King County Benchmarks 2007 Environment

Anticipating and Responding to Global Climate Change

Global climate change has become a defining issue of this century. The National Oceanic and Atmospheric Administration (NOAA) identified 2006 as the second warmest year on record in the United States. U.S. and global annual temperatures are now warmer than at the start of the 20th century. Over the past 30 years, temperatures have accelerated at a rate that is approximately three times faster than the rate of warming over the last century. In fact, the past nine years have been among the 25 warmest years on record for the contiguous U.S., an unprecidented warming trend in this country.[1] The degree to which these worldwide weather patterns are due to human activity and the means by which these effects can be mitigated is the subject of a large body of analysis occuring throughout the scientific community.

While greenhouse gases do occur naturally, a disproportionate amount are caused by human activity, most notably as carbon dioxide emissions from transportation. Total petroleum consumption in King County increased almost 20% over the last 10 years, driven by almost 50% growth in the consumption of diesel fuel. As a result, diesel fuel steadily contributes to a larger share of total petroleum consumption in King County. This is consistent with the increase in activity at the Port of Seattle, which has contributed to the increase in commercial traffic as shown in the 2006 Transportation Bulletin. Indeed, the number of commercial trucks on King County's major highways has increased almost 70% since 1994.

With an increase in commercial traffic, total vehicle miles traveled (VMT) has crept ahead slightly since 1995. Per capita VMT rose during the late 1990's but has actually been on a nominal downward trend since 1999, even though almost two-thirds of workers in King County continue to use their pesonal vehicle for work commutes. This per capita decrease may be attributed to the combined effect of two factors over the last seven years: a recession that resulted in resulting in job losses throughout the region through 2003, followed by an increase in public transit ridership as the county regained jobs in 2004. However, despite the growing number of King County residents using public transportation, the increased use of light- and heavy-duty trucks, as well as thriving port activity, have contributed to increased VMT and elevated greenhouse gas emissions.

What's Inside

[1] NOAA National Climatic Data Center 2006 annual climate report, http://www.ncdc.noaa.gov/oa/climate/research/2006/ann/ann06.html.

continued on page 2

The consequences of rising temperatures associated with global climate change are complex and complicated. As temperatures have risen, spring snow pack in the Cascades, which supplies most of the County's water, has shrunk from an average of about 20 inches in the 1950s to an average in the range of less than 14 inches since 1995.[2] This decrease contributes to changes in the quantity and quality of the county's surface and ground water, making conservation efforts increasingly important.

In addition to threatening our region's supply of drinking water, climate change can hamper the ability of our natural areas to provide habitat for wildlife. A 2006 NOAA study indicated that habitat degradation "associated with climate change is likely to make salmon recovery in the Pacific Northwest much more difficult."[3] However, the study also suggested that habitat protection and restoration efforts may mitigate some of the harmful effects of future climate change. Indeed, some of these efforts are underway now. Although still drastically short of historical numbers and population targets, it is hoped that active habitat and harvest management strategies are contributing to growing chinook returns. Water utilities are employing a number of strategies to decrease water consumption, such as informing the public about water conservation techniques and by making key improvements to system operations.

And for the first time, King County residents are recycling more pounds of waste than they are disposing in landfills. As the indicators in this bulletin illustrate, the Puget Sound Region is making progress on some fronts. However, additional proactive efforts to decrease regional greenhouse gas emissions and improve air quality are necessary to protect public health, property and natural resources for our region's future generations.

[2] King County Department of Natural Resources, *Measuring for Results 2005.*

[3] NOAA news release, April 5, 2007, http://www.nmfs.noaa.gov/mediacenter/docs/climate_and_salmon.pdf

King County Benchmark Program

Established by the Growth Management Planning Council (GMPC) in 1995 as required by the WA State Growth Management Act, the King County Benchmark Program monitors 45 indicators that measure the progress of the King County Countywide Planning Policies. The indicators are intended to collectively articulate the impact of land use and development policies/ practices on our natural, built and social environment. Rather than focusing on the jurisdictional programs of the county's 40 jurisdictions, the Benchmarks provide a high level analytical view of change within the geographic boundaries of King County.

As one of the first and most durable efforts at monitoring outcomes in the public sector, the King County Benchmark Program demonstrates how measurement of broad quality-of-life outcomes can help determine if public policy and programs are making a difference. Public outcome monitoring is a strategy for change: it alerts us to what we are doing well and where we need to do better. It is closely connected to both the policy goals that it monitors, and to the strategic planning, programs, and services that are intended to implement those goals.

The Benchmark Program reports cover five policy areas: land use, economic development, transportation, affordable housing and the environment. All reports are available on the Internet at http://www.metrokc.gov/budget/benchmrk. For information, please contact Lisa Voight, Program Manager (206) 296-3464, King County Office of Management and Budget, 701 Fifth Ave, Suite 3200, Seattle, WA 98104, or e-mail: lisa.voight@kingcounty.gov.

King County Office of Management and Budget

Bob Cowan, Director
Elissa Benson, Supervisor- Regional Governance Group
Chandler Felt, Supervisor- Growth Information Team
Lisa Voight, Benchmark Program Manager
Nanette M. Lowe, GIS Analyst- Growth Information Team
Jeremy Valenta, Research Analyst- RGG

LAND COVER CHANGES IN URBAN AND RURAL AREAS OVER TIME

Outcome: Protect and Enhance Natural Ecosystems

Countywide Planning Policy Rationale

"The land use pattern for the County shall protect the natural environment by reducing the consumption of land and concentrating development. Urban Growth Areas, Rural Areas, and resource lands shall be designated and the necessary implementing regulations adopted." (FW-6) "All jurisdictions shall protect and enhance the natural ecosystems through comprehensive plans and policies, and develop regulations that reflect natural constraints and protect sensitive features. Land use and development shall be regulated in a manner which respects fish and wildlife habitat in conjunction with natural features and functions, including air and water quality. Natural resources and the built environment shall be managed to protect, improve and sustain environmental quality while minimizing public and private costs." (FW-4)

About This Indicator:

Population growth and development have substantially altered the landscape in King County. Of particular interest for the protection of salmon and other aquatic resources is the conversion of forest and natural land cover to hard or impervious surfaces, such as roofs, sidewalks, parking lots and roads. In 2004, the King County Council adopted stormwater, clearing and grading, and critical area regulations that are designed to maintain forest cover and limit impervious surfaces in rural areas and improve stormwater management in urban areas. These changes reduce the impact of rural development on the natural environment. In the Rural Area, they protect hydrologically mature forest cover and soil, which in turn absorb rainful, encourage natural stream flows and provide necessary wildlife habitat in the Rural Area. In the Urban Area, they provide for better infiltration of stormwater, which recharges the groundwater and reduces stormwater impacts on streams and wetlands.

Land Cover King County includes approximately 2,136 square miles of land area. Over 78% of this land area—1,676 square miles—is designated rural land. As shown in figure 9.1, over one-half of King County's geography is forested, including a small percentage of forest cover within the urban growth area. Impervious cover accounts for 14% of the county's land area and another 30% of the land area includes other forms of vegetative cover including grass, wetlands and crops. No trend data for land cover change currently exists; however, this land cover data, obtained by 2001 Landsat imaging provides a baseline for outyear comparison.

