

US EPA ARCHIVE DOCUMENT

Variations of the Extent of Reaction During One-Hour and Eight-Hour Ozone Episodes in Central California

March 19, 2002

Statistical summaries of the extent of reaction during afternoon hours were prepared to illustrate two types of variations. First, summaries are shown compared with the sequence of days within ozone episodes. Both one-hour and eight-hour episodes are examined. Second, comparisons are made between days when hourly ozone values exceeded the federal one-hour ozone standard (one-hour episodes) and days when eight-hour daily maxima exceeded the eight-hour standard but peak hourly values remained below the one-hour standard.

At some sites in the central and southern San Joaquin Valley, the extent of reaction increased during the course of multi-day one-hour ozone episodes. This finding indicates that ozone formation became more NO_x -limited over the course of multi-day one-hour episodes at such sites. These increases were not as evident for multi-day eight-hour episodes.

At all sites, the frequency of VOC-limited days was greater during eight-hour ozone episodes that were not also one-hour episodes than during one-hour episodes.

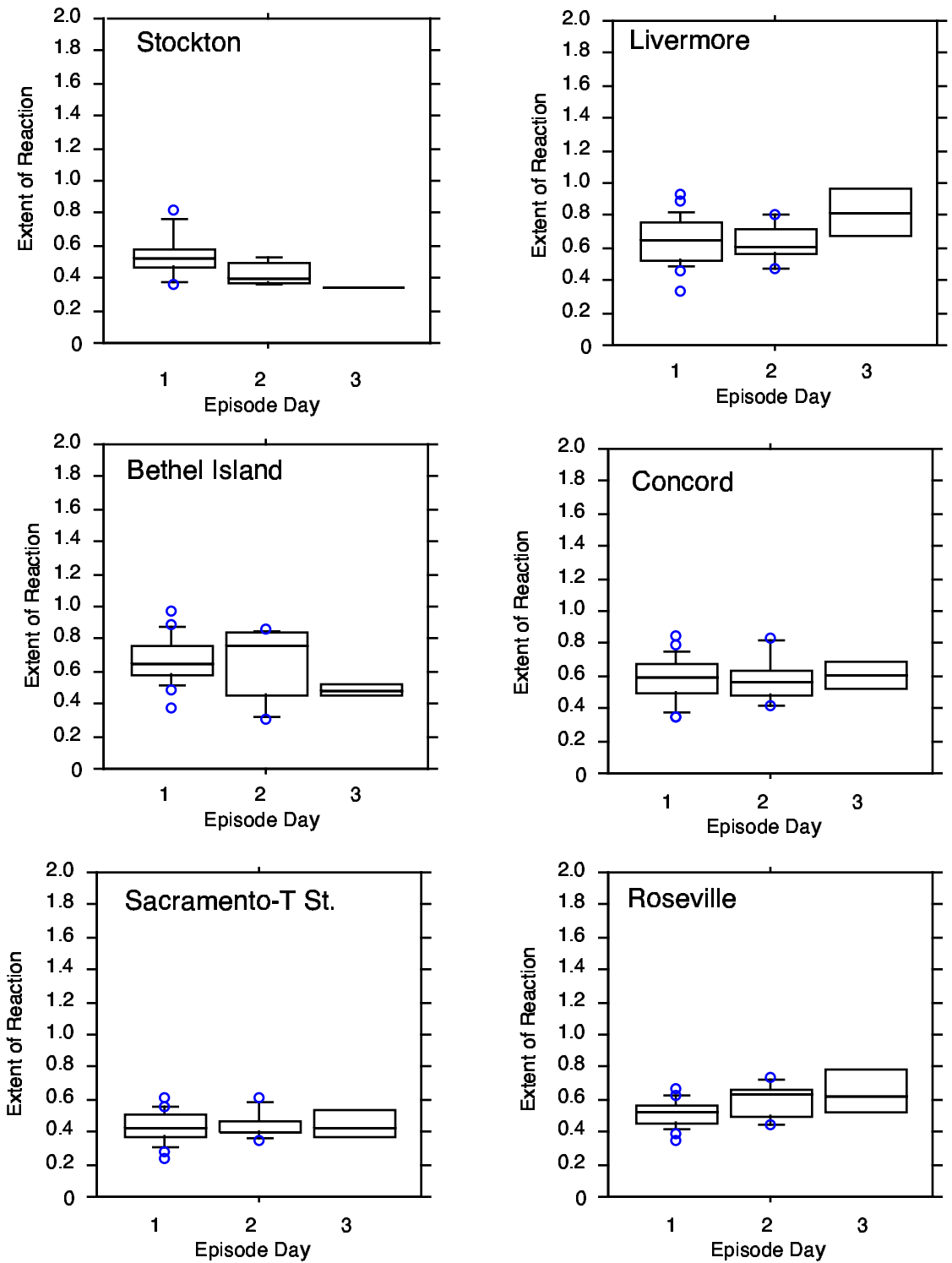


Figure 1. Extent of reaction during 1-hour episode days in the San Francisco, Sacramento and northern San Joaquin Valley areas for 1994-2000 versus sequence of days within an episode. Episode days were defined as days when any site in a region exhibited peak hourly ozone concentration exceeding 124 ppbv. For this determination, the San Francisco, Sacramento, and northern San Joaquin Valley were treated as separate regions. Extent was averaged over the sampling hours of noon through 4 pm.

