Nevada Air Quality Designations
Boundary Recommendations for the
8-Hour Ozone NAAQS for Clark County, Nevada

Prepared by
Clark County Department of Air Quality and Environmental Management
(DAQEM)
Las Vegas, Nevada

With Assistance from
David DuBois and
John Watson
Desert Research Institute Las Vegas, Nevada
With Technical Contributions from Jin Xu, Mark Green, and Eric Fujita

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1. INTRODUCTION

On April 12, 2004, the State of Nevada sent the Regional Administrator for the U.S. EPA Region IX a letter recommending that Clark County be designated as a nonattainment area for the 8-Hour Ozone National Ambient Air Quality Standards (NAAQS). Nevada's original recommendation of July 10, 2003 concluded that all areas of the State should be designated as either unclassifiable or attainment. In a letter of December 3, 2003, the Regional Administrator agreed with the recommendation, but asked that the State "expedite submittal of the 2003 ozone monitoring data" so that the final designation would "accurately reflect the State's air quality."

Ordinarily, annual ozone data need not be certified for use until July 1 of the following year, but in order to comply with Region IX's expedited submission request, data were submitted to the U.S. EPA on March 4, 2004 and on March 16, 2004. On March 17, 2004, less than a month from U.S. EPA's April 15, 2004 designation deadline, the State was notified of the agency's decision to designate Nye and Clark Counties as ozone nonattainment areas. Three weeks prior to the designation, the State conducted an 11-factor boundary analysis for Nye County in accordance with U.S. EPA's March 28, 2000 guidance document (Seitz 2000) for ozone boundary designations. However, because of the short timeframe Clark County was excluded from the State's analysis, which necessitates Clark County's analysis.

In the preamble to the final designations, U.S. EPA notes that counties in the West can be extremely large "leading to different air quality in different parts of the county; …" 69 Fed. Reg. at 23861. As part of the State's recommendation, the State pointed out that Clark County's nonattainment problem appeared to be restricted to the urban core "within the city of Las Vegas, in the center of the Las Vegas valley, in the center of Clark County."

The DAQEM contracted with the Desert Research Institute (DRI) to assist with this 11-factor analysis so that the nonattainment boundary would be based on the best available technical analysis. This analysis was conducted in accordance with the Seitz 2000 guidance document, which constitutes the contents of this document.

On March 28, 2000, The U.S. EPA issued guidance for the states to use as they developed their recommendations – "Boundary Guidance on Air Quality Designations for the 8-Hour Ozone National Ambient Air Quality Standards". In addition, Section 107(d)1(A)(i) of the Clean Air Act (CAA) defines a nonattainment area as "*… any area that does not meet (or that contributes to ambient air quality in a nearby area that does not meet) the national primary or secondary ambient air quality standard for the pollutant…*"

The March 28, 2000, guidance stated metropolitan statistical areas (MSAs) would be the presumptive default nonattainment areas. The U.S. Bureau of the Census defines MSAs. The Las Vegas MSA covers the counties of Clark and Nye in Nevada and Mojave County in Arizona. In order to avoid the default, a state must address the following eleven criteria listed in the guidance:

1. Emissions and air quality in adjacent areas (including adjacent C/MSAs),
2. Population density and degree of urbanization including commercial development

(significant difference from surrounding areas),

3. Monitoring data representing ozone concentrations in local areas and larger areas (urban or regional scale),
4. Location of emission sources (emission sources and nearby receptors should generally be included in the same nonattainment area),
5. Traffic and commuting patterns,
6. Expected growth (including extent, pattern and rate of growth),
7. Meteorology (weather/transport patterns),
8. Geography/topography (mountain ranges or other air basin boundaries),
9. Jurisdictional boundaries (e.g., counties, air districts, existing 1-hour nonattainment areas, Reservations, etc.),
10. Level of control of emission sources; and
11. Regional emission reductions (e.g., NOx SIP call or other enforceable regional strategies).

The State of Nevada and Clark County provide the rationale for establishing the nonattainment boundary designation in the following sections of this report.

2. BACKGROUND

Clark County is 8,091 square miles in land area. This is larger than the states of Connecticut (4,845 square miles), and Delaware (1,954 square miles). Las Vegas Valley metropolitan area contains more than 95% of Clark County's population and occupies approximately 5% of the total county area. For the 2001 through 2003 monitoring period, ambient Ozone (O_3) measurements in the Las Vegas area indicated nonattainment for the 8-Hour Ozone NAAQS of 0.08 ppm (U.S. EPA, 2004). In the Eastern U.S., the U.S. EPA uses political boundaries such as counties to define nonattainment areas. This method of classification is appropriate when the political units are relatively small, the terrain is flat, and population centers and emission sources are closely spaced. Moreover, Clark County is ten fold larger than many counties in the U.S., yet most of its emissions and population are located in the Las Vegas Valley.

Clark County includes large expanses of federally owned, undeveloped and non-developable desert, a small amount of agricultural development, and small isolated rural communities that are not significant sources of ozone precursors. The entire county is characterized by basin and range topography and the State has, since the inception of the CAA, been divided into hydrographic areas for air quality management purposes. Numerous mountain ranges separate the Las Vegas Valley and its ozone producing sources from other hydrographic areas in Clark County.

Clark County air quality monitoring data shows that the violation of the 8-hour ozone standard occurred within the Las Vegas Valley metropolitan area located in central Clark County. This area is the most heavily urbanized portion of Clark County and has most of the local sources of ozone precursors. Although biogenic emissions of ozone precursors are distributed throughout the county and other anthropogenic sources may be found in association with rural communities and industrial sources, these sources are considered insignificant when compared to the anthropogenic emissions from the Las Vegas Valley.

Land ownership patterns greatly influence development patterns in Clark County. Only 7.14% of Clark County is privately owned. Federal, State and Tribal lands create large, expansive barriers to contiguous expansion of the urbanized core beyond the current Southern Nevada Public Lands Management Act (SNPLMA) boundary. In addition, the Multiple Species Habitat Conservation Plan Incidental Take Permit from the U.S. Fish and Wildlife Service (USFWS) limits private development in the entire county to 145,000 total acres.

The geographical boundaries for the nonattainment area must be designated. In the Eastern U.S., this is often done by using political boundaries such as counties. This is a U.S. EPA accepted practice when the political units are relatively small, the terrain is flat, and population centers and emission sources are closely spaced. As noted above, Clark County is larger than some states, with most of its emission sources and population located in the Las Vegas Valley, where the elevated O_3 levels were measured. With concurrence of the U.S. EPA, the State uses hydrographic areas to define air quality management areas for planning purposes.

The objectives of this report are as follows:

1. Describe and evaluate existing data relevant to Clark County O_3 nonattainment,
2. Conduct the 11-factor analysis in accordance with Seitz 2000, and
3. Recommend an appropriate nonattainment boundary.

3. INFORMATION SOURCES

This document uses available information to designate the 8-Hour Ozone nonattainment boundary. Data sets available to this and other analyses include:

1. 2000 census data;
2. U.S. EPA national emission inventory;
3. Land use and vegetation maps;
4. Topographic maps;
5. Hydrographic area boundaries;
6. Roadway and traffic information;
7. Data from the Clark County and State of Nevada air quality networks;
8. Several surface meteorological networks; and
9. Several upper air meteorological networks. Each of these is described in greater detail in the following sub-sections.

3.1 Census Data

The most recent population count is from the nationwide 2000 census. Census blocks are the smallest geographic entity that the Census Bureau tabulates and are typically bounded by streets, legal boundaries, and other features. Data from the 2000 Population and Housing Summary tape file 1A is the primary source of census block population counts. In Clark County the mean population per census block is approximately 85 people (Figure 3.1-1). Census Bureau block population data is linked to the TIGER 2000 block polygon shape files in ArcGIS. Areas for each block polygon can be calculated to estimate population density. Once the average population density for each polygon is calculated, the file can be converted to ESRI GRID format and girded to a 1 square kilometer resolution in the ArcGIS Geographic Information System (GIS).

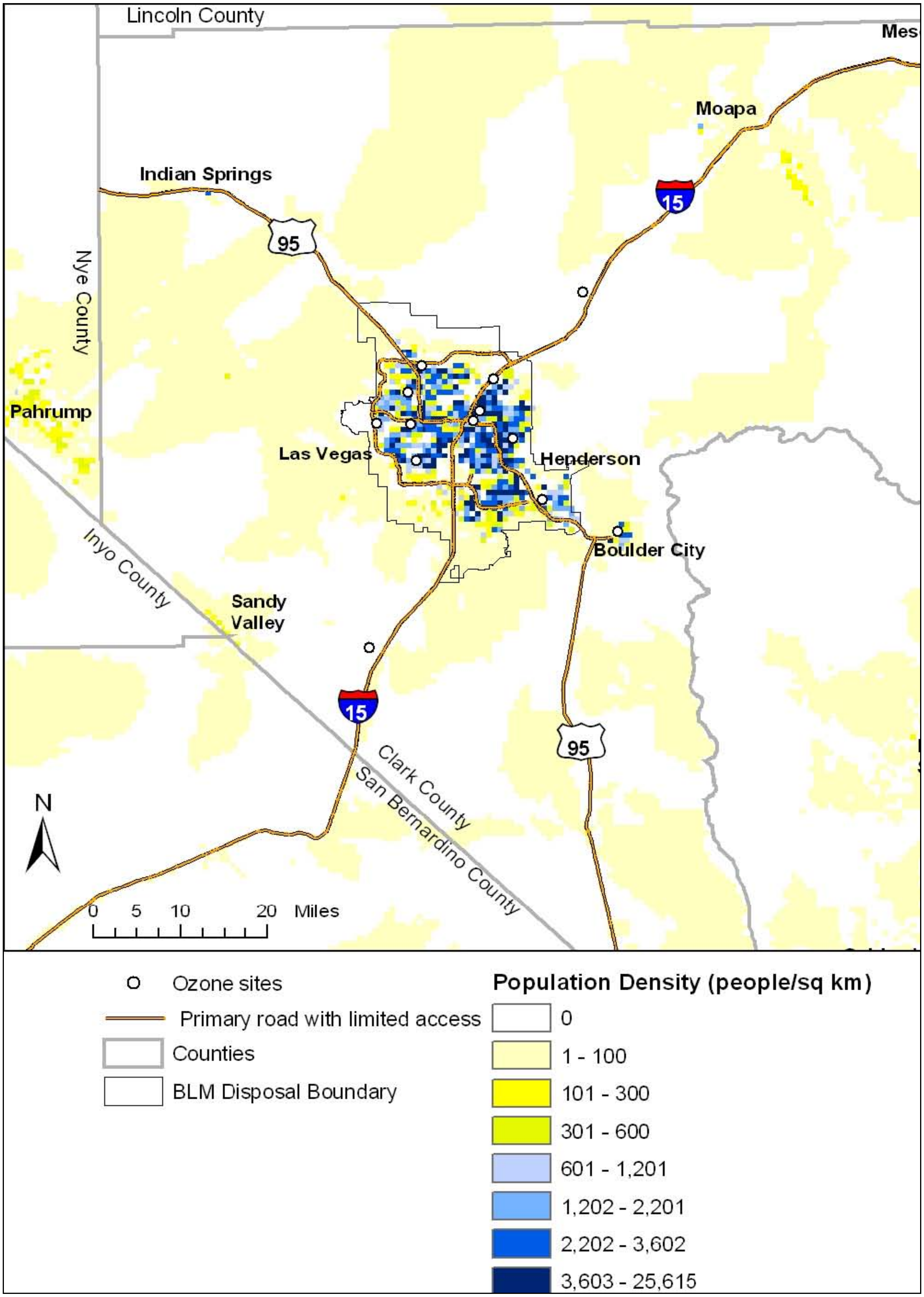

Figure 3.1-1. Population Density Based on the 2000 Census Block Data.

3.2 EPA National Emissions Inventory

Clark County DAQEM reports actual NO_x and VOC emissions from point, area, and mobile sources as part of the National Emissions Inventory (NEI) submittal. This submission does not contain emissions from coal-fired power plants permitted by the State. Therefore, emissions for these are contained in the State's NEI submission. The submittals are in accordance with U.S. EPA's Consolidated Emissions Reporting Rule (FR 67 (111), 39602-39616).

3.3 Land Use and Vegetation

The National Land Cover Database (NLCD) provides the most recent and accurate depiction of land cover over the contiguous U.S. This database was derived from Landsat satellite Thematic Mapper imagery (circa 1992) with a spatial resolution of 30 meters and supplemented by ancillary data. Processing involved identifying similar land use areas using a supervised clustering algorithm on the Landsat images. These land use clusters were then labeled using aerial photographs (Figure 3.3-1).

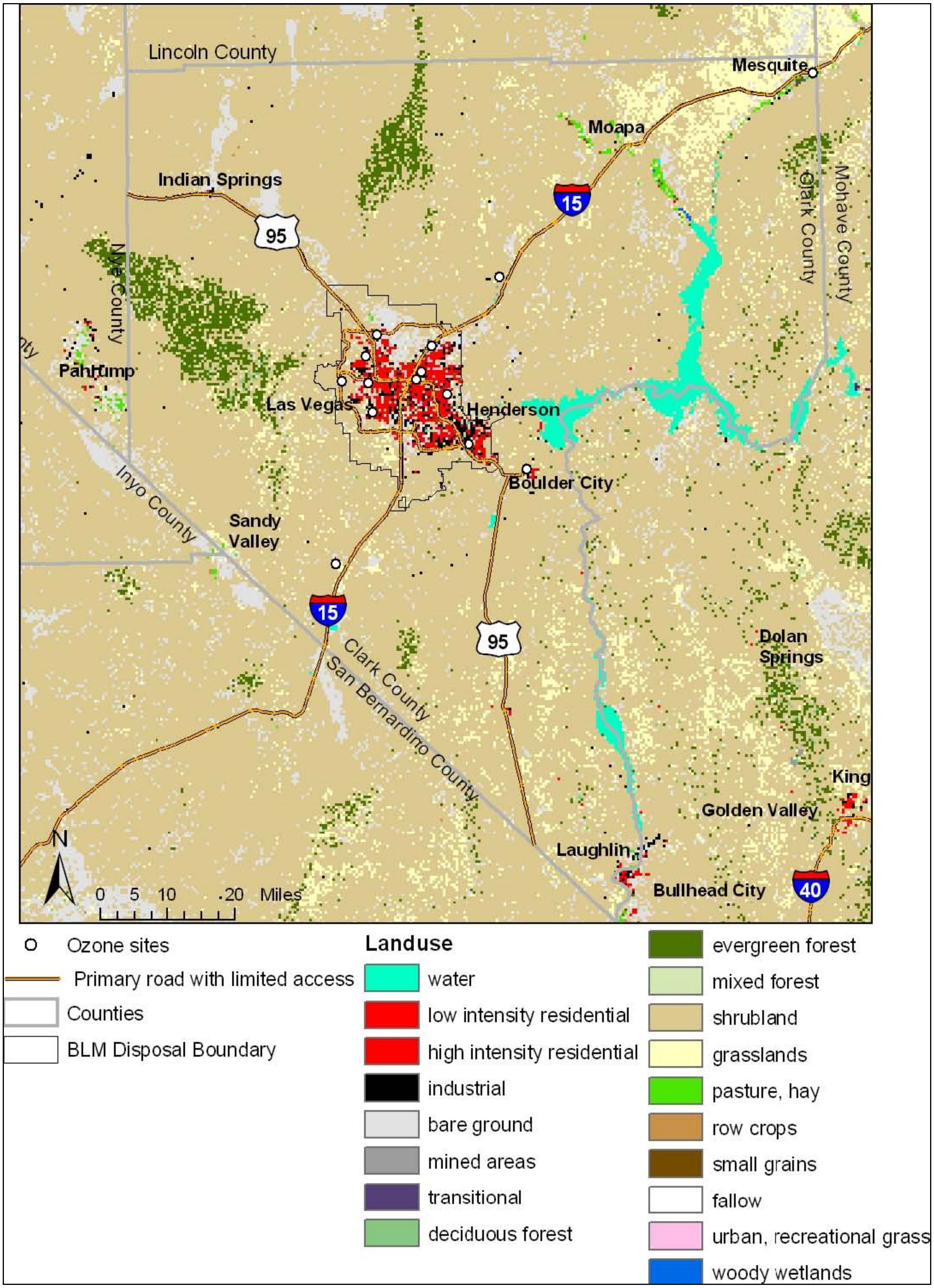

Figure 3.3-1. Clark County Land Use.

3.4 Topography

The U. S. Geological Survey (USGS) has archived elevations for the entire United States at a 30 meter resolution as the National Elevation Database (NED). The USGS Seamless Data Distribution System (http://seamless.usgs.gov/) permits construction of shaded relief maps from the 30 meter NED elevations (Figure 3.4-1).

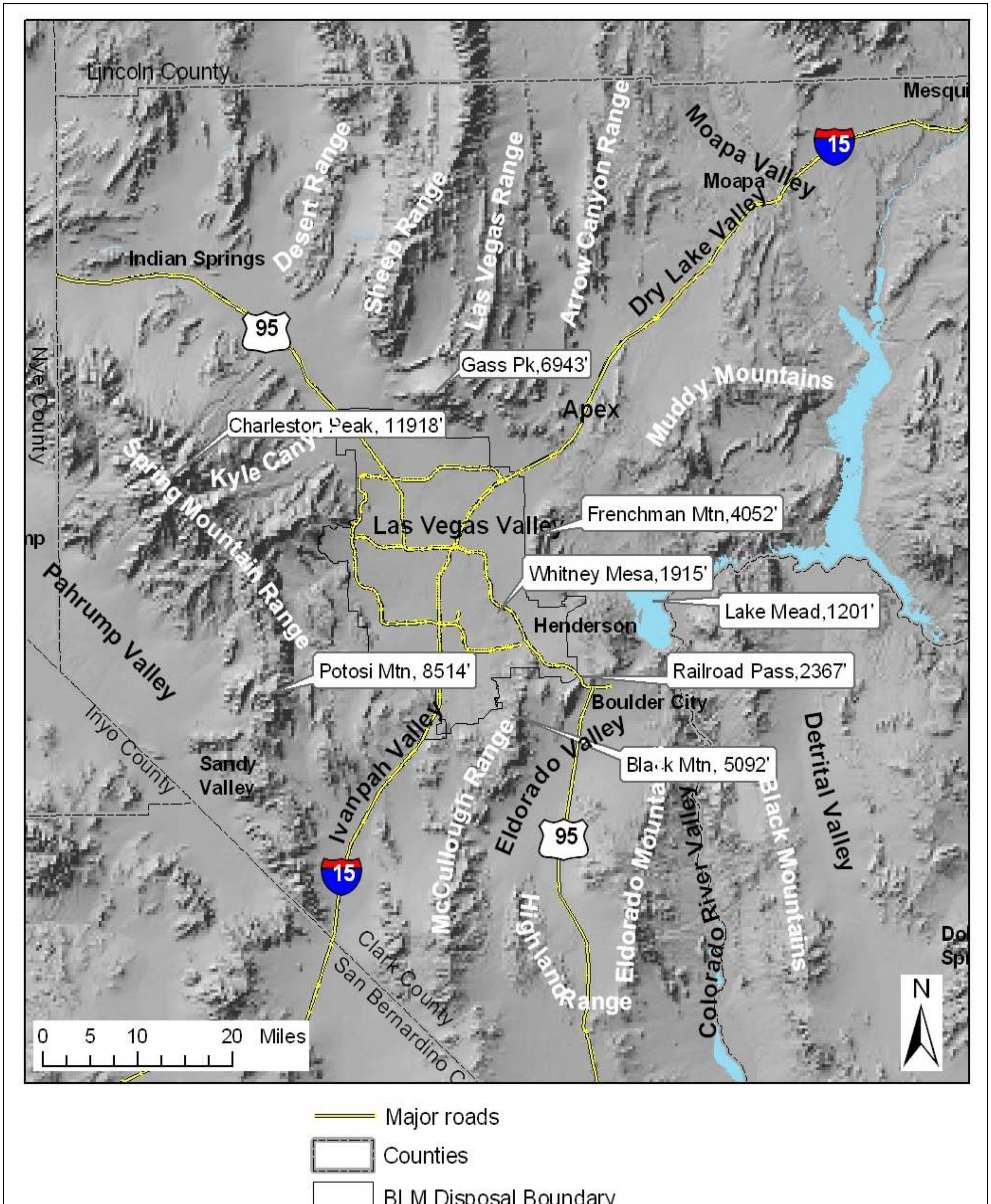

Figure 3.4-1. Mountain Ranges and Basins Surrounding the Las Vegas Valley.

3.5 Hydrographic Areas

The hydrologic areas represent natural and manmade stream-drainage areas or basins. For quick reference the following map is provided that represents the hydrographic areas and air quality regions within the Clark County boundary and exclude only the portion of the hydrographic area that is outside of the Nevada boundary (67 FR 12474, March 19, 2002) (Figure 3.5-1).

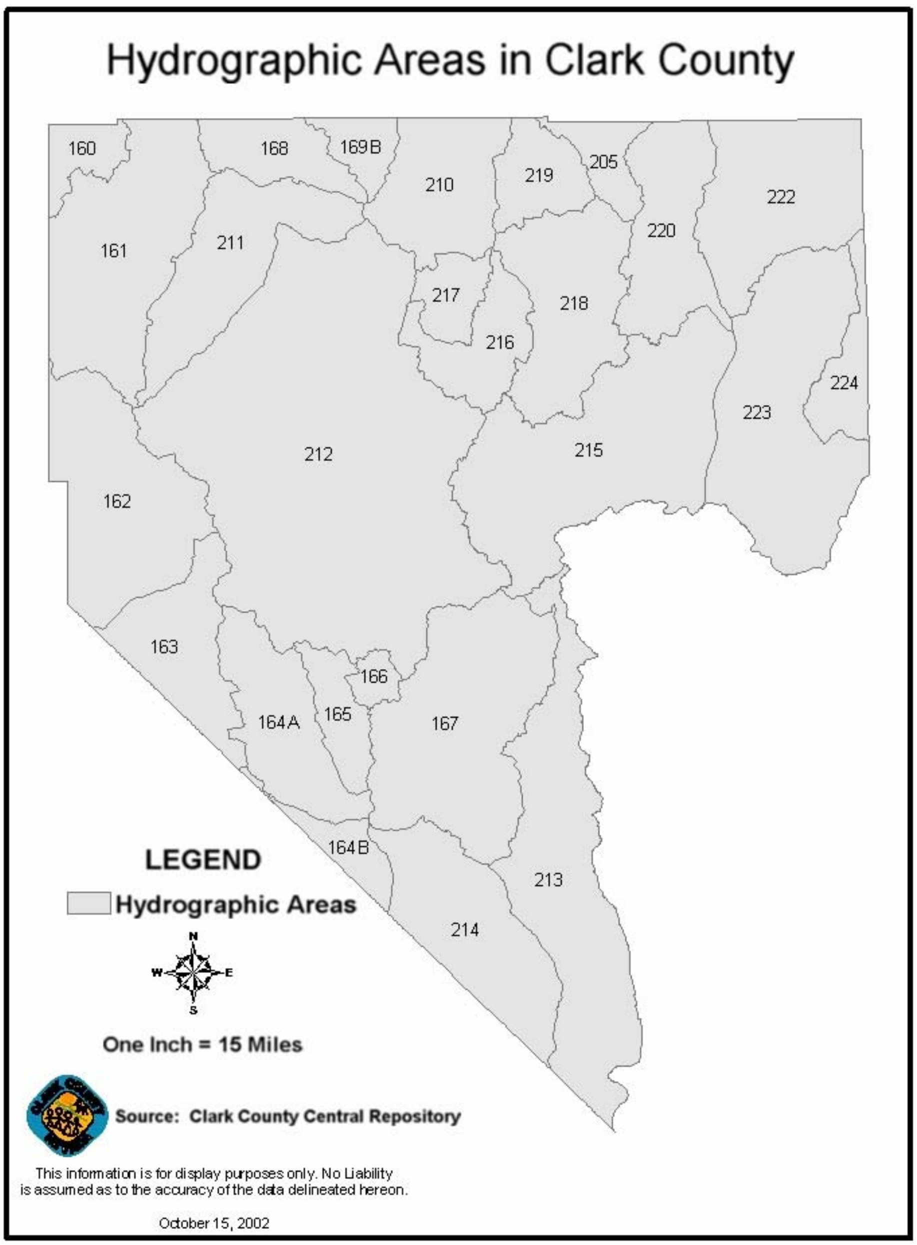

Figure 3.5-1. Hydrographic Areas.