Figure 9.1

Land Cover in King County (2000/2001)

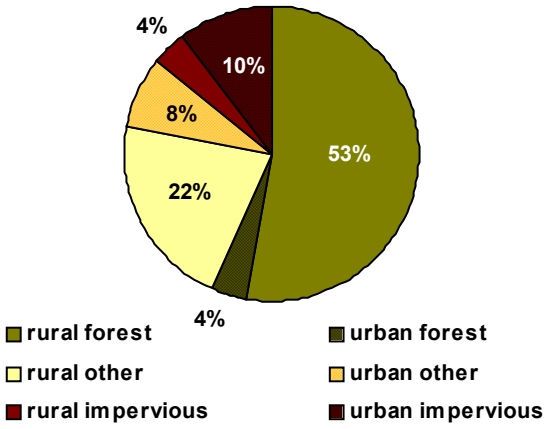


Figure 9.2

Land Cover in King County by Urban and Rural Area (2000/2001)

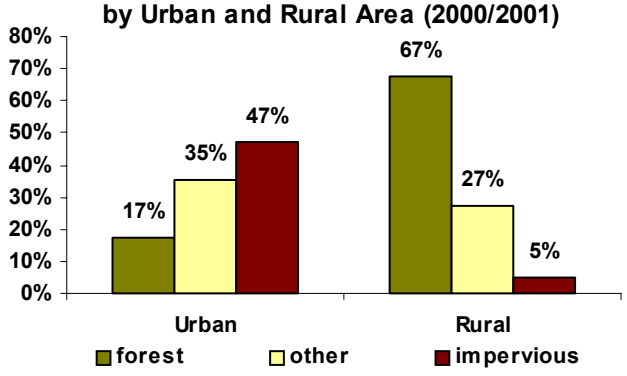


Figure 9.2 allocates King County's land cover by Urban and Rural Area. As shown, the Rural Area is largely characterized by vegetative cover, while only 5% of the area is covered with impervious surface. The natural cover of the Rural Area and high rate of impervious cover in the Urban Area can be attributed to development practices that focus growth in the Urban Area and preserve natural space in the Rural Area. It is notable however, that 17% of the Urban Area's geography includes forested land (a characterization determined by canopy density), providing important ecological functions and recreation opportunities for King County residents.

CHANGES IN AIR QUALITY
Outcome: Improve Air Quality

Countywide Planning Policy Rationale

"All jurisdictions, in coordination with Puget Sound Air Pollution Control Agency* and the Puget Sound Regional Council, shall develop policies, methodologies and standards that promote regional air quality, consistent with the Countywide Policy Plan." (CA-14)

*Now the *Puget Sound Clean Air Agency*

About This Indicator:

Air quality is measured for its short, medium and long-term impacts on health and the climate. To monitor daily air quality, the U.S. Environmental Protection Agency (EPA) developed the ***Air Quality Index*** (AQI), which establishes national air quality standards. However, the AQI does not measure potentially harmful air toxics and greenhouse gases, which lack national standards for measuring and reporting. Consequently, medium-term health impacts of pollution are evaluated through the measurement of ***air toxics***, including over 400 additional pollutants suspected of causing significant health problems such as cancer and respiratory disease. ***Greenhouse gases*** are monitored due to their long-term effect on climate change.

Air Quality Index The AQI measures levels of six criteria pollutants-- fine particulate matter, ground-level ozone, carbon monoxide, sulfur dioxide, nitrogen dioxide and lead. Of these, particulate matter-- tiny particles in the air such as soot, smoke and dust-- represents the most important air pollutant challenge in the Puget Sound region. Exposure to this particulate matter aggravates asthma and is linked with respiratory infections. In the winter, most particulate matter comes from wood burning stoves and fireplaces; in the summer, vehicle exhaust and outdoor burning contribute most to levels of particulate matter.

The AQI indicates that air quality in King County improved steadily between 1980 and 1999, when the EPA applied stricter standards and added a category for sensitive groups. As shown in figure 10.1, King County experienced fewer "good" air quality days in 2005 than in 1999. However, only five days were categorized as "unhealthy for sensitive groups" and none were considered "unhealthy" in 2005.

Figure 10.1

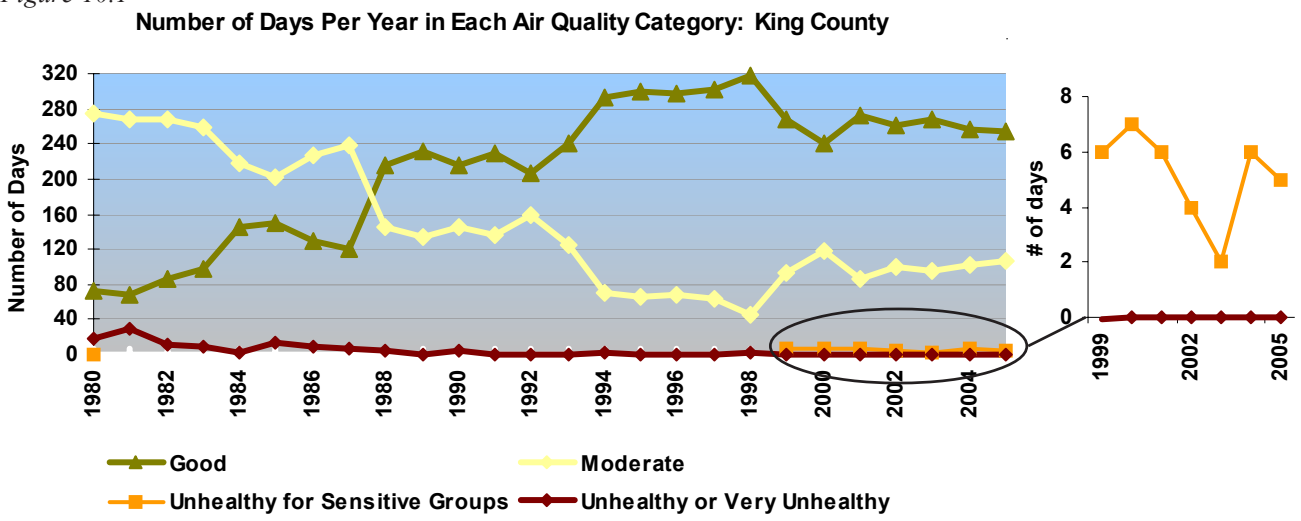
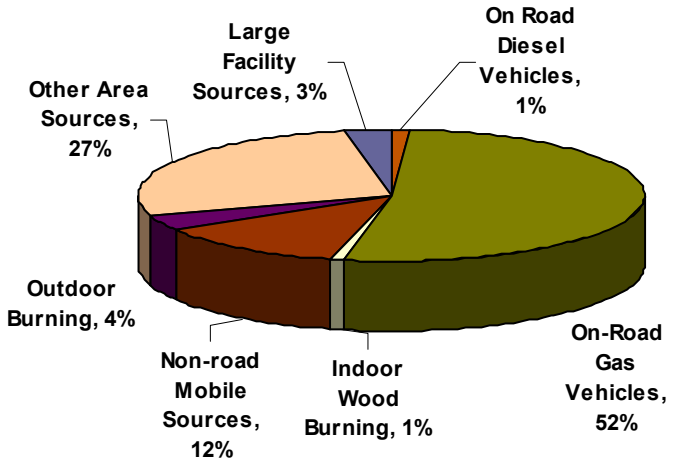