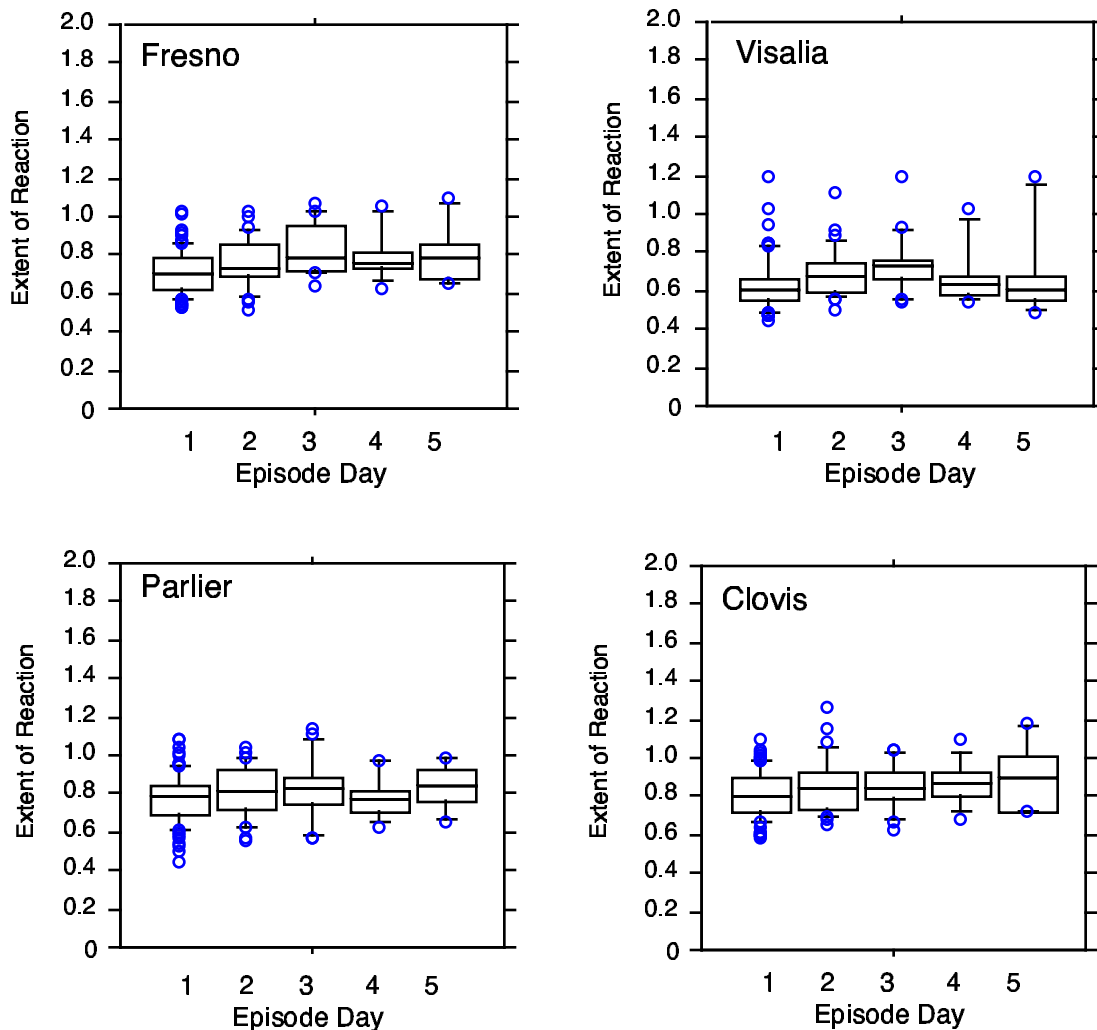


Figure 2. Extent of reaction during 1-hour episode days in the central San Joaquin Valley for 1994-2000 versus sequence of days within an episode. Episode days were defined as days when any site in the central San Joaquin Valley exhibited peak hourly ozone concentration exceeding 124 ppbv. Extent was averaged over the sampling hours of noon through 4 pm.

