ADDENDUM TO 2004 EPIC UPDATE

September 2005

A "**Findings**" section has been added to the 2004 update to the Environmental Protection Indicators for California Report.

In addition, the following indicators have been updated:

AIR QUALITY

- Days with unhealthy levels of ozone
- Peak 1-hour ozone concentration
- Exposure to unhealthy ozone levels
- Days with unhealthy levels of inhalable particulate matter (PM10)
- Peak 24-hour inhalable particulate matter (PM10) concentration
- Annual inhalable particulate matter (PM10) concentration
- Days with unhealthy levels of carbon monoxide
- Peak 8-hour carbon monoxide concentration

WATER

- Spill/Release Episodes -- Waters

LAND, WASTE AND MATERIALS MANAGEMENT

- Statewide solid waste generation, disposal and diversion, per capita
- Number of tires diverted from landfills

FINDINGS

This update to the Environmental Protection Indicators for California (EPIC) Report presents information on 43 of the 50 "Type I" indicators discussed in the 2002 report. Type I indicators are those supported by ongoing, systematic data collection, and for which sufficient data are available for presenting a status or trend. Fiscal constraints precluded an evaluation of the indicators designated as "Type II" (indicators supported by ongoing, systematic data collection but requiring further data collection, analysis or management before a status or trend can be presented) or "Type III" (conceptual indicators for which systematic data collection is not in place) in the previous report.

Key findings based on updated data are discussed below.

AIR QUALITY

Extensive monitoring of air pollutants by the State originally arose out of the need to tackle some of the worst urban air pollution in the country. Over the past 20 years, technological advances and regulatory strategies have yielded significantly cleaner air in spite of substantial growth in population and vehicular travel. The dramatic progress toward improving air quality is a direct result of our comprehensive emission control programs implemented at the State and local levels. However, weather can play a significant role in year-to-year changes in air quality. Some years have more extreme weather conditions, with many more hot stagnant days, that are conducive to the formation of ozone. For example, during 2003, the weather in the South Coast Air Basin was more conducive to forming ozone than any of the past 25 years and as a result there appeared to be a reversal of air quality progress. However, in 2004, when weather returned to more normal conditions, progress was again evident, with lower peak levels and fewer days with unhealthy ozone levels. For this reason, it is important to look at long-term air quality trends, rather than year-to-year changes in the trends. The indicators for air quality show the following:

- California has made substantial progress in reducing unhealthy levels of ozone. In the South Coast Air Basin, peak ozone, the frequency of days that exceed the air quality standards, and population-based exposure have declined dramatically. In the San Joaquin Valley, population-based exposure to ozone has dropped since the late 1980's, but other indicators show less progress.

- Carbon monoxide is a success story. The South Coast recently attained both the State and federal carbon monoxide standards. This brings the entire State into attainment with the exception of Calexico near the Mexican border. However, Calexico continues to make good progress toward attaining the standards.

- Exposure to inhalable particulate matter (PM10) has declined moderately in most regions of the State. In 2002, a new standard for the smallest particles (PM2.5) was adopted. PM2.5 levels have also declined since 1999 when monitoring was initiated. Urban sources of PM10 and PM2.5 currently represent one of the biggest challenges in reducing air pollution. Diesel particulate, an important component of PM2.5, continues to decline statewide. *(Note: No indicators are included in this update for PM2.5 or diesel particulate. See http://www.arb.ca.gov/aqd/almanac/almanac05/chap205.htm for more information.)*

WATER

California's water needs must be met by an adequate supply of water of the quality appropriate for many purposes (called "beneficial uses"), including drinking, swimming, fishing, supporting aquatic life and habitat, and agricultural and industrial uses. The indicators for water show the following:

- California's economy and environmental quality are dependent upon the availability of clean, useable water supplies. In general, while all water bodies do not at all times comply with all water quality standards, it is a rare exception that beneficial use of a water body cannot occur. A snapshot of the 2002 assessment is presented. Status and trends hopefully can be more fully documented through a newly implemented monitoring program that was initiated in 2003. The first report will be available in late 2005.

- From 1997 to 2001, spills reported to the Office of Emergency Services (OES) increased approximately 70 percent, while reported incidents decreased approximately 10 percent from 2001 to 2002. The recent downward trend is encouraging, however, there are no clear-cut factors explaining why. Change in annual rainfall is often a factor, but correlations have not been made. Because of certain limitations of the OES database (it does not record spills smaller than 1000 gallons, reporting to it has been unreliable, and it was never designed for indicator development purposes) and other needs, the State Water Board is developing a sanitary sewer overflow database to collect water quality related-information about sewage spills. In addition, alternative sources of petroleum spill data will be identified for future updates.

- The number of leaking underground fuel tank sites continued to decline since 1995, a trend resulting from the upgrading of nearly all active tanks.

- From 1996 through 2000, monitoring results show a slight decrease in the number of drinking water sources with first-time detections of contaminants at levels above regulatory standards. The number of detections increased in 2001 and 2002, but this is likely due to new reporting requirements.

- Coastal beach postings have remained relatively constant from 1999 (when weekly bacterial testing began) to 2003. Beach closures increased in 2003, primarily due to the impacts of urban runoff and sewage flowing from Mexico.

- Commercial shellfish growing waters continue to meet the regulatory standard for fecal coliform bacteria during the open harvesting periods.

- Fish contamination data from 808,501 acres (out of 1,369,069 total acres) of bays and estuaries have been assessed as of 2004. The number of acres of bays and estuaries from which fish can safely be eaten once a week by the general population remains unchanged from 1995.

- Water supply is a major concern for California. The *California Water Plan Update* develops statewide and regional water balance information and forecasts. Among the findings of the *California Water Plan 2004 Update* are: cities use about the same amount of water today as they did in the mid-1990's, while accommodating 3.5 million more people; most agricultural water demands are met in average water years; although more water is dedicated today to restore ecosystems, some environmental requirements are not always met; and, California relies on over-pumping its groundwater basins, a practice that reduces available water supply, increases pumping costs, and in some areas, degrades groundwater quality.

- Recycling or reuse of treated municipal wastewater increased by 30 percent between 2000 and 2002 (the most recent year data are available).

LAND, WASTE AND MATERIALS MANAGEMENT

California is faced with the formidable task of properly managing the waste generated by more than 36 million residents and a $1.4 trillion economy ranked seventh in the world. Waste is a by-product of human activity and, if not managed properly, can exact considerable costs in terms of lost resources, environmental contamination, and adverse effects on human health and the environment. California's waste management programs seek to reduce the potential for such adverse impacts by focusing on reducing the amount of waste generated in the first place, promoting reuse or recycling to divert wastes from landfills, and improving the management of waste through regulations designed to ensure the safety of waste storage, treatment and disposal. Where past human activities have contaminated land, water and air, the state performs or oversees the cleanup of sites to prevent further contamination and harmful human exposures to hazardous constituents or decomposition products of the waste. Indicators relating to solid and hazardous wastes show that:

- Over the last 15 years, since the Integrated Waste Management Act (AB 939) went into effect, per capita disposal rates have decreased due to increased diversion, even as generation has increased. Diversion involves recycling, composting and reduction in waste generation. Statewide diversion has increased from 10 percent in 1989 to 48 percent in 2004. Recent increases in generation and disposal may reflect an economy more dependent than ever on construction activities.

