Mississippi Department of Environmental Quality, 1999, Design of Conventional Gravity Sewers, *Guidance for the Design of Publicly Owned Wastewater Facilities*, Chapter 20, pp. 19-27.

[2] Metcalf & Eddy Inc., G. Tchobanoglous, F.L. Burton, and H.D. Stensel, 2003, *Wastewater Engineering Treatment and Reuse*, Fourth Edition.

						Pre-Katrina Flow					Post-Katrina Flow					
						Limit (mgd)		Flow (mgd)			Limit (mgd)		Flow (mgd)			Post-Katrina Ave
Permit #	Name	City	County	Receiving Stream	Quantity Units	Min	Max	Min	Max	Ave	Min	Max	Min	Max	Ave	Δ (mgd)
MS0030333	HC/WEST BILOXI POTW	BILOXI	HARRISON	BACK BAY OF BILOXI	MGD	11.7	11.7	7.4	9.8	8.3	11.7	11.7	5.3	7.1	5.9	-2.4
MS0021521	GC/ESCATAWPA - ACT SLUDGE	ESCATAWPA	JACKSON	ESCATAWPA RIVER	MGD	N/A	N/A	1.1	1.8	1.4	N/A	N/A	0.7	1.4	0.9	0.9
MS0043010	GC/GAUTIER POTW	GAUTIER	JACKSON	WEST PASCAGOULA RIVER	MGD	4	4	1.5	2.15	1.7925	4	4	1.4	1.7	1.5	-0.2925
MS0027537	BERNARD BAYOU INDUSTRIAL DIST	GULFPORT	HARRISON	DITCH TO BERNARD BAYOU	MGD	0.6	0.6	0.1978	0.2555	0.232	0.6	0.6	0.19	0.28	0.23	-0.002
MS0059307	HARRISON COUNTY WASTEWATER AND	GULFPORT	HARRISON	UNNAMED TRIBUTARY THENCE HONEY	MGD	0.06	0.06	0	0	0	0.06	0.06	0	0	0	Not In Operatior
MS0052574	HC/DELISLE WASTEWATER TREATMENT	GULFPORT	HARRISON	DELISLE BAYOU	MGD	0.2	0.2	0	0	0	0.2	0.2	0.01	0.05	0.02	0.02
MS0042340	HC/D'IBERVILLE POTW	GULFPORT	HARRISON	BACK BAY OF BILOXI	MGD	1.156	1.156	0.8615	1.1165	0.97235	1.156	1.156	0.697	0.848	0.761	-0.21135
MS0023159	HC/EAST BILOXI POTW	GULFPORT	HARRISON	KEEGAN BAYOU AND BACK BAY OF BILOXI	MGD	8.5	10	3.85	6.4	4.835	8.5	10	2.1	5.7	3.3	-1.535
MS0051756	HC/GULFPORT POTW - NORTH #2	GULFPORT	HARRISON	BERNARD BAYOU (GULFPORT LAKE)	MGD	5.5	5.5	3.1545	4.725	3.7695	5.5	7.75	3.1	3.95	3.45	-0.3195
MS0023345	HC/GULFPORT POTW_SOUTH	GULFPORT	HARRISON	BERNARD BAYOU (SEG 168)	MGD	10.5	16	5.7	11.1	8.26	10.5	16	4.8	8.3	5.9	-2.36
MS0043141	HC/LONG BEACH-PASS CHRISTIAN	GULFPORT	HARRISON	BAYOU PORTAGE	MGD	7	7	3.59	4.875	4.195	7	7	2.21	4.27	2.68	-1.515
MS0057011	HC/WW & SOLID WASTE MGT DIST	GULFPORT	HARRISON	TIGER CREEK THENCE BILOXI RIVER	MGD	0.75	4	0	0	0	0.35	0.35	0	0	0	No In Operatior
MS0044504	LUCEDALE POTW	LUCEDALE	GEORGE	BIG CEDAR CREEK	MGD	0.5	0.5	-	-	0.354	0.5	0.5	-	-		0.354
MS0020249	GC/PASCAGOULA/MOSS POINT POTW	PASCAGOULA	JACKSON	PASCAGOULA RIVER	MGD	10	10	4.9	7.2	5.84	10	10	3.2	5.9	4.6	-1.24
MS0045446	GC/WEST JACKSON COUNTY POTW	PASCAGOULA	JACKSON	COST APIA BAYOU	MGD	5	5	2.75	2.9	3.105	5	5	2.4	3.4	2.9	-0.205
MS0042161	PICAYUNE POTW	PICAYUNE	PEARL RIVER	PEARL RIVER	MGD	3.075	3.075	1.71	3.99	2.51	3.075	3.075	1.33	2.03	1.71	-0.8
MS0020494	POPLARVILLE POTW	POPLARVILLE	PEARL RIVER	JUMP OFF CREEK	MGD	0.64	0.64	0.191	0.874	0.25	0.64	0.64	0.175	0.484	0.484	0.234
MS0058718	SOUTHERN REGIONAL WASTEWATER	WAVELAND	HANCOCK	PATE BAYOU/WHITE BAYOU	MGD	N/A	N/A	N/A	N/A	N/A	0.2	0.2	0	0	0	Not In Operatior
MS0027847	SRWMD/WAVELAND POTW	WAVELAND	HANCOCK	EDWARDS BAYOU	MGD	4.9	4.9	3.07	4.35	3.615	4.9	4.9	1.81	2.74	2.31	-1.305
MS0024864	WIGGINS POTW - # 1	WIGGINS	STONE	FLINT CREEK	MGD	0.48	0.48	-	-	0.395	0.48	0.48	-	-	0.478	0.083
MS0026905	WIGGINS POTW - # 2	WIGGINS	STONE	FOUR MILE CREEK	MGD	0.158	0.158	0.146	0.156	0.149	0.158	0.158	0.113	0.115	0.12	0.029