Figure 10.2

Sources of Air Toxic Emissions (2002)



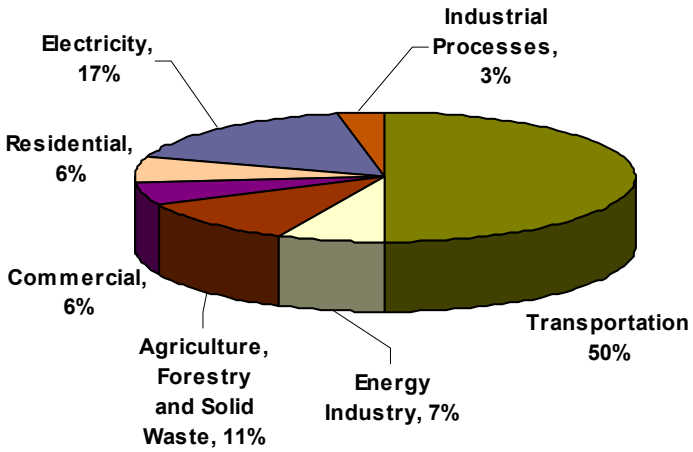
Air Toxics The Washington State Department of Ecology has monitored air toxics in the Puget Sound region since 2000 but trends in air toxics are not yet available. However, consistent with most major metropolitan areas, the U.S. EPA placed the Puget Sound region in the top five percent of the nation for potential cancer risk from air toxics. Diesel particulate matter—pollution from diesel-fueled trucks, cars, buses, construction equipment, rail, marine and port activities—poses the highest potential cancer risk in the region. The sources of diesel particulate matter and other air toxics are linked with land use and growth and shown in figure 10.2.

Greenhouse Gases While both naturally occurring and synthetic gases have been increasing in concentration for centuries, attention is drawn to the effects of global population growth and industrialization on greenhouse gas concentrations resulting specifically from human activity. In the State of Washington, carbon dioxide (CO_2) emissions are the largest source of greenhouse gas emissions.

As shown in Figure 10.3, the transportation sector—including on-road vehicles, ships, trains and planes—contribute fully one-half of the greenhouse gases emitted in the Puget Sound region. In 2006, the Washington State Department of Community, Trade and Economic Development found that increased freight movement on Washington's roadways has accounted for an increasing share of on-road transportation carbon dioxide emissions over the last two decades. Despite improved fuel efficiency in passenger cars, the increased use of less-efficient light-duty trucks, SUVs and heavy-duty trucks has contributed to elevated carbon dioxide emissions.

Figure 10.3

Sources of Greenhouse Gas Emissions (2002)



From 1999 to 2003, greenhouse gas emissions in King County increased from 21.4 million metric tons of CO_2 equivalents ($MTCO_2e$) to about 23 million $MTCO_2e$. King County's 2003 per capita emissions of 12.7 $MTCO_2e$ were lower than the national average of 20.2 $MTCO_2e$ per person, which may be due to the absence of coal-fired power plants and relatively little heavy industry in King County.

As with air toxics, motor vehicles contribute the vast majority of greenhouse gas emissions in our region. As discussed in Indicator 12, vehicle miles traveled (VMT) have risen steadily in the past decade, contributing to the rise in greenhouse gas emissions.

ENERGY CONSUMPTION

Outcome: Improve Air Quality

Countywide Planning Policy Rationale

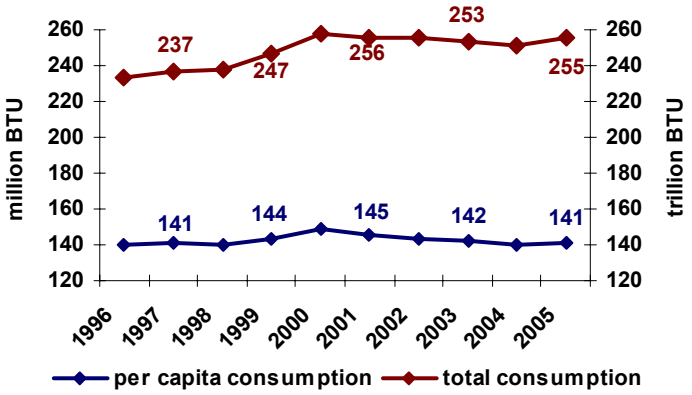
"In cooperation with water and electricity providers, local jurisdictions, including sewer and water districts, shall encourage programs for...power conservation in public facilities and in the private sector." (ED - 11) "Aggressive conservation efforts shall be implemented to address the need for adequate supply for electrical energy and water resources, and [to] achieve improved air quality. Efforts shall include, but not be limited to, public education...conservation credits, and energy efficiency in new and existing buildings." (CO, 6)

Total energy consumption in King County increased nearly 10% from 1996 to 2005. Total energy consumption peaked in 2000, declined over the following four years and again increased slightly in 2005. When adjusted for population growth, per capita energy consumption increased less than 1% in the same time period as shown in figure 11.1.

Non-Petroleum Energy Per capita consumption of non-petroleum energy (electricity and natural gas) has increased nominally since 1986, driven by an 11% increase in natural gas usage while electricity consumption decreased by almost 5%. Since 1986 natural gas has represented an increasing share of the consumed non-petroleum energy in King County, from 43% in 1986 to 47% in 2005.

Figure 11.1

King County Per Capita and Total Energy Consumption

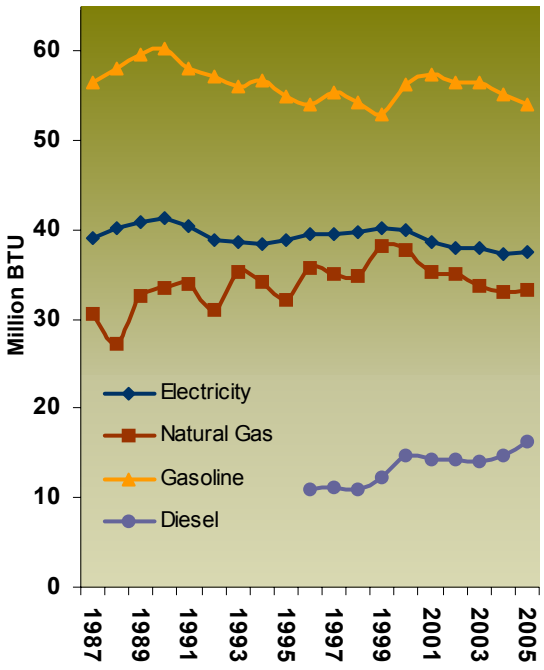


After peaking in 1999, per capita consumption of non-petroleum energy declined steadily through 2004, possibly due to a recession which decreased commercial activity and natural gas needs as well as aggressive conservation programs implemented by utilities. Reversing that trend, both electricity and natural gas consumption increased about 1% in 2005.