- Over the past 13 years, the quantity of tires that have been recycled or reused in some manner has increased, while the quantity disposed of at landfills has decreased. Statewide diversion has increased from 34 percent in 1990 to more than 73 percent in 2003. More than 28 million tires (73.1 percent) are diverted annually for various alternative uses, including reuse, re-treading, recycling, and combustion.

The remaining 10.5 million tires are shredded and disposed of in California's permitted solid waste landfills, stored at permitted sites, or illegally disposed of around the State.

- The total amount of hazardous waste shipped for treatment, storage and disposal has fluctuated over the past decade, with the lowest amounts shipped in 1996 and 1997, and the highest in 2001. However, the amount of hazardous waste generated per unit of economic activity has continued to decline over the past decade.

- Most hazardous waste shipped offsite is destined for disposal in landfills, or for recycling. In 2003, more than 75 percent of hazardous wastes shipped were destined for disposal in landfills or recycling. The amount of hazardous waste disposed in landfills has fluctuated over the past ten years, but has increased overall; the amount recycled has increased slightly over the same period of time.

- No clear trends were noted for hazardous material spills or soil cleanup at hazardous waste sites.

- Conservation and waste diversion efforts are generally not captured well by environmental indicator systems. Although conservation-based programs can clearly affect natural resources and environmental quality in the long-term, their environmental impacts are difficult to measure using environmental indicators. Nevertheless, these programs and activities lessen pressures on the environment through waste reduction, recycling, and diversion.

PESTICIDES

Pesticides are unique among toxic chemicals in that they are deliberately released into the environment to achieve a specific purpose. While pesticides have brought significant benefits, they have the potential to adversely impact human and ecological health because of their inherent toxicity. Hence, it is important to track the human and ecological effects of pesticides, as well as the presence of pesticides in air, water, or produce. The pesticide indicators in this report show that:

- From 1989 through 2003, less than two percent of produce samples (approximately 3,500/year) had illegal pesticide residues. Of these, less than half a percent exceeded the allowable levels (tolerances); a higher portion contained residues for which allowable levels of the pesticide have not been established for the produce in which it was found.

- Although a slight increase in reported occupational pesticide illnesses and injuries occurred in 2002, the overall trend continues to decline over the past 14 years. Reported pesticide illnesses declined by about 60 percent (from 2,016 reports in 1988, to 793 in 2002). The increase in 2002 cases is the result of a few incidents in which a larger number of people were exposed. These were primarily due to pesticides or their breakdown products that moved beyond the area targeted for pesticide application.

- Well water sampling conducted to detect pesticide residues in ground water has been used to characterize geographic areas vulnerable to pesticide contamination. Vulnerable areas have been delineated based on relationships of detections to soil properties and depth-to-ground water characteristics. Recent regulations adopted by the Department of Pesticide Regulation regulate the use of detected pesticides in vulnerable areas. Pesticides have been detected in new areas, resulting in ongoing investigations to determine factors of vulnerability in these new geographic locations.

TRANSBOUNDARY ISSUES

The movement of certain pollutants by natural processes, meteorological forces, and human activities can produce environmental threats extending beyond California's geographical boundaries. Conversely, pollutants originating in other states, countries or ecosystems, carried by atmospheric air currents, watersheds, trade, and travel can impact California. The transboundary indicators show that:

- Carbon dioxide emissions from the combustion of fossil fuels account for about 75 percent of greenhouse gas emissions. Total emissions have increased nearly 30 percent since 1970. However, emissions have been decreasing, on both a per capita and a per $1,000 gross state product basis.

- California air temperatures have gone up approximately one degree Fahrenheit (1^0F) in rural areas over the past century. This can be compared to an increase of about 3^0F in cities, a larger increase due to the "urban heat island effect," which can skew temperature readings. Sea surface temperatures can moderate land temperatures in coastal areas. Global air temperatures are estimated to have increased by 0.5^0F to 1^0F since the late 19th century.

- Average spring snowmelt from the Sierra Nevada into the Sacramento River has decreased by about 12 percent since 1906. The decrease, especially after 1950, is likely due to increased air temperatures. Other factors, such as the Pacific Ocean sea surface temperature pattern oscillations, solar radiation, and air pollution probably contribute to the patterns observed.

- Global warming may escalate sea level rise. California's mean sea level, as shown by tidal measurements in the past century has risen, but local land subsidence, and conversely, geologic uplifting of land mass can affect tidal calculations.

- California and Mexican air monitoring stations in the San Diego/Tijuana and Imperial Valley/Mexicali border areas reported peak ozone, carbon monoxide and inhalable particulate matter (PM 10) concentrations that continue to exceed California air quality standards. However, nitrogen dioxide concentrations have basically shown attainment of the state standard since 1994.

HUMAN HEALTH

Most environmental protection programs are aimed at protecting human health against harmful exposures to environmental contaminants. Human health indicators are intended to reflect the impacts of exposures to environmental contaminants directly on

people: the retention of toxic chemicals in human body tissues, and human conditions and diseases related to environmental exposures. Although it is known that certain environmental pollutants influence disease, other factors including genetics and lifestyle also play a role. The degree to which these various factors contribute to reported diseases or conditions from environmental pollutant exposures is largely undetermined, making it difficult to identify a cause and effect relationship that would support the development of indicators at the present time.

Certain background indicators show the following health-related trends:

- The life expectancy of Californians continues to increase, and compares favorably to national averages. In 2002, life expectancy at birth was 77 years for males and 81.7 years for females in California, compared to 74.7 for males, and 79.9 for females nationally.

- Infant mortality rates continue to decrease, from almost 8 deaths per 1,000 live births in 1990 to 5.3 deaths per 1,000 live births in 2001 (compared to a national rate of 6.8 deaths per 1,000 live births).

- Based on a survey of individuals aged 18 and over, the lifetime asthma prevalence (i.e., the percent of individuals surveyed who responded "yes" to the question, "Have you ever been told by a doctor that you have asthma?") increased in 2002 to 12.7 percent in California and 11.8 percent in the United States, compared to 11.5 and 10.5 percent, respectively in 2000. During the same period of time, however, current asthma prevalence (i.e., the percent of individuals surveyed who responded "yes" to the question, "Do you still have asthma?") decreased from 7.3 to 6.4 percent in California, while increasing from 7.2 to 7.5 percent nationally.

ECOSYSTEM HEALTH

An ecosystem is an interdependent grouping of living and non-living components in the environment. The 2002 report addresses the health of four natural ecosystems (forests, grasslands and rangeland; the desert; freshwater aquatic; and coastal aquatic) and two ecosystems managed for the benefit of people, urban and agricultural. The key issues of concern in the natural ecosystems are: (1) preservation of habitat quantity and quality; (2) biodiversity; and, (3) maintenance of ecological function. Changes in the structural components of an ecosystem (habitat, species diversity) can ultimately alter ecological function and the viability of the ecosystem.

The updated indicators presented here show that:

- Since the late 1960s, the clarity of Lake Tahoe has been decreasing by about one foot per year. Water clarity is an indicator of the health of a lake.

