

US EPA ARCHIVE DOCUMENT

## LOUISIANA Area Designations for the 2008 Ozone National Ambient Air Quality Standards

The table below identifies the areas and associated parishes or parts of parishes in Louisiana that EPA intends to designate as nonattainment for the 2008 ozone national ambient air quality standards (2008 NAAQS). In accordance with section 107(d) of the Clean Air Act, EPA must designate an area “nonattainment” if it is violating the 2008 ozone NAAQS or if it is contributing to a violation of the 2008 ozone NAAQS in a nearby area. The technical analyses supporting the boundaries for the one nonattainment area are provided below.

### Intended Nonattainment Areas in Louisiana

Area	Louisiana’s Recommended Nonattainment Parishes	EPA’s Intended Nonattainment Parishes
Baton Rouge-Pierre Part, LA	East Baton Rouge	Ascension East Baton Rouge Iberville Livingston West Baton Rouge

EPA intends to designate the remaining parishes in Louisiana that are not listed in the table above as “unclassifiable/attainment” for the 2008 ozone NAAQS.

The analysis below provides the basis for intended nonattainment area boundaries. It relies on our analysis of whether and which monitors are violating the 2008 ozone NAAQS, based on certified air quality monitoring data from 2008-2010 and an evaluation of whether nearby areas are contributing to such violations. EPA has evaluated contributions from nearby areas based on a weight of evidence analysis considering the factors identified below. EPA issued guidance on December 4, 2008 that identified these factors as ones EPA would consider in determining nonattainment area boundaries and recommended that states consider these factors in making their designations recommendations to EPA.<sup>1</sup>

1. Air quality data (including the design value calculated for each FRM or FEM<sup>2</sup> monitor in the area);
2. Emissions and emissions-related data (including location of sources and population, amount of emissions and emissions controls, and urban growth patterns);
3. Meteorology (weather/transport patterns);
4. Geography and topography (mountain ranges or other basin boundaries);
5. Jurisdictional boundaries (e.g., parishes, air districts, existing nonattainment areas, Indian country, metropolitan planning organizations (MPOs))

<sup>1</sup> The December 4, 2008 guidance memorandum “Area Designations for the 2008 Revised Ozone National Ambient Air Quality Standards” refers to 9 factors. In this technical support document we have grouped the emissions-related factors together under the heading of “Emissions and Emissions-Related Data,” which results in 5 categories of factors.

<sup>2</sup> FRM refers to Federal Reference Method, and FEM refers to Federal Equivalent Method. FRM monitors utilize a chemiluminescent technique to measure ozone, while many FEM monitors use a technique involving ultraviolet photometry. FEM methods began to be developed in the late 1970’s and early 1980’s and are now the most widely utilized methods for monitoring ozone levels. Refer to 40 CFR Part 53 for a more detailed description of FEM and FRM methods.

<http://www.epa.gov/ttnamti1/files/ambient/criteria/reference-equivalent-methods-list.pdf>

Ground-level ozone generally is not emitted directly into the air, but is created by chemical reactions between oxides of nitrogen (NO<sub>x</sub>) and volatile organic compounds (VOC) in the presence of sunlight. Because NO<sub>x</sub> and VOC emissions from a broad range of sources over a wide area typically contribute to violations of the ozone standards, EPA believes it is important to consider whether there are contributing emissions from a broad geographic area. Accordingly, EPA chose to examine the 5 factors with respect to the larger of the Combined Statistical Area (CSA) or Core Based Statistical Area (CBSA) associated with the violating monitor(s).<sup>3</sup> All data and information used by EPA in this evaluation are the latest available to EPA and/or provided to EPA by states or tribes.

In EPA's designations guidance for the 2008 ozone NAAQS EPA recommended examining CSA/CBSAs because certain factors used to establish CSAs and CBSAs are similar to the factors EPA is using in this technical analysis to determine if a nearby area is contributing to a violation of the 2008 ozone NAAQS. Congress required a similar approach in 1990 for areas classified as serious or above for the 1-hour ozone standard and EPA used the same basic approach in the designation process for the 1997 ozone NAAQS. Where a violating monitor is not located in a CSA or CBSA, EPA's guidance recommended using the boundary of the parish containing the violating monitor as the starting point for considering the nonattainment area's boundary.