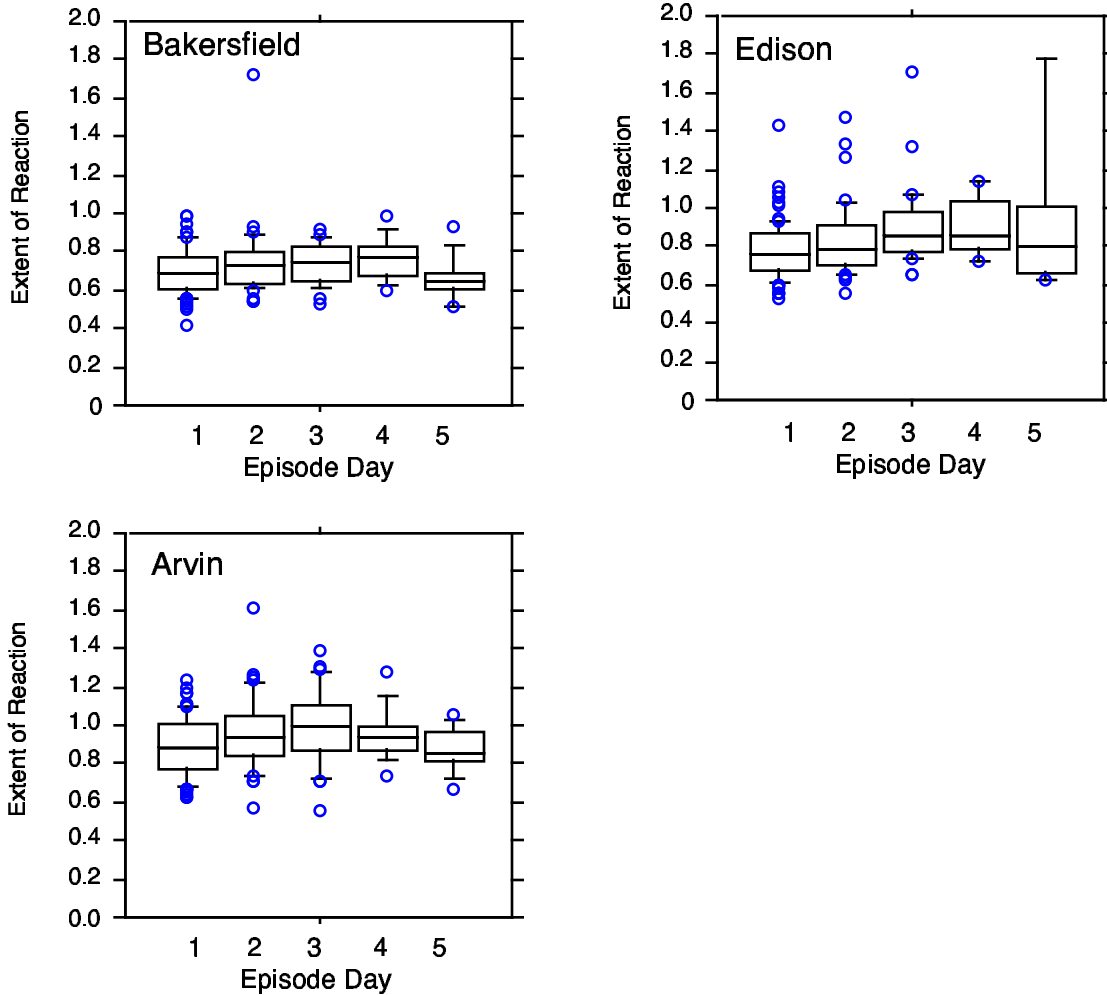


Figure 3. Extent of reaction during 1-hour episode days in the southern San Joaquin Valley (Kern County) for 1994-2000 versus sequence of days within an episode. Episode days were defined as days when any site in the central San Joaquin Valley exhibited peak hourly ozone concentration exceeding 124 ppbv. Extent was averaged over the sampling hours of noon through 4 pm.