- The population of winter-run Chinook salmon in the Central Valley, one of the endangered species for which reasonably good information exists, has increased compared to perilously low levels in the early 1990's; however, the population remains well below the proposed level for recovery. At present, these salmon spawn only in the mainstem Sacramento River and number approximately 8,000 fish.

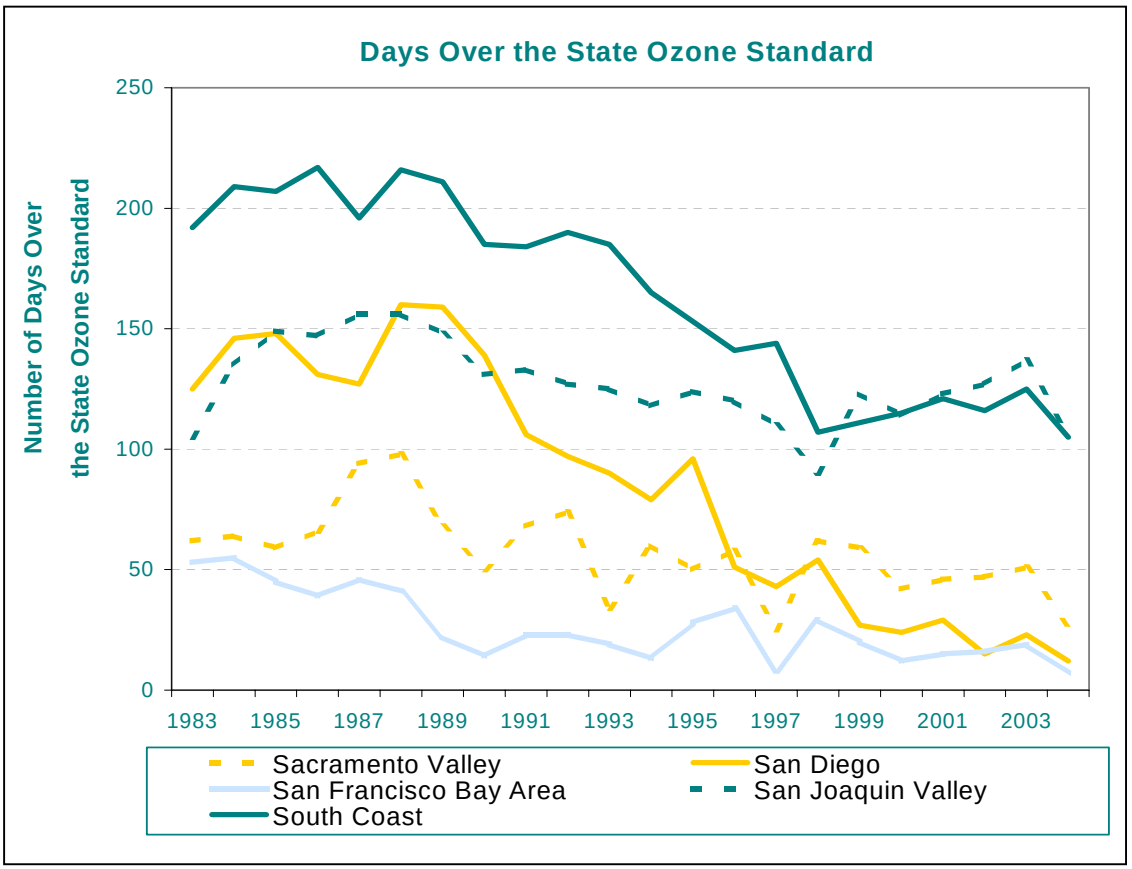
- The population of the least tern, a coastal shorebird on the federal and State lists of endangered species, has increased since 1970, although production of young has been relatively poor since the late 1990s. The record-high total of 6,688 pairs reported in 2003 was more than twice the average annual breeding population size during the mid-1990s.

- The annual acreage of forests and grasslands burned in wildfires over the last fifty years has been highly variable, and is largely related to climate.

- Farmland continues to be lost to urban development, removed from active use, or used for environmental restoration purposes. Between 2000 and 2002, prime farmland accounted for 21 percent of the 92,750 new urban acres, while other irrigated farmland categories comprised an additional 8 percent of new urban land.

DAYS WITH UNHEALTHY LEVELS OF OZONE

The number of days in California with unhealthy levels of ozone has decreased substantially in most areas of California over the past two decades, with the exception of the San Joaquin Valley, which has seen little improvement in this indicator. Decreases for most regions were modest during the 1980's, but accelerated during the 1990s. Besides emissions, weather is an important factor in the year-to-year variation in ozone levels. During 2000-2003, for example, weather played a major role in ozone trends in the South Coast Air Basin. In particular, there were more days in 2003 with the potential to produce high ozone than there were in any of the past 25 years. In contrast, the weather in 2004 was more typical and the number of exceedances dropped considerably, continuing the long term downward trend in the South Coast.



Note: 2004 data are preliminary and subject to change

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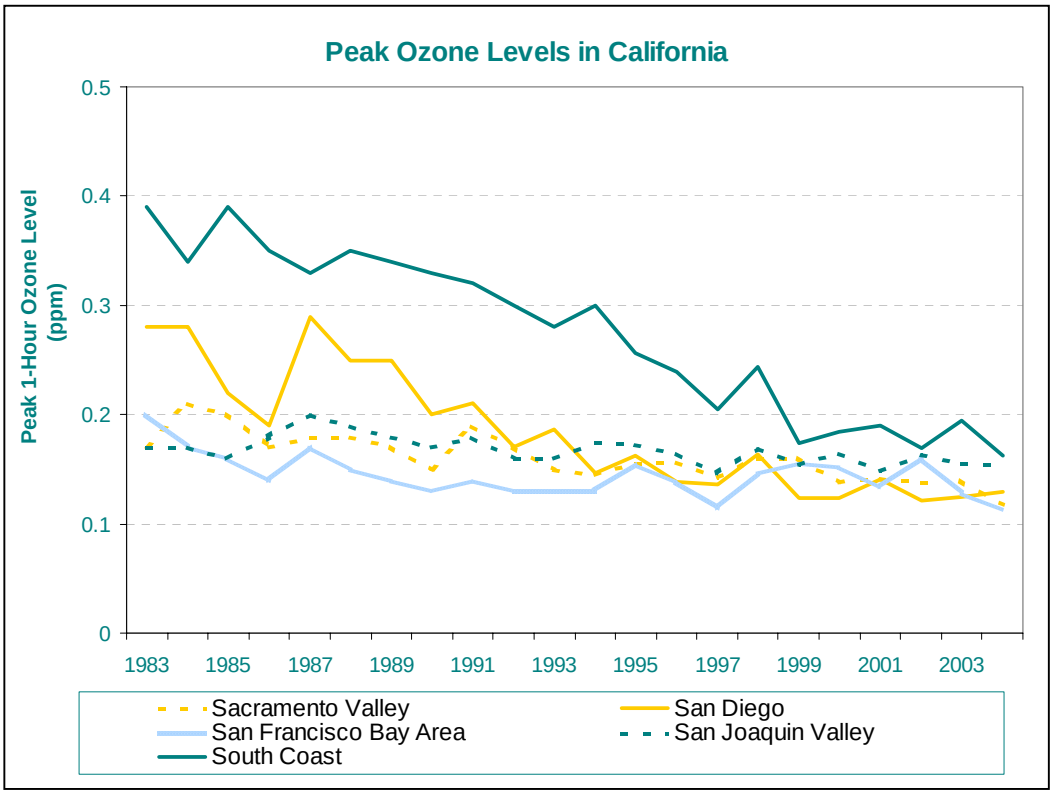
More information on ozone pollution is posted at:
http://www.arb.ca.gov/2005Almanac