### **Technical Analysis for Baton Rouge-Pierre Part**

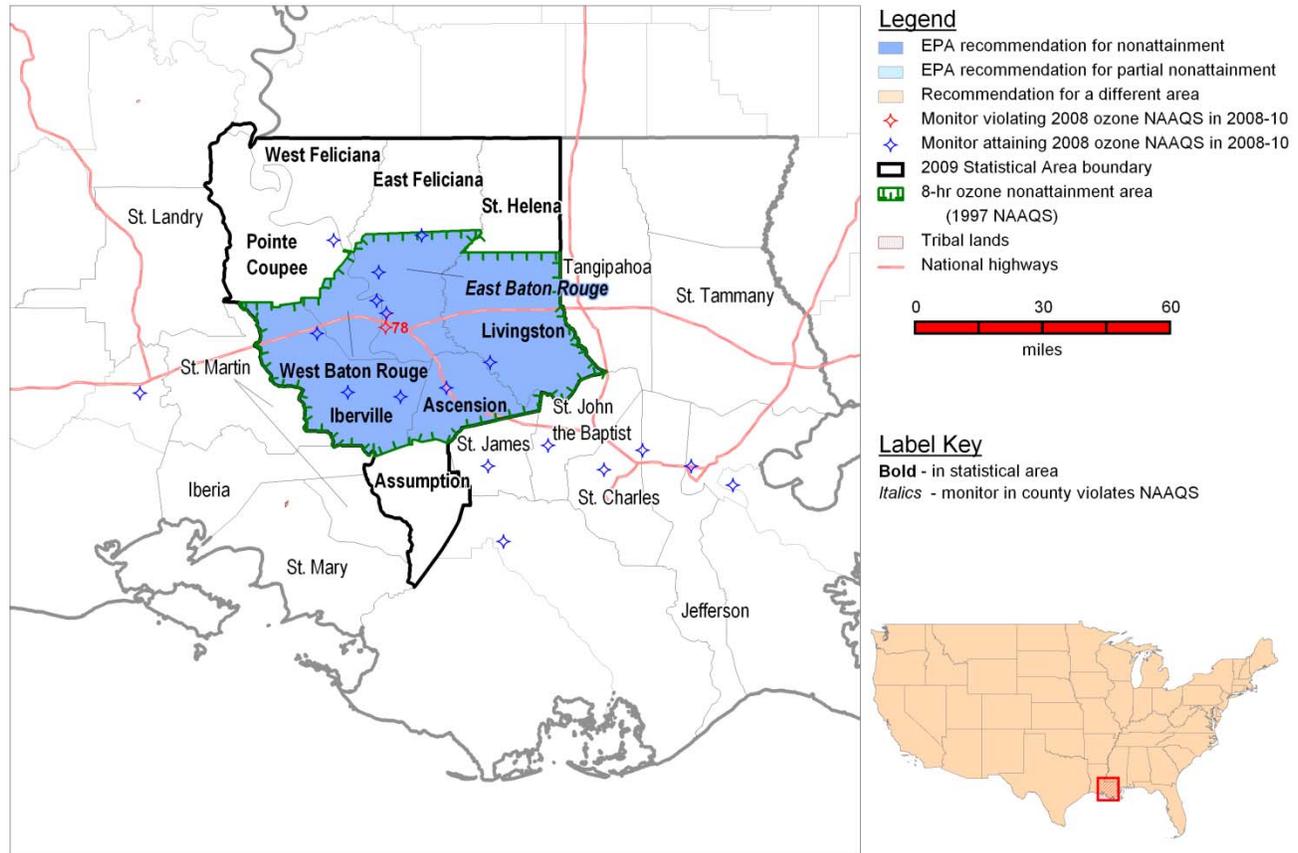
Figure 1 is a map of the Baton Rouge-Pierre Part intended nonattainment area. The map provides other relevant information including the locations and design values of air quality monitors, parish and other jurisdictional boundaries, relevant statistical area boundaries, the nonattainment area boundary for the 1997 ozone NAAQS, and major transportation arteries.

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<sup>3</sup> Lists of CBSAs and CSAs and their geographic components are provided at [www.census.gov/population/www/metroareas/metrodef.html](http://www.census.gov/population/www/metroareas/metrodef.html). The lists are periodically updated by the Office of Management and Budget. EPA used the most recent update, based on 2008 population estimates, issued on December 1, 2009 (OMB Bulletin No. 10-02).

Figure 1: Intended Baton Rouge-Pierre Part nonattainment area.

## Baton Rouge-Pierre Part, LA



For purposes of the 1997 8-hour ozone NAAQS, this area was designated nonattainment. The boundary for the nonattainment area for the 1997 ozone NAAQS included the entire parishes of Ascension, East Baton Rouge, Iberville, Livingston, and West Baton Rouge.