3.6 Roadways and Traffic

The Regional Transportation Commission of Southern Nevada (RTCSN, 2004) has published a comprehensive analysis of current and projected transportation needs. Travel demand models are used to estimate trips and vehicle miles traveled between calendar years 2000 and 2025 (Figure 3.6-1 and Table 3.6-1). These data are available in summary forms in written reports as well as in files suitable for GIS analysis.

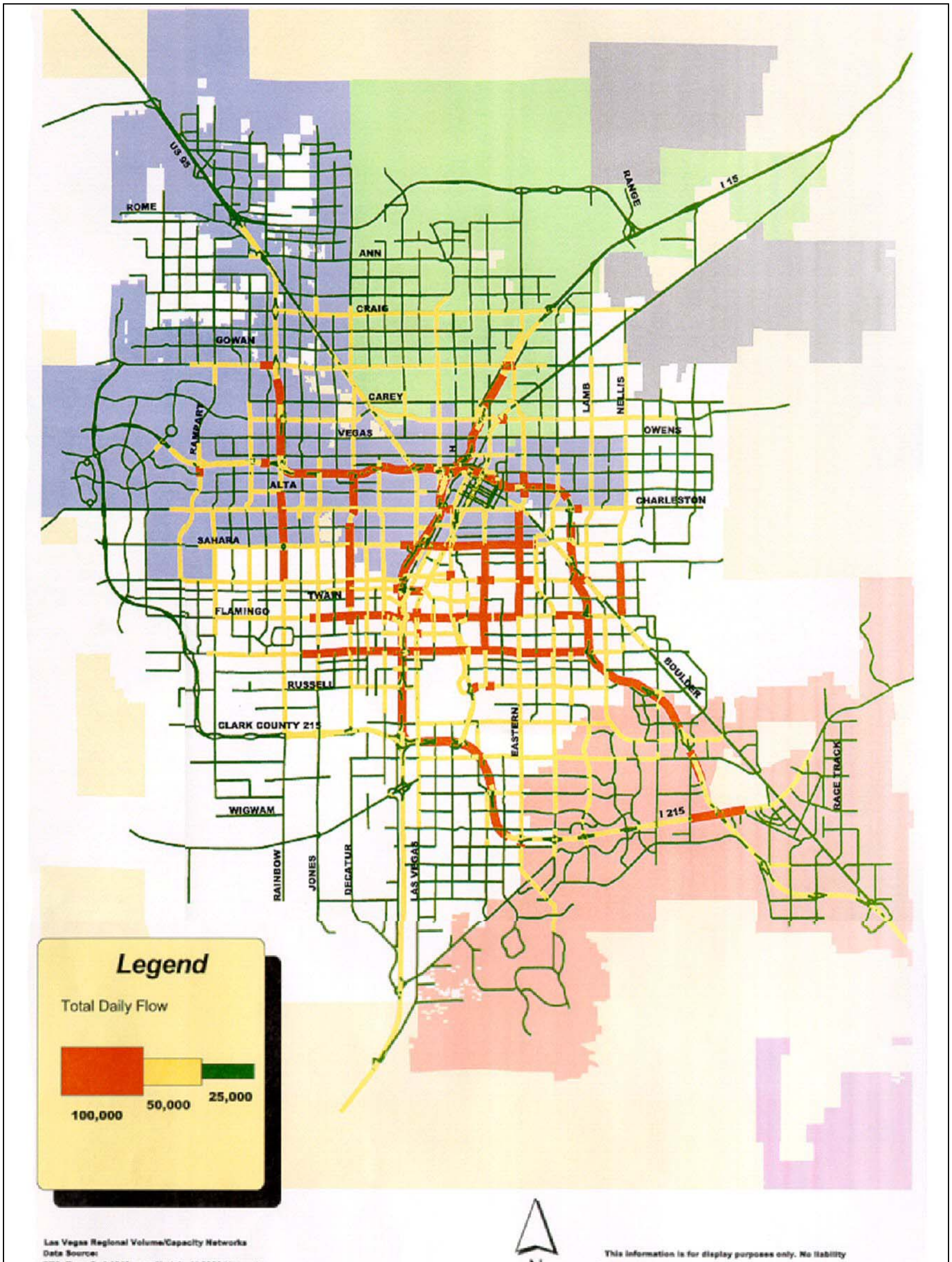

Figure 3.6-1. Las Vegas RTC Total Daily Traffic Flow for 2002.

	Average Weekday Vehicle Miles of Travel					
	2000	2004	2005	2010	2020	2025
Modeled Network VMT	24,131,206	32,565,094	33,026,405	41,294,327	51,121,203	53,433,431
Intrazonal VMT	240,465	237,213	239,121	320,745	451,855	493,068
Transit VMT	66,900	105,800	196,700	196,700	197,800	197,800
Total Annual Average Weekday VMT	**24,438,571**	**32,908,107**	**33,462,226**	**41,811,772**	**51,770,858**	**54,124,299**
Source: Regional Transportation Commission						

Table 3.6-1. Estimated Annual Average Vehicle Miles Travel for Weekdays Projected from 2000 through 2025 for the Las Vegas Metropolitan Area (RTCSN 2004).

3.7 Clark County Air Quality Network

Table 3.7-1 identifies O_3 monitoring locations within Clark County and Figure 3.7-1 shows their locations.

Code	Name	Address	Elevation (ft ASL)	UTMX (m)	UTMY (m)
AP	Apex	12101 Highway 93	2200	855091.0	26844650.0
BC	Boulder City	1005 Industrial Rd	2760	874230.8	26694490.0
BS	East Craig Road	4701 Mitchell Street	1920	800698.0	26791230.0
CC	City Center	559 N 7th	2020	788239.1	26765150.0
JD	J D Smith	1301B E Tonopah	1775	792025.3	26771560.0
JN	Jean	T25S R59E S10	3120	723306.9	26623690.0
JO	Joe Neal	6651 W Azure Ave	2306	757890.0	26800300.0
LO	Lone Mountain	3525 N Valdez Street	2400	749148.6	26783750.0
MQ	Mesquite	465 E Old Mill Road	1570	1101866.0	26999280.0
PL	Powerline	545 W Lake Mead Drive	1870	829202.3	26714870.0
PM	Paul Meyer	4525 New Forest Drive	2411	753651.9	26740510.0
PV	Palo Verde	333 Pavillion Center Drive	2790	730035.9	26765080.0
SL	Shadow Lane	Shadow Lane	2058	679789.0	4001497.0
ST	Searchlight	103 Highway 95 Rd.		688725.4	3927154.6
WJ	Walter Johnson	7701 Ducharme Ave	2560	750713.0	26763570.0
WW	Winterwood	5483 Club House Drive	1789	811767.1	26754090.0

Table 3.7-1. Site Codes and Locations for Ozone Monitoring Sites in Clark County.

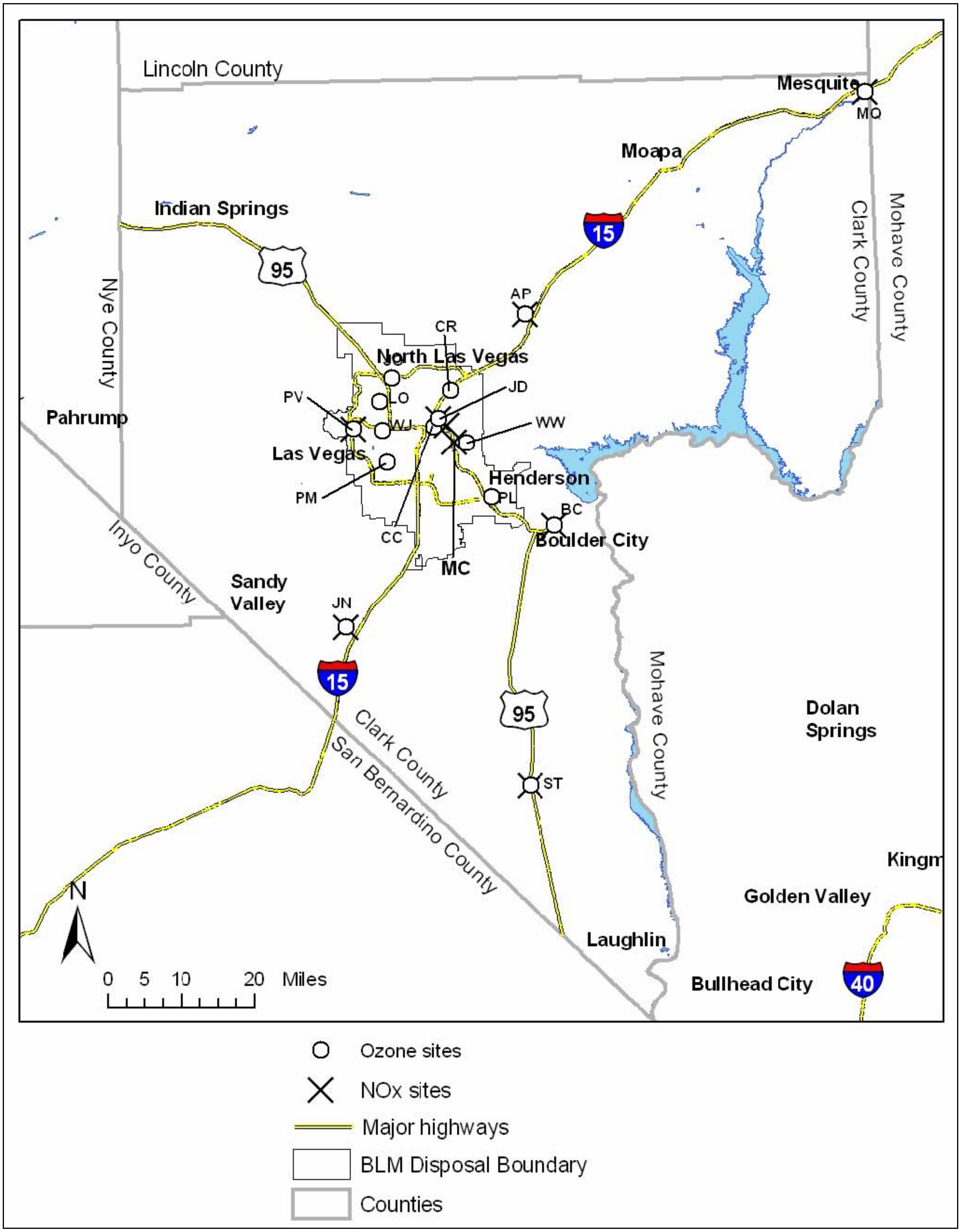

Figure 3.7-1. O_3 and NO_X Monitoring Sites in Clark County

3.8 Surface Meteorology

Wind speed, direction, and temperature are measured on meteorological towers in a variety of networks within and around Clark County as illustrated in Figure 3.8-1. These networks include those of:

1. NOAA Air Resources Laboratory, Special Operations and Research Division (SORD);
2. Nevada Test Site (NTS);
3. Community Environmental Monitoring Program;
4. National Weather Services/Federal Aviation Administration (NWS/FAA);
5. Remote Automatic Weather Stations (RAWS);
6. Department of Air Quality and Environmental Management (DAQEM); and
7. Las Vegas Regional Flood Control District (LVRFCD).

Many of these data are available through the Western Regional Climate Center.

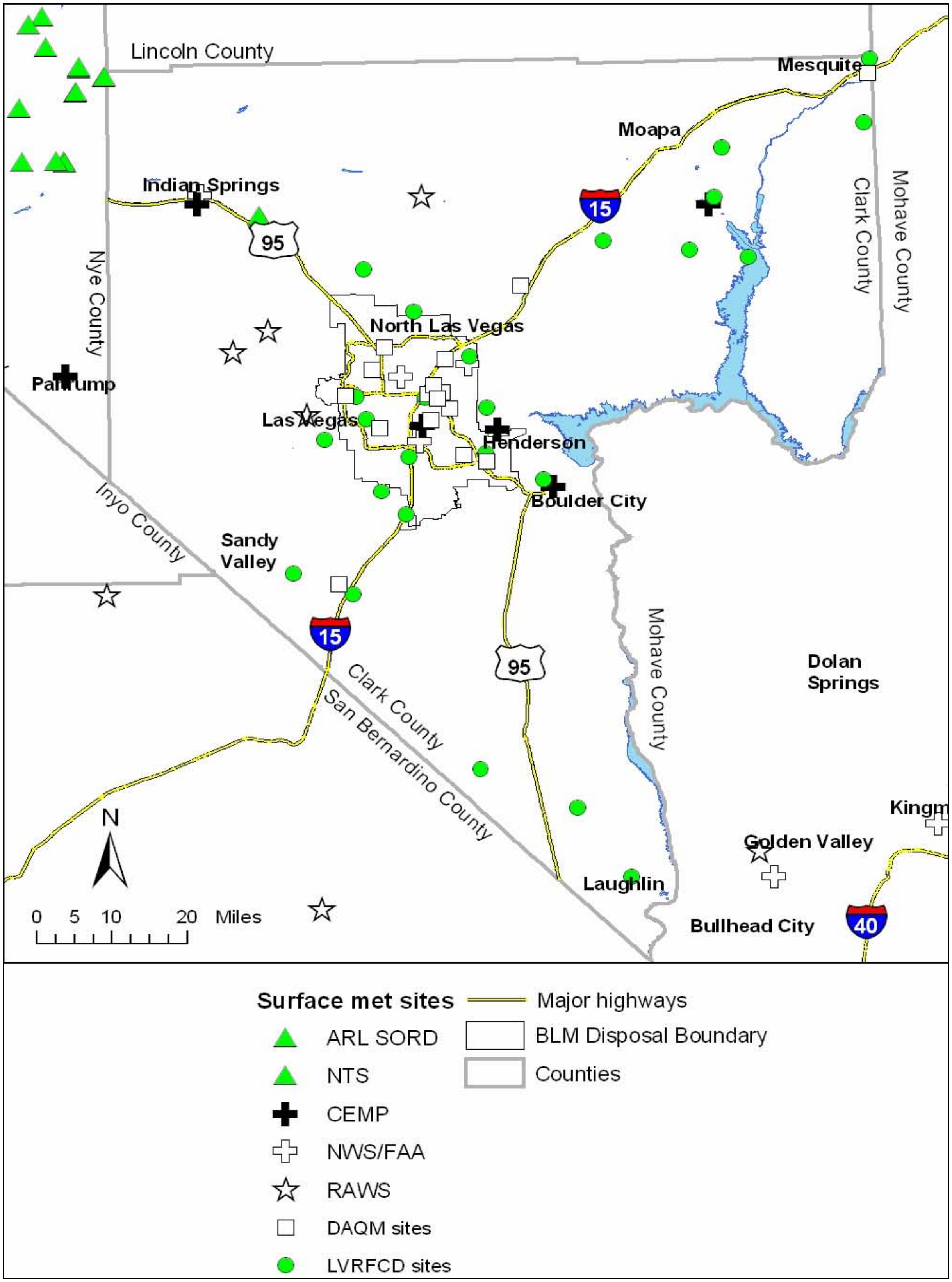

Figure 3.8-1. Surface Meteorological Monitoring Sites In and Around Clark County.

3.9 Upper Air Meteorology

Figure 3.9-1 shows the locations of upper air monitoring stations that can be used to estimate flows aloft. These flows are important because they indicate the potential for and directions of transport of pollutants into and out of the Las Vegas Valley. Currently the nearest upper air wind, temperature and humidity measurements are collected twice daily at the Desert Rock airport, approximately 70 km northwest of Las Vegas. SORD operates a radiosonde system at 00:00 and 12:00 UTC (4 pm and 4 am PST) at that site. Other radiosonde sites in the region include Flagstaff, San Diego, Phoenix, Vandenburg AFB and Reno.

The NOAA/National Weather Service and the Department of Defense operate a network of 143 Next Generation Radars (NEXRAD) across the U.S. The closest NEXRAD measurements are taken approximately 30 km south of Henderson and 17 km west of the Colorado River. Other NEXRAD stations in the southwest are at Edwards AFB, Cedar City, Yuma and Elko (Figure 3.9-1).

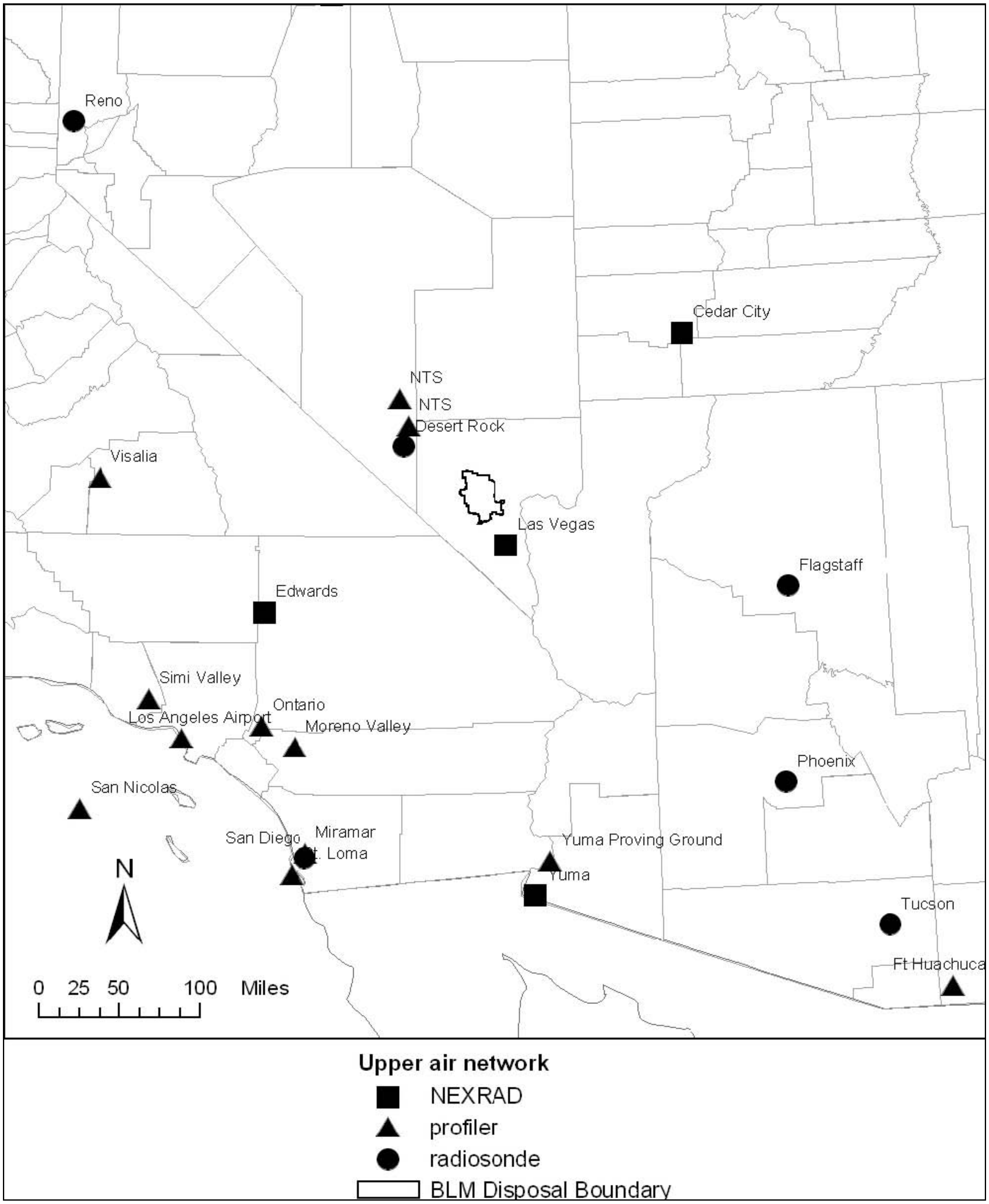

Figure 3.9-1. Operating Upper Air Monitoring Sites Surrounding Southern Nevada.

4. BOUNDARY CRITERIA ANALYSIS

4.1 Emissions and Air Quality in Adjacent Areas

The Mohave Power Plant in the Colorado River Valley, hydrographic area 213, is a significant source of NO_X emissions. As shown in section 4.7, these emissions are likely to be transported into the Las Vegas Valley along with emissions from Ivanpah Valley, the I-15 Corridor, and residual O_3 from Southern California. Ozone generated within the Las Vegas Valley often exits through the Apex Valley where additional emissions sources exist that may contribute additional O_3 formation.

The I-15 corridor from Apex to Mesquite contains emitting sources (e.g., the Reid Garnder Power Plant in hydrographic area 219, southern part of Moapa Valley) that impact the Las Vegas Valley with shifts in wind direction. There is no evidence in the Mesquite O_3 diurnal distributions shown in Figure 4.1-1 that these emissions create significant increments that might differ from the regional background and be of concern for O_3 nonattainment in these valleys.