A full discussion of air quality indicators can be found at:
http://www.oehha.ca.gov/multimedia/epic/2002reptpdf/Chapter3-2of8Air.pdf

PEAK 1-HOUR OZONE CONCENTRATION

Peak ozone levels have been declining over the last two decades. The peak level is the highest measured 1-hour concentration at any monitor within an air basin for a particular year. The greatest decline has been in the South Coast Air Basin, which continues to have the highest peaks. Besides emissions, weather can play a major role in the year-to-year variation in ozone levels. For example, the weather in 2003 was quite severe in the South Coast Air Basin. That year, there were more days that had the potential to produce high ozone than there were in any of the past 25 years. This resulted in the first stage 1 alert (above 0.19 ppm) since 1998. However, the weather in 2004 was much more normal and the peak concentration was the lowest ever in the South Coast, consistent with the long-term downward trend.



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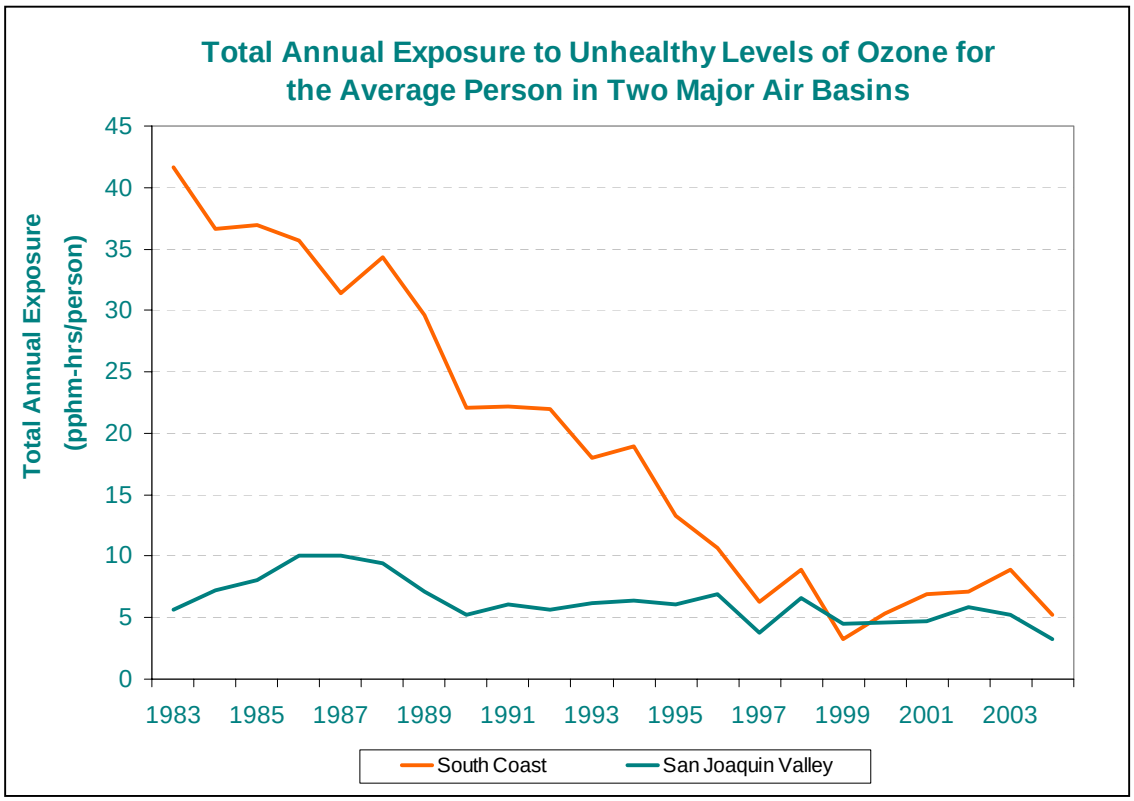
EXPOSURE TO UNHEALTHY OZONE LEVELS

Population exposure to unhealthy levels of ozone – based on duration of exposure and level of ozone pollution – has declined significantly, with the most dramatic decrease (about 80 %) seen in the South Coast Air Basin. The San Joaquin Valley also has seen improvement, with exposure levels dropping 50% since the late 1980's. These trends are expected to continue as cleaner vehicles enter the fleet, replacing older ones, and as additional emission controls are implemented. The graph below reflects total annual (population-weighted) exposures to ozone at concentrations above the 1-hour standard (0.09 parts per million), and incorporates both the magnitude and the duration of exposure. The trend in the South Coast appears to have reversed during the last four years. This was heavily influenced by weather. During 2000-2003, the South Coast had weather conditions that were very conducive to ozone formation, with 2003 being the worst in 25 years. The return to more normal weather in 2004 reversed the trend back, similar to what is seen in the other indicators for ozone.



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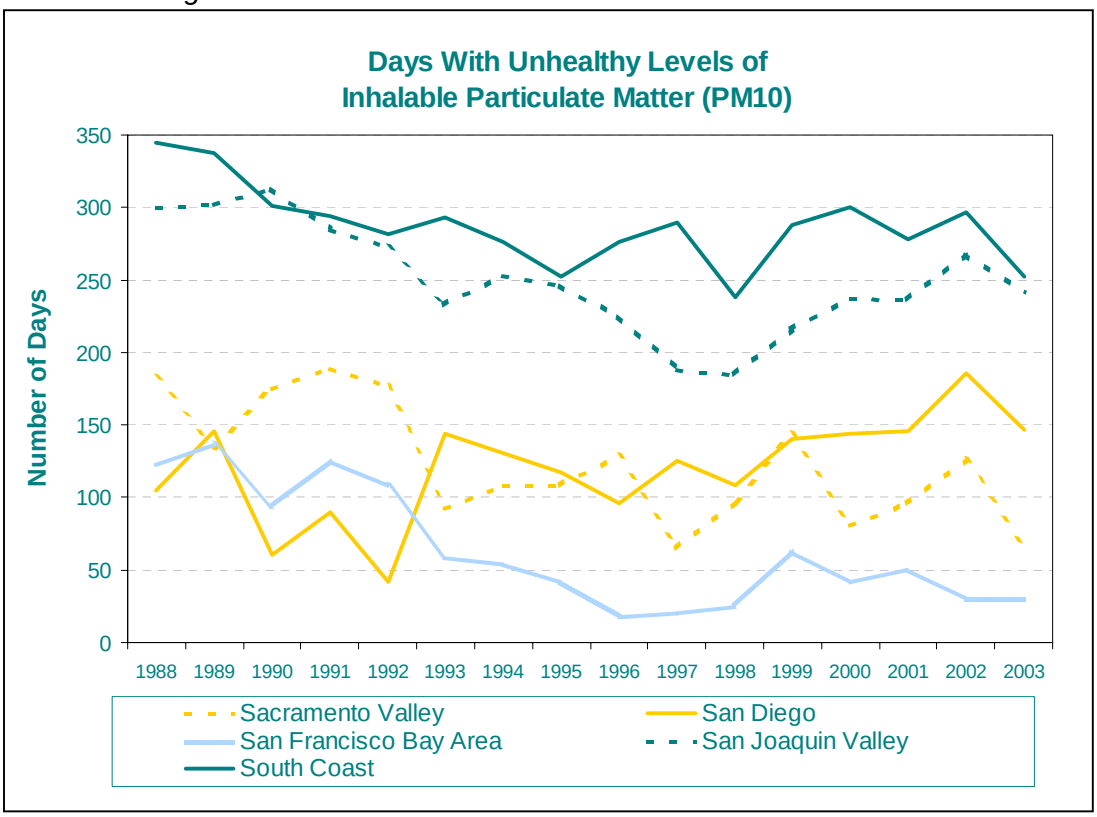
DAYS WITH UNHEALTHY LEVELS OF INHALABLE PARTICULATE MATTER (PM10)