In March 2009,<sup>4</sup> Louisiana recommended that eleven parishes throughout the state, including East Baton Rouge Parish, be designated as nonattainment for the 2008 ozone NAAQS based on air quality data from 2006-2008. In January 2011<sup>5</sup>, Louisiana provided a revised recommendation that only East Baton Rouge Parish be designated nonattainment. This revised recommendation was based on air quality data from 2008-2010, which was obtained from Federal Equivalent Method (FEM) monitors sited and operated in accordance with 40 CFR Part 58.

After considering these recommendations and based on EPA's technical analysis described below, EPA intends to designate five (5) parishes in Louisiana (identified in Table 1 below) as “nonattainment” for the 2008 ozone NAAQS as part of the Baton Rouge nonattainment area.

<sup>4</sup> Initial 2008 ozone NAAQS designation recommendation letter from Secretary Leggett to Acting Regional Administrator Starfield, dated March 12, 2009.

<sup>5</sup> Updated ozone designation letter from Secretary Hatch to Regional Administrator Armendariz, dated January 25, 2011.

Table 1. Louisiana’s Recommended and EPA’s Intended Designated Nonattainment Parishes for Baton Rouge-Pierre Part.

Baton Rouge-Pierre Part	State-Recommended Nonattainment Parishes	EPA Intended Nonattainment Parishes
Louisiana	East Baton Rouge	Ascension East Baton Rouge Iberville Livingston West Baton Rouge

**Factor Assessment**

***Factor 1: Air Quality Data***

For this factor, we considered 8-hour ozone design values (in ppm) for air quality monitors in parishes in the Baton Rouge CMSA based on data for the 2008-2010 period (i.e., the 2010 design value, or DV), which are the most recent years with fully-certified air quality data. A monitor’s DV is the metric or statistic that indicates whether that monitor attains a specified air quality standard. The 2008 ozone NAAQS are met at a monitor when the annual fourth-highest daily maximum 8-hour average concentration, averaged over 3 years is 0.075 ppm or less. A DV is only valid if minimum data completeness criteria are met. See 40 CFR part 50 Appendix P. Where several monitors are located in a parish (or a designated nonattainment area or maintenance area), the DV for the parish or area is determined by the monitor with the highest level.

The 2010 DVs for the ozone NAAQS for parishes in Baton Rouge and nearby surrounding area are shown in Table 2.

Table 2. Air Quality Data.

Parish	State Recommended Nonattainment?	2008-2010 Design Value (ppb)
Ascension, LA	No	75
Assumption, LA	No	--
East Baton Rouge, LA	Yes	78
East Feliciano, LA	No	--
Iberville, LA	No	73
Livingston, LA	No	75
Pointe Coupee, LA	No	75
St. Helena, LA	No	--
West Baton Rouge, LA	No	71
West Feliciano, LA	No	--

Ambient monitoring in East Baton Rouge Parish indicates a violation of the 2008 ozone NAAQS, therefore this parish is included in the nonattainment area. A parish (or partial parish) must also be designated nonattainment if it contributes to a violation in a nearby area. Each parish without a violating monitor that is located near a parish with a violating monitor has been evaluated, as discussed below, based on the five factors and other relevant information to determine whether it contributes to the nearby violation. EPA also notes that, in addition to the violating monitor in East Baton Rouge Parish, ambient

monitors in three parishes in the Baton Rouge area, Ascension Parish, Livingston Parish, and Pointe Coupee Parish, indicate design values just under the nonattainment threshold.

**Factor 2: Emissions and Emissions-Related Data**

EPA evaluated emissions of ozone precursors (NO<sub>x</sub> and VOC) and other emissions-related data that provide information on areas contributing to violating monitors.

**Emissions Data**

EPA evaluated parish-level emission data for NO<sub>x</sub> and VOC derived from the 2008 National Emissions Inventory (NEI), version 1.5. This is the most recently available NEI. (See <http://www.epa.gov/ttn/chief/net/2008inventory.html>) Significant emissions levels in a nearby area indicate the potential for the area to contribute to observed violations. We will also consider any additional information we receive on changes to emissions levels that are not reflected in recent inventories. These changes include emissions reductions due to permanent and enforceable emissions controls that will be in place before final designations are issued and emissions increases due to new sources.