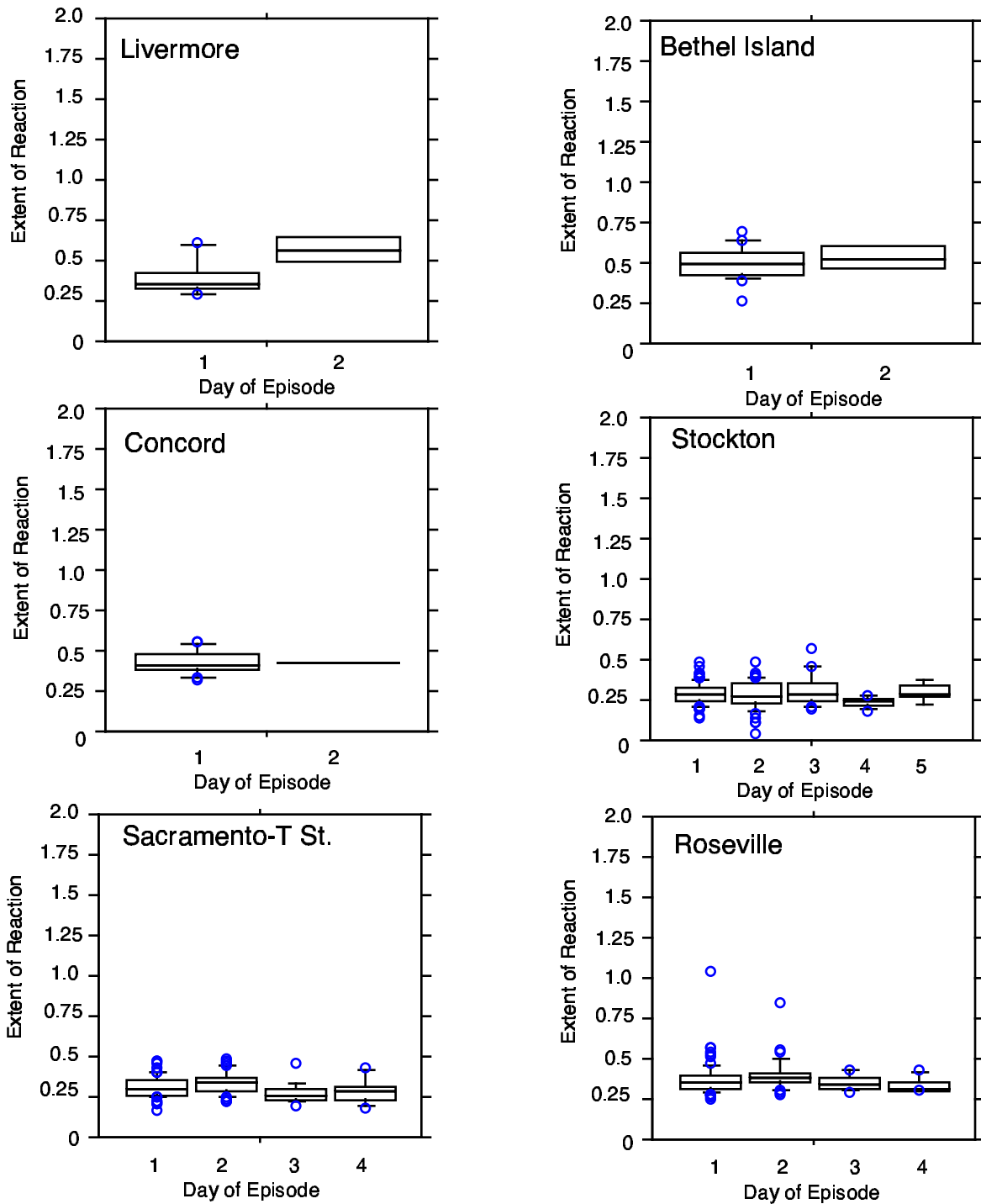


Figure 4. Extent of reaction during 8-hour episode days in the San Francisco Bay area for 1994-2000 versus sequence of days within an episode. Episode days were defined as days when any site in a region exhibited peak 8-hour ozone concentration exceeding 84 ppbv. For this determination, the San Francisco, Sacramento, and northern San Joaquin Valley were treated as separate regions. Extent was averaged over the sampling hours of noon through 4 pm.