Exposure to PM10 has declined in most regions of the State. Most of the major air basins have shown a moderate decline in the number of days over the PM10 standard. However, as more particulate monitors were deployed statewide throughout the 1990s, there was a greater potential to record exceedances in previously unmonitored regions. For example, three PM monitors deployed in San Diego in 1993 contributed to that region's increase in days over the standard. Despite the increase in population in urban areas and subsequent increase in vehicle miles traveled, PM10 levels are decreasing within most regions of the State.



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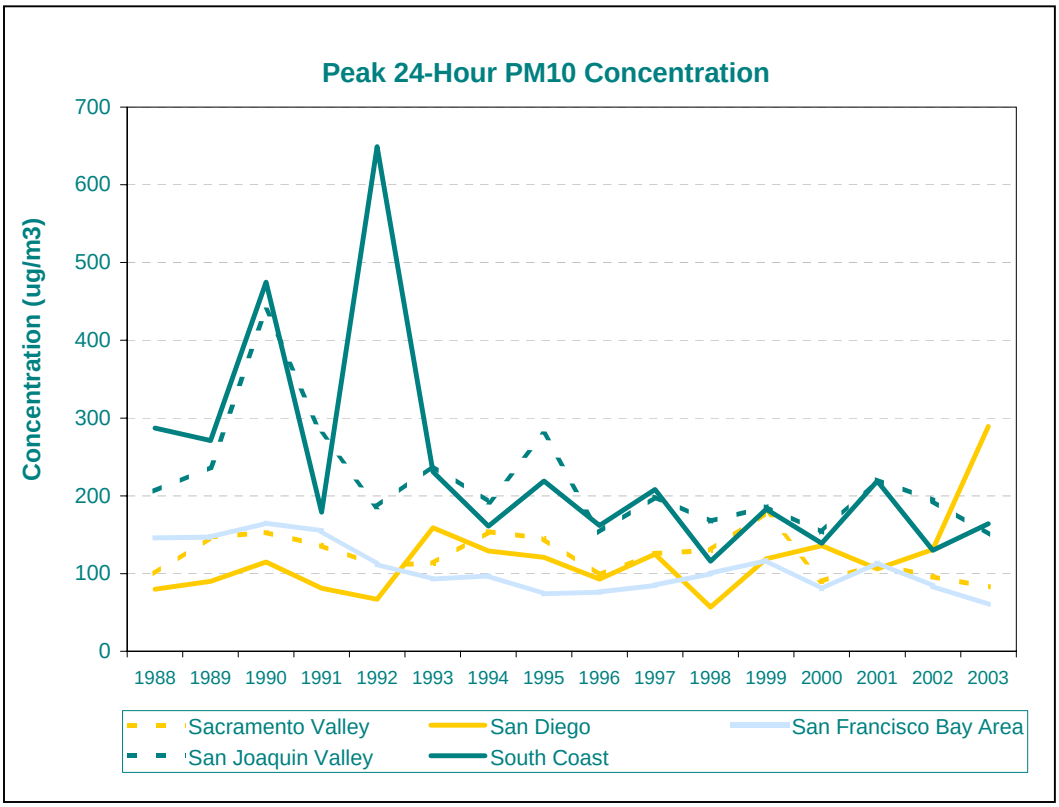
PEAK 24-HOUR INHALABLE PARTICULATE MATTER (PM10) CONCENTRATION

Most of the major air basins have shown a moderate decline in maximum 24-hour PM10 concentrations. The increased monitoring enabled by the deployment of additional particulate monitors statewide throughout the 1990s in some cases resulted in higher measured peaks. For example, San Diego added a PM10 monitor at the Otay Mesa border region in 1993; this monitor has recorded the San Diego basin's maximum PM10 levels each year since then. This indicator is also dependent on weather and the occurrence of relatively infrequent events - for example fugitive dust can cause high levels on dry, windy days. A combination of drought years and high wind events are likely to have contributed to the spikes in PM10 levels in the South Coast and San Joaquin Valley Air Basins in 1990, and in the South Coast Air Basin in 1992, while wildfires in Southern California caused the higher levels in the South Coast and San Diego air basins in 2003.



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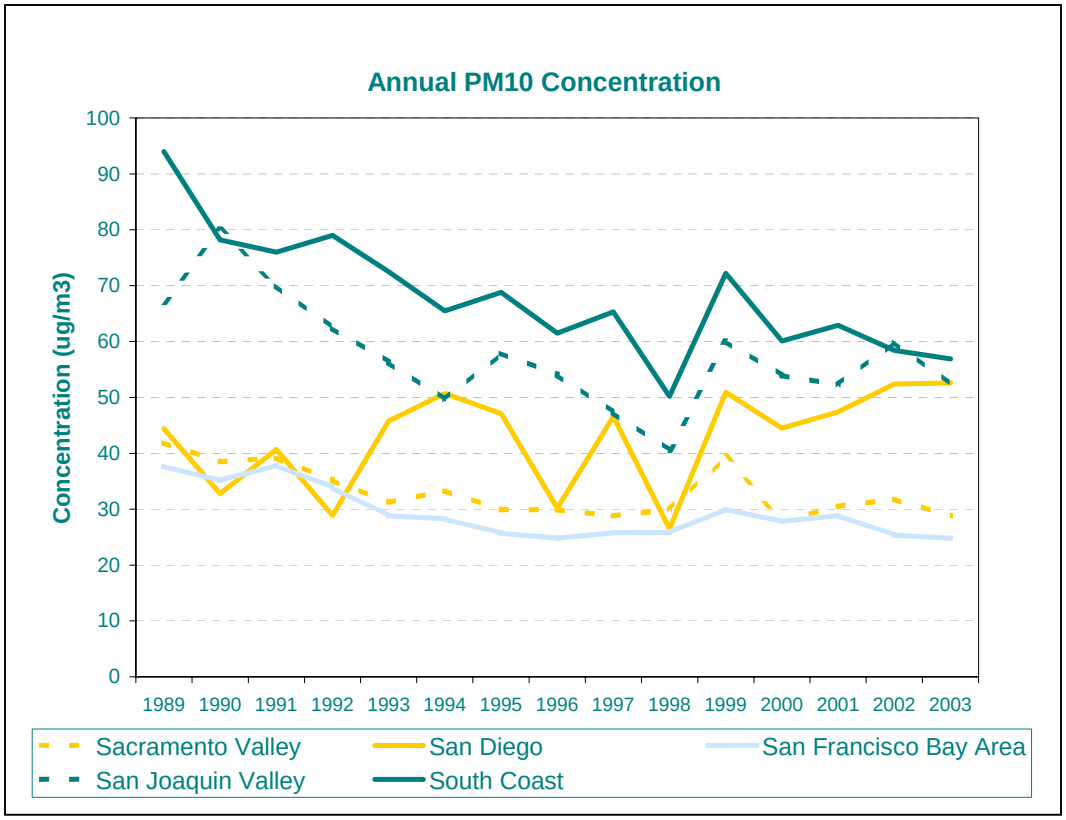
ANNUAL INHALABLE PARTICULATE MATTER (PM10) CONCENTRATION