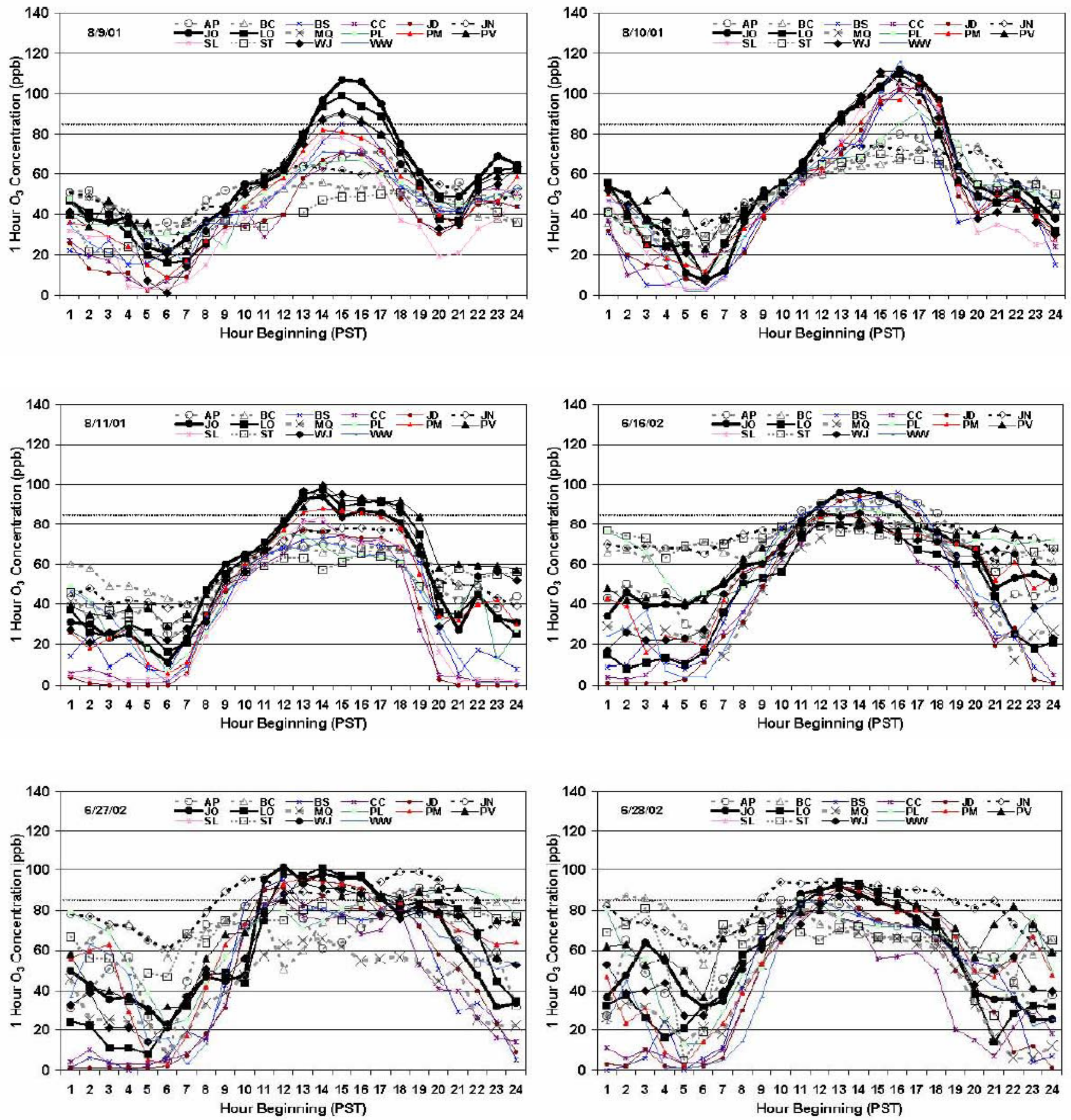

Figure 4.1-1. Diurnal Changes in One Hour Ozone Concentrations on Days when Eight Hour Average Concentrations Exceeded or Equaled 85 ppb at Any Site.

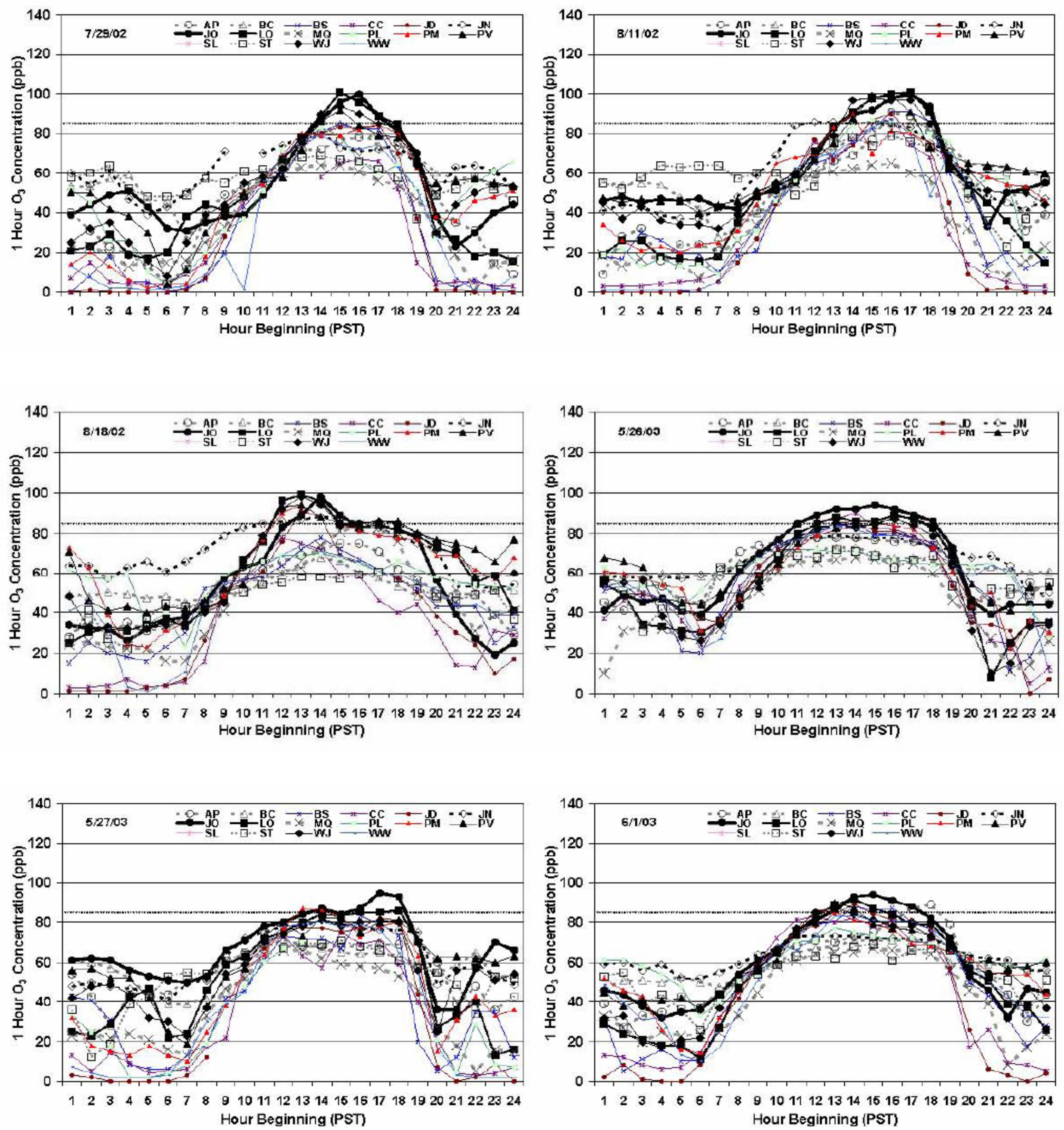

Figure 4.1-1. (Continued)

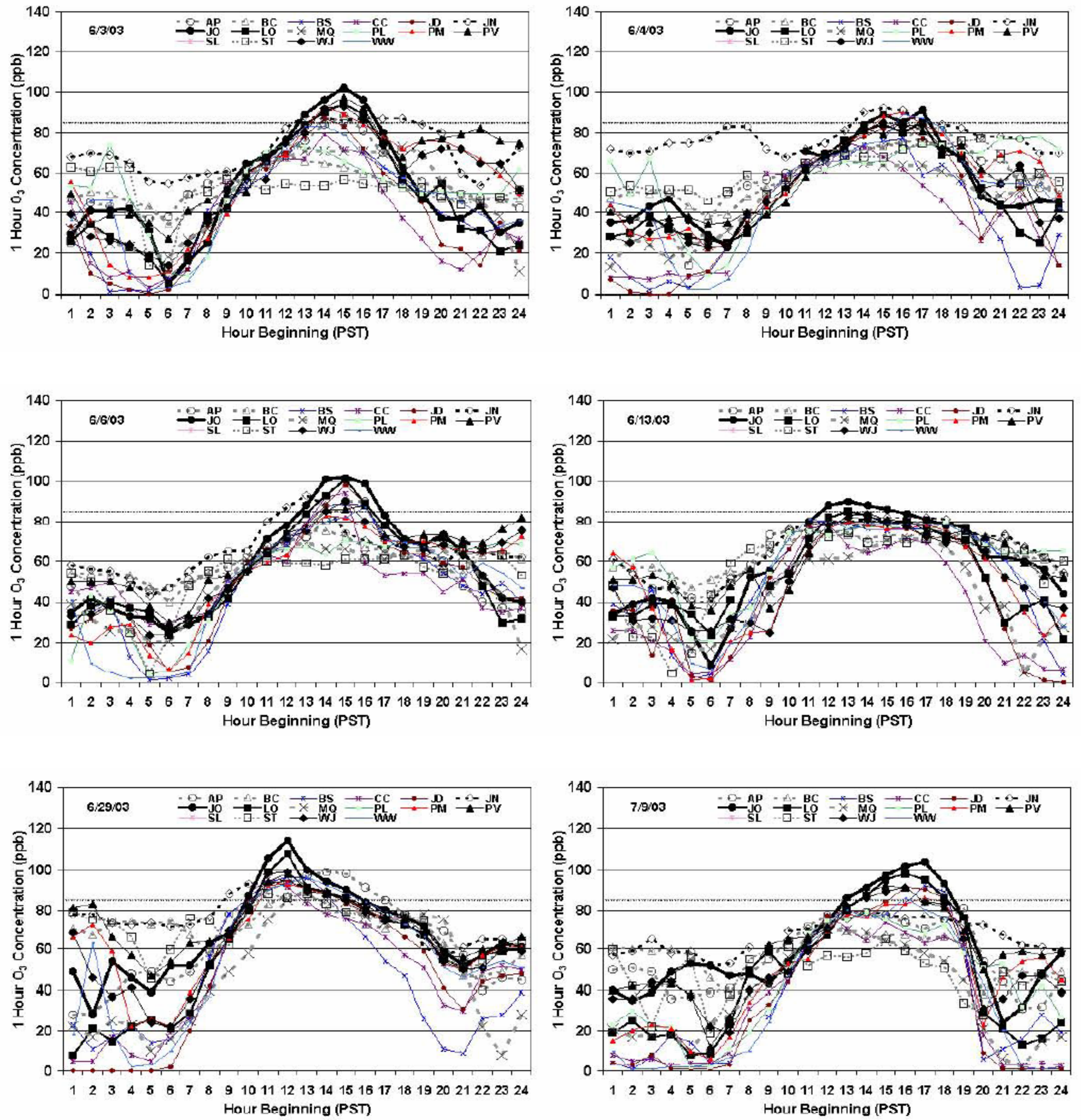

Figure 4.1-1. (Continued)

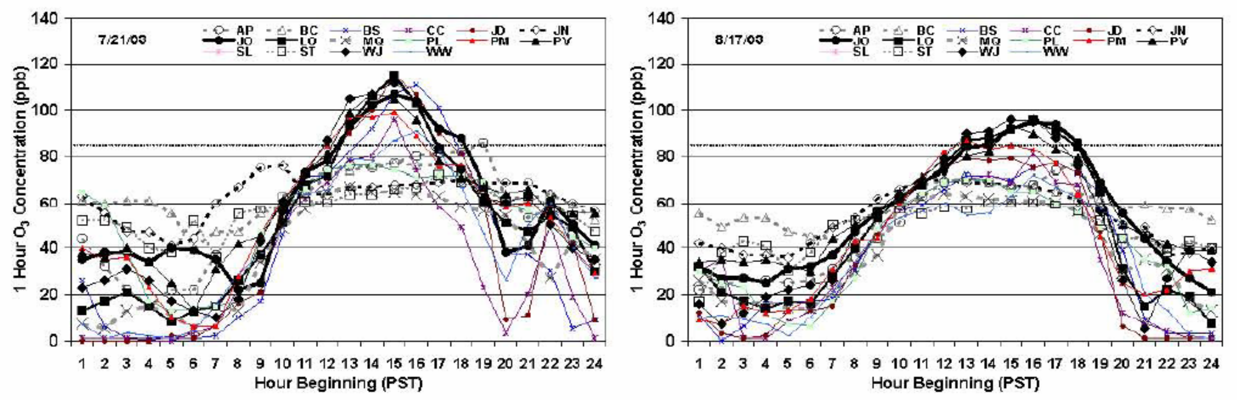

Figure 4.1-1. (Continued)

4.2 Population Density and Degree of Urbanization

Table 4.2-1 demonstrates that more than 95% of the Clark County population is within the Las Vegas Valley. This population is estimated to increase by 66% between 2000 and 2025. Area and mobile source emissions are expected to grow accordingly. The prior analysis of trip and VMT projections indicates that these will exceed the population growth rate. These population figures demonstrate that the highest human exposure to excessive pollutant levels will occur in the Las Vegas Valley.

Year	Clark County Population	Clark County Employment	Las Vegas Valley Population	Las Vegas Valley Employment
2000	1,428,700	857,600	1,357,300	820,600
2004	1,686,100	917,300	1,601,800	884,800
2005	1,730,700	926,100	1,644,200	899,900
2010	1,912,800	964,400	1,817,100	941,600
2020	2,219,700	1,072,300	2,108,800	1,034,000
2025	2,368,400	1,118,400	2,250,000	1,083,400
Source: Center for Business and Economic Research, University of Nevada, Las Vegas				

Table 4.2-1. Estimated Population Projections for Clark County and the Las Vegas Metropolitan Area Projected from 2000 to 2025 in (RTCSN 2004).

Figure 3.1-1 puts these numbers into a spatial perspective using census tracts and population density for Clark and surrounding counties. In Clark County there are 16,258 census block units with the mean population density of 2,409 people per square kilometer. In Nevada the mean population density is approximately 5 people per square kilometer using the 2000 census blocks. There is substantial variability in population density even within the Las Vegas metropolitan area. Some densities within the city will increase as vacant areas are filled in, but most increases are anticipated on the periphery of the metropolitan area. The nonattainment area boundary must encompass this anticipated expansion of the populated area to include anticipated emissions and pollutant exposure in the new neighborhoods. Public land boundaries, identified in Figure 4.2-1, and the surrounding mountains illustrated in Figure 3.4-1, provide effective limits on the spatial extent of the urbanized area. Water availability and other environmental and economic concerns also add constraints to spatial growth.

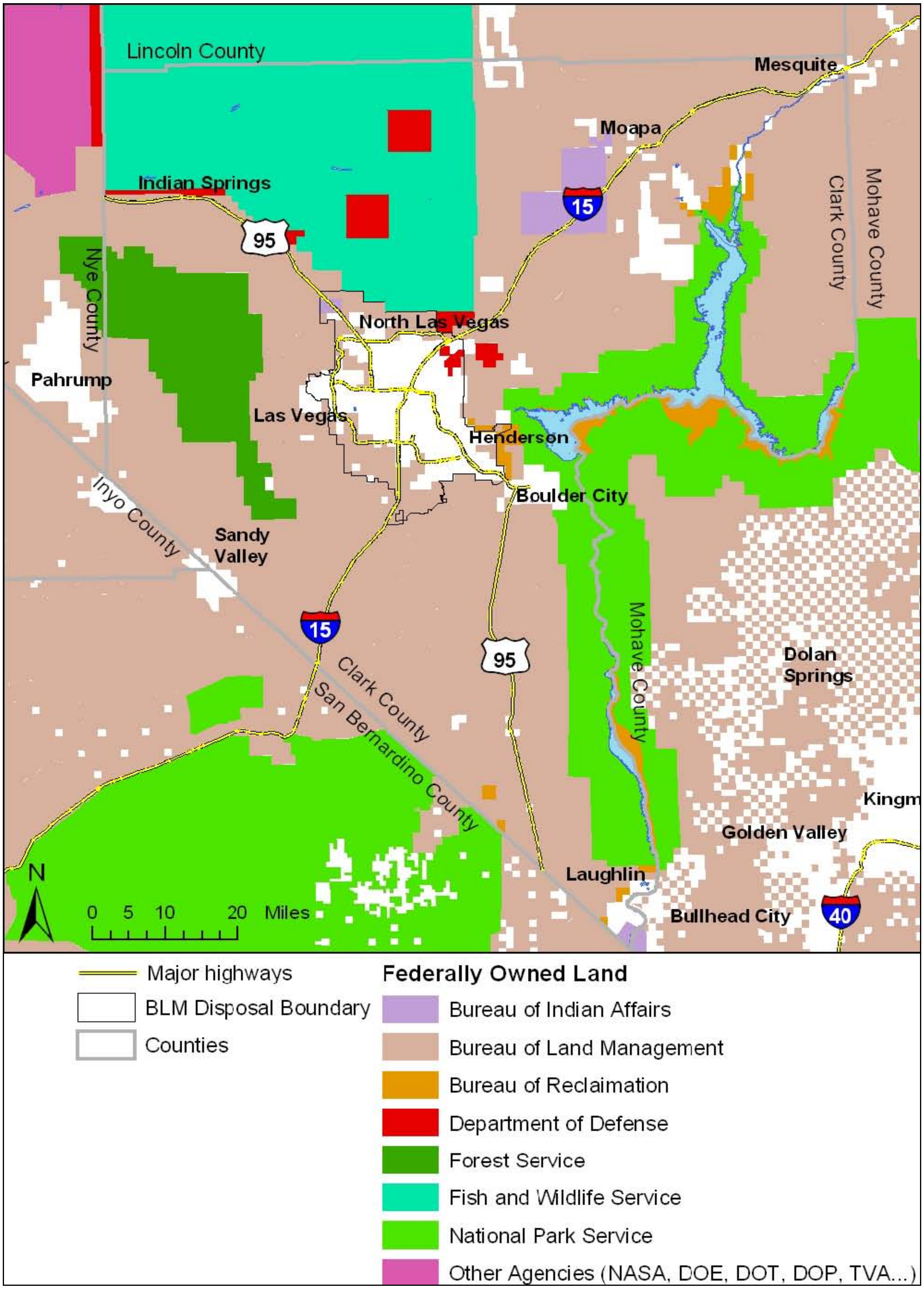

Figure 4.2-1. Land Ownership Within and Around Clark County. Private Land is Unshaded.

4.3 Air Quality Monitoring Data

Table 4.3-1 depicts all monitoring sites. The Joe Neal site, which is situated in the northwest portion of the city, recorded the only violation of the 8-hour standard for the period of 2001 to 2003. At this site, the 3 year average of the annual 4th highest daily maximum 8-hour average concentration was 0.086 ppm of O_3. Table 4.3-2 summarizes the number of 8-hour periods on which O_3 concentrations exceeded 0.084 ppm at any site in the monitoring network.

- Boulder City (BC), City Center (CC), Mesquite (MQ) and Searchlight (ST) showed no values higher than 0.084 ppm.
- BC and ST are south of the Las Vegas urban area, while MQ is located far to the northeast near the Utah border, as illustrated in Figure 3.5-1.
- Of the urban sites, only City Center (CC) showed no values exceeding 0.084 ppm.
- There were exceedances for one or more monitoring sites in the County on three days during 2001, six days occurred during 2002, and 11 days occurred during 2003. These exceedances were observed as early in a year as May 26 and as late as August 18 during the three year period.

E. Craig Road								
Year	1st High	Date	2nd High	Date	3rd High	Date	**4th High**	Date
2001	0.078	10-Aug	0.071	22-Jun	0.071	6-Jun	**0.070**	11-Aug
2002	0.089	16-Jun	0.082	27-Jun	0.079	28-Jun	**0.078**	15-Jun
2003	0.089	21-Jul	0.084	29-Jun	0.081	1-Jun	**0.080**	26-May
Average							**0.076**	
City Center								
Year	1st High	Date	2nd High	Date	3rd High	Date	**4th High**	Date
2001	0.083	10-Aug	0.070	11-Aug	0.067	22-Jul	**0.063**	23-Aug
2002	0.077	27-Jun	0.076	2-Sep	0.076	16-Jun	**0.073**	11-Aug
2003	0.082	28-Jun	0.081	26-May	0.081	29-Jun	**0.078**	1-Jun
Average							**0.071**	
Winterwood								
Year	1st High	Date	2nd High	Date	3rd High	Date	**4th High**	Date
2001	0.085	10-Aug	0.074	16-Jun	0.072	11-May	**0.071**	17-Sep
2002	0.086	16-Jun	0.081	12-Jul	0.080	27-Jun	**0.077**	17-Jun
2003	0.088	29-Jun	0.079	26-May	0.078	13-Jun	**0.078**	21-Jul
Average							**0.075**	
S.E. Valley								
Year	1st High	Date	2nd High	Date	3rd High	Date	**4th High**	Date
2001	0.076	10-Aug	0.076	29-Jul	0.075	7-Jun	**0.072**	16-Jun
2002	0.087	27-Jun	0.082	16-Jun	0.079	11-Aug	**0.078**	8-Jun
2003	0.076	13-Jun	0.074	4-Jun	0.073	25-May	**0.073**	21-Jun
Average							**0.074**	
Apex								
Year	1st High	Date	2nd High	Date	3rd High	Date	**4th High**	Date
2001	0.076	29-May	0.075	25-May	0.074	16-May	**0.074**	6-Jun
2002	0.090	16-Jun	0.083	15-Jun	0.083	16-May	**0.082**	15-Apr
2003	0.092	29-Jun	0.080	25-May	0.078	21-Jul	**0.078**	1-Jun
Average							**0.078**	

Table 4.3-1. Running High Eight Hour Average.

Lone Mountain								
Year	1st High	Date	2nd High	Date	3rd High	Date	**4th High**	Date
2001	0.090	10-Aug	0.088	11-Aug	0.082	9-Aug	**0.080**	25-May
2002	0.092	27-Jun	0.088	18-Aug	0.087	11-Aug	**0.086**	28-Jun
2003	0.089	21-Jul	0.088	29-Jun	0.085	9-Jul	**0.085**	26-May
Average							**0.083**	
Palo Verde								
Year	1st High	Date	2nd High	Date	3rd High	Date	**4th High**	Date
2001	0.091	10-Aug	0.090	11-Aug	0.078	29-Jul	**0.078**	2-Jul
2002	0.090	27-Jun	0.087	18-Aug	0.084	28-Jun	**0.082**	11-Aug
2003	0.088	21-Jul	0.087	29-Jun	0.083	26-May	**0.082**	3-Jun
Average							**0.080**	
Jean								
Year	1st High	Date	2nd High	Date	3rd High	Date	**4th High**	Date
2001	0.082	16-Jun	0.080	18-May	0.080	1-Jun	**0.079**	17-Jun
2002	0.093	27-Jun	0.092	28-Jun	0.085	18-Aug	**0.083**	11-Aug
2003	0.089	29-Jun	0.086	3-Jun	0.085	4-Jun	**0.083**	27-Jun
Average							**0.081**	
Paul Meyer								
Year	1st High	Date	2nd High	Date	3rd High	Date	**4th High**	Date
2001	0.085	10-Aug	0.081	11-Aug	0.080	2-Jul	**0.076**	25-May
2002	0.090	27-Jun	0.084	18-Aug	0.083	28-Jun	**0.079**	16-Jun
2003	0.086	21-Jul	0.084	29-Jun	0.083	28-Jun	**0.081**	3-Jun
Average							**0.078**	

Table 4.3-1. (Continued).