Table 3 shows emissions of NO<sub>x</sub> and VOC (given in tons per year) for violating and nearby parishes that we considered for inclusion in the Baton Rouge-Pierre Part intended nonattainment area.

Table 3. Total 2008 NO<sub>x</sub> and VOC Emissions.

Parish	State Recommended Nonattainment?	NO <sub>x</sub> (tpy)	VOC (tpy)
Ascension, LA	No	14,128	13,524
Assumption, LA	No	1,654	2,008
East Baton Rouge, LA	Yes	21,863	24,473
East Feliciana, LA	No	1,142	1,631
Iberville, LA	No	14,818	10,152
Livingston, LA	No	3,087	4,780
Pointe Coupee, LA	No	15,733	2,560
St. Helena, LA	No	1,154	1,001
West Baton Rouge, LA	No	9,268	3,467
West Feliciana, LA	No	1,107	793
Area-wide:		83,954	64,389

Five parishes in the CBSA are characterized by comparatively high emissions of NO<sub>x</sub>, which exceed 9,000 tons per year, and three parishes have comparatively high VOC emissions in excess of 10,000 tons per year. Collectively, the parishes of Ascension, East Baton Rouge, Iberville, Pointe Coupee, and West Baton Rouge contribute 90 percent of the NO<sub>x</sub> emissions for the ten-parish area. Similarly, Ascension, East Baton Rouge, and Iberville Parishes collectively contribute 75 percent of the ten-parish area’s VOC emissions. The relatively high emissions of ozone precursors in these parishes is a factor that EPA considered in evaluating their possible inclusion in the Baton Rouge-Pierre Part nonattainment area.

In our analysis of the emissions data for the area, we took note that the NO<sub>x</sub> emissions from Pointe Coupee are primarily from a single point source that is already well-controlled and may undergo further emissions reductions resulting from implementation of regional air quality measures such as CSAPR.

The remaining parishes are characterized by comparatively low NO<sub>x</sub> and VOC emissions, in the range of 1,000 to 5,000 tons per year.

**Population density and degree of urbanization**

EPA evaluated the population and vehicle use characteristics and trends of the area as indicators of the probable location and magnitude of non-point source emissions. These include ozone-creating emissions from on-road and off-road vehicles and engines, consumer products, residential fuel combustion, and consumer services. Areas of dense population or commercial development are an indicator of area source and mobile source NO<sub>x</sub> and VOC emissions that may contribute to ozone formation that contributes to nonattainment in the area. Rapid population or VMT growth (see below) in a parish on the urban perimeter signifies increasing integration with the core urban area, and indicates that it may be appropriate to include the area associated with area source and mobile source emissions as part of the nonattainment area. Table 4 shows the population, population density, and population growth information for each parish in the area.

Table 4. Population and Growth.

Parish	State Recommended Nonattainment?	2010 Population	2010 Population Density (1,000 pop/sq mi)	Absolute change in population (2000-2010)	Population % change (2000-2010)
Ascension, LA	No	107,215	0.35	29,937	39
Assumption, LA	No	23,421	0.06	42	0
East Baton Rouge, LA	Yes	440,171	0.93	27,281	7
East Feliciana, LA	No	20,267	0.04	(1,098)	(5)
Iberville, LA	No	33,387	0.05	72	0
Livingston, LA	No	128,026	0.18	35,496	38
Pointe Coupee, LA	No	22,802	0.04	46	0
St. Helena, LA	No	11,203	0.03	695	7
West Baton Rouge, LA	No	23,788	0.12	2,224	10
West Feliciana, LA	No	15,625	0.04	488	3
Area-wide:		825,905	0.18	95,183	13

Sources: U.S. Census Bureau population estimates for 2010 as of August 4, 2011

([http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=DEC\\_10\\_PL\\_GCTPL2.STO5&prodType=table](http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=DEC_10_PL_GCTPL2.STO5&prodType=table))

The 2010 Census data indicates that the population of the Baton Rouge area is centered around the parishes of Ascension, East Baton Rouge, and Livingston; each of these parishes is characterized by population counts in excess of 100,000 people and population densities greater than 150 people per square mile. Although West Baton Rouge has a lower population count than Ascension, East Baton Rouge, and Livingston, it does have a population density of 120 people per square mile, which is similar to that of the larger parishes.

Three of the parishes, Ascension, Livingston, and West Baton Rouge, have undergone increases in population of 10 percent or more since the 2000 Census was taken. The growth in population in these three parishes accounts for almost all the total population growth for the area.