Most air basins show moderate declines in annual PM10 levels. In 2002, California's annual PM10 standard was revised from 30 ug/m3 to 20 ug/m3, and is now calculated as an annual average of quarters instead of the annual geometric mean. All years in the graph have been adjusted to reflect this change. In addition, a new annual PM2.5 standard of 12 ug/m3 was adopted. Because PM2.5 monitoring did not begin until 1999, long-term trend data for PM2.5 are not shown. However, since 1999, PM2.5 levels have also been declining.



Note: Data in the San Francisco Bay Area did not meet the criteria for calculating an annual average for State purposes in 2001 and 2002. Instead, the annual average for federal purposes is included for these years. State and federal annual averages are generally very similar.

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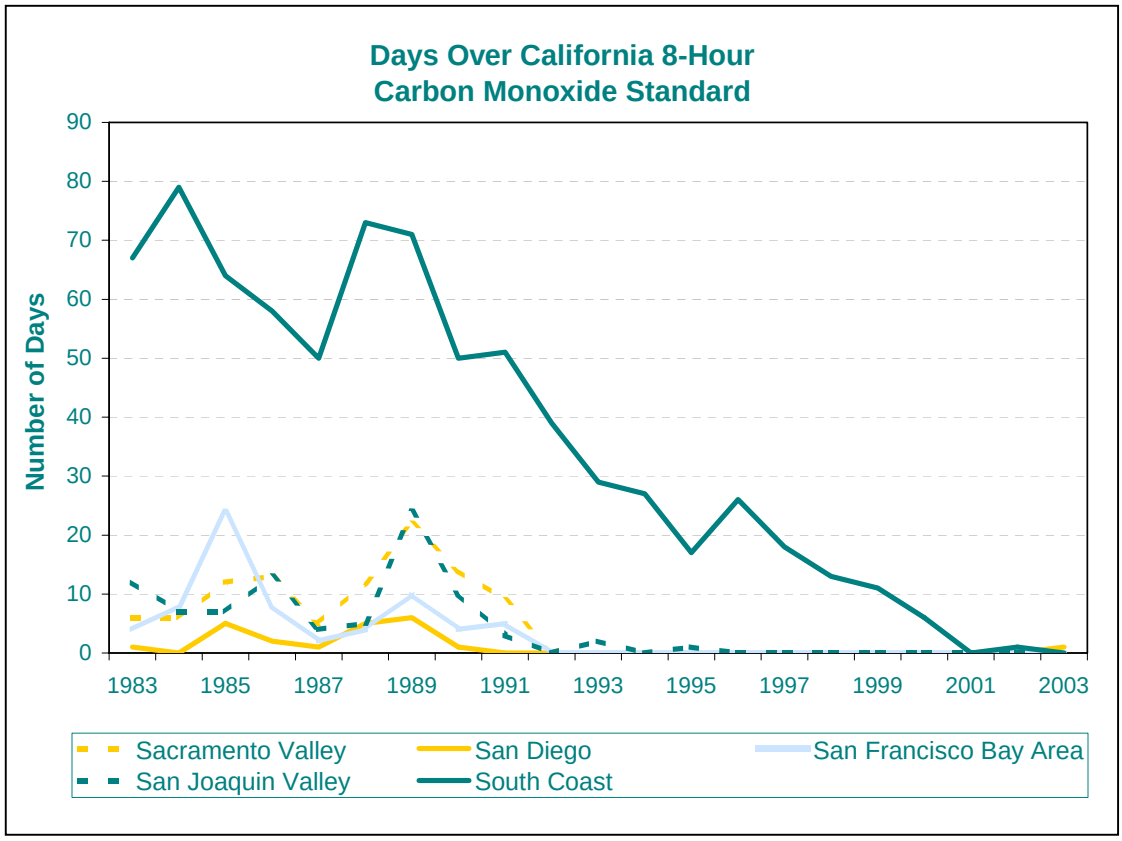
DAYS WITH UNHEALTHY LEVELS OF CARBON MONOXIDE

Days with unhealthy levels of carbon monoxide have decreased dramatically throughout the State. The Los Angeles area, which is part of the South Coast Air Basin, has been the only major urbanized area with any unhealthy days since the mid-1990s. Los Angeles now attains the standard, and had only one day above the standard in 2001 and 2002.



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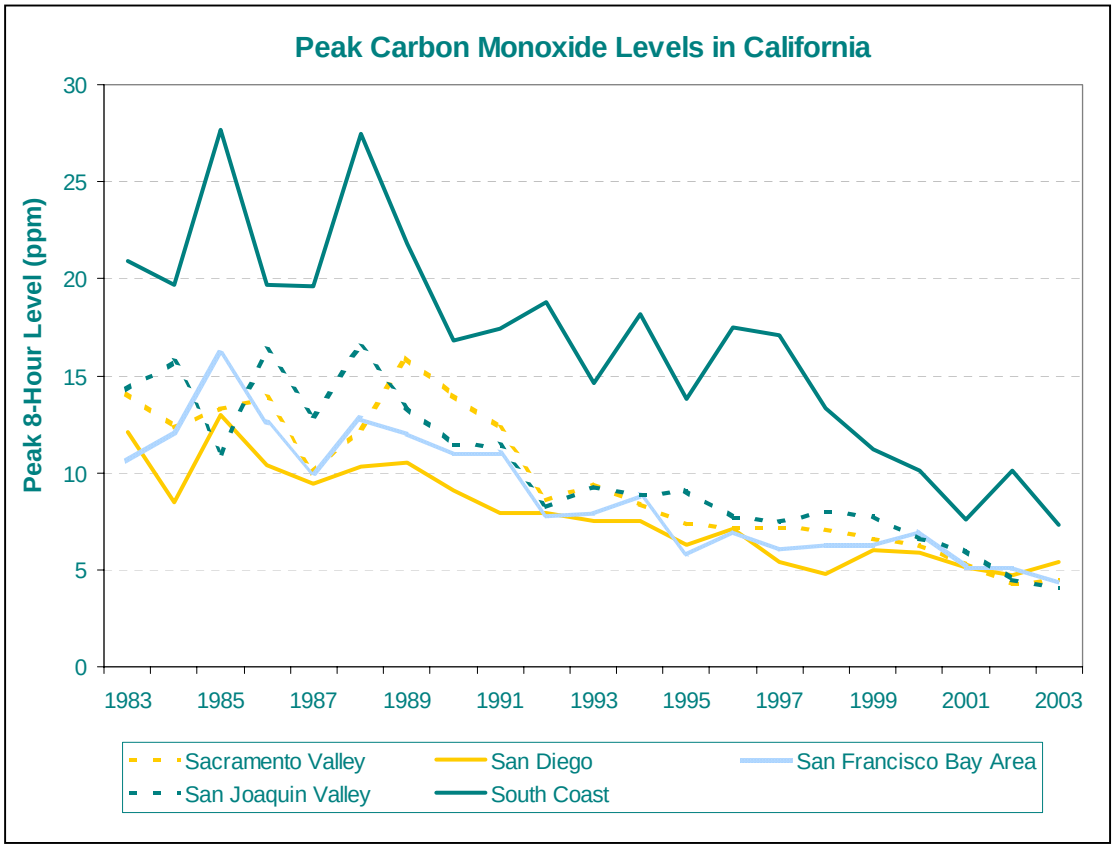
PEAK 8-HOUR CARBON MONOXIDE CONCENTRATION