Boulder City								
Year	1st High	Date	2nd High	Date	3rd High	Date	**4th High**	Date
2001	0.074	17-Jun	0.073	17-Sep	0.072	16-Jun	**0.071**	10-May
2002	0.084	27-Jun	0.082	16-Jun	0.081	15-Jun	**0.081**	17-Jun
2003	0.079	29-Jun	0.077	28-Jun	0.074	11-Apr	**0.074**	21-Jul
Average							**0.075**	
J.D. Smith								
Year	1st High	Date	2nd High	Date	3rd High	Date	**4th High**	Date
2001	0.080	10-Aug	0.072	11-Aug	0.072	16-Aug	**0.071**	6-Jun
2002	0.085	16-Jun	0.083	27-Jun	0.080	28-Jun	**0.078**	12-Jul
2003	0.092	21-Jul	0.085	29-Jun	0.081	9-Jul	**0.081**	1-Jun
Average							**0.076**	
Walter Johnson								
Year	1st High	Date	2nd High	Date	3rd High	Date	**4th High**	Date
2001	0.092	10-Aug	0.088	11-Aug	0.082	2-Jul	**0.082**	25-May
2002	0.088	18-Aug	0.086	11-Aug	0.085	27-Jun	**0.081**	29-Jul
2003	0.093	21-Jul	0.086	29-Jun	0.085	17-Aug	**0.082**	26-May
Average							**0.081**	
Joe Neal								
Year	1st High	Date	2nd High	Date	3rd High	Date	**4th High**	Date
2001	0.094	10-Aug	0.085	9-Aug	0.084	11-Aug	**0.083**	14-Aug
2002	0.093	27-Jun	0.088	16-Jun	0.087	28-Jun	**0.086**	11-Aug
2003	0.094	29-Jun	0.092	21-Jul	0.090	9-Jul	**0.089**	26-May
Average							**0.086**	
Searchlight								
Year	1st High	Date	2nd High	Date	3rd High	Date	**4th High**	Date
2001	0.084	17-Jun	0.079	16-Jun	0.074	10-May	**0.073**	1-Jun
2002	0.081	27-Jun	0.076	8-Jun	0.075	16-Jun	**0.074**	6-May
2003	0.082	29-Jun	0.074	17-May	0.073	25-May	**0.072**	27-Jun
Average							**0.073**	

Table 4.3-1. (Continued).

Date	AP	BC	BS	CC	JD	JN	JO	LO	MQ	PL	PM	PV	SL	ST	WJ	WW
8/9/01							1									
8/10/01							6	4			1	4	2		4	2
8/11/01								3				3			2	
6/16/02	5		4		2		4									2
6/27/02						11	4	6		4	5	7			1	
6/28/02						9	2	2								
7/29/02								1								
8/11/02							2	3							2	
8/18/02						3	1	4				3			4	
5/26/03							4	1								
5/27/03							2									
6/1/03							2									
6/3/03						2										
6/4/03						1										
6/6/03							3									
6/13/03							1									
6/29/03	6				1	5	6	3				3			3	3
7/9/03							3	1								
7/21/03			3		3		4	4			2	4			5	
8/17/03								1							1	

Table 4.3-2. Number of Eight Hour Ozone Concentrations Greater than or Equal to 85 ppb at Each Site When Any Site Exceede 85 ppb for 2001 to 2003.

Table 4.3-3 shows the highest 8-hour average O_3 achieved at each site on any of the days. Following are significant facts associated with the Table:

- The beginning of high value observations began between 1000 and 1300 PST.
- Most occurrences of O_3 exceedances were found at the Joe Neal (JO) and Lone Mountain (LO) sites.
- Palo Verde (PV) and Walter Johnson (WJ) sites had numerous, but infrequent, O_3 exceedances.
- Jean (JN) site, located outside Las Vegas Valley, near the California border, also exhibited a large number of elevated concentrations. Even when JN values were less than 0.085 ppm, they were often higher than those observed at some of the urban sites.
- Apex (AP) had two exceedances greater than 0.090 ppm.

Figure 4.1-1 shows the diurnal evolution for each of the episodic days identified in Tables 4.3-2 and 4.3-3. These plots indicate several different phenomena that are indicative of transport into and out of the Las Vegas Valley as well as circulation within the valley. They are examined here to determine the extent to which O_3 is generated within the Las Vegas Valley.

Date	AP	BC	BS	CC	JD	JN	JO	LO	MQ	PL	PM	PV	SL	ST	WJ	WW
8/9/01	66	53	67	57	57	62	**85**	83		61	69	78	61	49	75	62
8/10/01	69	70	78	84	81	72	**94**	**91**		77	**85**	**91**	**87**	67	**93**	**86**
8/11/01	68	67	70	71	72	75	84	**89**		67	82	**90**	73	62	**89**	66
6/16/02	**91**	83	**90**	76	**86**	79	**88**	75	77	83	79	80		76	79	**87**
6/27/02	78	84	83	77	84	**93**	**93**	**93**	60	**88**	**90**	**90**		81	**85**	81
6/28/02	80	76	79	69	80	**92**	**87**	**86**	72	76	83	84		70	80	76
7/29/02	73	75	72	61	75	74	83	**86**	60	68	77	77		65	81	70
8/11/02	75	78	77	74	76	84	**86**	**87**	61	79	77	83		72	**86**	73
8/18/02	69	61	66	65	71	**86**	**86**	**88**	72	67	84	**87**		57	**88**	67
5/26/03	77	71	80	81	81	77	**90**	**86**	66	70	80	84		69	83	79
5/27/03	69	67	73	67	77	78	**86**	81	61	51	78	78		68	78	75
6/1/03	78	69	81	78	81	72	**86**	84	65	72	77	80		65	80	78
6/3/03	76	63	71	67	75	**86**	84	79	71	67	81	82		55	79	72
6/4/03	75	74	68	66	76	**85**	80	77	64	74	79	77		73	77	77
6/6/03	76	69	76	69	78	78	**87**	82	65	68	74	78		60	76	76
6/13/03	78	73	77	69	76	81	**85**	79	66	76	76	78		71	76	79
6/29/03	**92**	80	84	81	**86**	**89**	**94**	**88**	80		84	**87**		82	**87**	**88**
7/9/03	76	67	80	68	81	76	**90**	**86**	64	73	78	82		59	81	76
7/21/03	79	74	**90**	71	**92**	69	**92**	**89**	63	73	**87**	**89**		66	**93**	78
8/17/03	70	68	71	70	76	68	84	**85**	62	65	79	82		58	**86**	61

Table 4.3-3. Highest Eight Hour Ozone Concentration on Days When Any Site Exceeded 85 ppb for 2001 to 2003 Values Greater Than or Equal to 85 ppb are in Bold.

Figure 4.3-1 shows the average diurnal evolution of O_3 for all the sampling days. This indicates that Jean, Searchlight and Boulder City do not have as much diurnal variations as the other sites, which suggests that no fresh NO_x emissions occurred during the night. The concentration at Jean is generally higher than Searchlight and Boulder City. Sites that are close to the city area show lower O_3 levels before sunrise and after sunset. Strong diurnal variability is observed at the Mesquite site, although the concentration in the afternoon is low in comparison to most other sites. This suggests that there are NOx emissions at or near to the Mesquite site, which reacts with O_3 and reduces the O_3 concentration during the night.

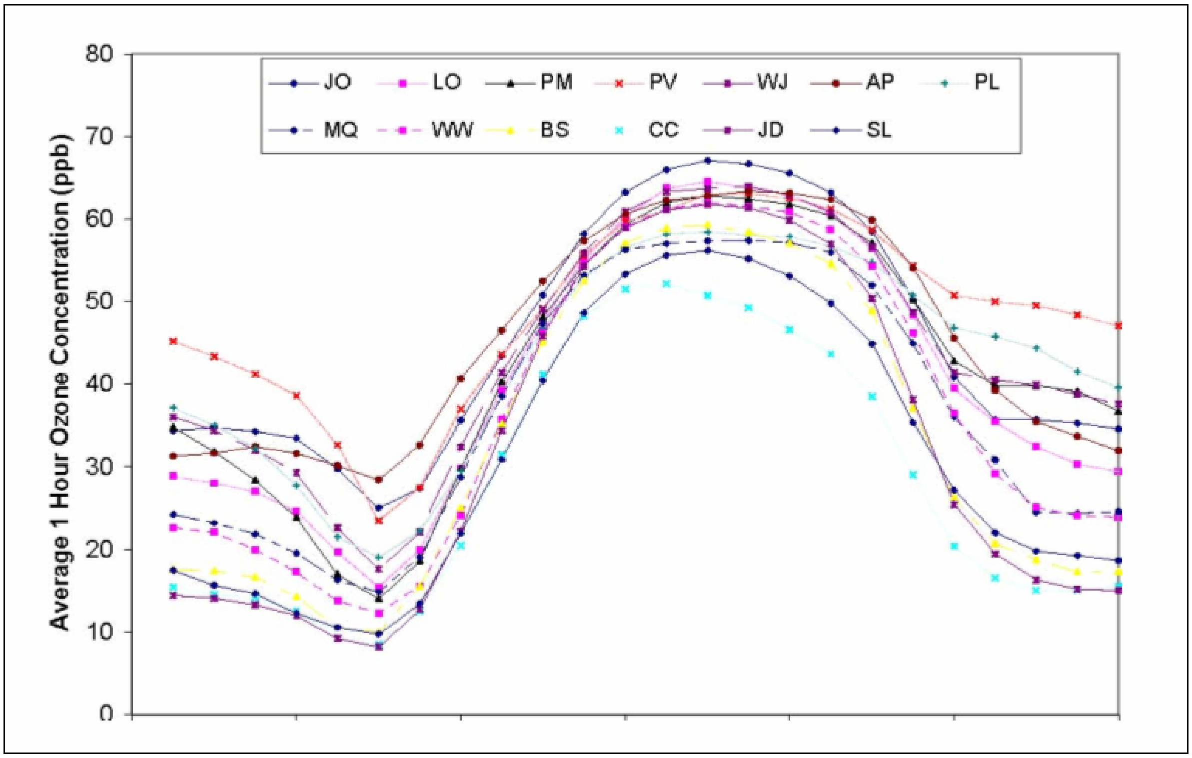

Figure 4.3-1. Diurnal Changes in Average One Hour Ozone Concentrations.

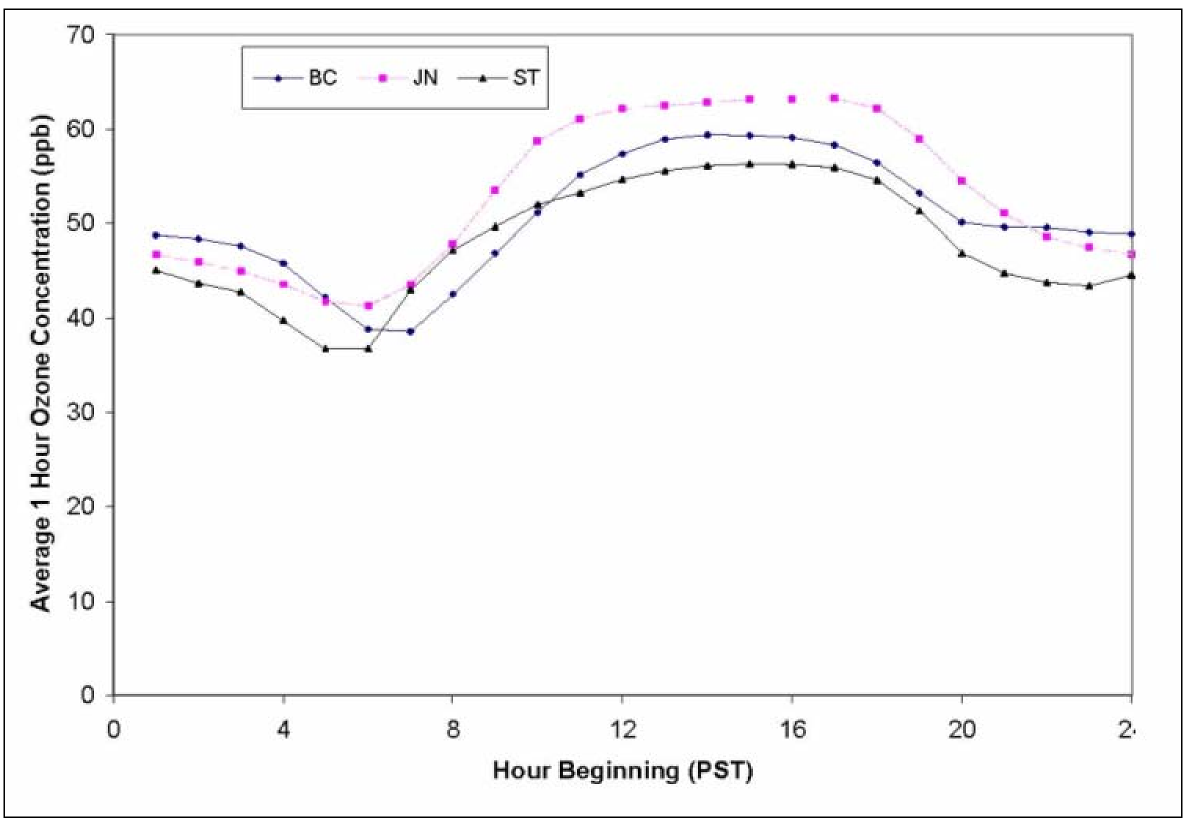

Figure 4.3-1. (Continued)

The Searchlight (ST) site is representative of regional O_3 concentrations. These levels do not show as much diurnal variation and often level off at 0.060 to 0.080 ppm during the afternoon. These levels include natural background O_3 (0.030 to 0.040 ppm, based on monitoring data) plus a mixture of contributions from numerous sources throughout the southwestern U.S. They provide an indication of the background on which contributions from Clark County sources are superimposed. Boulder City (BC) measurements are often similar to the Searchlight measurements, indicating that this area is effectively separated from the remainder of the Las Vegas Valley.

Recirculation due to daytime upslope (warming) and nightime downslope (cooling) flows is indicated by elevated O_3 levels on the westside of the Las Vegas Valley. During periods of stagnation, much of the excessive O_3 remains in the Las Vegas Valley rather than being transported elsewhere. During non-stagnation periods, prevailing winds transport O_3 and O_3 precursors into valleys located northeast of the Las Vegas Valley.

Monitoring data from the Joe Neal (JO), Lone Mountain (LO), and Palo Verde (PV) sites supports this conclusion.

Periodically, O_3 levels at the Jean (JN) site are equivalent to the regional levels, which are reflective of measurements at the Searchlight (ST) and Mesquite (MQ) sites. However, they are often much higher, which indicates transport from southern California. On June 27, 2002 and June 28, 2002 the Jean (JN) levels exceeded those within the Las Vegas Valley for most hours of the day. O_3 concentrations at Jean (JN) were higher than the background by as much as 0.050 ppm. The plots clearly demonstrate that O_3 is generated within the Las Vegas Valley and O_3 is transported into the Las Vegas Valley.

Monitoring data, in conjunction with meteorological and geographical and topographical data, indicates that the following hydrographic areas are receptors of O_3 and O_3 precursors: 164A, 164B, 165, 166, 212, 216, and 218.

4.4 Location of Emission Sources

Clark County DAQEM's 2002 NEI submission contains 42,159 tons per year (tpy) of NO_x and 40,106 tpy of VOC. The Nevada Division of Environmental Protection 2002 NEI submission contains 31,061 tpy of NO_x and 216 tpy of VOC. Clark County O_3 precursor emissions are as follows: 73,220 tpy of NO_x and 40,322 tpy of VOC.

Sources	NO_X		VOC	
	#	%	#	%
Onroad Mobile	20,047	27.38	27,633	68.53
Nonroad Mobile	15,507	21.18	10,484	26.00
Area	1,262	1.72	1,818	4.51
Point	36,404	49.72	387	0.96
Clark County:	73,220	100.00	40,322	100.00

Table 4-1. NOX and VOC Emissions Summary.

As indicated in the preceding table, mobile sources are a significant contributor for VOC and mobile and point sources are significant contributors for NO_X.

As shown in Figure 3.3-1, urbanized land use is concentrated in the Las Vegas Valley. This corresponds with the highest population densities and roadway networks that create area and mobile source emissions. The rest of the County is classified as shrubland with deciduous forest along the upper elevations of the Spring Mountains.

Figures 4.4-1 and 4.4-2 show the locations and magnitudes of NO_x and VOC point sources. Significant facts related to point sources contained in this figure are as follows:

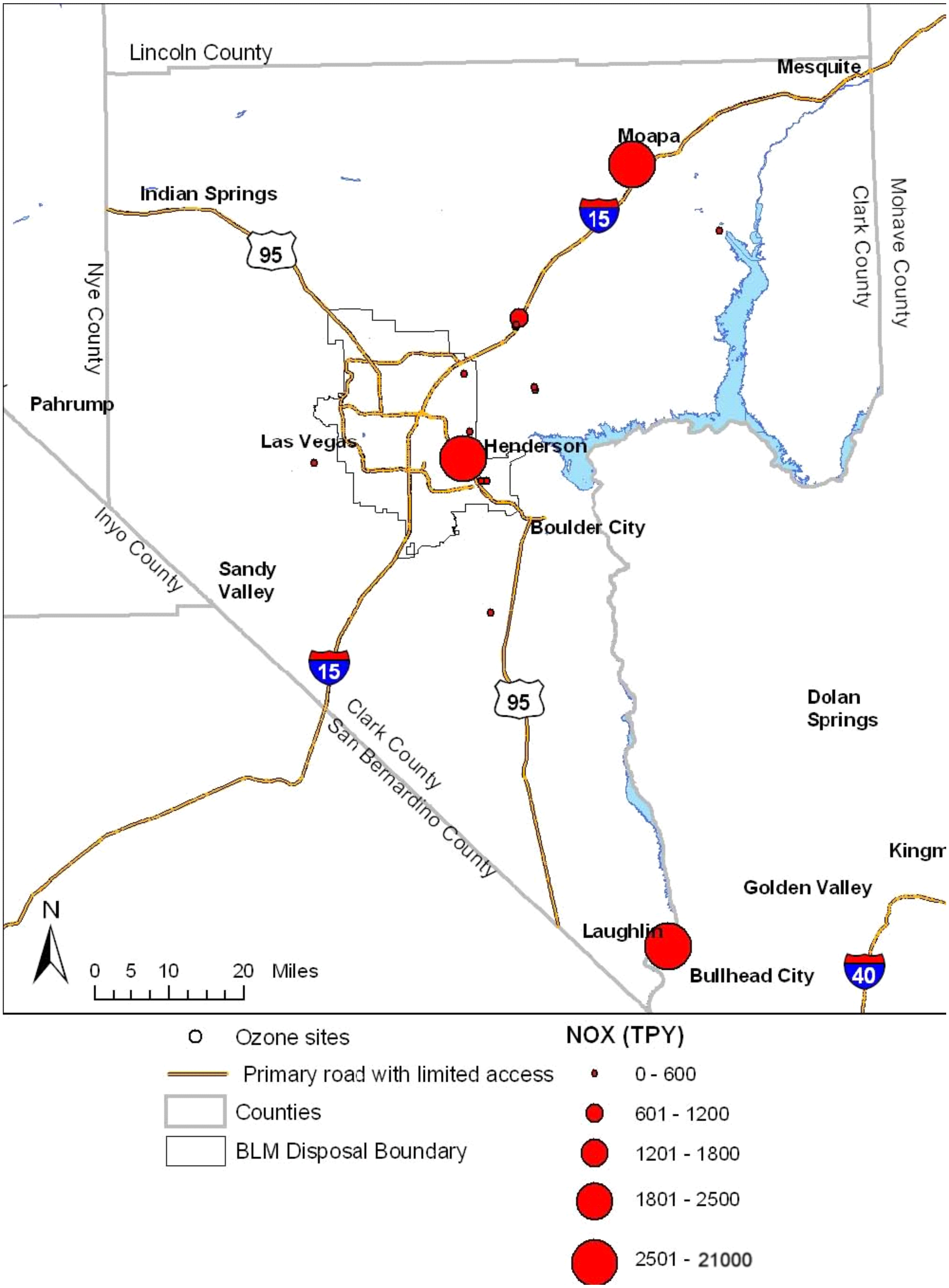

Figure 4.4-1. Locations and Magnitudes of NO_X Point Source Emission in Clark County and Surrounding Areas for 2002. Diameter of Symbol is Proportional to Annual Actual Emission Rate.