The presence of large populations, and high population density, is an indicator of high area and mobile source emissions of ozone precursors that may contribute to observed violations of the 2008 ozone NAAQS in this area, which argues for inclusion of these parishes in the nonattainment area. The remaining parishes are mostly rural with little urbanization.

The attachment to this document contains Figure 2, Baton Rouge Ozone and Ozone Precursor Monitoring Network, and Figure 3, Population Density Change Percentage Between 2000 and 2010 Census for Baton Rouge Ozone and Ozone Precursor Monitoring Network, which present graphical information on population density and growth for the Baton Rouge area.

### **Traffic and commuting patterns**

EPA evaluated the commuting patterns of residents in the area, as well as the total Vehicle Miles Traveled (VMT) for each parish. In combination with the population/population density data and the location of main transportation arteries (see above), this information helps identify the probable location of non-point source emissions. A parish with high VMT and/or a high number of commuters is generally an integral part of an urban area and indicates the presence of motor vehicle emissions that may contribute to ozone formation that contributes to nonattainment in the area. Rapid population or VMT growth in a parish on the urban perimeter signifies increasing integration with the core urban area, and indicates that the associated area source and mobile source emissions may be appropriate to include in the nonattainment area. Table 5 shows traffic and commuting pattern data, including total 2008 VMT and 10-year VMT growth, and the total vehicle miles traveled (VMT) for each parish.

Table 5. Traffic and Commuting Patterns (As Indicated by VMT).

Parish	State Recommended Nonattainment?	2008 VMT* (million miles)	% Change in VMT (2002 – 2008)
Ascension, LA	No	1,141	+28
Assumption, LA	No	261	+54
East Baton Rouge, LA	Yes	3,572	+19
East Feliciana, LA	No	225	-19
Iberville, LA	No	516	+28
Livingston, LA	No	1,287	+12
Pointe Coupee, LA	No	289	+25
St. Helena, LA	No	136	+8
West Baton Rouge, LA	No	596	+102
West Feliciana, LA	No	160	-33
Area-wide:		8,183	---

\* MOBILE model VMTs are those inputs into the NEI version 1.5.

Five of the parishes in the Baton Rouge area are characterized by comparatively high VMT. These parishes are: Ascension, East Baton Rouge, Iberville, Livingston, and West Baton Rouge. Collectively these five parishes account for 87 percent of the total VMT for the area. Because motor vehicle emissions can contribute significantly to an area's NOx emissions inventory, indicators such as high VMT and growth in VMT argue for inclusion of these parishes in the nonattainment area designation. The parishes of East Feliciana and Pointe Coupee are characterized by low total VMTs, relative to the core parishes discussed above.

### ***Factor 3: Meteorology (weather/transport patterns)***

EPA evaluated available meteorological data to help determine how meteorological conditions, such as weather, transport patterns and stagnation conditions, would affect the fate and transport of precursor emissions contributing to ozone formation. We conducted an analysis of back trajectories to assess where air masses originated when ozone exceedances (greater than 75 ppb) occur in the Baton Rouge area. We used the NOAA HYSPLIT model to assess all exceedances at the Design Value monitor for the area, the LSU monitor, for the years 2008 to 2010 and also evaluated 2006 and 2007.

The attachments to this document contain Figures 2 and 4. Figure 2, Baton Rouge Ozone and Ozone Precursor Monitoring Network, presents locations of major stationary sources, and locations of ambient monitors with their design values. Figure 4, Baton Rouge Ozone and Ozone Precursor Monitoring Network with Wind Trajectories, includes an overlay of the back trajectories (on Figure 2), which characterizes where the centerline of the air mass originated for the 24 hours preceding the afternoon of the violation. An examination of the 24-hour back trajectories for the recent 3 years of violations of the 75 ppb standard at the LSU monitor indicates that emissions from Pointe Coupee Parish do not appear to contribute to observed violations of the 2008 ozone NAAQS in East Baton Rouge Parish for days with ozone concentrations above 75 ppb at the LSU site for the three-year period from 2008-2010. For the 2008-10 back trajectories, only one back-trajectory traverses through the southwest edge of the Pointe Coupee Parish, where no major sources are present. For this one back trajectory, it does not appear that the one major source, a power plant in the northeast part of the Parish, could contribute based on the trajectory. Normally when we are developing a conceptual model understanding of what yields ozone exceedances in an area we will evaluate 5 to 10 years worth of meteorological data. Therefore we decided to evaluate all days that had ozone exceedances at LSU monitor for the 2006-2007 period as well. Looking back a little further to the 2006-2007 period, there were two days out of 25 with back trajectories that traversed Pointe Coupee Parish, but for the five-year 2006-2010 time period only 5 percent of all days with ozone concentrations greater than 75 ppb at the LSU site had wind back trajectories that went back through Pointe Coupee Parish.