Peak 8-hour carbon monoxide levels have declined and have remained well below the State 8-hour standard (9.0 ppm) since the mid-1990s in all urban areas except the South Coast Air Basin. Compared to previous years, the South Coast experienced only one day above the State standard in 2001 and 2002, and now attains both the State and federal CO standards. The only remaining nonattainment area in California is the small region of Calexico in Imperial County (not shown on the graph). During 2003 measured CO concentrations exceeded State and national standards only in San Diego. However, these high values were due to extensive wildfires that impacted air quality throughout southern California. Since these type of exceedances do not affect an area's designation status, they aren't shown on this graph.



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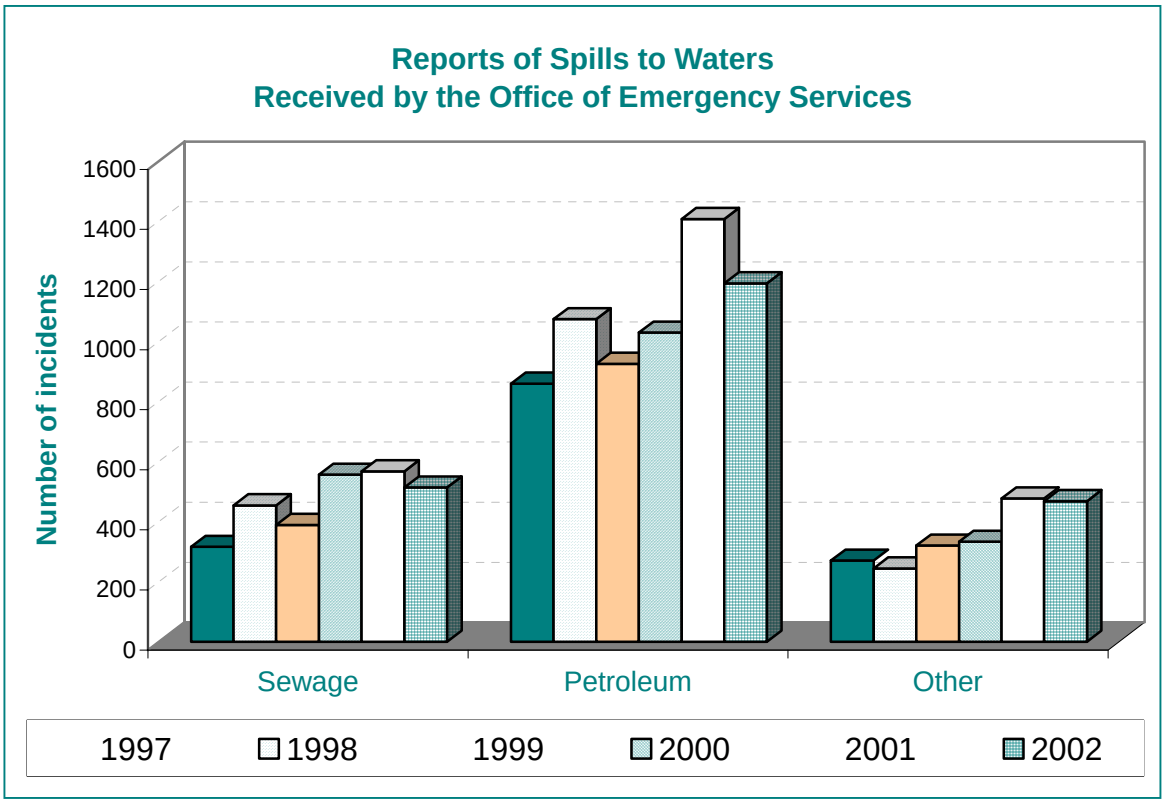
SPILL/RELEASE EPISODES -- WATERS

Spills of sewage, petroleum and other materials to water generally cause temporary conditions of pollution or nuisance. This indicator is based on the number of spills reported to the Office of Emergency Services (OES), which is responsible for addressing emergencies that threaten lives, property, and the environment. The OES data indicate that reported spills increased approximately 70 percent from 1997 to 2001, and decreased approximately 10 percent from 2001 to 2002. The recent downward trend is encouraging, however, there are no clear-cut factors explaining why. Change in annual rainfall is often a factor, but correlations have not been made. It is difficult to determine or explain trends from these data because the OES database was not designed for this purpose. For example, the data are based on initial reports, which are inherently inaccurate, and all reports are counted regardless of impact to public health or environment. For these and other reasons, the State Water Board is developing a sanitary sewer overflow database to collect water quality-related information about sewage spills. In addition, alternative sources of petroleum spill data will be identified for future updates.