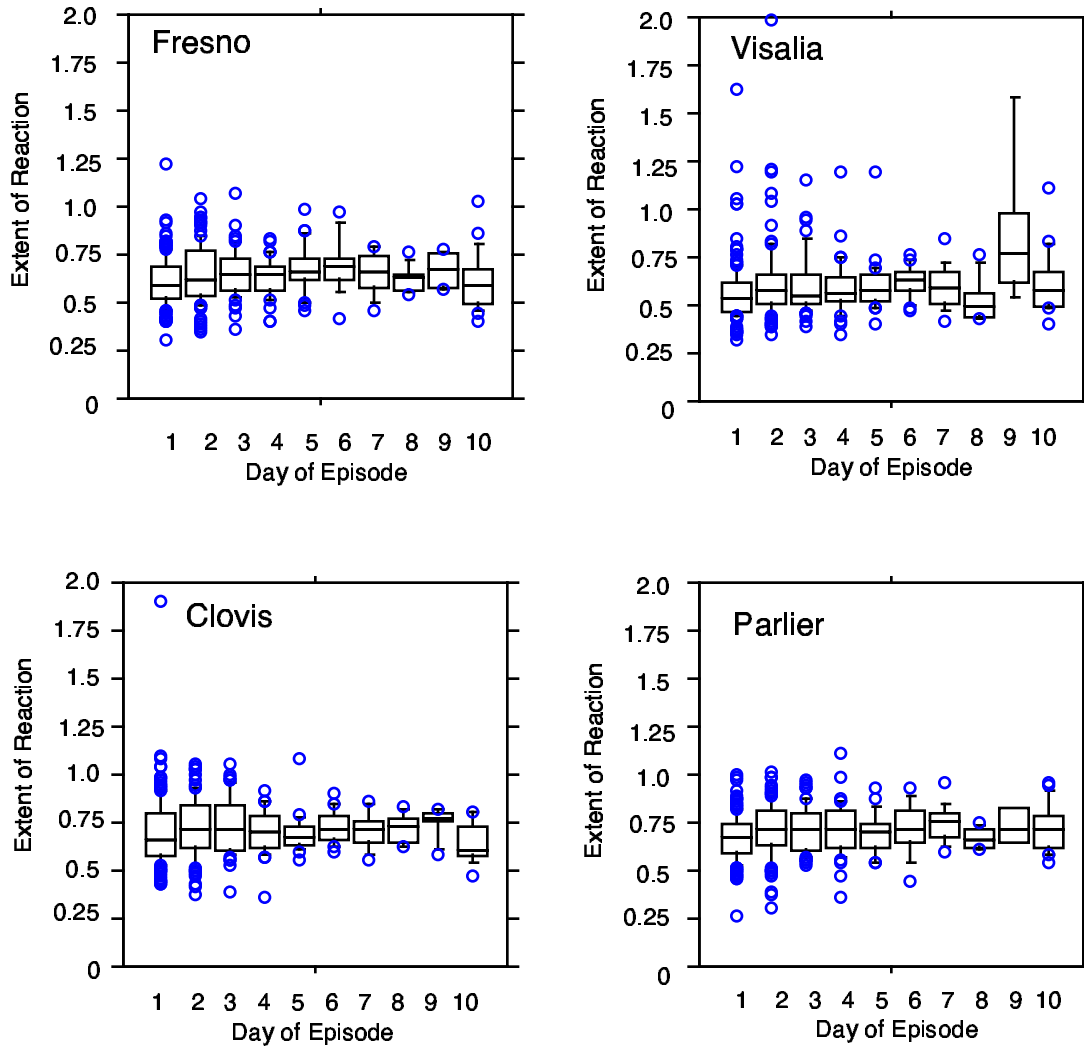


Figure 5. Extent of reaction during 8-hour episode days in the central San Joaquin Valley (Kern County) for 1994-2000 versus sequence of days within an episode. Episode days were defined as days when any site in the central San Joaquin Valley exhibited peak 8-hour ozone concentration exceeding 84 ppbv. Extent was averaged over the sampling hours of noon through 4 pm.

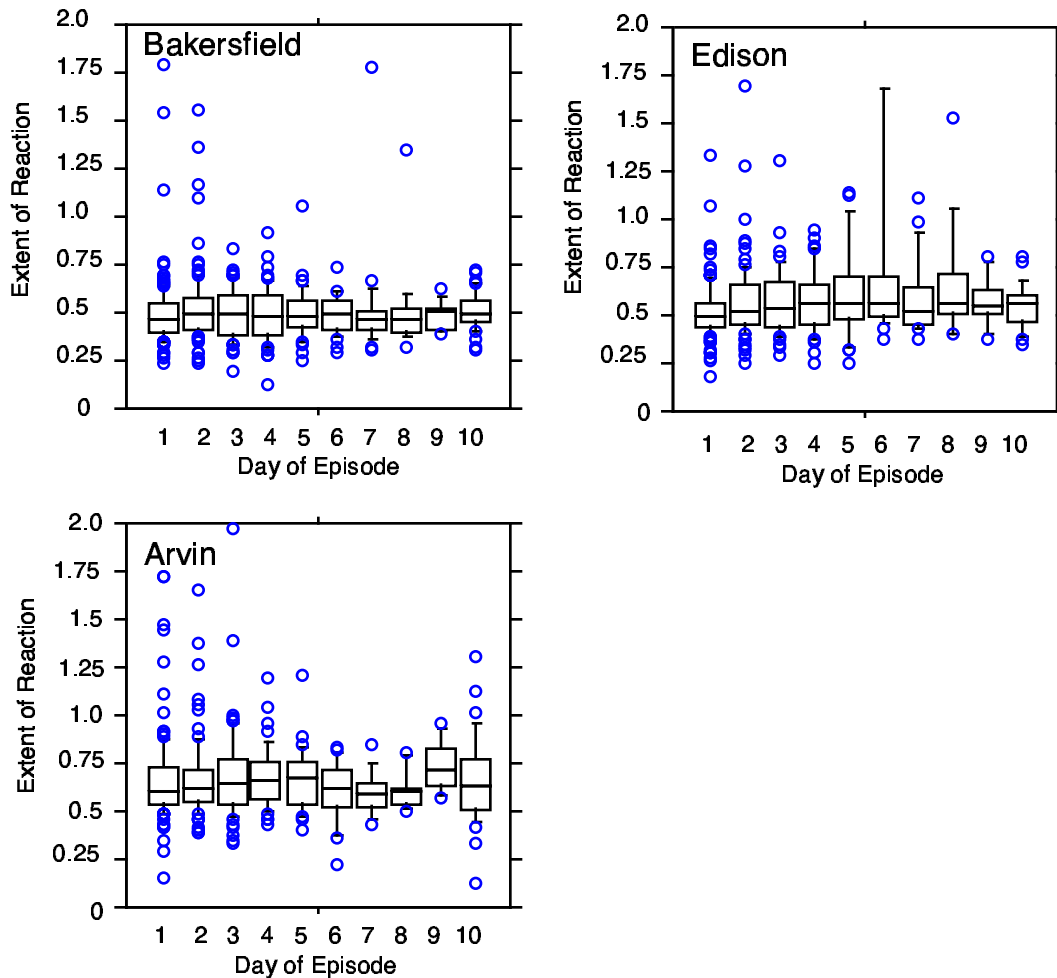


Figure 6. Extent of reaction during 8-hour episode days in the southern San Joaquin Valley (Kern County) for 1994-2000 versus sequence of days within an episode. Episode days were defined as days when any site in the central San Joaquin Valley exhibited peak 8-hour ozone concentration exceeding 84 ppbv. Extent was averaged over the sampling hours of noon through 4 pm.