Conversely, examination of the back trajectory data depicted in Figure 4 indicates that emissions from Ascension, Iberville, Livingston, Pointe Coupee, and West Baton Rouge Parishes could contribute at times to nonattainment in East Baton Rouge Parish. We note that the back trajectories passed through the Pointe Coupee Parish only 5% of the time.

### ***Factor 4: Geography/topography (mountain ranges or other air basin boundaries)***

The geography/topography analysis evaluates the physical features of the land that might affect the airshed and, therefore, the distribution of ozone over the area. The Baton Rouge area does not have any geographical or topographical barriers significantly limiting air pollution transport within its air shed. Therefore, this factor did not play a significant role in this evaluation.

## ***Factor 5: Jurisdictional boundaries***

Once we identified the general areas we anticipated we would recommend should be included in the nonattainment area, we then considered existing jurisdictional boundaries for the purposes of providing a clearly defined legal boundary and to help identify the areas appropriate for carrying out the air quality planning and enforcement functions for nonattainment areas. Examples of jurisdictional boundaries include existing/prior nonattainment area boundaries for ozone or other urban-scale pollutants, parish lines, air district boundaries, township boundaries, areas covered by a metropolitan planning organization, state lines, Reservation boundaries, and urban growth boundaries. Where existing jurisdictional boundaries were not adequate or appropriate to describe the nonattainment area, other clearly defined and permanent landmarks or geographic coordinates were considered.

The Baton Rouge area has previously established nonattainment boundaries associated with the 1-hour and 1997 8-hour ozone NAAQS, the latter of which encompassed all of Ascension, East Baton Rouge, Iberville, Livingston, and West Baton Rouge Parishes. Louisiana has recommended a different boundary for the 2008 ozone NAAQS, limiting their recommended nonattainment area to East Baton Rouge Parish, which has the only ambient monitor indicating a violation of the 2008 ozone standard. For evaluation of the boundary for the 2008 ozone nonattainment area, EPA gave strong consideration to the nonattainment area boundary for the 1997 ozone standard.

### **Conclusion**

Based on the assessment of the factors described above, EPA has preliminarily concluded that the following parishes should be included as part of the Baton Rouge-Pierre Part nonattainment area because they are either violating the 2008 ozone NAAQS or contributing to a violation in a nearby area: Ascension, East Baton Rouge, Iberville, Livingston, and West Baton Rouge Parishes. These are the same parishes that were included in the Baton Rouge-Pierre Part nonattainment area for the 1997 ozone NAAQS. The air quality monitors in East Baton Rouge Parish indicate a violation of the 2008 ozone NAAQS based on the 2010 design value; therefore this parish is included in the nonattainment area.

Ascension, Iberville, Livingston, and West Baton Rouge are nearby parishes that do not have monitors indicating a violation of the NAAQS, but EPA has preliminarily concluded that these parishes contribute, through emissions from point sources and non-point sources (e.g., vehicles and other small area sources), to the ozone concentrations in violation of the 2008 ozone NAAQS in East Baton Rouge Parish.

Ascension, East Baton Rouge, Iberville, Livingston, Pointe Coupee, and West Baton Rouge Parishes have among the highest NO<sub>x</sub> and VOC emissions in the area. Pointe Coupee Parish is not being preliminarily proposed for inclusion in the 2008 ozone nonattainment area because analysis of back trajectory meteorological data indicate that the transport of emissions from Pointe Coupee Parish do not contribute very often to observed violations of 2008 ozone NAAQS in East Baton Rouge Parish. We note that, other than the large power plant point source, the Pointe Coupee Parish ranks low on the other factors of population, and VMT. We also note that most of the emissions of NO<sub>x</sub> from Pointe Coupee are emitted by a single point source that is already well-controlled and that will likely further reduce emissions to comply with future regional air quality measures like CSAPR. In past attainment demonstration SIPs for the Baton Rouge area, Louisiana has controlled point sources outside the Baton Rouge nonattainment area when it determined it was needed. Overall, Pointe Coupee parish does not rank high on factors other than point source emissions that will be further reduced in the future and could be

even further controlled by the state if the state finds it necessary, therefore our preliminary conclusion is to not include the Pointe Coupee Parish in the Baton Rouge Pierre Part nonattainment area for the 2008

Finally, the parishes of Ascension, East Baton Rouge, Iberville, Livingston, and West Baton Rouge are the most densely populated in the Baton Rouge area. Collectively, these five parishes account for almost all of the VMT within East Baton Rouge Parish.