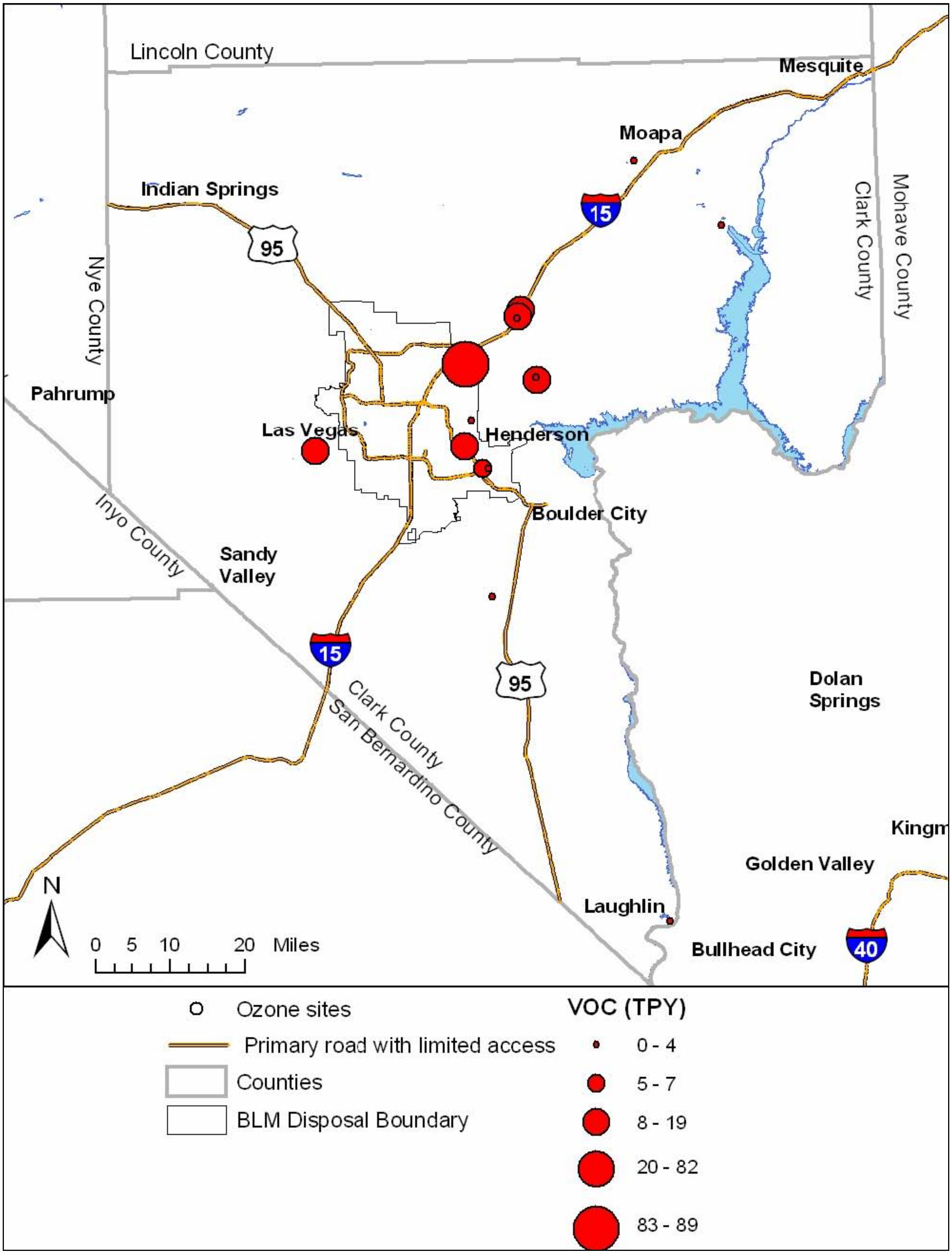

Figure 4.4-2. Locations and Magnitudes of VOC Point Source Emission in Clark County and Surrounding Areas for 2002. Diameter of Symbol is Proportional to Annual Actual Emission Rate.

NO_X Sources, Figure 4.4-1

- (Big dot near Moapa) The Reid Gardner generating station accounts for 9,160 of NO_X.
- (Big dot in Laughlin) The Mohave generating station accounts for 20,013 tpy of NO_x. This station is slated to cease operations in 2006 in accordance with a Consent Decree. However, the station may not close due to a legal challenge.

NOTE: These two point sources constitute a significant amount (40%) of the total NO_x inventory.

- (Big dot in Las Vegas Valley) The largest point source NO_x emitter in the Las Vegas Valley is the Clark generating station with 4,229 tpy of NO_x.
- Chemical Lime Apex in the Apex Valley emits 1,121 tpy of NO_x.
- (Small dot southeast of Moapa) JR Simplot emits 180 tpy of NO_x.
- (Small dot south of Boulder City) Eldorado Energy emits 131 tpy of NO_x.
- (Small dots at various locations) Kinder Morgan CalNev Pipeline, Nevada Power Sunrise Station, Saguaro Power Company, TIMET, Republic Dumpco, BPB Gypsum Blue Diamond, Nevada Cogeneration Associates No. 1, and Georgia Pacific are within or on the periphery of the Las Vegas urbanized area.

The following sources are not indicated on the figure, nor included in the 2002 NEI submissions:

- Mirant and Silverhawk generating stations became operational in 2003. These generating stations are located in hydrographic area 216, just south of the boundary for hydrographic area 217 with no geographic barriers.
- Reliant Big Horn generating station became operational 2003. This generating station is located in hydrographic area 164A.

VOC Sources, Figure 4.4-2

- Reid Gardner and Mohave generating stations are negligible emitters.
- Kinder Morgan CalNev Pipeline, the large circle in northeast Las Vegas Valley emits 89 tpy of VOC.
- All of the other point sources combined emit less than 83 tpy of VOC.

Project MOHAVE (Pitchford et al. 1999) found that tracers from stack emissions were detected from the southern border of Nevada to the Las Vegas Valley. This supports the conclusion that emissions from the Mohave generating station impact the Las Vegas Valley.

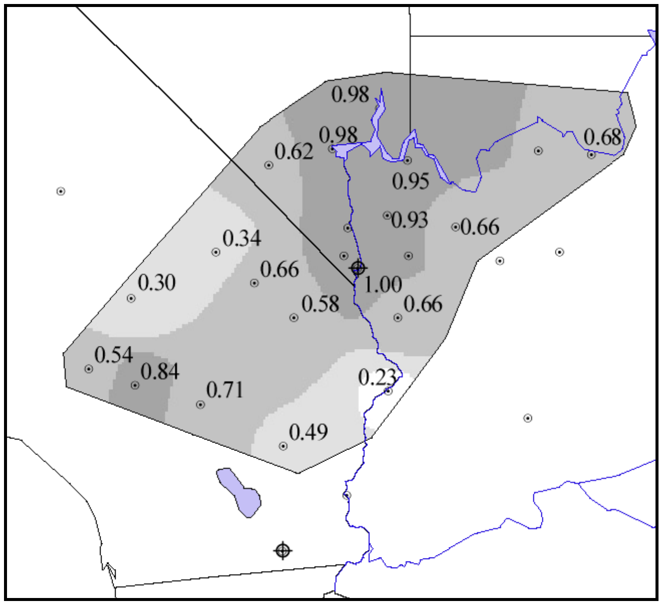

Figure 4.4-3. MPP Tracer Summer Plot

Figure 4.4-3 shows the mean influence functions for the PFT tracers. Influence functions are the emission rate normalized PFT concentrations (i.e., tracer concentration divided by emission rate) and have units of seconds/cubic meter. This is tracer rate detected above background for the PFT Mohave Power Plant release locations. Only data meeting completeness criteria were used to generate the contours. The polygons surround the sites meeting the completeness criteria.

Based on the location of these sources, there are significant O_3 precursors generated in the following hydrographic areas: 164A, 212, 213,216, and 218.

The following hydrographic areas are O_3 receptors based on the location of the O_3 generators: 164A, 164B, 165, 166, 167, 212, 213, 214, 216, 217, and 218.

4.5 Traffic and Commuting Patterns

As the fastest-growing urban area in the nation, traffic volumes are increasing every year in the Las Vegas Valley. Figure 3.6-1 shows the roadway network and total daily flows on the major arterials within the metropolitan area.

Table 3.6-1 estimates the total number of vehicle miles traveled (VMT) through 2025. The VMT are estimated to double over the 25 year period, reflecting the continued population and employment growth projections for the Las Vegas Valley.

The Nevada Department of Transportation estimated total VMT for Clark County at 12,109 million during 2002. Interpolating from Table 3.6-1 and multiplying by 365 days per year yields approximately 10,400 million VMT per year just within the Las Vegas Valley, more than 85% of the total county VMT. Much of the remainder occurs along the I-15 and US-95 corridor.

4.6 Expected Growth

Substantial growth is expected between now and 2025 based on the information contained Table 4.2-1. Nearly all of this growth is expected for the Las Vegas Valley, where population is anticipated to increase by more than 60%. Much of the new industrialization is occurring in the Apex Valley to the northeast.

Boulder City is the closest population concentration outside of hydrographic area 212. Boulder City has existing city ordinances that limit growth in housing and manufacturing within the city limits, which retards population growth.

Figure 4.2-1 depicts land ownership within Clark County and the surrounding areas. Most of the land is under the control of several U.S. government agencies. The Bureau of Land Management (BLM) has the largest holdings, which include the Red Rock Conservation area to the west of Las Vegas. Most of the Spring Mountain Range, including Mt. Charleston, is within the boundaries of the Toyabe National Forest administered by the U.S. Forest Service (USFS). Less than 10% of the county is privately owned. Federal, State, and Tribal lands create barriers to contiguous expansion of the urbanized core in the Las Vegas Valley.

The primary O_3 impact on human health occurs in hydrographic area 212.

4.7 Meteorology

To investigate transport pathways into and out of the Las Vegas Valley, the National Oceanic Atmospheric Administration (NOAA), Air Resources Laboratory (ARL) Eta Data Assimilation System (EDAS) meteorological data was used in the HYSPLIT trajectory model (Draxler and Hess, 1997). EDAS assimilates data from the rawinsonde upper network, as shown in Figure 3.3-1 into short-term Eta model calculations to obtain wind speeds and directions at different elevations. The EDAS wind fields are archived by the NOAA ARL at 80 km horizontal resolution. These meteorological fields represent large-scale flows and do not accurately represent local to mesoscale flows such as topographically influenced flow and nocturnal jets. In some cases systematic biases may occur that could lead to invalid conclusions regarding source-receptor relationships. Individual trajectories are expressed as lines whereas air masses usually spread in horizontal and vertical directions with distance from the emissions source. For this reason trajectories are usually examined as a statistical ensemble of many events rather than as individual indicators of source receptor relationships. HYSPLIT has been shown to be adequate for the purpose of this study, which is to obtain a general idea of how air enters and exits the Las Vegas Valley during elevated O_3 episodes.

The HYSPLIT model calculated backward and forward trajectories of 8 days duration from Las Vegas International Airport (KLAS) every 3 hours for nine episodes during the years 2001 to 2003. The airport was chosen because of its central location within the Las Vegas Valley. To put the episodic trajectories into perspective, the model was run for the entire month during which the episode occurred. Forward and backward trajectories were calculated at 10, 500 and 1500 meters above ground level to explore how air mass pathways can vary over the deep summertime mixed layer over the desert. The 500 m trajectory is most appropriate to the objective of determining transport between neighboring valleys. HYSPLIT model output was converted into GIS data layers to help visualize the air mass trajectories. Figures 4.7-1 through 4.7-18 depict back and forward trajectories for each of the nine episodes. The red dots on the maps show urbanized areas with the diameter of the dot proportional to the population.

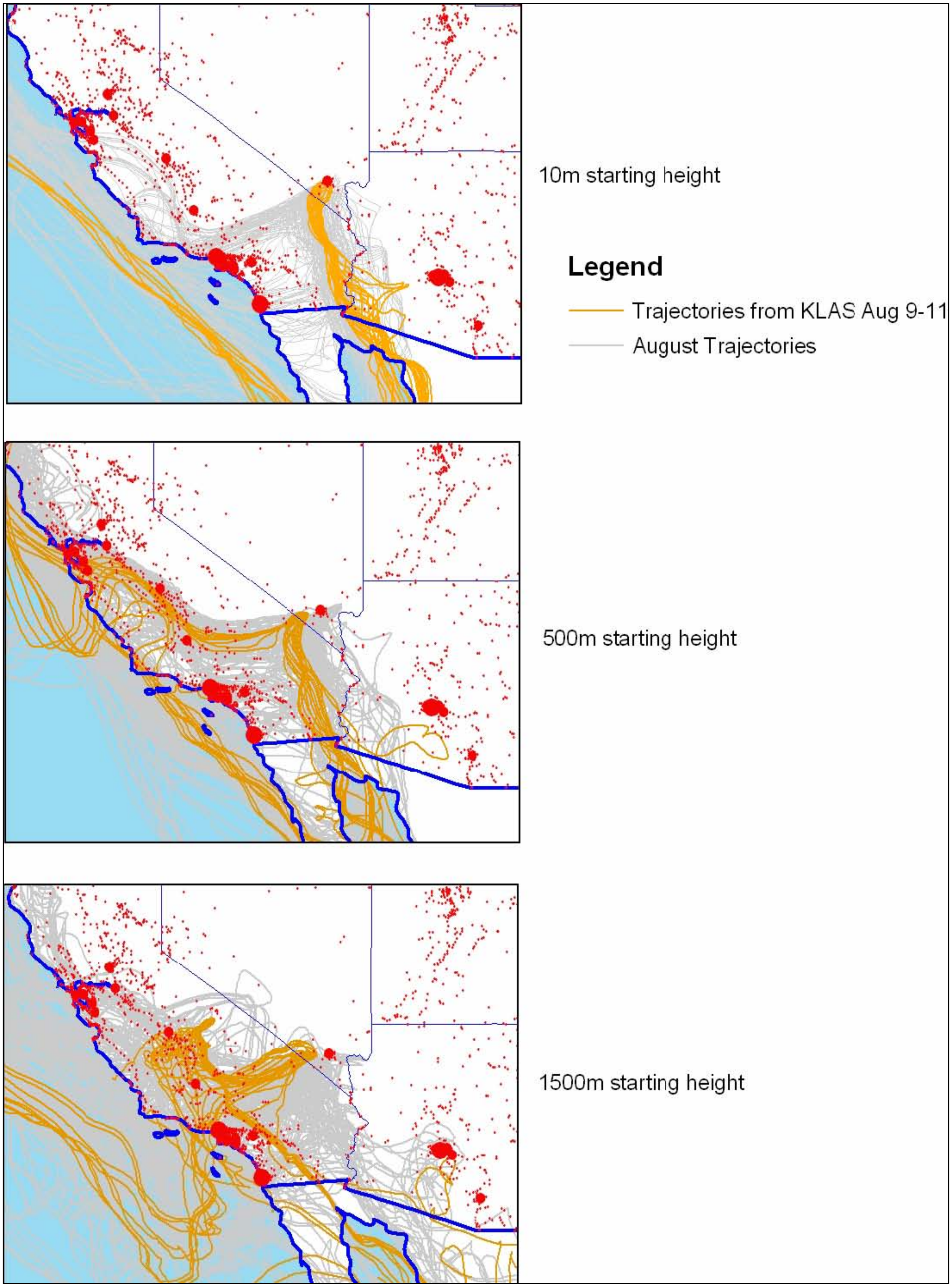

Figure 4.7-1. August 9-11, 2001 Back Trajectories for Days With Ozone >= 85 ppb.

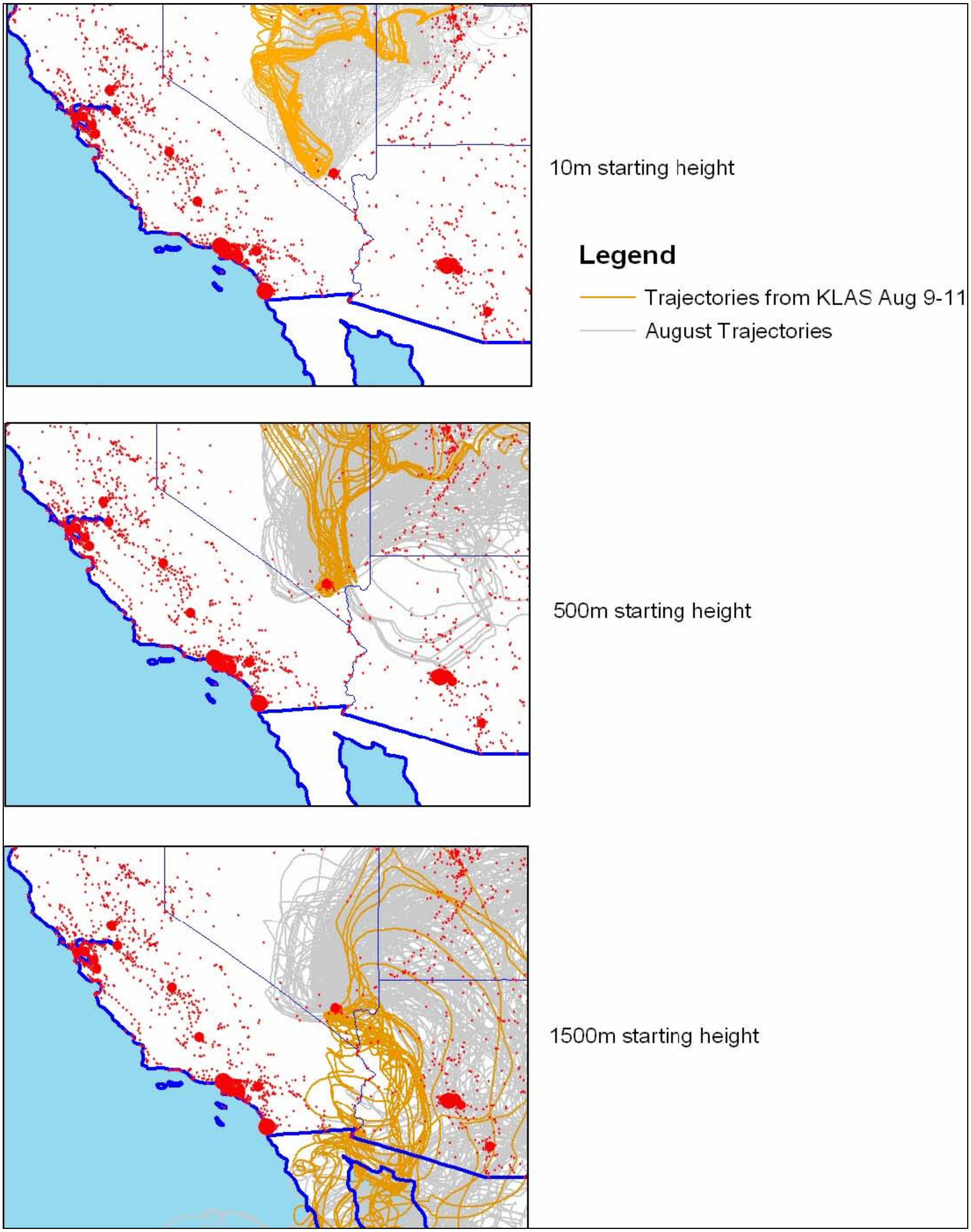

Figure 4.7-2. August 9-11, 2001 Forward Trajectories for Days With Ozone >= 85 ppb.

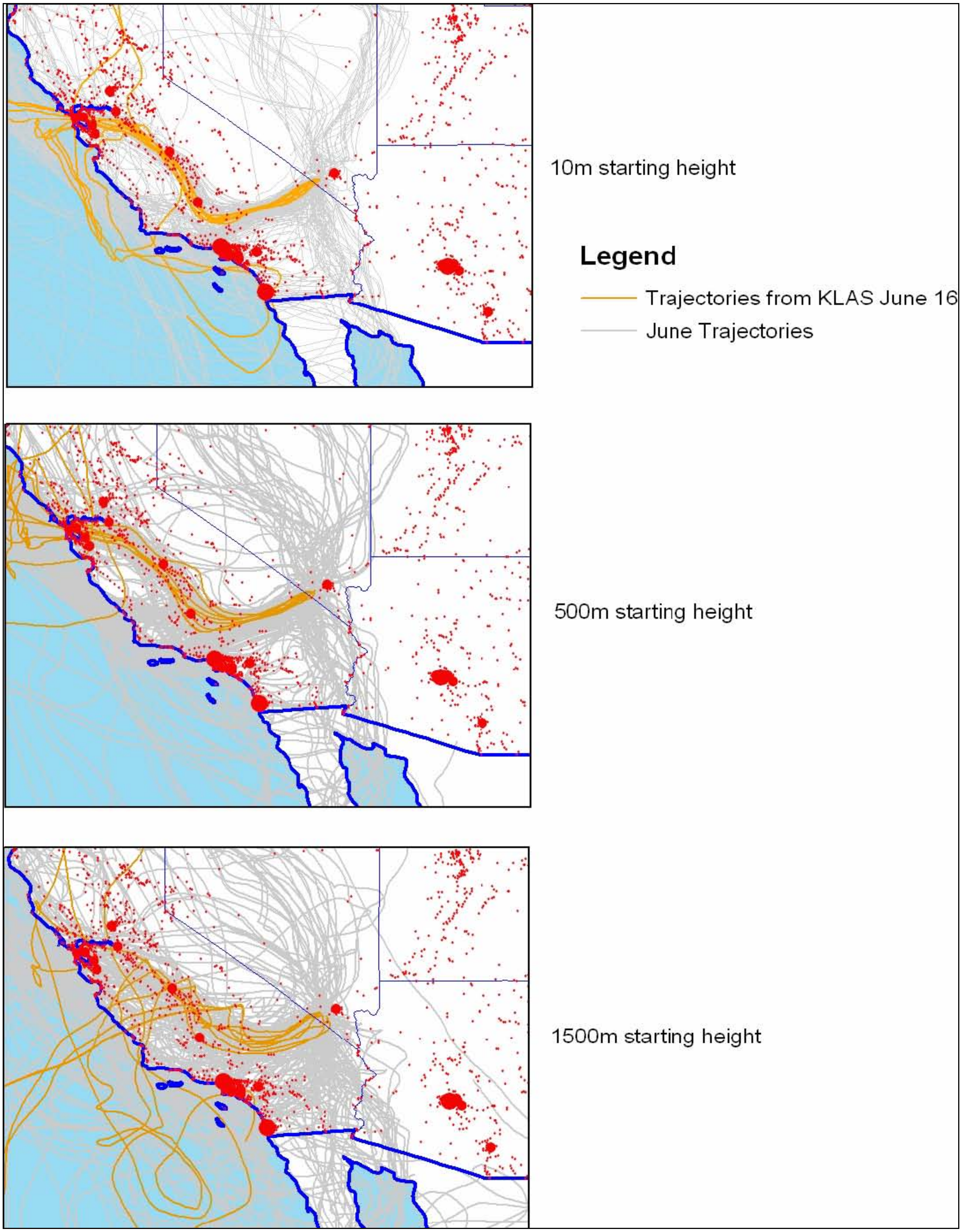

Figure 4.7-3. June 16, 2002 Back Trajectories for Days With Ozone >= 85 ppb.