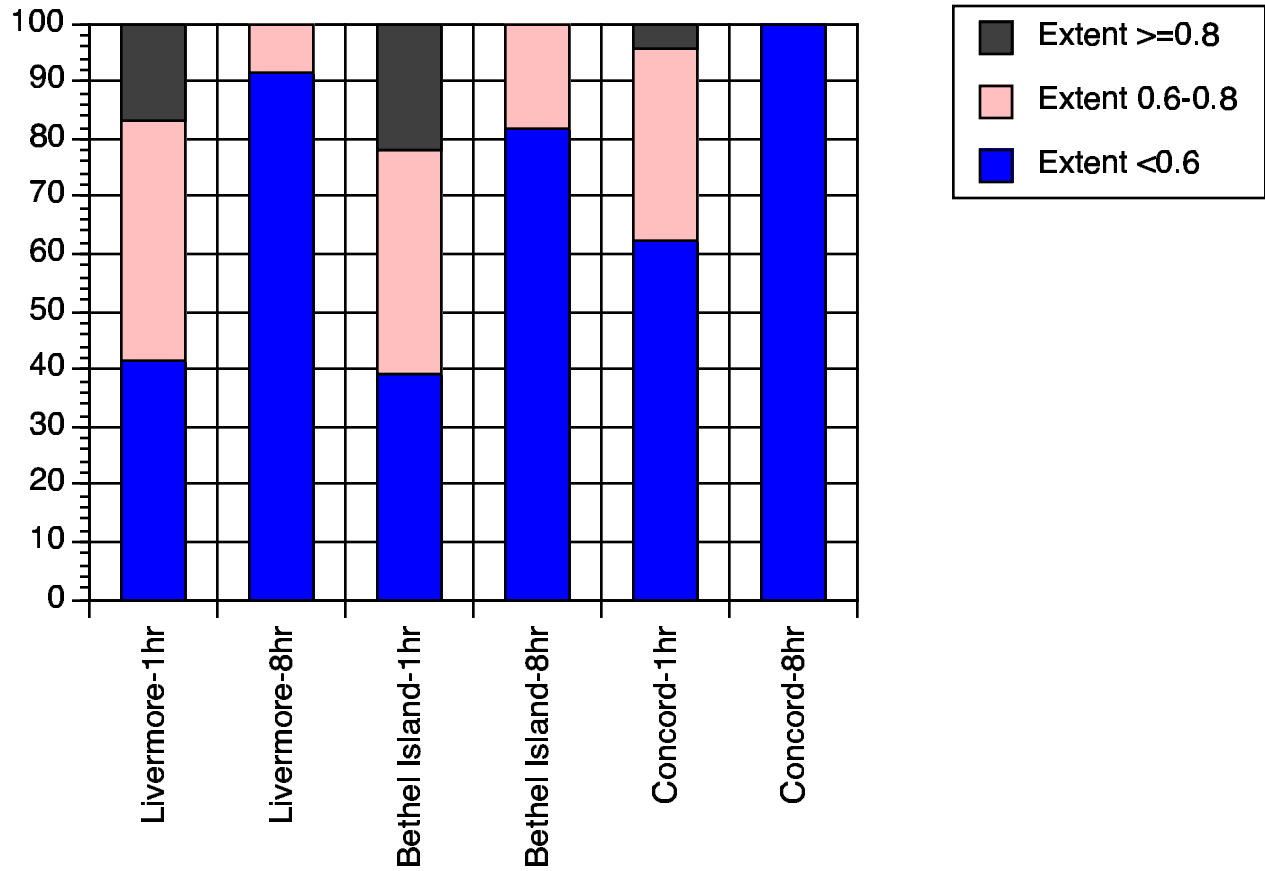


Figure 7. Frequencies of days (percent) with extent of reaction falling into three ranges at three sites in the San Francisco area. The data are from 1994-2000 for the first days of 1-hour episodes and 8-hour episodes that are not also 1-hour episode days.