## ATTACHMENTS

Figure 2. Baton Rouge Ozone and Ozone Precursor Monitoring Network, with Population Density.

Figure 3. Population Density Change Percentage Between 2000 and 2010 Census for Baton Rouge Ozone and Ozone Precursor Monitoring Network.

Figure 4. Overlay of 24-hour HYSPLIT back trajectories of all 75 ppb exceedances at the LSU monitor for the 2006-2010 period.

Figure 2 - Baton Rouge Ozone and Ozone Precursor Monitoring Network., with Population Density

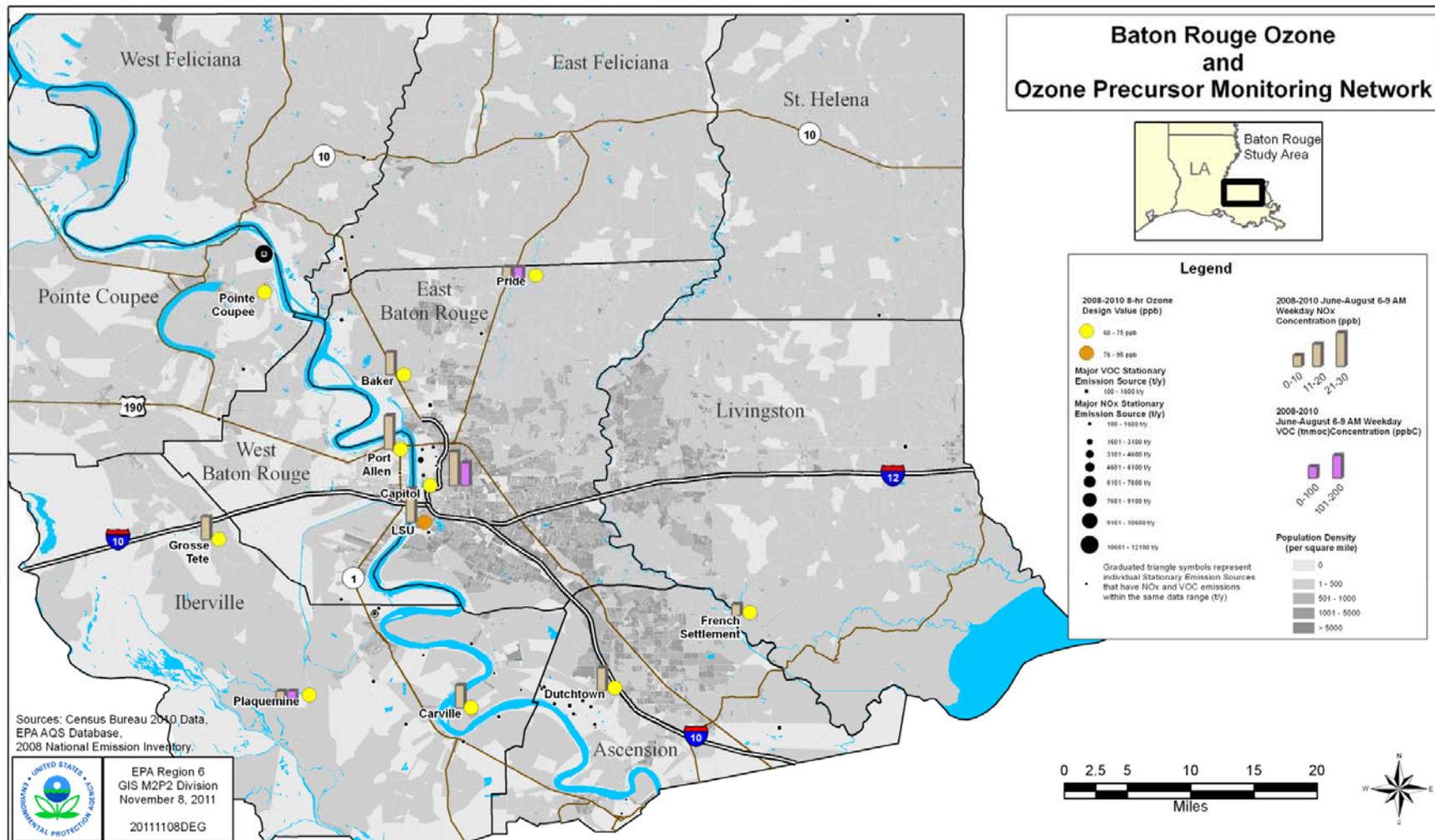


Figure 3 - Population Density Change Percentage Between 2000 and 2010 Census for Baton Rouge Ozone and Ozone Precursor Monitoring Network.