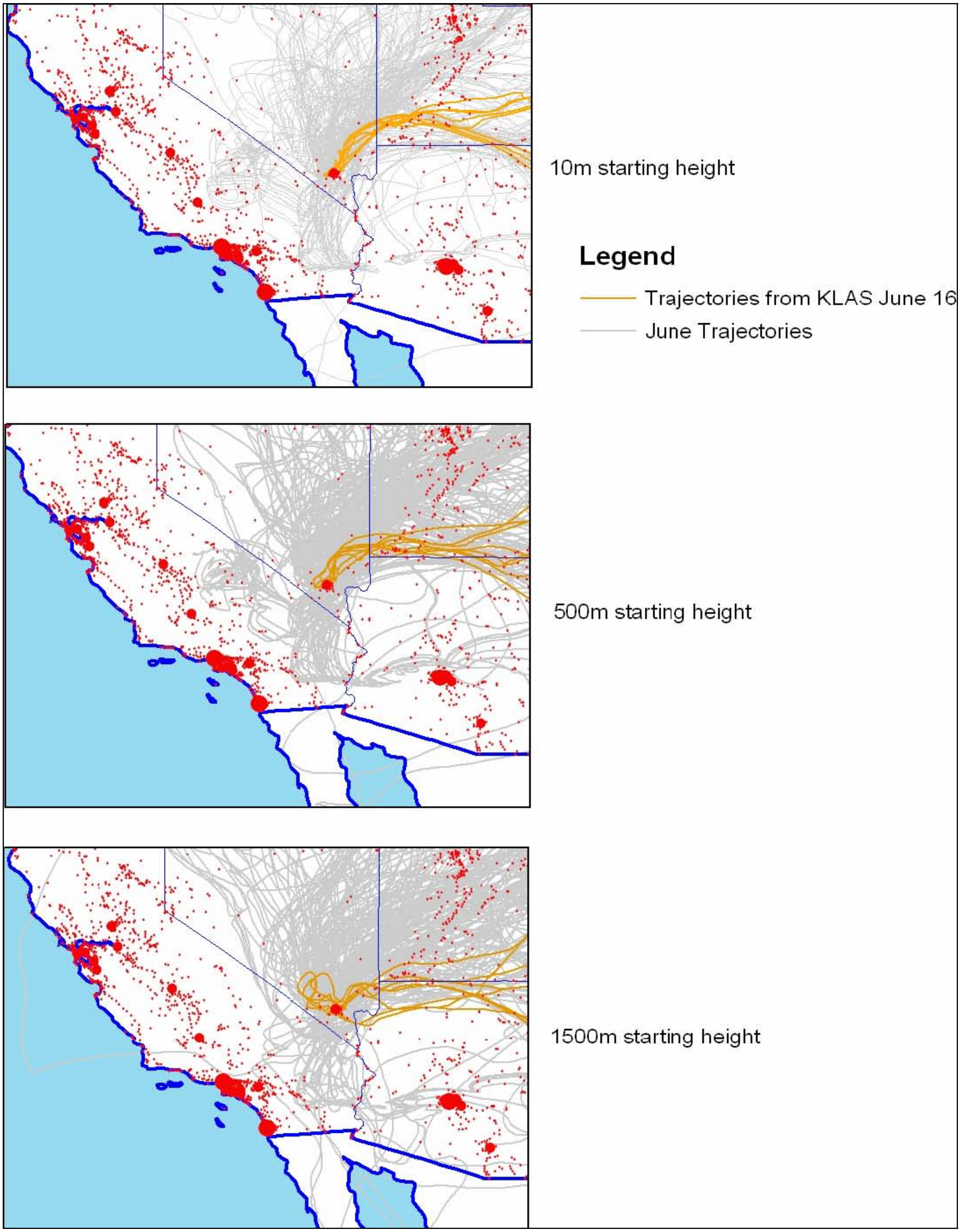

Figure 4.7-4. June 16, 2002 Forward Trajectories for Days With Ozone >= 85 ppb.

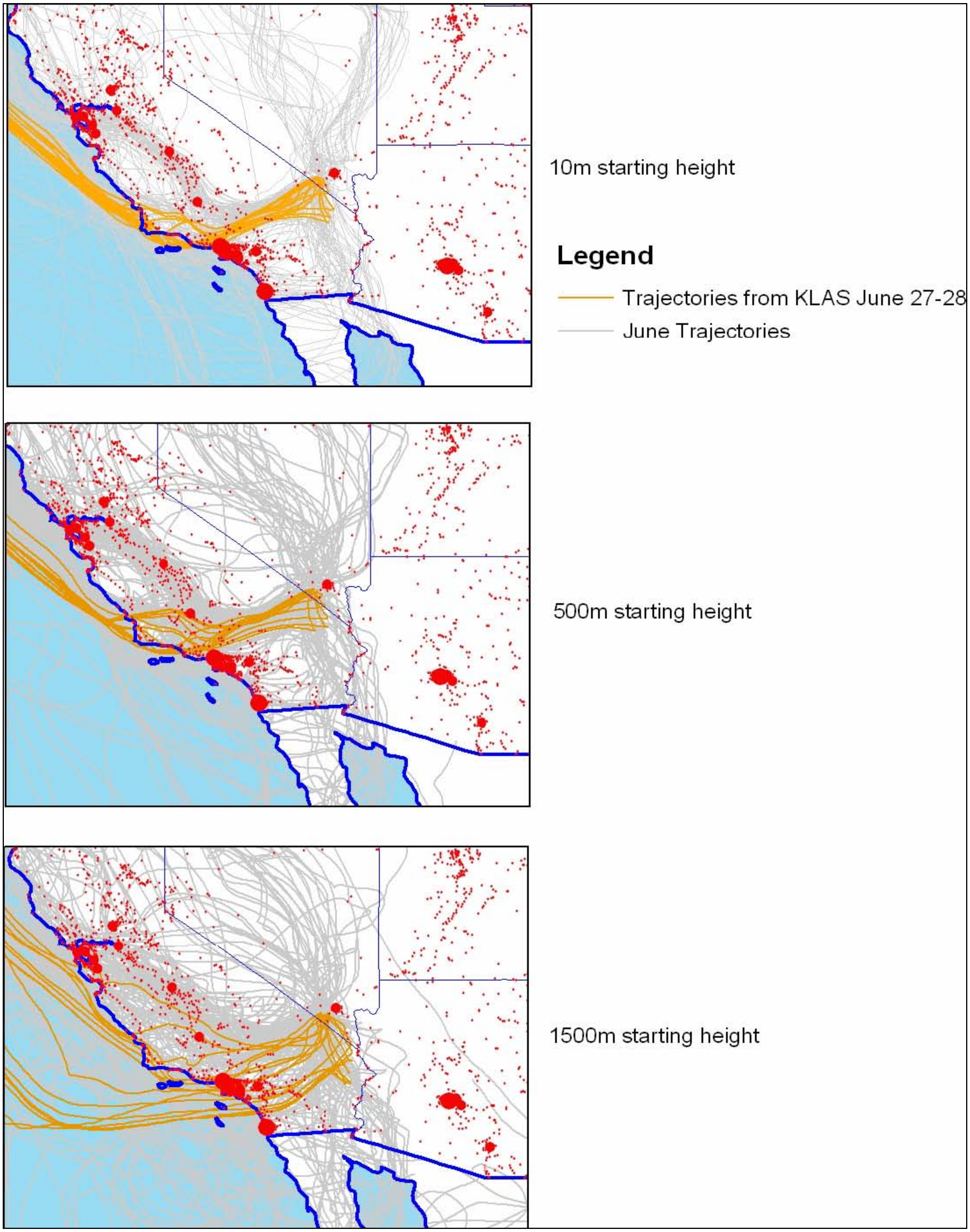

Figure 4.7-5. June 27-28, 2002 Back Trajectories for Days With Ozone >= 85 ppb.

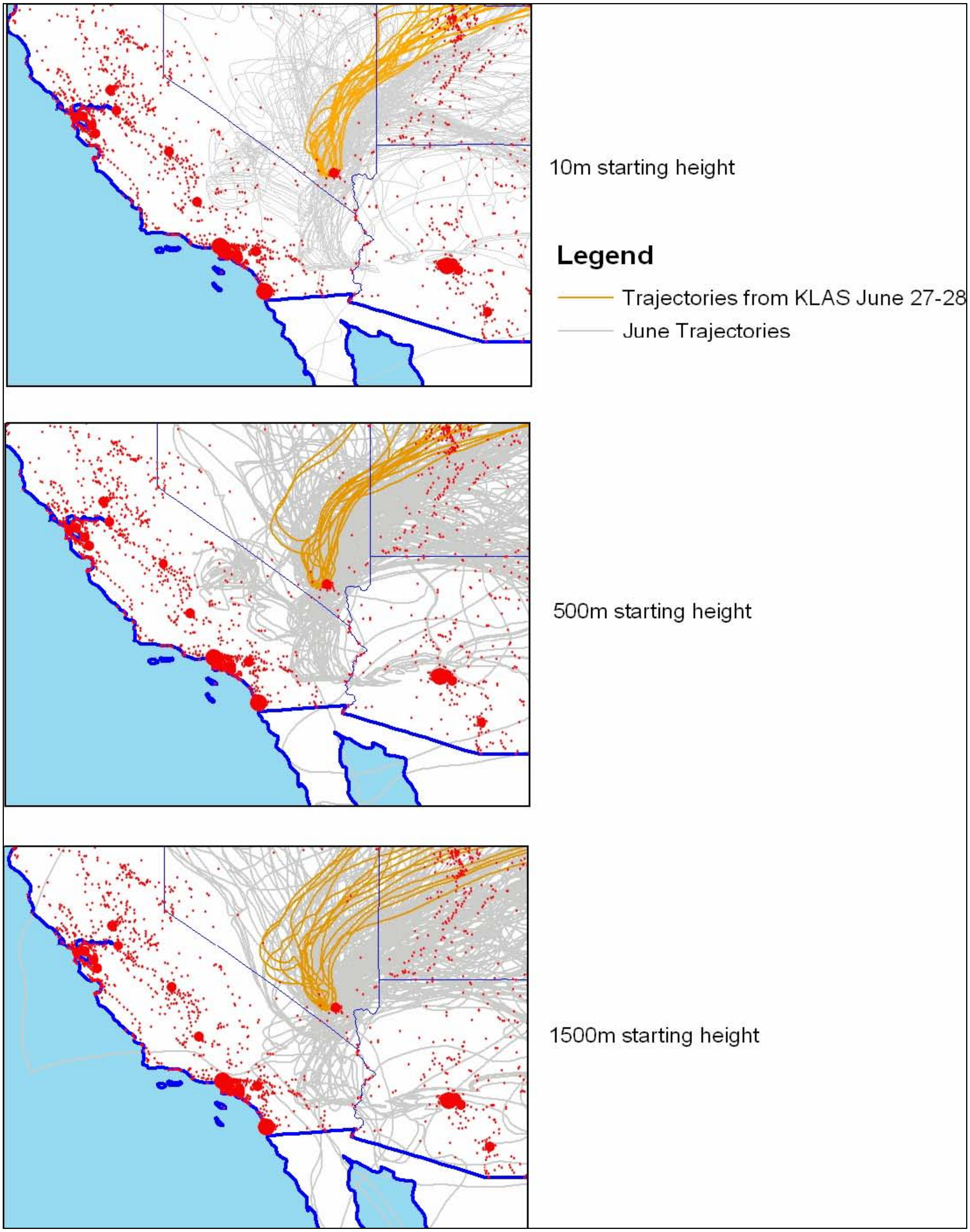

Figure 4.7-6. June 27-28, 2002 Forward Trajectories for Days With Ozone >= 85 ppb.

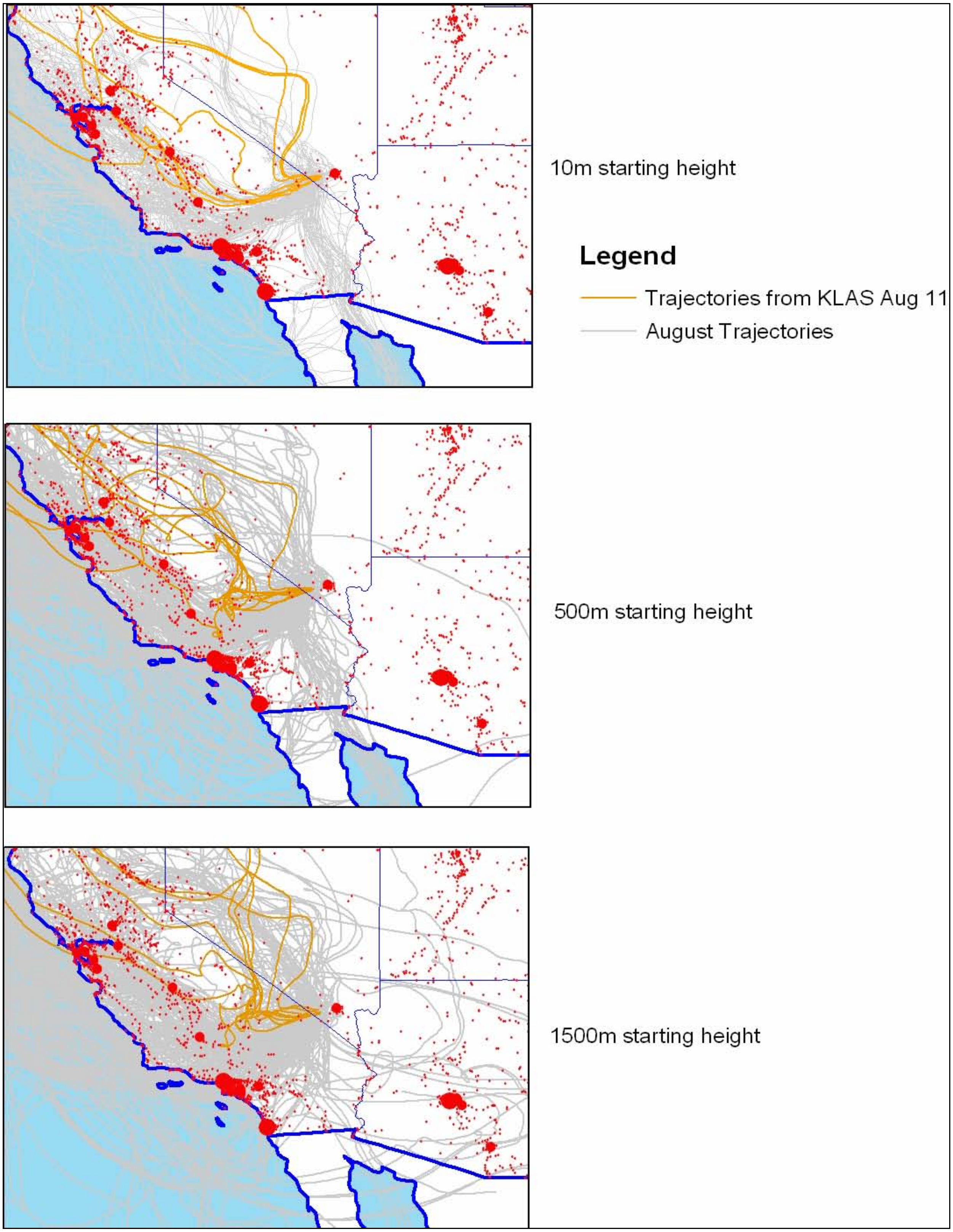

Figure 4.7-7. August 11, 2002 Back Trajectories for Days With Ozone >= 85 ppb.

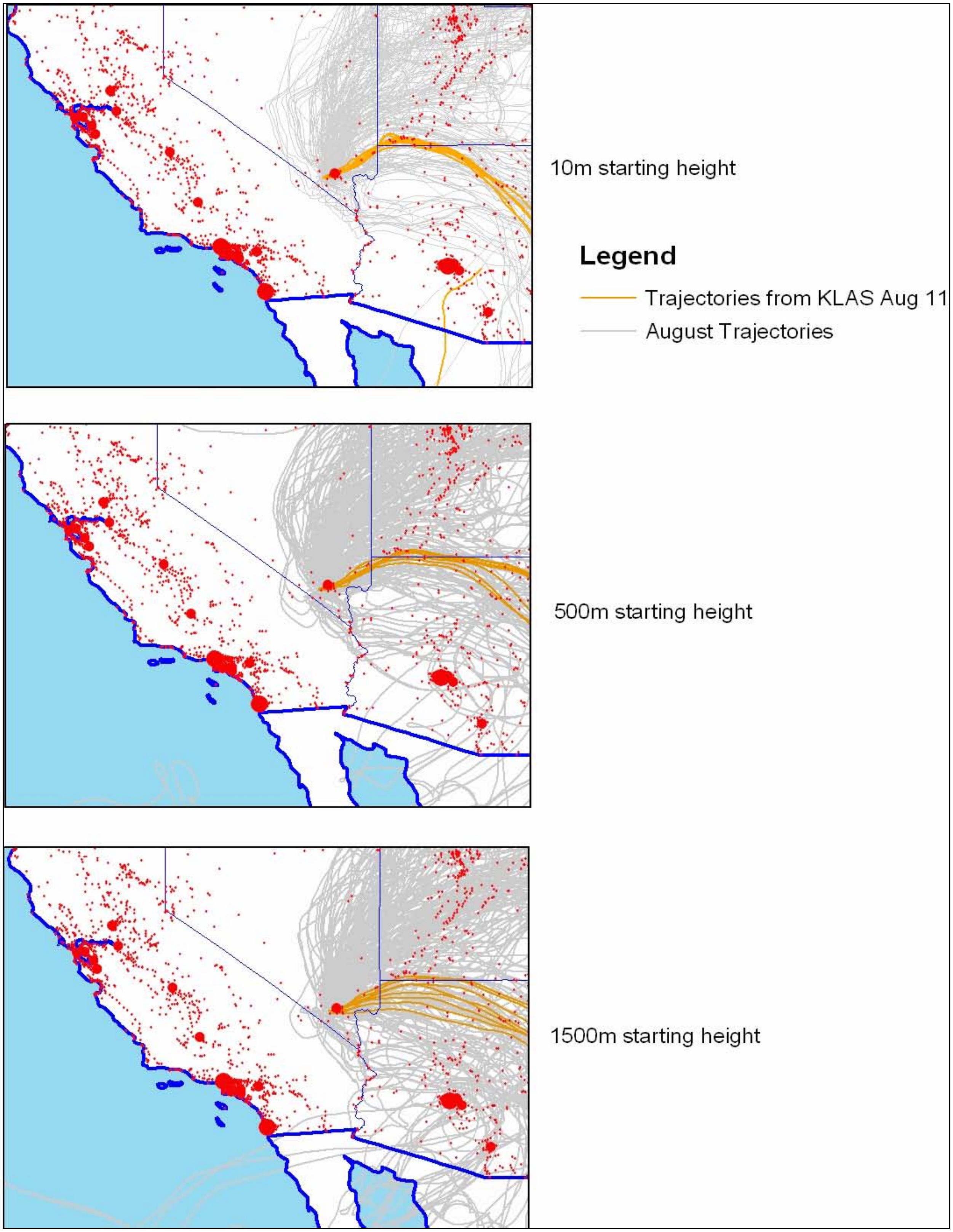

Figure 4.7-8. August 11, 2002 Forward Trajectories for Days With Ozone >= 85 ppb.

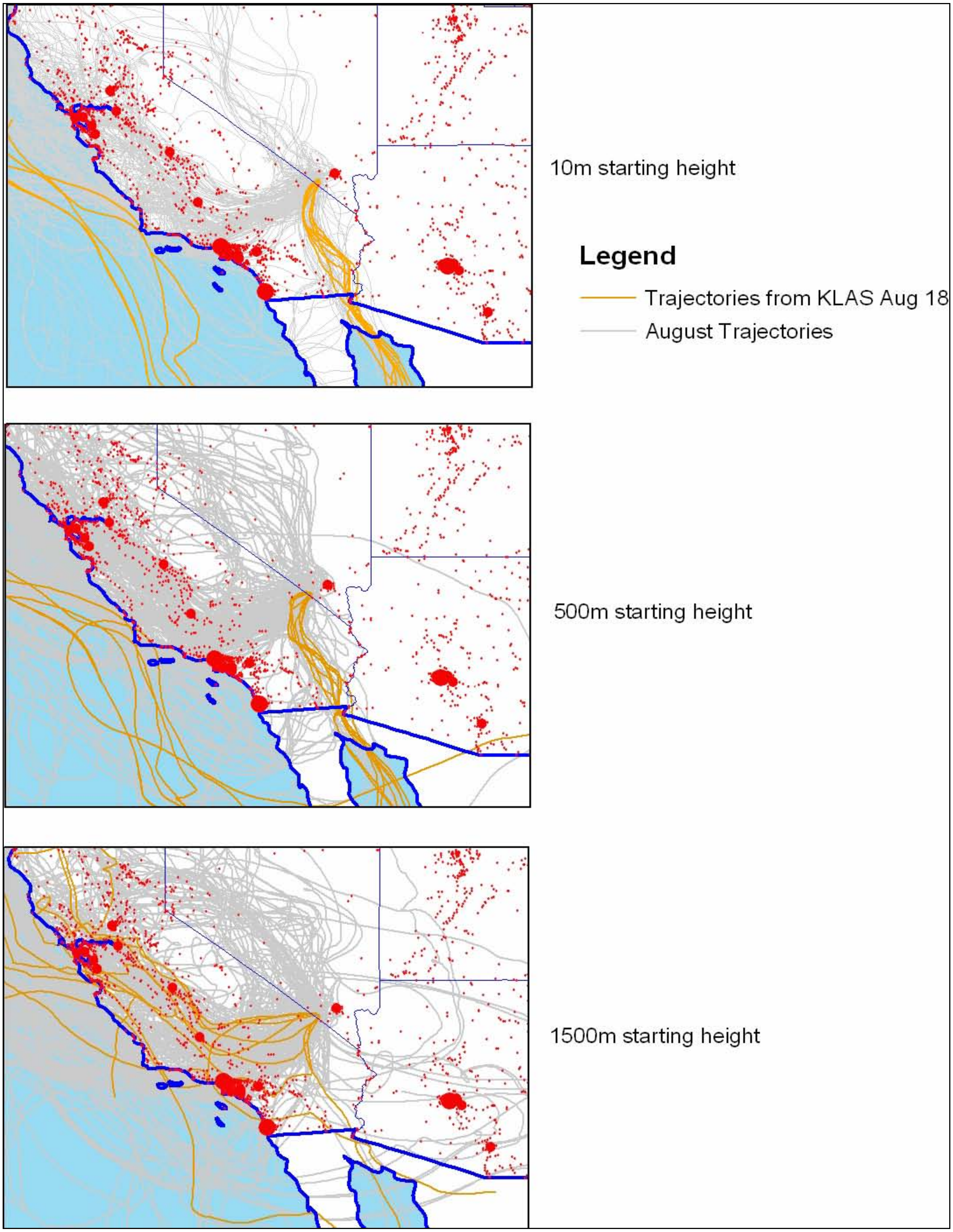

Figure 4.7-9. August 18, 2002 Back Trajectories for Days With Ozone >= 85 ppb.