Non-petroleum energy is consumed predominantly for residential and commercial uses. In 2005, 86% of the non-petroleum energy consumed in King County was for residential and commercial uses. Another 14% was consumed for industrial purposes. Only a fraction was consumed for other purposes including transportation.

Figure 11.2

Per Capita Energy Consumption by Type: King County 1986-2005



Petroleum Energy As shown in Figure 11.2, per capita gasoline consumption has pursued a see-saw path with an eventual decrease since 1986. Two peaks in consumption occurred in this time period, the first in 1990 (at 1.32 gallons per day) and a second in 2001 (at 1.25 gallons per day). Since 2001, gasoline consumption has decreased nearly 6%, dropping to 1.18 gallons per day per person in 2005. In contrast, per capita consumption of diesel fuel increased over 14% in the same time period, consistent with the increase of freight movement via commercial truck traffic. Diesel fuel usage has steadily assumed a greater share of petroleum energy usage since 1996, driving the increase in petroleum consumption in the last decade.

VEHICLE MILES TRAVELED (VMT) PER YEAR

Outcome: Improve Air Quality

Countywide Planning Policy Rationale

"All jurisdictions, in coordination with Puget Sound Air Pollution Control Agency* and the Puget Sound Regional Council, shall develop policies, methodologies and standards that promote regional air quality, consistent with the Countywide Policy Plan." (CA-14) "The land use pattern for King County shall protect the natural environment by...concentrating development" (FW-6) "The land use pattern shall be supported by a balanced transportation system which provides for a variety of mobility options....(FW-18) "General capacity improvements promoting only single-occupant vehicle traffic shall be a lower priority." (T-8)

*Now the *Puget Sound Clean Air Agency*

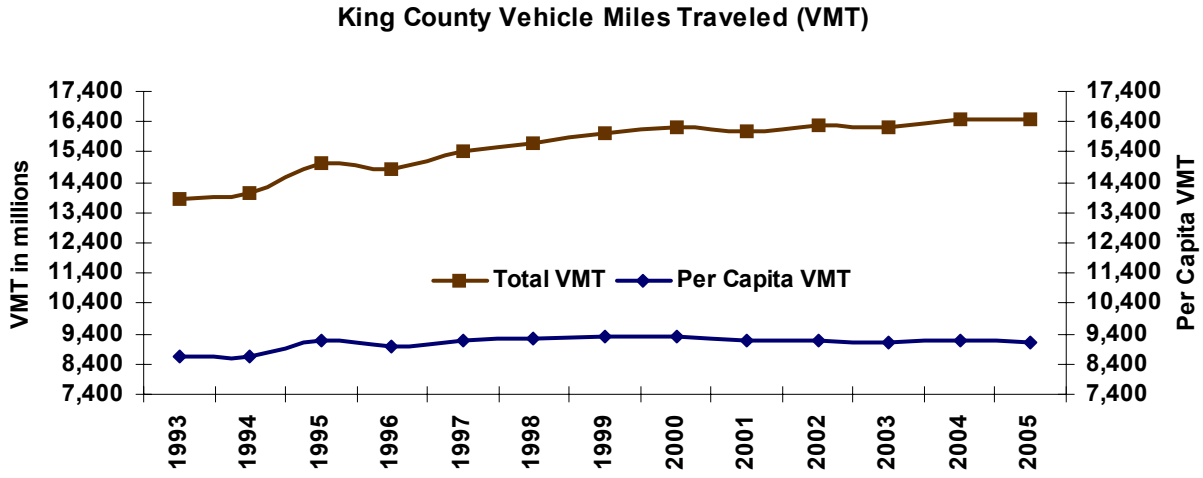
This indicator measures all vehicle miles traveled (VMT) in a given year on the streets and highways of King County. Because the total includes commercial and private vehicles, both economic activity and personal travel patterns influence the total. According to the Washington State Department of Transportation (DOT) statistics, Washington State residents traveled roughly 9,000 vehicle miles per year in the last decade, while King County's residents traveled an average of 9,175 miles per year in the same time period. Since 1995, the pattern of vehicle miles traveled in Washington has resembled that in King County, an expected mirroring due to King County's location along a major freight corridor and large population.

Total VMT As shown in Figure 12.1, the greatest annual increase in total VMT occurred between 1994 and 1995. Since then, total VMT has increased less than 1% per year. Total VMT in King County edged slightly higher in 2005; vehicles drove 45 million more miles than in the previous year.

Per Capita VMT Despite several years of high vehicle use in the late 1990's, the average annual increase in total VMT has lagged behind population growth since 1995. Per capita VMT edged down from 9,154 miles in 1995 to 9,125 miles per person in 2005. It should be noted, however, that with the exception of 1996 and 2003, per capita VMT in all other years during this time period exceeded the 1995 rate. Indeed, from 1995 to 2003, per capita VMT averaged 9,175 miles per year.

Per capita VMT in 2005 for both King County and Washington State decreased from the prior year, while total VMT increased only slightly. Factors influencing these decreases in per capita VMT may include rising gas prices as seen in 2004 and 2005 and an increase in the use of public transportation.

Figure 12.1



SURFACE WATER QUALITY

Outcome: Protect Water Quality and Quantity

Countywide Planning Policy Rationale

"Natural drainage systems including associated riparian and shoreline habitat shall be maintained and enhanced to protect water quality, reduce public costs, protect fish and wildlife habitat, and prevent environmental degradation. Jurisdictions with shared basins shall coordinate regulations to manage basins and natural drainage systems which include provisions to: a. Protect the natural hydraulic and ecological functions of drainage systems, maintain and enhance fish and wildlife habitat, and restore and maintain those natural functions; b. Control peak runoff rate and quantity of discharges from new development to approximate pre-development rates; and c. Preserve and protect resources and beneficial functions and values through maintenance of stable channels, adequate low flows, and reduction of future storm flows, erosion, and sedimentation." (CA-9) "All jurisdictions shall implement the Puget Sound Water Quality Management Plan to restore and protect the biological health and diversity of the Puget Sound Basin." (CA-15) "Each jurisdiction's policies, regulations, and programs should effectively prevent new development and other actions from causing significant adverse impacts on major river flooding, erosion, and natural resources outside their jurisdiction." (CA-12)

About This Indicator:

The King County Countywide Planning Policies require all jurisdictions to implement the *Puget Sound Water Quality Management Plan* to restore and protect the biological health and diversity of the Puget Sound Basin. The Puget Sound Management Plan identifies jurisdictional actions to maintain and improve Puget Sound's health by: preserving and restoring wetlands and aquatic habitats; preventing increases in the introduction of pollutants to the Sound and its watersheds; and eliminating harm from the entry of pollutants to the waters, sediments and shorelines of Puget Sound. As such, this indicator focuses on the condition of lakes, streams and rivers within King County's watersheds as well as that of Puget Sound itself.