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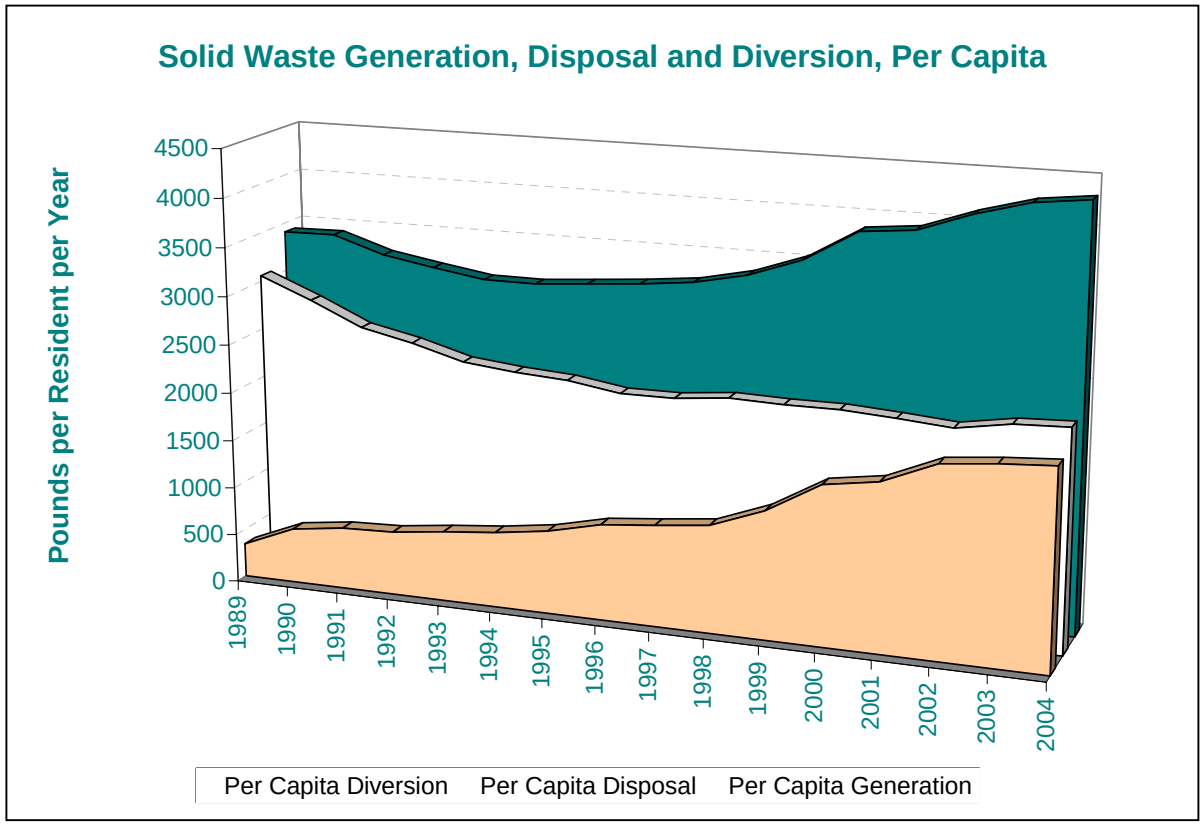
STATEWIDE SOLID WASTE GENERATION, DISPOSAL AND DIVERSION, PER CAPITA

Per capita disposal of solid waste has decreased, even as generation has increased. This is due to a sharp increase in diversion. The statewide diversion rate has increased from 10 percent in 1989 to 48 percent in 2004. Diversion involves recycling, composting and reduction in waste generation. Recent increases in generation and disposal may reflect an economy more dependent than ever on construction activities.



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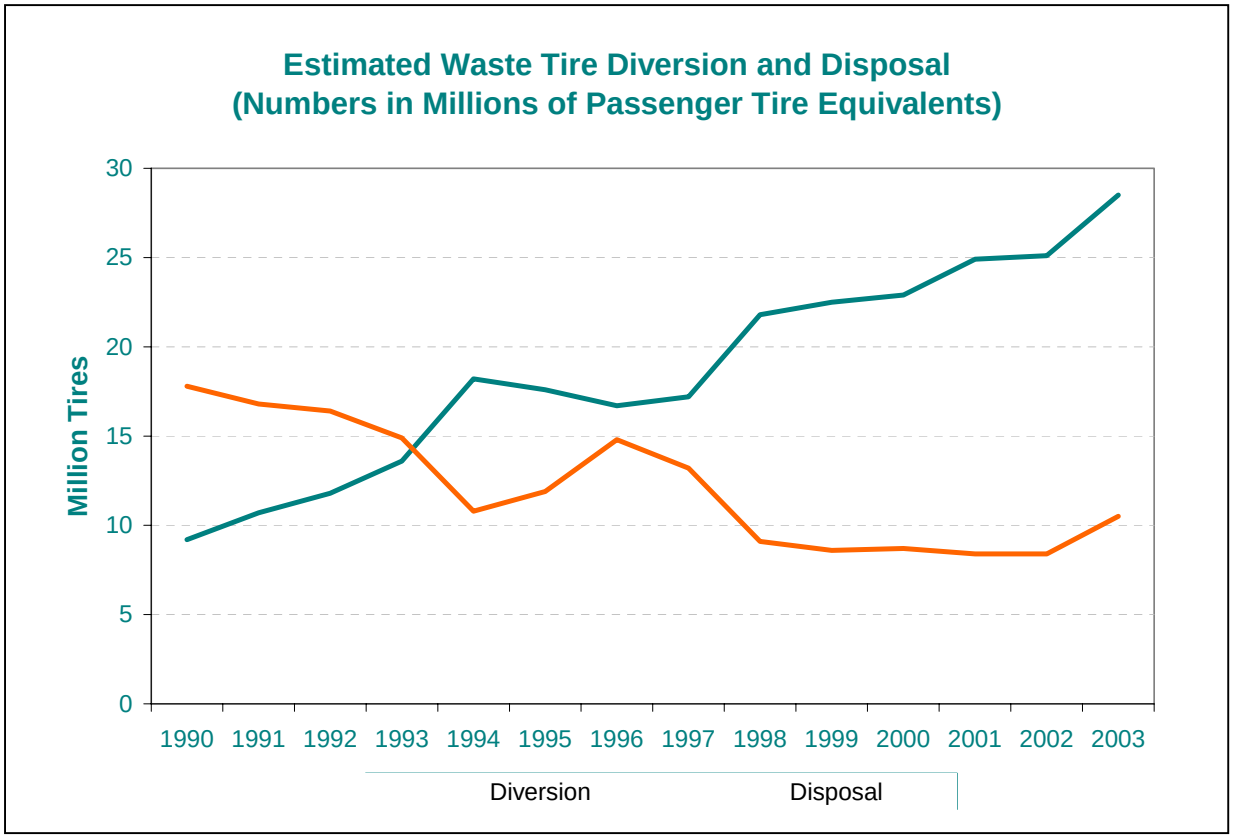
More information on solid waste generation, disposal and diversion is posted at:
http://www.ciwmb.ca.gov/LGCentral/Rates/Diversion/RateTable.htm
http://www.ciwmb.ca.gov/LGCentral/Rates/default.htm

A full discussion of waste management indicators can be found at:
http://www.oehha.ca.gov/multimedia/epic/2002reptpdf/Chapter3-4of8-Waste.pdf

NUMBER OF TIRES DIVERTED FROM LANDFILLS

Over the past 13 years, the quantity of tires that have been recycled or reused in some manner has increased, while the quantity disposed of at landfills has decreased. Statewide diversion has increased from 34 percent in 1990 to more than 73 percent in 2003. More than 28 million tires (73.1 percent) are diverted annually for various alternative uses, including reuse, re-treading, recycling, and combustion. The remaining 10.5 million tires are shredded and disposed of in California's permitted solid waste landfills, stored at permitted sites, or illegally disposed of around the State.



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More information on waste tire management is posted at:
www.ciwmb.ca.gov/Tires/default.htm

A full discussion of waste management indicators can be found at:
http://www.oehha.ca.gov/multimedia/epic/2002reptpdf/Chapter3-4of8-Waste.pdf