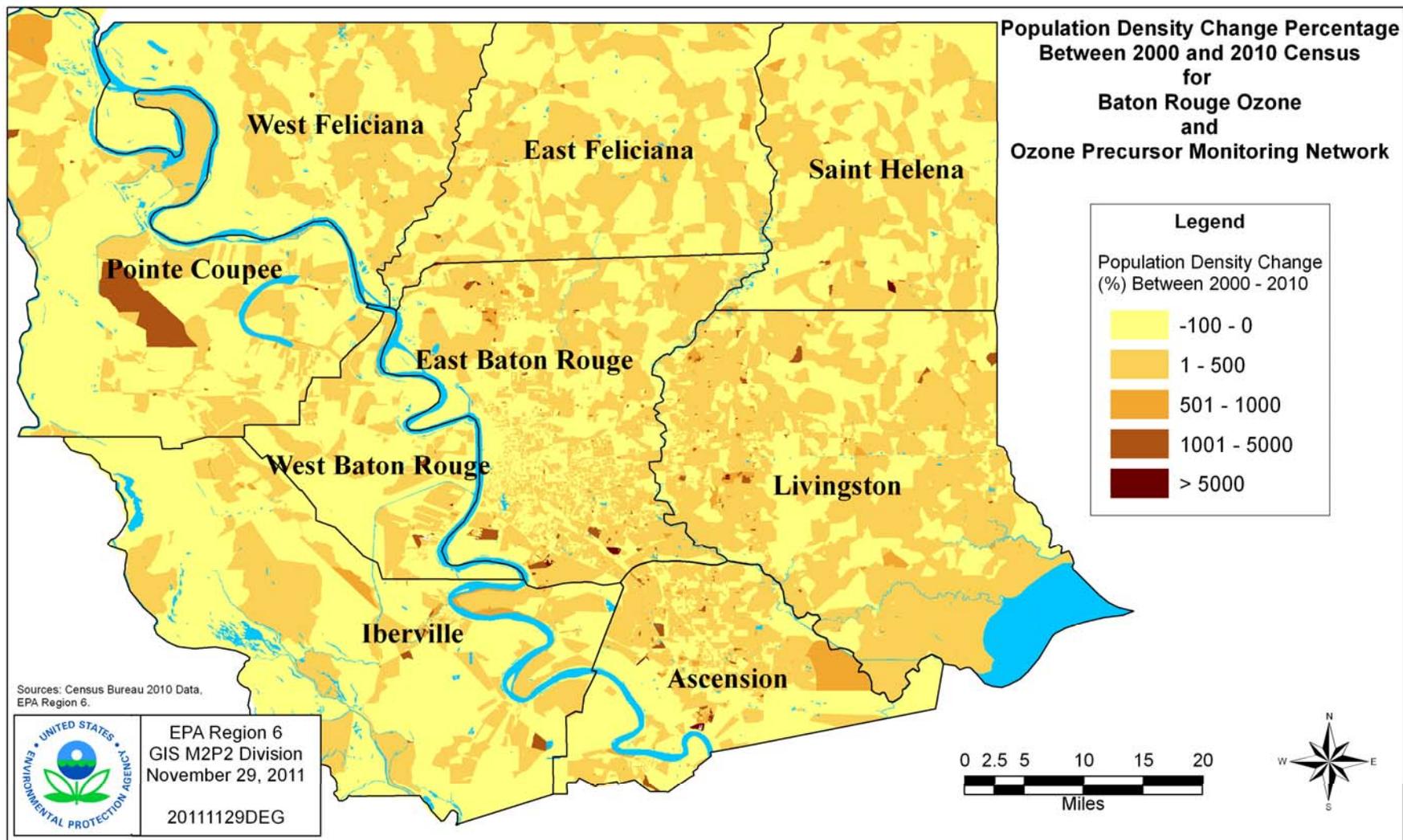


Figure 4 – Overlay of 24-hour HYSPLIT back trajectories of all 75 ppb exceedances at the LSU monitor for the 2008-2010 period.