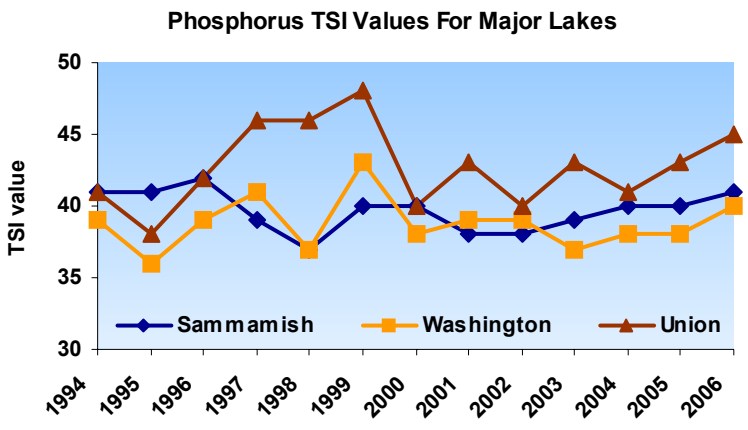
Lakes Monitored by the King County Department of Natural Resources and Parks, Carson's Trophic State Index (TSI) assesses the condition of lakes in King County. A lake's trophic state is defined as the total weight of living biological material in its waters and includes measurements of water clarity, phosphorus levels and algal levels. These attributes provide a good indication of a lake's biological activity, which is influenced by a variety of factors, both natural (including watershed size, lake depth and climate) and man-made (including land development, increases in impervious land surfaces and the introduction of sewage to a lake). The increase in a lake's biological activity is referred to as eutrophication. Natural eutrophication occurs over centuries and is often not observable in a single human lifetime, but human activity can accelerate these natural processes.

Figure 13.1

Trophic State Index Values and Attributes	
TSI Value and Trophic State	**Attributes**
<40 Oligotrophic	• high water clarity • low algae values • low phosphorus
40-50 Mesotrophic	• moderate water clarity • moderate algae values • moderate phosphorus values
50-60 Eutrophic	• lower water clarity • higher chlorophyll values • higher phosphorus value
>60 Hypereutrophic	• low water clarity • high potential for nuisance algae blooms

Major Lakes Figure 13.2 illustrates the annual fluctuations in the Phosphorus TSI value of the county's large lakes. While phosphorus is necessary for plant and animal growth, excessive amounts can increase the likelihood of nuisance algal blooms. Because phosphorus enters water bodies via the discharge of detergents, runoff containing fertilizers, or septic system seepage, efforts to decrease stormwater discharge and to improve wastewater treatment are meant to decrease excessive phosphorus levels in these lakes. As shown, the 2006 phosphorus level in Lake Sammamish returned to its 1994 baseline, while the phosphorus levels in both Lake Union and Washington increased.

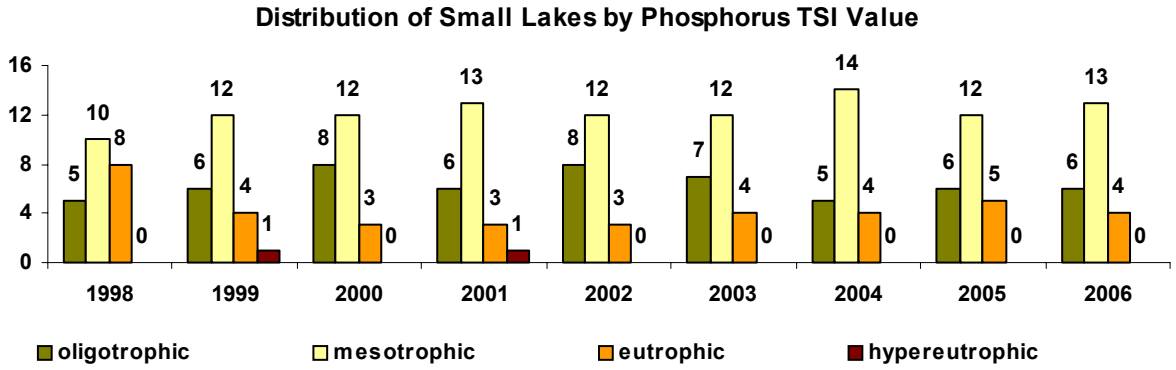
Figure 13.2



Small Lakes Figure 13.3 shows the distribution of 23 small lakes between 1998 and 2006 by phosphorus trophic state. As shown, over two-thirds of the lakes monitored in 2006 had low to moderate phosphorus levels (oligotrophic and mesotrophic TSI values). This is an improvement from 1998 when about one-half of them had low to moderate phosphorus levels. Overall, 13 of the lakes had lower phosphorus levels in 2006 than their 1998 levels. The percentage of lakes in a eutrophic state fell by one-half in the eight-year period. Only one lake transitioned from a mesotrophic to a oligotrophic state.

In 2006, only four lakes were found to have high phosphorus levels (eutrophicTSI values): Trout Lake in South King County, Paradise and Cottage Lakes in North King County, and Allen Lake in East King County. All four lakes are within the unincorporated area of King County. The map on page 11 shows the location of the 23 monitored lakes by trophic state.

Figure 13.3



Marine Puget Sound water quality is monitored through a variety of means by various stakeholders in Washington state. This section focuses on eutrophication and sediment quality. King County DNRP conducts monthly water quality monitoring at 12 offshore locations in Puget Sound, In 2006, all of the offshore stations sampled were at a level of lower concern for eutrophication potential. Similarly, all of the sites met the fecal coliform bacteria geometric mean standard in 2006, suggesting that fecal bacteria are not a concern in the Puget Sound waters surrounding King County.

From 1997 to 1999, the Washington State Department of Ecology conducted a random sampling of sediments at 300 stations throughout Puget Sound, covering approximately 2,363 km^2. The samples were tested for sediment chemistry, toxicity and invertebrate community analyses. Figure 13.4 shows the distribution of sediment quality throughout Puget Sound study area. Overall, high quality sediments were found in over 68% of the study area, including over one-half of the Central Sound's waters. The highest quality sediments were prevalent in passages, deep basins and rural embayments. Conversely, the largest percentage of samples with degraded sediments was found in harbor areas, exhibiting high chemical concentrations and toxicity and lacking an abundant and diverse invertebrate community.

Figure 13.4

Marine Sediment Quality in Puget Sound (1998)

	High	Intermediate/ High	Intermediate/ Degraded	Degraded
Strait of Georgia	81%	18%	1%	0%
Whidbey Basin	82%	15%	3%	<1%
Admiralty Inlet	100%	0%	0%	0%
Central Sound	***54%***	***41%***	***2%***	***3%***
Hood Canal	74%	24%	1%	1%
South Sound	48%	36%	16%	<1%
Entire Puget Sound	**68%**	**27%**	**4%**	**1%**

Streams Through the Stream Monitoring Program, King County Department of Natural Resources and Parks routinely monitors the quality of a number of the county's streams and rivers. Water samples are collected during routine baseflow conditions and are analyzed for a variety of parameters including: temperature, dissolved oxygen, turbidity, total dissolved solids, pH, conductivity and nutrient content. The parameters are aggregated into a single value – the Water Quality Index (WQI)—which allows for comparative analysis over time and across sampling locations. Based on its WQI value, a stream location is identified as being of low, moderate or high concern with regard to its water quality. Figure 13.7 shows the location of the 56 stream monitoring stations by quality rating.