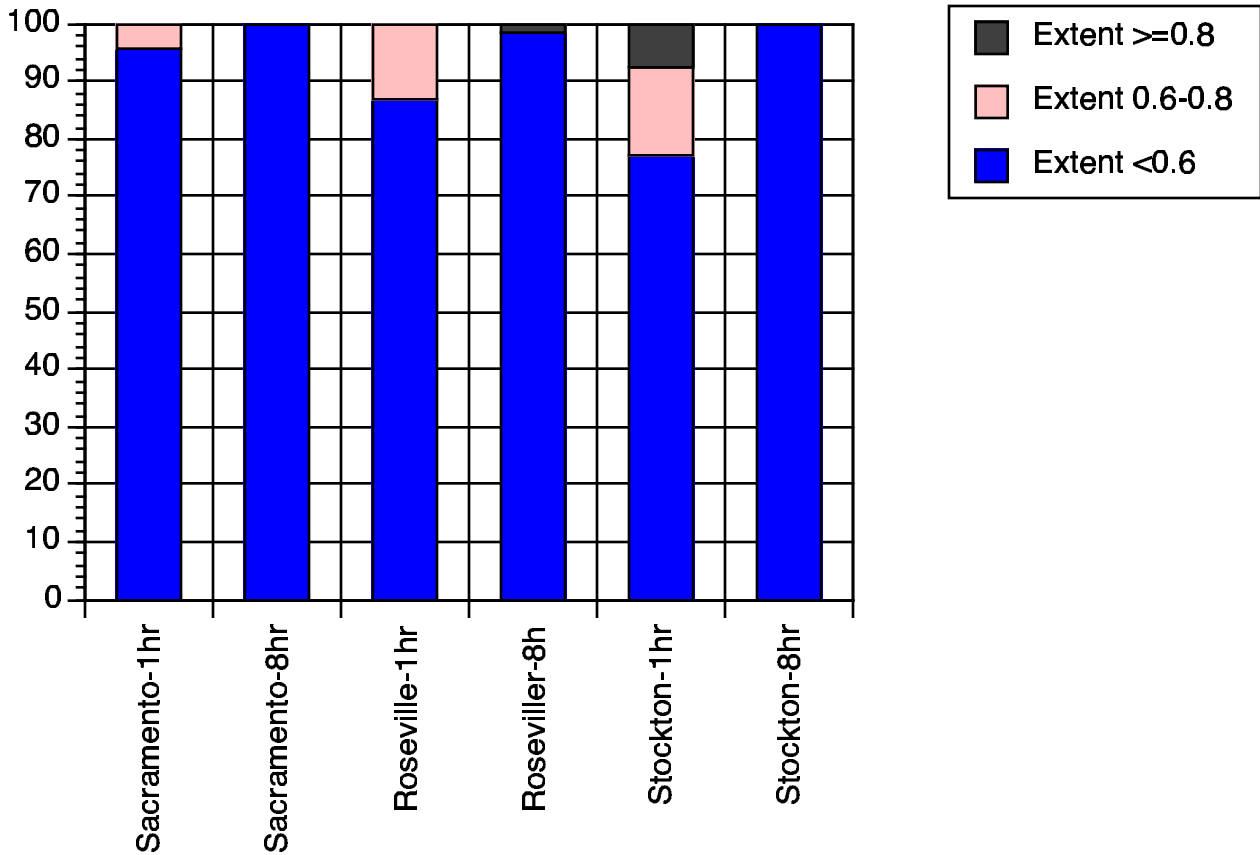


Figure 8. Frequencies of days (percent) with extent of reaction falling into three ranges at three sites in the Sacramento and northern San Joaquin valleys. The data are from 1994-2000 for the first days of 1-hour episodes and 8-hour episodes that are not also 1-hour episode days.