Notes: (1) N/A - No Flow Limit Permit

Table 4-16 Municipal Permitted Treatment Levels Before and After Katrina

	Hancock County Projected Flows									
	2005		2010		2015		2020		2025	
Drainage Basin	Average Daily Flow Rate, gpd	Peak Hourly Flow Rate, gpm	Average Daily Flow Rate, gpd	Peak Hourly Flow Rate, gpm	Average Daily Flow Rate, gpd	Peak Hourly Flow Rate, gpm	Average Daily Flow Rate, gpd	Peak Hourly Flow Rate, gpm	Average Daily Flow Rate, gpd	Peak Hourly Flow Rate, gpm
Nicholas-Pearlington	463,050	1,152	1,065,050	2,416	757,475	1,800	835,135	1,964	849,037	1,993
Hobolochitto Creek	1,936	6	3,924	12	3,641	11	4,041	12	4,092	12
Upper Jourdan River	1,063,191	2,431	2,155,029	4,491	1,999,738	4,212	2,219,650	4,606	2,247,567	4,656
Lower Wolfe River - Cane Creek	79,367	215	160,873	415	149,280	387	165,697	426	167,781	431
Upper Wolfe River	4,839	15	9,809	29	9,102	27	10,103	30	10,231	30
Rotten Bayou	106,468	283	215,805	543	200,254	507	222,276	557	225,072	564
DeLisle	806,309	1,752	1,849,074	3,555	1,520,481	3,015	1,686,808	3,291	1,884,131	3,613
Turkey Creek-Old Fort Bayou	49	0	37	0	58	0	58	0	58	0
Bayou LaCroix	2,897,274	6,280	2,827,155	6,186	3,949,810	8,225	3,953,834	8,236	3,954,673	8,238