This indicator reports stream water quality based on the WQI monitoring performed by the Stream Monitoring Program. The 56 sites reported here are found in Water Resource Inventory Areas (WRIA) 8, which roughly combines the Lake Washington/ Cedar River and Lake Sammamish/ Sammamish River Watersheds and WRIA 9, which roughly combines the Green/ Duwamish Watershed and South Puget Sound Drainage Basin.

Figure 13.5

Distribution of Stream Quality Ratings WRIA 8 and 9

		WRIA 8*		WRIA 9		combined	
		2000	2006	2000	2006	2000	2006
streams tested		*39*	40	*16*	16	*55*	56
rating	low concern	*3*	1	*6*	4	*9*	5
	moderate concern	*27*	20	*8*	10	*35*	30
	high concern	*9*	19	*2*	2	*11*	21

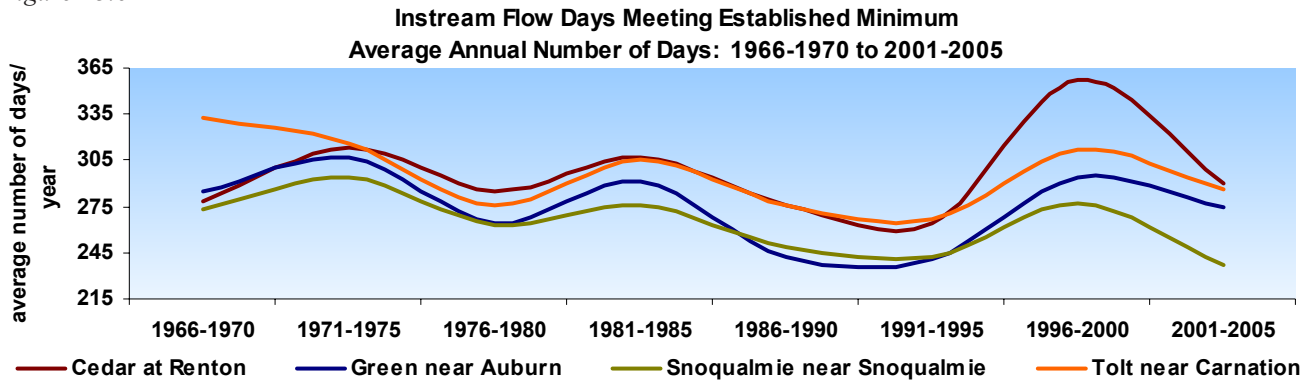
* the upstream Little Bear monitoring station was tested in 2006 (as moderate concern). It was not tested in 2000.

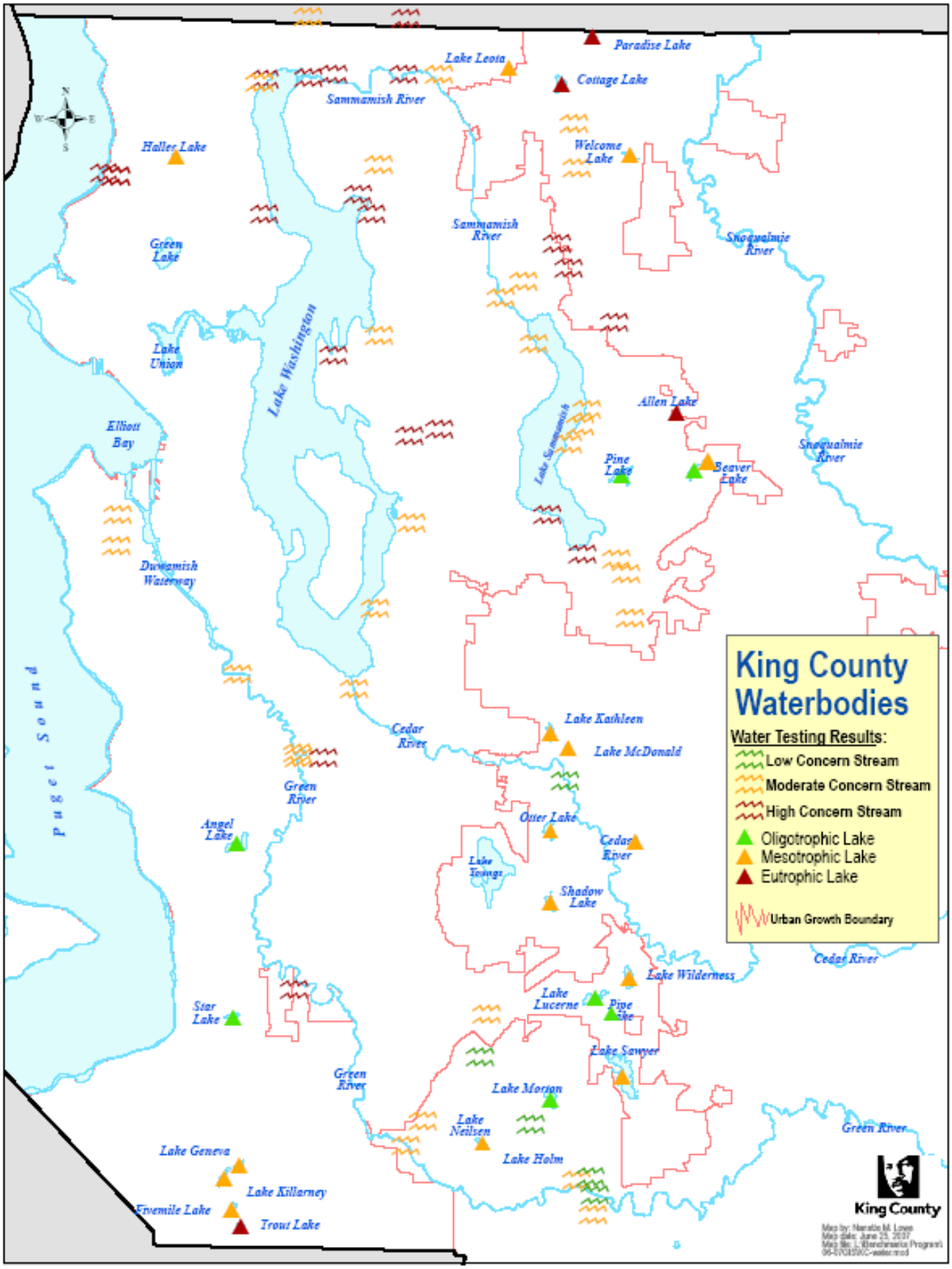
As figure 13.5 illustrates, over one-third of the streams sampled in 2006 were given a "high concern" rating. The number of "high concern" stream locations almost doubled from those in 2000, driven largely by degrading stream conditions in WRIA 8. In fact, almost one-half of the 40 monitored streams in WRIA 8 are of "high concern," the vast majority of them being in highly urbanized areas, between Interstate 90 and the King-Snohomish County line. Despite the increase in "high concern" stream locations, nearly two-thirds of the sample stream locations are considered to have good to moderate water quality, with either "low concern" or "moderate concern" ratings.