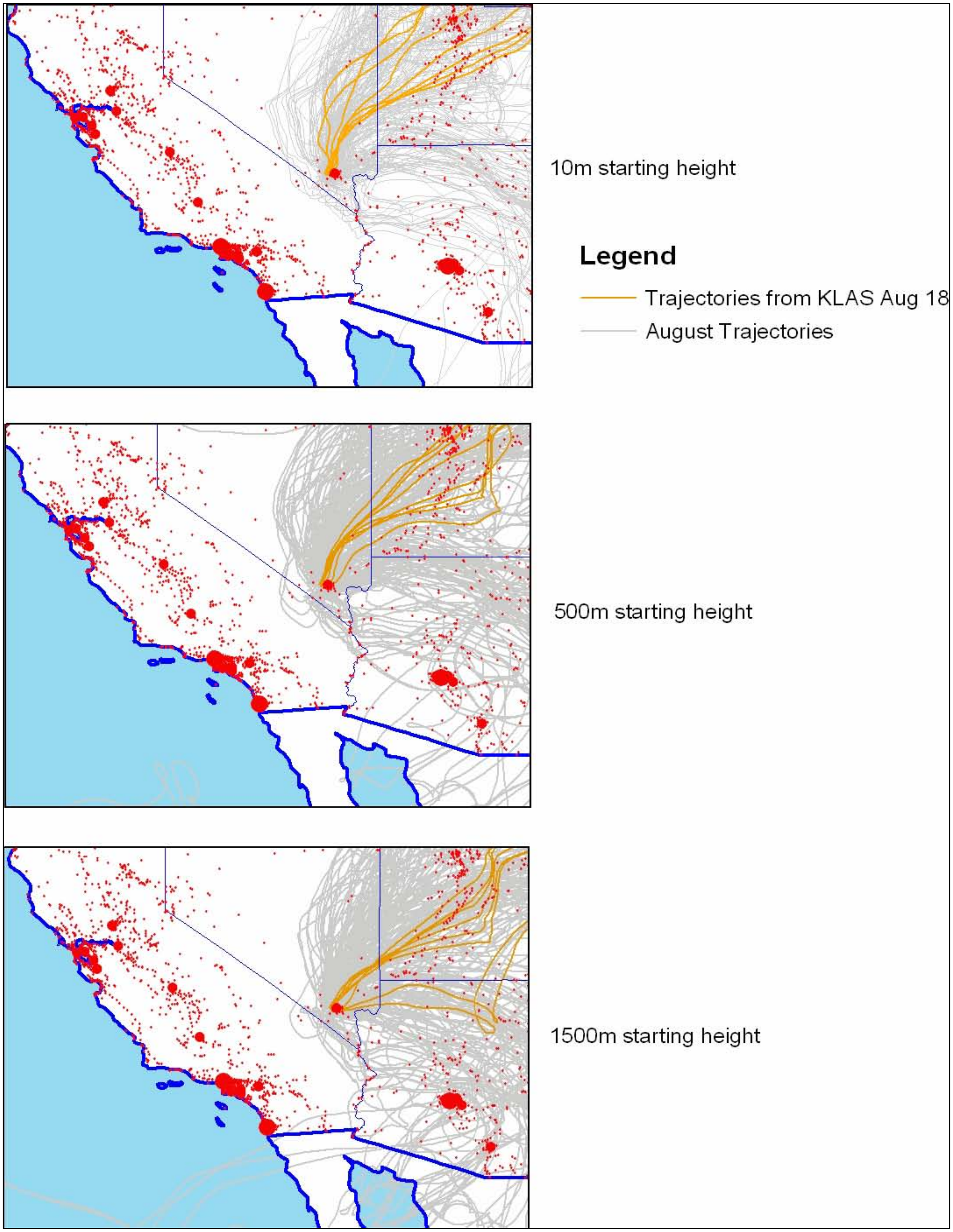

Figure 4.7-10. August 18, 2002 Forward Trajectories for Days With Ozone >= 85 ppb.

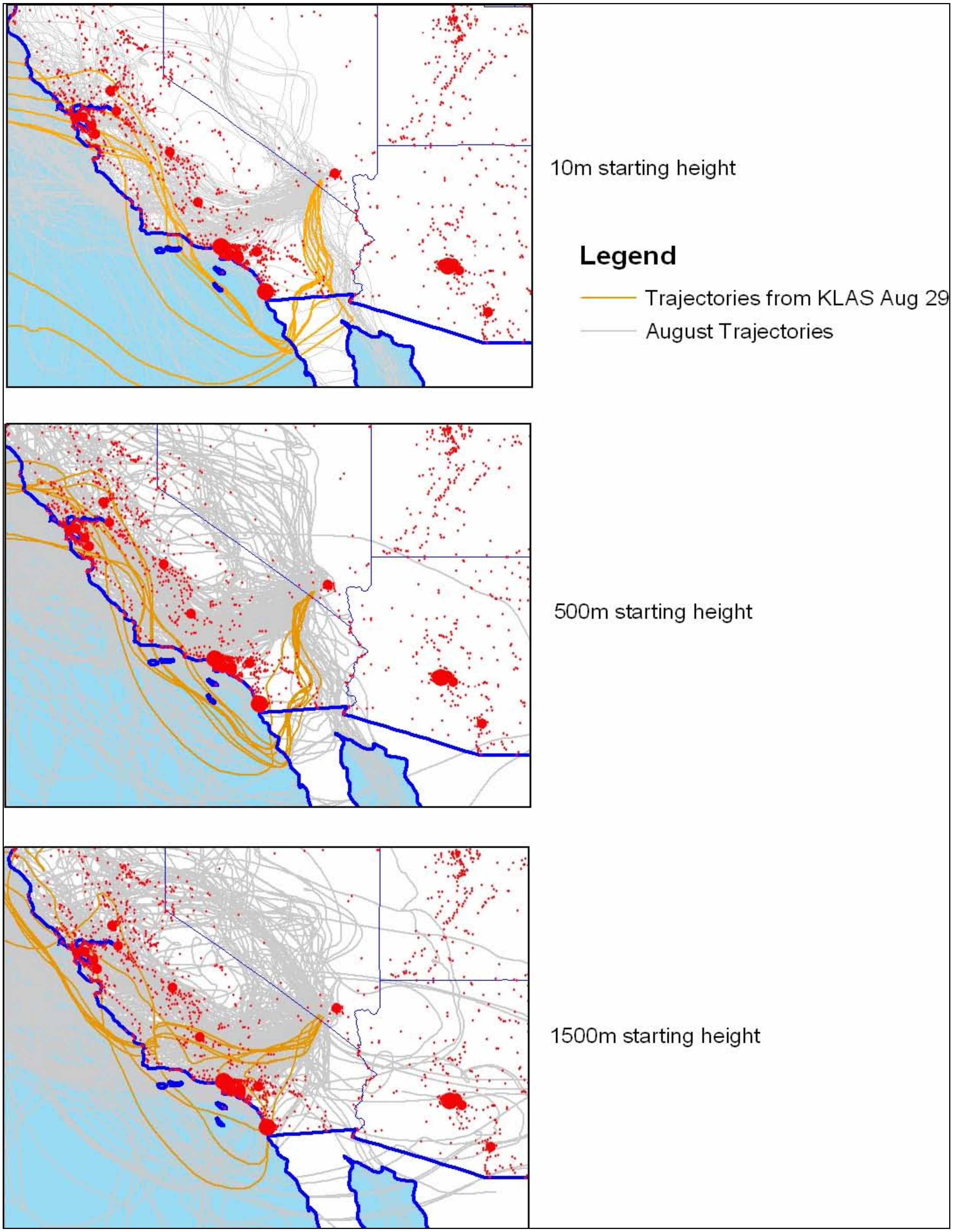

Figure 4.7-11. August 29, 2002 Back Trajectories for Days With Ozone >= 85 ppb.

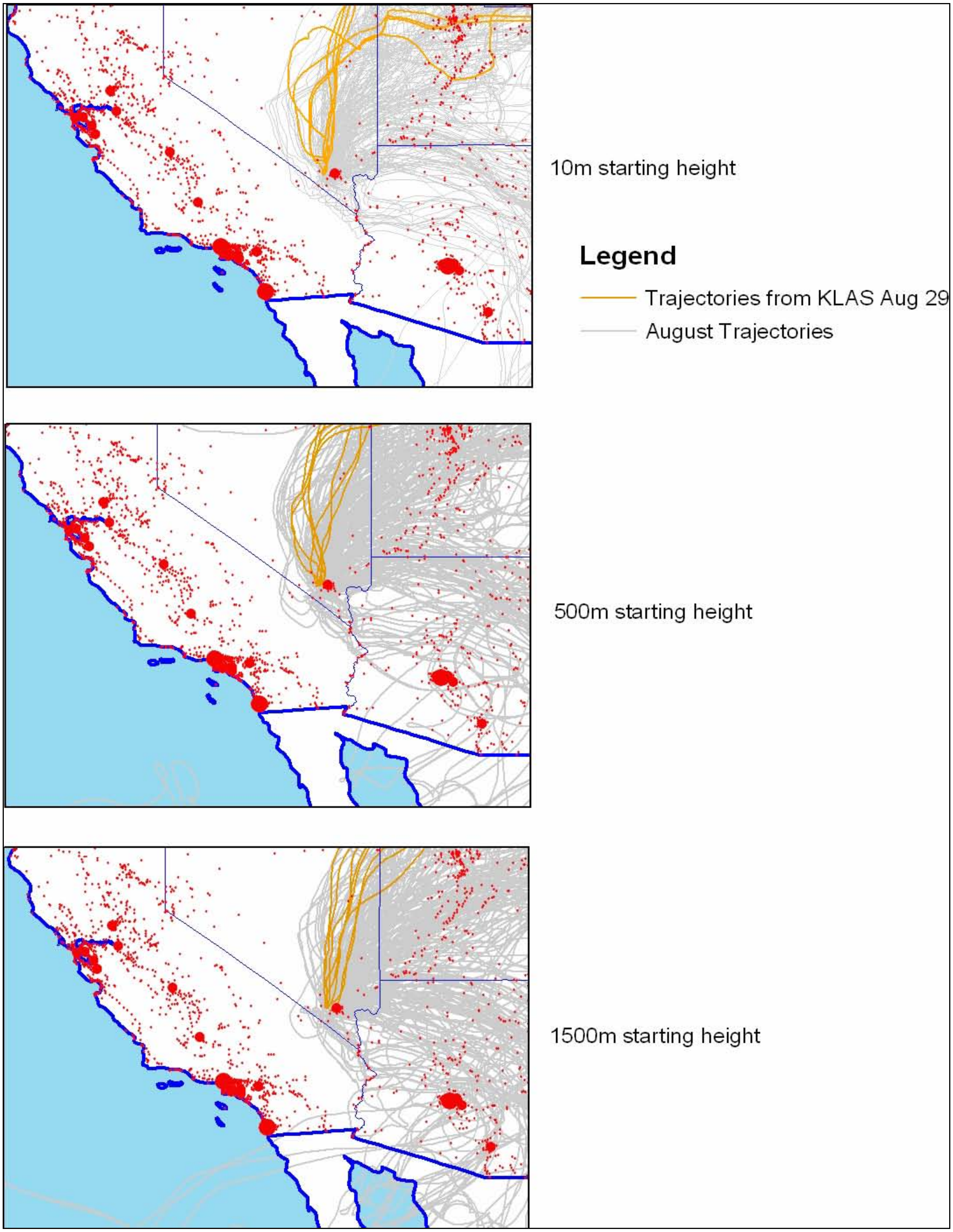

Figure 4.7-12. August 29, 2002 Forward Trajectories for Days With Ozone >= 85 ppb.

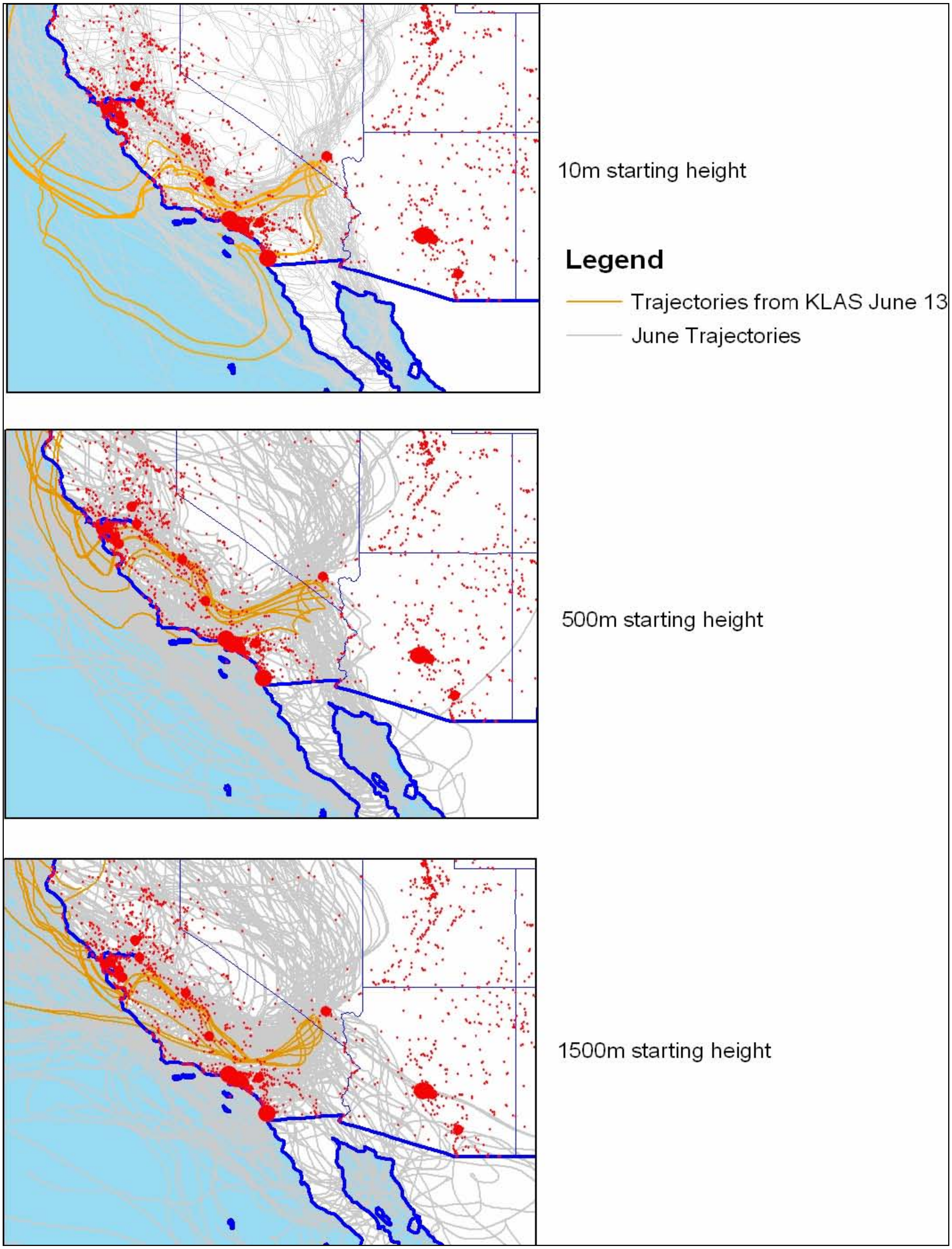

Figure 4.7-13. June 13, 2003 Back Trajectories for Days With Ozone >= 85 ppb.

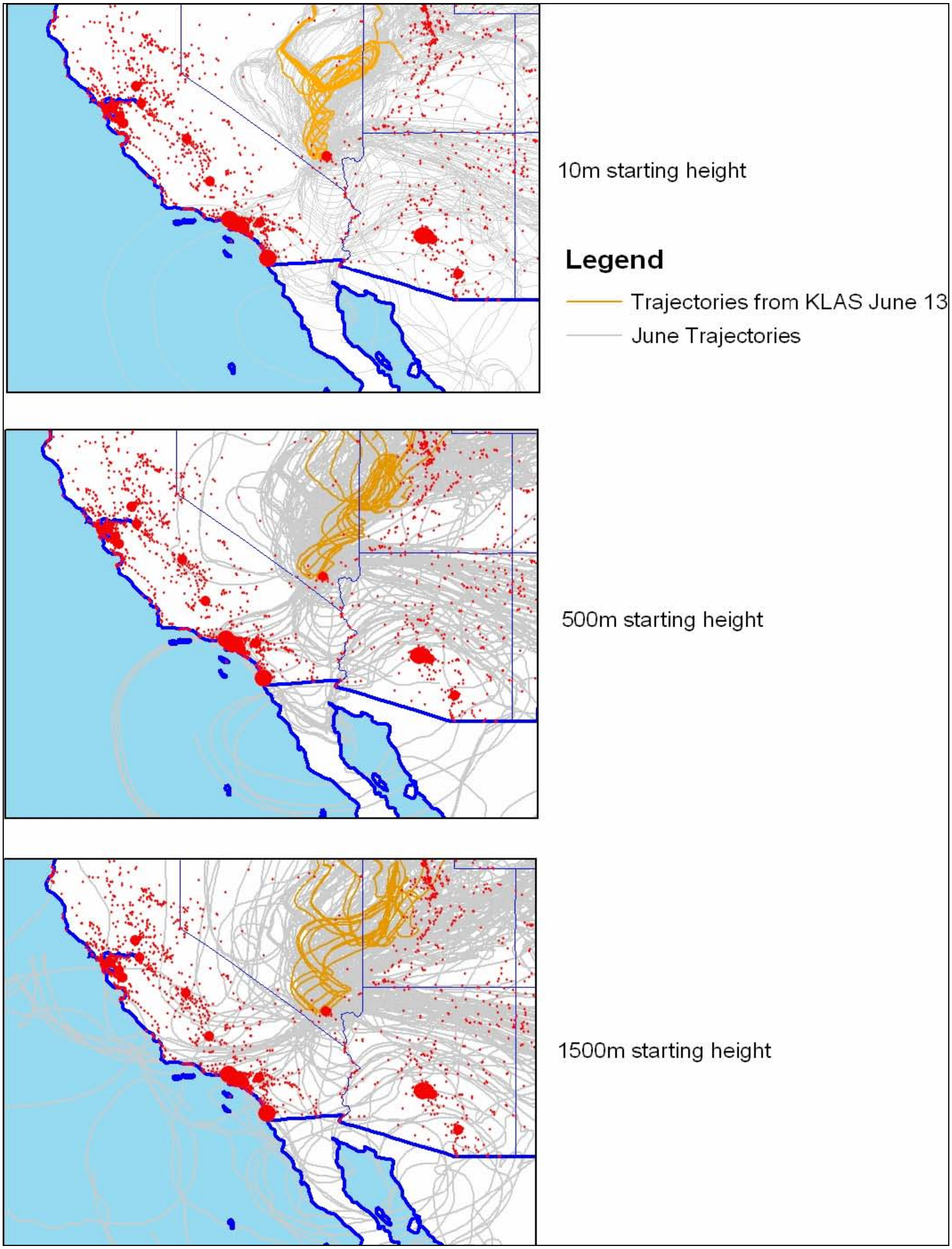

Figure 4.7-14. June 13, 2003 Forward Trajectories for Days With Ozone >= 85 ppb.

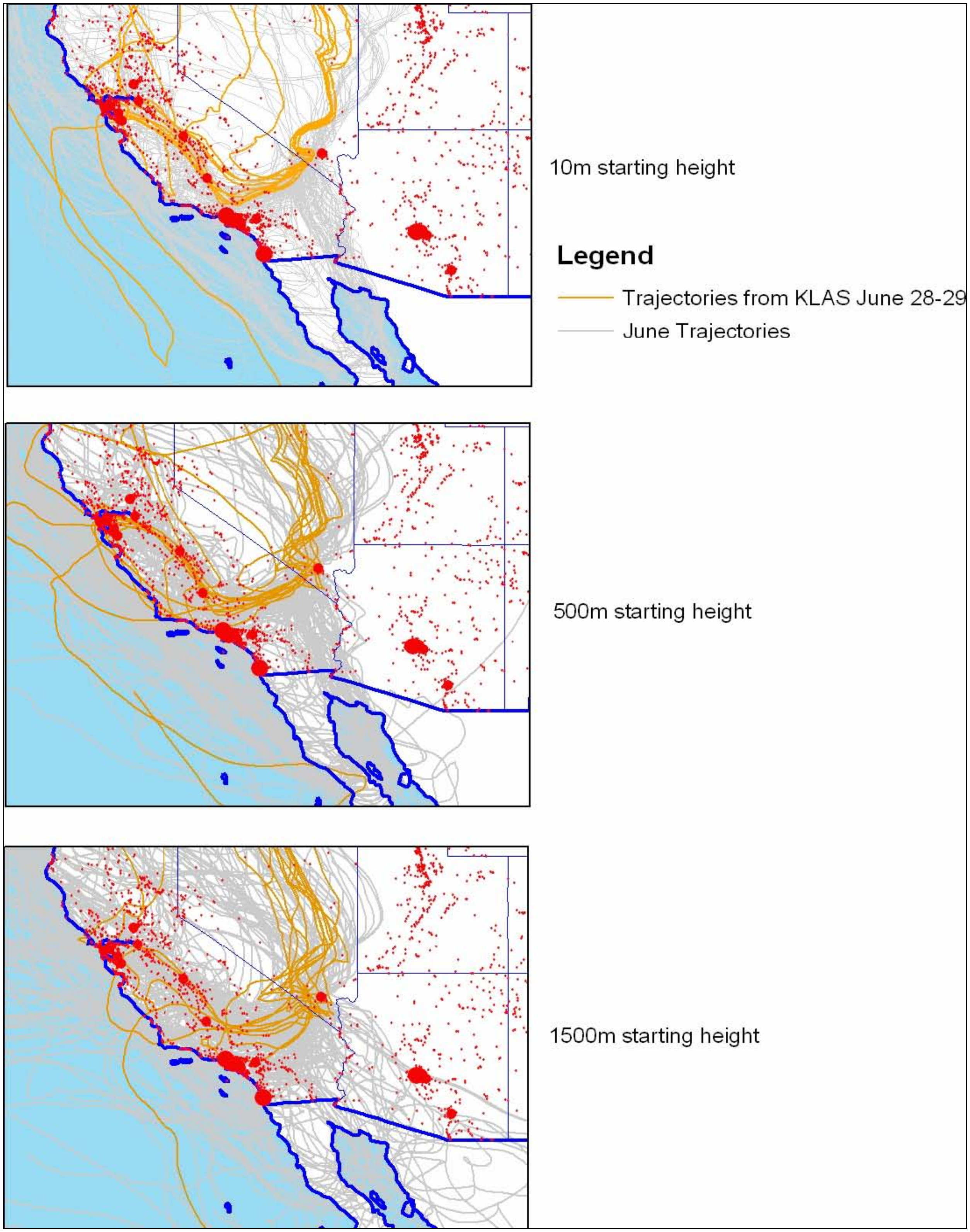

Figure 4.7-15. June 28-29, 2003 Back Trajectories for Days With Ozone >= 85 ppb.