	Harrison County Projected Flows									
	2005		2010		2015		2020		2025	
Drainage Basin	Average Daily Flow Rate, gpd	Peak Hourly Flow Rate, gpm	Average Daily Flow Rate, gpd	Peak Hourly Flow Rate, gpm	Average Daily Flow Rate, gpd	Peak Hourly Flow Rate, gpm	Average Daily Flow Rate, gpd	Peak Hourly Flow Rate, gpm	Average Daily Flow Rate, gpd	Peak Hourly Flow Rate, gpm
DeLisle	140,078	374	308,727	775	322,850	807	346,762	861	397,997	975
Biloxi River	1,757,561	3,894	4,389,700	8,630	4,877,213	9,450	5,915,706	11,125	6,838,320	12,558
Lower Wolf River Cane Creek	1,292,349	3,155	2,546,237	5,788	2,548,666	5,809	2,713,671	6,139	2,905,739	6,517
Rotten Bayou	298,917	793	618,010	1,542	625,273	1,556	669,709	1,655	745,250	1,819
Turkey Creek-Old Fort Bayou	17,960,871	30,220	36,068,887	56,890	45,171,241	60,876	45,872,584	69,188	47,135,632	70,802
Tuxachanie Creek	1,309,182	15,852	3,928,828	7,769	4,637,289	8,906	5,826,588	10,718	6,932,977	12,323
Upper Wolf Creek	26,395	77	56,054	158	58,037	163	65,264	183	70,691	197

	Jackson County Projected Flows									
	2005		2010		2015		2020		2025	
Drainage Basin	Average Daily Flow Rate, gpd	Peak Hourly Flow Rate, gpm	Average Daily Flow Rate, gpd	Peak Hourly Flow Rate, gpm	Average Daily Flow Rate, gpd	Peak Hourly Flow Rate, gpm	Average Daily Flow Rate, gpd	Peak Hourly Flow Rate, gpm	Average Daily Flow Rate, gpd	Peak Hourly Flow Rate, gpm
Turkey Creek - Old Fort Bayou	3,218,109	7,490	4,643,293	10,309	3,929,987	11,136	3,253,312	12,071	5,986,662	12,776
Tuxachanie Creek	5,690,363	11,469	7,760,204	15,006	8,693,276	16,609	11,565,051	22,197	10,075,368	18,856
Lower Red Creek	52,208	148	69,232	193	72,422	202	77,689	215	81,451	225
Cypress Creek	18,426	54	24,435	71	25,561	74	27,420	80	28,747	83
Indian Creek	5,415,638	10,360	6,421,313	12,132	7,186,560	13,268	7,060,624	12,695	7,370,261	13,164
Lower Escatawpa	4,607,720	9,813	5,718,276	11,926	6,263,314	12,836	5,189,315	10,445	5,431,147	10,858
Big Creek	107,908	294	146,477	391	153,225	407	18,263	54	19,148	56
Bayou Casotte	218,633	568	276,138	704	284,680	723	286,695	725	289,593	732
Bluff Creek	3,809,330	8,466	4,956,137	10,691	5,183,878	11,116	5,559,984	11,812	5,828,541	12,305

Table 4-17 Wastewater Flow Projections

	George County Projected Flows									
	2005		2010		2015		2020		2025	
Drainage Basin	Average Daily Flow Rate, gpd	Peak Hourly Flow Rate, gpm	Average Daily Flow Rate, gpd	Peak Hourly Flow Rate, gpm	Average Daily Flow Rate, gpd	Peak Hourly Flow Rate, gpm	Average Daily Flow Rate, gpd	Peak Hourly Flow Rate, gpm	Average Daily Flow Rate, gpd	Peak Hourly Flow Rate, gpm
Lower Red Creek	68,304	187	83,493	226	91,120	245	97,740	262	104,819	279
Cypress Creek	112,602	311	141,889	387	150,215	408	161,128	436	172,798	466
Whiskey Creek	41,825	118	53,749	149	55,796	155	59,850	165	64,184	176
McClain	15,203	45	19,485	57	20,311	59	21,785	63	23,361	68
Kittrell Creek	3,784	11	4,705	14	5,137	15	5,505	17	5,900	18
Lower Chickasawhay	91,748	257	113,632	315	124,561	343	133,475	366	143,045	391
Indian Creek	1,548,171	3,898	1,977,183	4,879	2,131,464	5,229	2,284,431	5,567	2,448,546	5,925
Bushy Creek	254,881	631	318,303	771	340,021	818	364,723	871	391,138	927
Lower Escatawpa	394,136	1,028	497,590	1,275	529,238	1,348	567,470	1,437	608,417	1,531