Instream flow—a specific stream flow at a specific location and time of year—is another important aspect of water quality. The Washington State Department of Ecology establishes minimum instream flows that are necessary to protect and preserve the resources and uses served by the stream, such as fish, wildlife and recreation.

Figure 13.6 illustrates the cyclical stream flows, which occur naturally as a result of weather and climate cycles. It also reveals the general instream flow trends at each location from the period 1966-1970 to 2001-2005. The average number of days per year that the Cedar River (at the Renton gauge site) exceeded its established minimum instream flows increased nominally, while the Green (near Auburn), Snoqualmie (near Snoqualmie) and Tolt (near Carnation) Rivers all experienced fewer days of adequate flows. The Tolt River (near Carnation) showed the most dramatic decrease, with an average of 46 fewer days per year with adequate stream flows between 2001 and 2005. As with the cyclical fluctuations, these instream flow trends may be attributed to natural causes, such as rainfall, temperature and the presence of groundwater. They may also be caused by human activities, such as land use practices, deforestation and stream diversions.

Figure 13.6




King County Waterbodies
Water Testing Results:
Low Concern Stream
Moderate Concern Stream
High Concern Stream
Oligotrophic Lake
Mesotrophic Lake
Eutrophic Lake
Urban Growth Boundary
King County
Paradise Lake
Lake Leota
Cottage Lake
Sammamish River
Welcome Lake
Haller Lake
Green Lake
Lake Union
Lake Washington
Sammamish River
Snoqualmie River
Allen Lake
Elliott Bay
Lake Sammamish
Pine Lake
Beaver Lake
Duwamish Waterway
Puget Sound
Lake Kathleen
Cedar River
Lake McDonald
Green River
Otter Lake
Angel Lake
Cedar River
Lake Youngs
Shadow Lake
Lake Wilderness
Lake Lucerne
Pine Lake
Star Lake
Lake Sawyer
Green River
Lake Morton
Lake Neilsen
Lake Holm
Green River
Lake Geneva
Lake Killarney
Fivemile Lake
Trout Lake

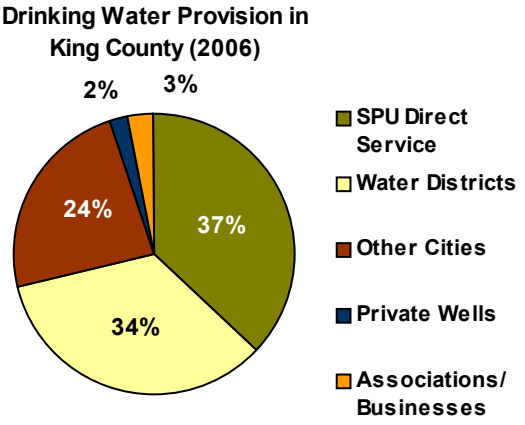
WATER CONSUMPTION
Outcome: Protect Water Quality and Quantity

Countywide Planning Policy Rationale

"Water supply shall be regionally coordinated to provide a reliable economic source of water and to provide mutual aid to and between all agencies and purveyors. The region should work toward a mechanism to address the long-term regional water demand needs of all agencies and water purveyors." (CO-5) "Aggressive conservation efforts shall be implemented to address the need for adequate supply for...water resources....Efforts shall include...public education, water reuse and reclamation, landscaping which uses native and drought-resistant plans and other strategies to reduce water consumption..."(CO-6) "Water reuse and reclamation shall be encouraged, especially for large commercial and residential developments, and for high water users such as parks, schools, golf courses, and locks." (CO-7)

Seattle Public Utilities (SPU) provides potable water for approximately 70% of King County's population, either through direct service or through wholesale provision by 27 other water utilities. Almost one-half of SPU's customers are direct, retail customers, with the remainder being wholesale customers. Nearly all of this water is supplied by the Cedar River Watershed and the South Fork Tolt River Watershed in eastern King County. The remaining King County population obtains their potable water from approximately 2,000 other public systems and 12,000 private wells.

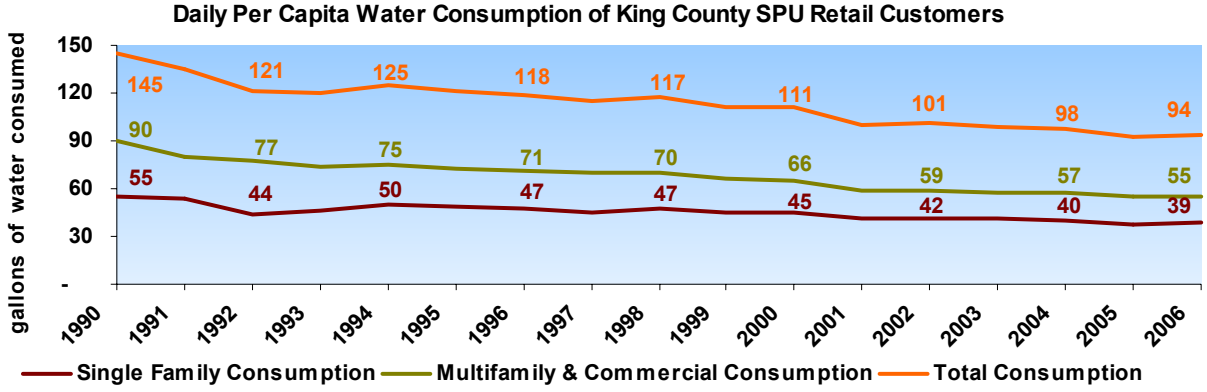
Figure 14.1



This indicator highlights SPU's retail consumption. Future reports should include more countywide data as water utilities begin routine reporting of water consumption and conservation information required under the new Water Use Efficiency rules adopted by the Washington State Department of Health effective January, 2007.

As figure 14.2 illustrates, SPU's retail customers decreased water consumption 35% over the last 16 years, with multifamily and commercial consumption showing a slightly greater decrease than single family consumption. The largest annual change in consumption occurred in 1992 as a result of severe drought conditions and mandatory water use restrictions. Since then, a number of factors have kept water demand down including higher water rates, conservation efforts and improved system operations.

Figure 14.2



While water consumption has shown a downward trend in the last several decades, annual fluctuations-- due partly to summer weather patterns in the region-- have occurred. The effect of weather can be seen in the 4% increase in water consumption in 2006, which recorded the driest summer months since 1976 accompanied by warmer than average temperatures.