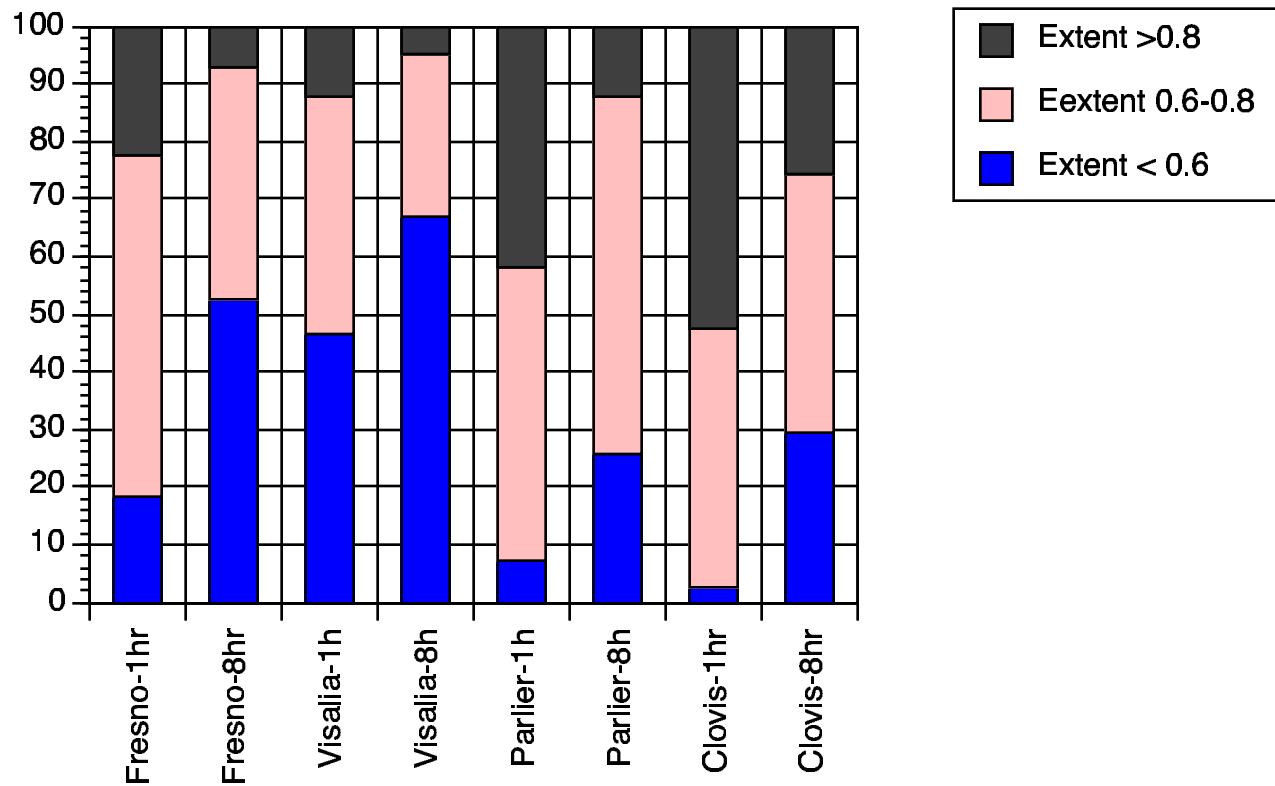


Figure 9. Frequencies of days (percent) with extent of reaction falling into three ranges at four sites in the central San Joaquin Valley. The data are from 1994-2000 for the first days of 1-hour episodes and 8-hour episodes that are not also 1-hour episode days.

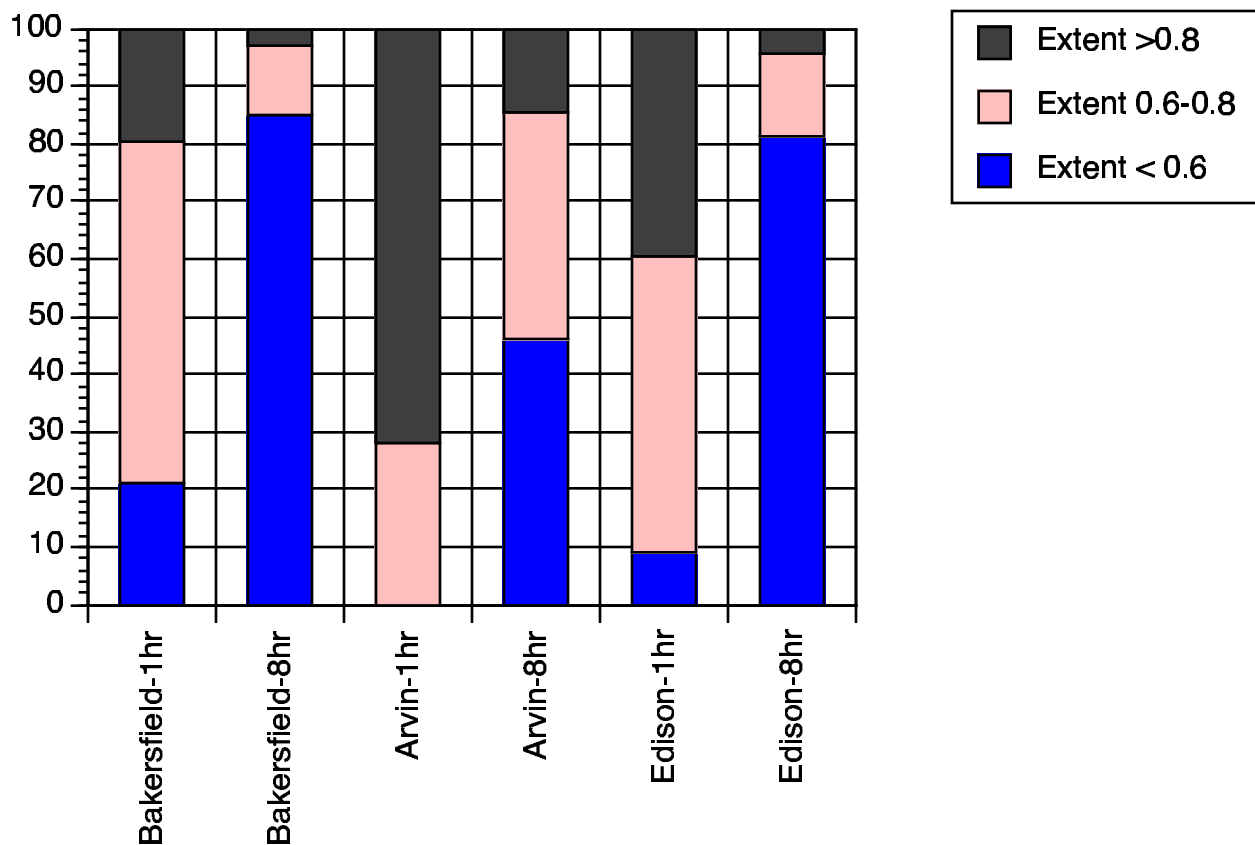


Figure 10. Frequencies of days (percent) with extent of reaction falling into three ranges at three sites in the southern San Joaquin Valley. The data are from 1994-2000 for the first days of 1-hour episodes and 8-hour episodes that are not also 1-hour episode days.