	Pearl River County Projected Flows									
	2005		2010		2015		2020		2025	
Drainage Basin	Average Daily Flow Rate, gpd	Peak Hourly Flow Rate, gpm	Average Daily Flow Rate, gpd	Peak Hourly Flow Rate, gpm	Average Daily Flow Rate, gpd	Peak Hourly Flow Rate, gpm	Average Daily Flow Rate, gpd	Peak Hourly Flow Rate, gpm	Average Daily Flow Rate, gpd	Peak Hourly Flow Rate, gpm
Upper Red Creek	116,977	309	154,440	400	158,983	410	165,652	426	174,741	448
Upper Wolf River	385,400	927	508,785	1,187	523,715	1,218	545,663	1,263	575,587	1,324
West Hobolochitto Creek	1,643,368	3,838	2,293,961	5,140	2,466,689	5,467	2,630,113	5,776	2,820,681	6,134
Clear Creek	272,278	710	359,299	916	369,717	940	385,140	976	406,208	1,024
Hobolochitto Creek	1,617,628	3,706	2,325,696	5,095	2,555,007	5,526	2,753,837	5,895	2,976,138	6,303
Upper Jourdan River	310,498	783	434,436	1,060	467,960	1,132	499,406	1,199	535,824	1,276
Lower Wolf River-Cane Creek	77,599	211	102,451	273	105,465	281	109,889	292	115,918	307
Nicholson-Pearlington	1,960,189	4,349	3,417,968	6,956	4,221,352	8,263	4,798,800	9,178	4,505,187	8,198
Old River	287,856	704	380,883	905	392,798	930	409,679	966	432,458	1,013

	Stone County Projected Flows									
	2005		2010		2015		2020		2025	
Drainage Basin	Average Daily Flow Rate, gpd	Peak Hourly Flow Rate, gpm	Average Daily Flow Rate, gpd	Peak Hourly Flow Rate, gpm	Average Daily Flow Rate, gpd	Peak Hourly Flow Rate, gpm	Average Daily Flow Rate, gpd	Peak Hourly Flow Rate, gpm	Average Daily Flow Rate, gpd	Peak Hourly Flow Rate, gpm
Cypress Creek	67,009	184	88,912	240	103,754	277	117,415	310	125,902	331
Lower Red Creek	295,751	768	392,339	997	463,992	1,162	530,689	1,315	573,945	1,414
Upper Red Creek	851,507	2,148	1,105,724	2,728	1,329,790	3,214	1,499,872	3,581	1,604,631	3,805
Upper Wolf River	64,177	180	88,626	245	99,520	273	112,613	307	120,746	328
Biloxi River	134,339	368	192,901	517	230,481	610	280,578	732	318,117	821
Tuxachanie Creek	160,766	415	251,606	624	309,275	751	405,796	957	483,862	1,119

Table 4-17 Wastewater Flow Projections (Continued)

4.4.3 Stormwater Runoff Projections

Based on demographic projections discussed previously, the Plan evaluated anticipated, future land use conditions, in order to assess stormwater infrastructure requirements necessary to support new development throughout the planning area. The following discussion summarizes the methodology followed in these evaluations.

Projections of Existing (Pre-Katrina) Development

Existing (Pre-Katrina) development and land use patterns were assessed based on demographic data from Section 4.2, combined with the following information:

- Interpretations of land use from satellite imagery flown in 2000 and available through the Mississippi Automated Resource Information System (MARIS) database, including areas of low-density urban, high-density urban, transportation infrastructure (e.g., interstates, airports), and various rural land uses; and
- A suitability model prepared by the Coastal Resources Management Program of the Mississippi Department of Marine Resources (DMR), which identifies areas prohibited from development (e.g., federal lands such as national forests and wildlife refuges, and other lands where development is restricted) and establishes a suitability index based on factors such as floodplains, wetlands, soils, and other land characteristics.