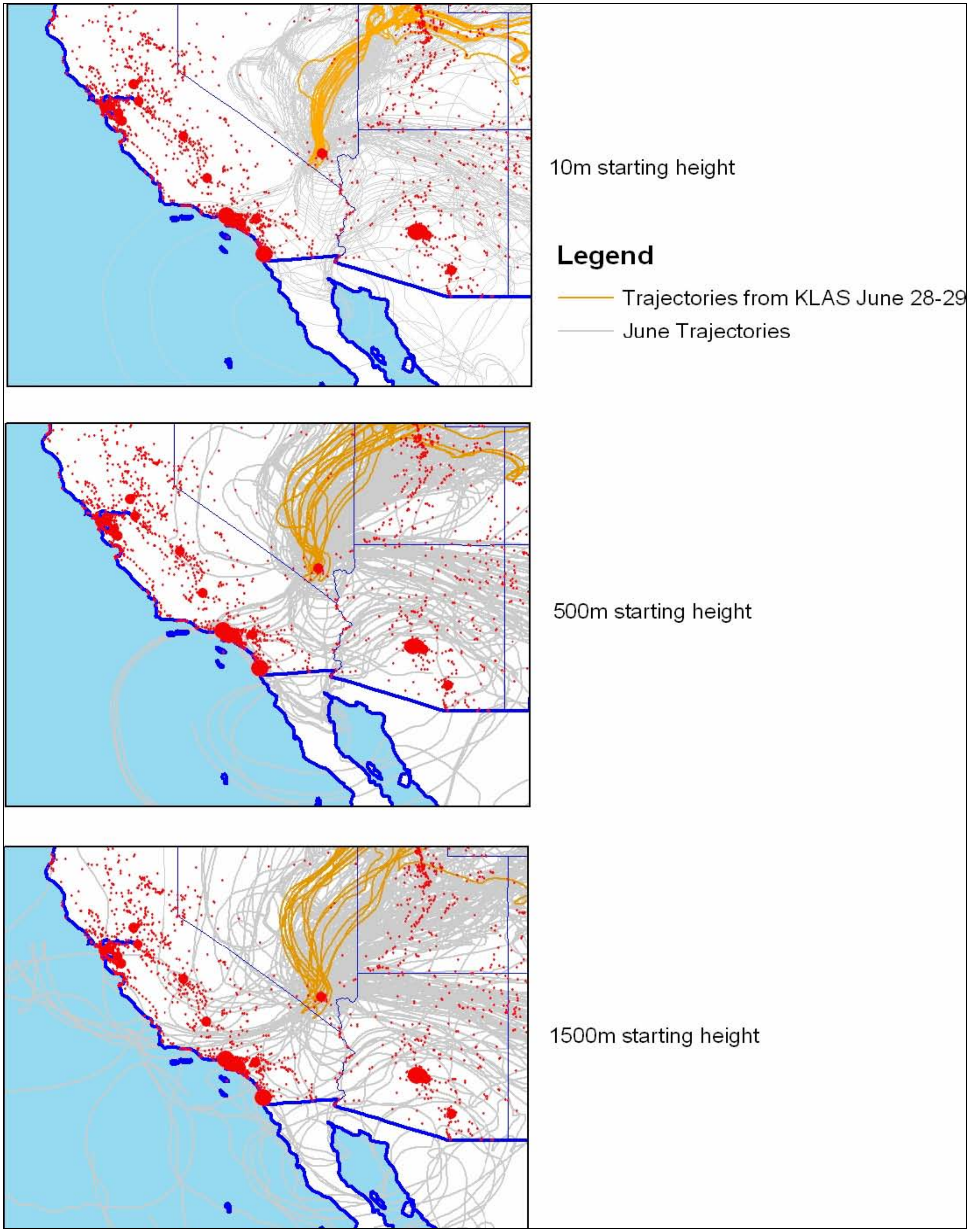

Figure 4.7-16. June 28-29, 2003 Forward Trajectories for Days With Ozone >= 85 ppb.

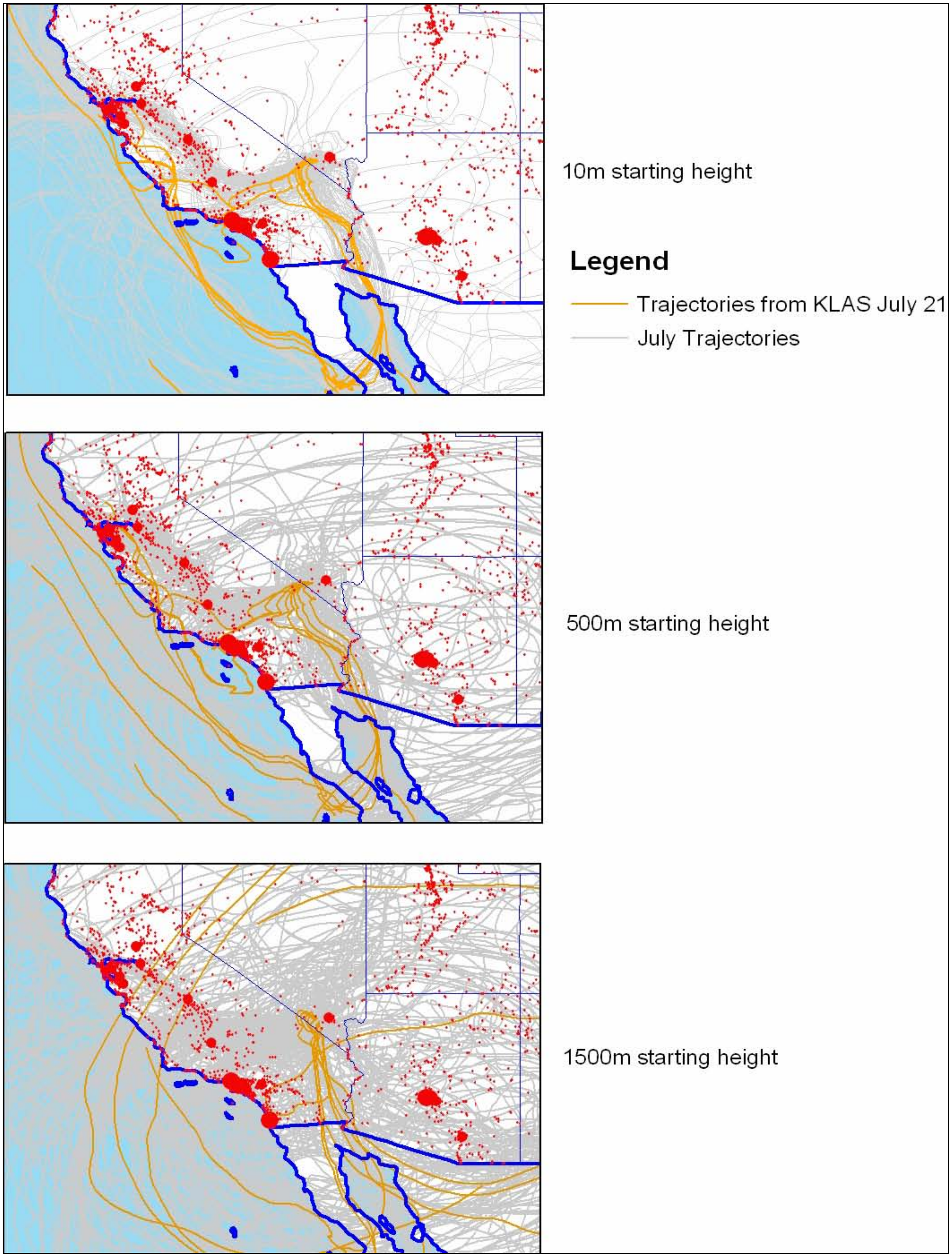

Figure 4.7-17. July 21, 2003 Back Trajectories for Days With Ozone >= 85 ppb.

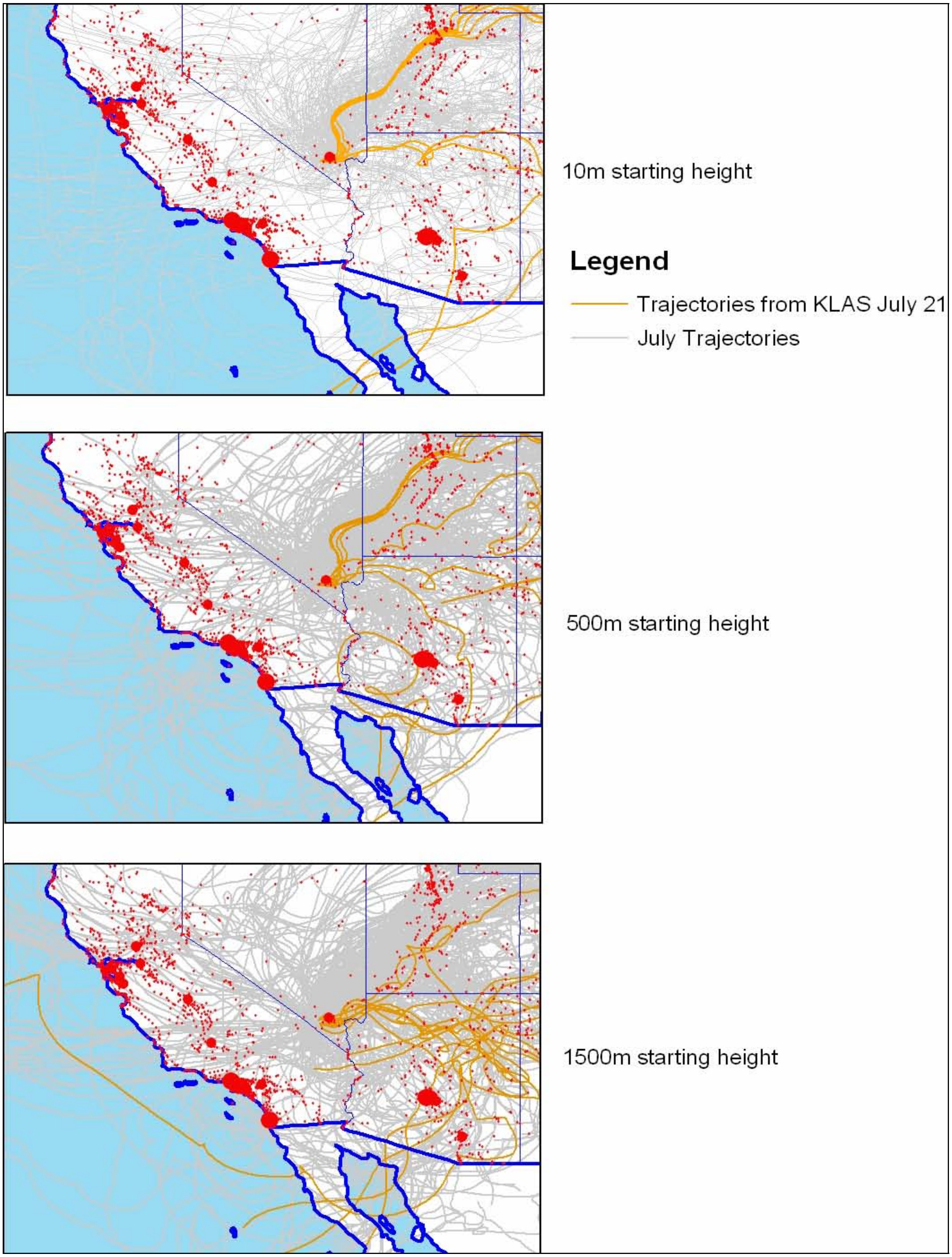

Figure 4.7-18. July 21, 2003 Forward Trajectories for Days With Ozone >= 85 ppb.

The back trajectories consistently show transport from the southwest to the northeast during high O_3 periods. These contrast to more variable flows during other periods of each month when O_3 levels are not as high in Clark County. These flows typically pass through the Ivanpah Valley where the Jean monitoring site is located and a good confirmation of transport from southern California.

The forward trajectories consistently show flow from the Las Vegas Valley to the northeast, along the I-15 corridor. These correspond to elevated O_3 concentrations measured at Apex, an indication of transport from O_3 produced in the Las Vegas Valley. The wind pattern continue from the Las Vegas Valley to Mesquite. O_3 concentrations monitored in Mesquite approximate the regional background level.

4.8 Geography and Topography

The geography in southern Nevada is characterized by basin and range topography. This topography was the basis for Nevada decision to use hydrographic areas as the air quality management unit throughout the state. Mountain ranges separating 256 hydrographic areas provide channeling and barriers to air pollution transport. Figure 3.4-1 shows the more detailed topography surrounding the Las Vegas Valley. Mountain ranges separate Las Vegas Valley from adjacent hydrographic areas:

- Spring Mountain Range to the west;
- McCullough Range to the south;
- Desert, Sheep, and Las Vegas Ranges to the north; and
- Frenchman and Sunrise Mountains to the east.

Las Vegas Valley opens north-northwest in the direction of Indian Springs, to the northeast in the direction of Apex, and from the south in the direction of Ivanpah Valley. These terrain features contain and channel local flows within, into, and out of neighboring hydrographic areas. The major roadways of I-15 and US-95 follow the lowlands and continue through natural passes between the Las Vegas Valleys and its neighboring valleys. The I-15 corridor, especially the portion to the southwest of the Las Vegas Valley into California, can be a large source of NO_x and VOC precursors to O_3. It is most likely that channeled flows along this natural topographic corridor will result in exchanges in both directions between the Ivanpah & Las Vegas Valleys and the Las Vegas & Apex Valleys.

4.9 Jurisdictional Boundaries

The Clark County area coincides with the jurisdictional boundary of the air quality management authorities in Nevada and Clark County. For all practical purposes air quality management is under the authority of Clark County Board of Commissioners and administered by DAQEM.

Figure 4.2-1 depicts land ownership within Clark County and the surrounding areas. Most of the land is under the control of several U.S. government agencies. The Bureau of Land Management (BLM) has the largest holdings, which include the Red Rock Conservation area to the west of Las Vegas. Most of the Spring Mountain Range, including Mt. Charleston, is within the boundaries of the Toyabe National Forest administered by the U.S. Forest Service (USFS). Less than 10% of the county is privately owned

Clark County has been and is in attainment of the 1-Hour Ozone NAAQS; therefore, an ozone nonattainment boundary has not been established.

Tribal lands are not within the jurisdiction of the State or Clark County air quality management authority.

Pursuant to Nevada Revised Statutes (NRS) §445B.500, the Governor has delegated regulatory authority for air quality management to the Clark County Board of Commissioners. Therefore, Jurisdictional boundaries do not impact the 8-Hour Ozone nonattainment boundary designation.

4.10 Level of Control of Emission Sources

Emission sources within the region comply with all existing rules and regulations through an enforceable program. Several federally enforceable control measures, specifically gasoline and diesel vehicle engine and fuel standards as well as application of New Source Review Rules and existing Stationary Source Performance Standards provide control for emissions sources in Clark County.

Vehicles are subject to the requirements of the Inspection and Maintenance (I/M) Program, which includes the Onboard Diagnostic (OBD) testing. More modern technologies are being incorporated into the on-road fleet with greater reductions and longevity associated with their emission control devices.

4.11 Regional Emission Reductions

Several emission reduction activities are being undertaken within Clark County, within the southern California/southern Nevada region, and at the national level that will result in emissions reductions over the coming decade. These include:

- New standards for on-road diesel fuels and emissions (U.S. EPA, 2001, Lloyd and Cackette, 2001, Chow, 2001): Diesel fuels will contain less than 15 ppmw sulfur by 2006 which will permit substantially lower on-road diesel emission standards starting in 2007. Diesel NO_x and $PM_{2.5}$ emissions will decrease as these new engines penetrate the fleet in the Las Vegas Valley, along the I-15 and US-95 corridors, and in southern California O_3 nonattainment areas.

- Proposed standards for non-road diesel fuels and emissions (U.S. EPA, 2003): These new standards will mimic the on-road standards but will be implemented over a longer time period.

- South Coast Air Basin and San Joaquin Valley SIPs: Reducing O_3 levels in these California nonattainment areas will probably result in some reduction in O_3 levels transported into the Clark County O_3 nonattainment area.

- Regional Haze Rule (U.S. EPA, 1999, Watson, 2002): Regional Planning Organizations (RPO) will be mandating emission reductions to achieve natural visibility levels in mandatory Class I areas by 2065. Most of these measures will address light scattering and absorbing aerosols, but there will be co-benefits as NO_x and VOC reductions are sought to reduce ammonium nitrate levels.

6. CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

The State of Nevada and Clark County recommend that the U.S. EPA modify the nonattainment boundary for the 8-Hour Ozone National Ambient Air Quality standard (NAAQS) of the April 15, 2004 designation of Clark County as nonattainment. Nevada recommends that the U.S. EPA designate a portion of Clark County as nonattainment for the 8-Hour Ozone NAAQS consisting of the following: Ivanpah Valley (hydrographic areas 164A, 164B, 165, and 166), Eldorado Valley (hydrographic area 167), Las Vegas Valley (hydrographic area 212), Colorado River Valley (hydrographic area 213), Paiute Valley (hydrographic area 214), Apex Valley (hydrographic areas 216 and 217), and a portion of Moapa Valley (hydrographic area 218).

The remainder of the hydrographic areas in Clark County are rural, sparsely populated, not significant sources of ozone precursors, and are geographically isolated from the Las Vegas Valley, which is both the source and receptor of O_3 and O_3 precursors. There is little transport of O_3 precursors to the remainder of Clark County and those hydrographic areas are not affected by the O_3 produced in the urban core of Clark County.

6.2 Recommended 8-Hour Ozone NAAQS Nonattainment Boundary

The recommended nonattainment area is smaller than the boundary of Clark County. The boundary also meets the definition in §107(d)(1)(A)(i) of the Clean Air Act, and addresses the criteria identified in U.S. EPA's March 2000 guidance.

Considering the examination of all 11-factors in Section 4, the nonattainment area specified in Figure 6.2-1 is recommended. This consists of the following hydrographic areas:

- 164A, 164B, 165, and 166 – Ivanpah Valley
- 167 – Eldorado Valley
- 212 – Las Vegas Valley
- 213 – Colorado River Valley
- 214 – Paiute Valley
- 216 and 217 – Apex Valley
- 218 – Moapa Valley

The Ivanpah Valley should be included in the nonattainment area due to mobile source emissions along the I-15 corridor and emissions from major point sources. In addition, prevailing wind direction and high O_3 readings at Jean is evidence of transport from southern California.

The Eldorado Valley should be included in the nonattainment area due to emissions from the Eldorado Energy power plant, and transport from the Mohave power plant. The Mohave tracer study indicates transport from and through the Eldorado Valley to the Las Vegas Valley.

The Las Vegas Valley must be included because it contains most of the emissions, the highest O_3 concentrations, evidence of local O_3 generation, and the major population exposure. This area will be the major focus of emission reduction activities.

The Colorado River Valley should be included in the nonattainment area due to emissions from the Mohave power plant. The Mohave tracer study indicates transport from the power plant to the Las Vegas Valley.

The Piaute Valley should be included in the nonattainment area due to transport from the Mohave power plant. The Mohave tracer study indicates transport from the power plant to the Las Vegas Valley.

The Apex Valley should be included in the nonattainment area due to emissions from point sources and mobile source emissions along the I-15 corridor. There is transport from the Las Vegas Valley to Apex Valley and from the Reid Gardner power station to Apex Valley. Furthermore, the Apex Valley had exceedences of the 8-Hour Ozone NAAQS in 2002, 2003, and 2004. Due to the close proximity to the Las Vegas Valley, emission from major point sources and mobile source emissions along the I-15 corridor may impact the Las Vegas Valley with wind shifts.

Hydrographic area 218, located in the Moapa Valley, should be included in the nonattainment area due to emissions from the Reid Gardner power plant and mobile source emissions along the I-15 corridor. Due to the close proximity to the Las Vegas Valley and because there are no geographic barriers adjoining Apex Valley, transport emissions from major point sources and mobile source emissions along the I-15 corridor may impact a southwest portion of hydrographic area 218.

The remaining hydrographic areas should not be included in the nonattainment area for the following reasons:

- They are sparsely populated, less than 2% of the total County population.
- There is lack of evidence that these areas will impact the recommended nonattainment area.
- There are insignificant point and mobile source emissions.
- Geographic and topographic features separate these areas from the recommended nonattainment area.
- Owing to regional O_3 levels measured at Mesquite, northeastern basins beyond those designated are excluded from the nonattainment area.

The recommended area excludes the Las Vegas Paiute Tribal Community, and the Moapa Band of the Paiute Tribal Land.

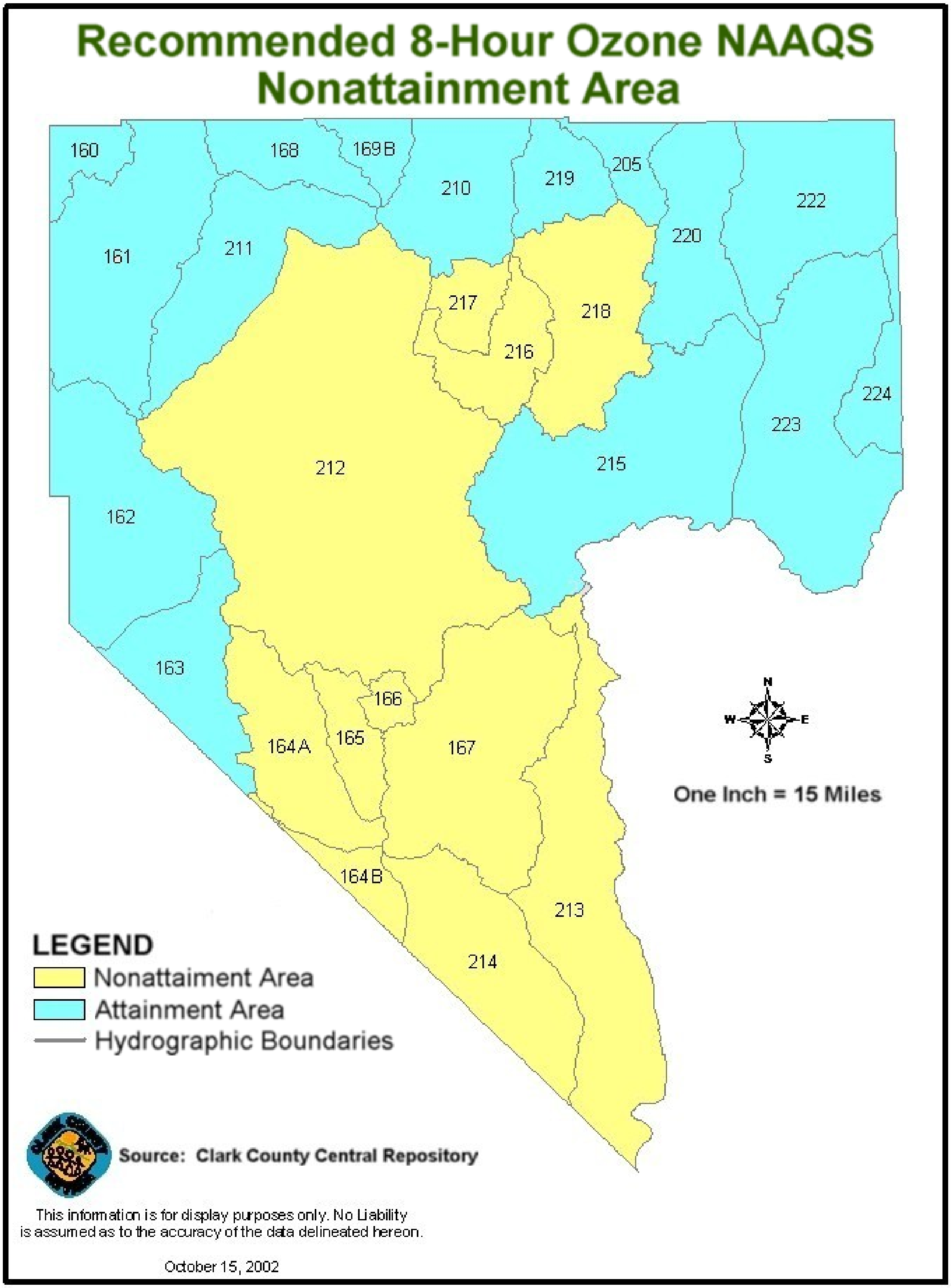

Figure 6.2-1. Recommended 8-Hour Ozone NAAQS Nonattainment Area

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