First, a portion of the 2005 population was associated with low-density urban land, using an average development density of two dwelling units per acre and assigning 2.1 people per dwelling unit. Next, the high-density urban land was split between residential and non-residential, with population assigned to high-density residential development at eight dwelling units per acre. Finally, the remaining 2005 population that was not assigned to either the low-density or high-density urban areas was considered to be rural residential at 0.7 dwelling units per acre.

Projections of Future Development

Projections of future land required to accommodate increases in population through the planning period were based on development density, which in turn was based on the approximations of remaining developable land within each census tract, capped at a maximum average lot size of 0.75 acres. New hotels and condominiums were assumed to add 10 units per acre to accommodate the transient population. An additional 20 percent of the projected new residential land use was reserved for roads and other non-residential uses.

Estimated New Stormwater Conveyance Infrastructure

The lengths of new stormwater conveyance systems required to support residential population growth were based on the additional length of roadway projected to accompany anticipated new development.

Stormwater Flow Calculations

In order to develop reasonable estimates of peak stormwater flow, procedures were developed based on rainfall parameters specified in the U.S. Weather Bureau's Technical Paper No. 40 (TP-40) and the Rational Method for estimating stormwater run-off quantities. The methodology also employed the commonly accepted USGS flow frequency equations for Mississippi watersheds. Several principles and assumptions involved in this methodology are summarized hereafter.

- **Design storm depths -** Rainfall amounts for various storm frequencies were obtained from TP-40.[3] Rainfall depths on the TP-40 maps tend to vary from north to south, so values were obtained for the southern three counties separately from the northern three counties.

- **Assumptions for impervious areas -** Residential lots were assumed to have impervious areas proportionate to their lot size. Commercial lots were assumed to contain 90 percent impervious area.

- **Flow calculations -** The USGS document, "Flood Characteristics of Mississippi Streams,"[4] provides regression formulas for estimating flood quantities on rural streams. These estimates were used to approximate flows for undeveloped conditions throughout the planning area; however, the USGS report does not provide specific guidance for flows in urbanized areas. Therefore, the Rational Method was utilized where appropriate.

Table 4-18 lists the projected increase in runoff volume that was calculated using the previously described methodology, for the 100-year design storm over the Gulf Region, for conditions reflective of projected future development.

[3] Hershfield, D.M., 1961, Rainfall frequency atlas of the United States for durations from 30 minutes to 24 hours and return periods from 1 to 100 years, *Weather Bureau Technical Paper No. 40*, U.S. Weather Bureau, Washington, D.C.

[4] Landers, M.N., and K.V Wilson, Jr., 1991, Flood characteristics of Mississippi streams, *U.S. Geological Survey Water-Resources Investigations Report 91-4037*, U.S. Geological Survey, Reston, VA.

	Projected Developed Area (Acres)			Projected Runoff (Acre-Feet)		
County	**Existing (Pre-Katrina)**	**2010**	**2025**	**Existing (Pre-Katrina)**	**2010**	**2025**
George	16,300	18,600	21,200	3,300	4,000	4,700
Hancock	26,900	32,900	34,300	8,100	10,400	11,100
Harrison	81,200	99,900	117,600	20,900	33,400	37,200
Jackson	68,400	72,000	81,900	17,600	19,400	23,800
Pearl River	36,600	41,000	48,000	9,100	11,400	14,600
Stone	11,100	13,300	17,500	2,200	2,800	4,000
Total	**240,600**	**288,400**	**320,600**	**61,300**	**81,500**	**95,300**

Table 4-18 Projected Increase in Runoff Volume from Developed Areas during the 100-Year Design Storm