GROUNDWATER QUALITY AND QUANTITY
Outcome: Protect Water Quality and Quantity

Countywide Planning Policy Rationale

"All jurisdictions shall adopt policies to protect the quality and quantity of groundwater where appropriate..." (CA-5) "Land use actions should take into account the potential impacts on aquifers determined to serve as water supplies. The depletion and degradation of aquifers needed for potable water supplies should be avoided or mitigated; otherwise a proven, feasible replacement source of water supply should be planned and developed to compensate for potential lost supplies." (CA-6)

From 2001 through 2004, the King County Department of Natural Resources and Parks (DNRP) conducted ambient groundwater monitoring, testing 68 wells for the presence of multiple contaminants including arsenic, nitrate, lead, and fecal coliform. Figure 15.1 shows the results of that testing. Arsenic was detected in wells throughout the county, though this was not unexpected as arsenic is a naturally occurring component of certain types of soil and rock found in the Pacific Northwest. In fact, the high levels of arsenic present in over one half of the tested wells in East King County were attributed to the natural geology of the region, rather than contamination from human activity, such as industrial manufacturing. Only two of the wells in East King County were found to have excessive quantities of nitrate and fecal coliform, leading to good to excellent overall water quality ratings for the monitored wells.

Additional nitrate testing has continued on Vashon-Maury Island. In both 2005 and 2006, all monitored wells on Vashon-Maury Island met the drinking water standard, all with less than 5 mg per liter of nitrate present.

Figure 15.1

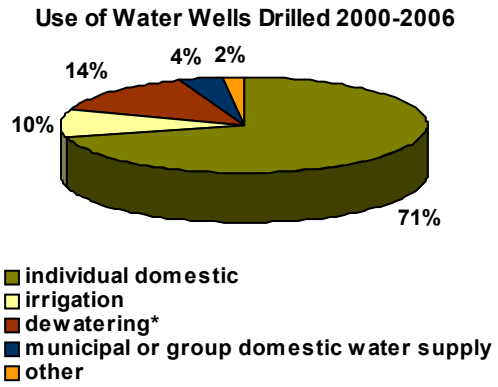
Ambient Groundwater Quality: 2001-2004 Monitoring Results

Ground Water Management Area (GWMA)	total wells sampled	Wells Not Meeting Drinking Water Standards*				Overall Water Quality
		Arsenic	Nitrate	Lead	Fecal Coliform	
East King County	15	8	1	0	1	Good
Issaquah Creek Valley	15	0	0	0	0	Very Good- Excellent
Redmond- Bear Creek Valley	16	1	0	0	0	Very Good
Vashon-Maury Island	22	2	0	0	0	Good
total	***68***	***11***	***1***	***0***	***1***	

* Drinking water standards: arsenic (0.01 mg/L), nitrate (10 mg/L), lead (0.015 mg/L), fecal coliform (any detection of fecal coliform constituted an exceedence of the drinking water standard).

In 2006, King County DNRP partnered with Seattle-King County Public Health to determine the effect of new and existing Group B systems (serving 2 to 14 connections) and other exempt water wells on Group A (15 or more connections) public water utilities. The study identified around 11,500 water wells logged by the Washington State Department of Ecology in King County. As shown in figure 15.2, over 1,500 new water wells have been drilled since 2000, most for individual domestic use. The majority of these domestic water wells (94% of those drilled over the seven-year period) have been drilled in rural King County. However, a large proportion of the domestic and irrigation wells were drilled within existing water utility service areas. Almost 40% of the domestic and irrigation wells drilled in King County were drilled within the water supply areas of Covington Water District, Cedar River Water and Sewer District, King County Water District 119, Sammamish Plateau Water and Sewer District and Fall City Water District #127.

Figure 15.2



* A dewatering well is intended to withdraw or divert groundwater for the purpose of facilitating construction, stabilizing a landslide or protecting an aquifer.

CONTINUITY OF TERRESTRIAL AND AQUATIC HABITAT NETWORKS

Outcome: Protect the Diversity of Plants and Wildlife

Countywide Planning Policy Rationale

"Adjacent jurisdictions shall identify and protect habitat networks that are aligned at jurisdictional boundaries. Networks shall link large protected or significant blocks of habitat within and between jurisdictions to achieve a continuous Countywide network. These networks shall be mapped and displayed in comprehensive plans." (CA-7) "All jurisdictions shall identify critical fish and wildlife habitats and species and develop regulations that a) promote their protection and proper management; and b) integrate native plant communities and wildlife with other land uses where possible." (CA-8) "Natural drainage systems including associated riparian and shoreline habitat shall be maintained and enhanced to protect water quality, reduce public costs, protect fish and wildlife habitat, and prevent environmental degradation." (CA-9)

About this Indicator:

In addition to designating and protecting critical areas, the Growth Management Act also requires local governments to identify open space corridors within and between urban growth areas that are useful for recreation, wildlife habitat, trails, and connection of critical areas. These open space corridors maintain wildlife connectivity, providing access to larger habitats. When ecosystems become fragmented and lack connectivity, fish and wildlife are prevented from meeting their need for food, water, cover and reproduction. This indicator focuses on land conservation priorities highlighted by the King County Greenprint Program. These priorities provide stakeholders with guidance regarding strategic land acquisition and conservation goals.

The Greenprint analysis has identified six regionally significant acquisition and conservation priorities in King County. The highest value lands are found throughout the forests of the Cascade foothills and along major riparian corridors. Other priority areas include farmland, the Puget Sound shoreline, regional trails connections and the protection of open space to maintain the Urban Growth Boundary.

Figure 17.1

Federal, State, County and City Owned Lands within King County (2005)

	acres of protected land	percent of countywide acreage
federal public lands	354,200	26%
city public lands	142,900	10%
state public lands	97,500	7%
King County public lands	31,800	2%
total	**626,400**	**46%**
total county acreage	***1,363,776***	

As shown in figure 17.1, almost one-half of King County's 1.4 million acres is permanently protected by local, state and federal land management agencies. King County and local jurisdictions together own and manage almost 175,000 acres of parks, open space and resource lands. An additional 105,000 acres of privately held, working resource lands are under development rights of King County. These lands comprise a variety of natural systems across the county and contribute to the protection of significant ecosystem features, such as water quality and quantity and wildlife habitat.

What is Greenprint? The ***Greenprint for King County Report*** describes a regional conservation strategy that King County plans to apply to protect open space resources for such purposes as salmon recovery, farm and forest preservation, flood hazard reduction, parks and regional trails. The Greenprint strategy is informed by Geographic Information Systems, or GIS, which is used to evaluate the King County landscape to identify land conservation options that provide the greatest public benefits. The ***Greenprint for King County Report*** also reflects completion of a King County Conservation Finance Study and extensive public outreach. The Greenprint strategy and GIS model were conceived by the Trust for Public Land project team and King County staff.

For more information about the Greenprint project, please see http://dnr.metrokc.gov/wlr/greenprint/.

CHANGE IN THE NUMBER OF SALMON
Outcome: Increase Salmon Stock

Countywide Planning Policy Rationale

"All jurisdictions shall identify critical fish and wildlife habitats and species and develop regulations that a) promote their protection and proper management; and b) integrate native plant communities and wildlife with other land uses where possible." (CA-8) "Natural drainage systems including associated riparian and shoreline habitat shall be maintained and enhanced to protect water quality, reduce public costs, protect fish and wildlife habitat, and prevent environmental degradation. Jurisdictions within shared basins shall coordinate regulations to manage basins and natural drainage systems which include provisions to: a) protect the natural hydraulic and ecological functions of drainage systems, maintain and enhance fish and wildlife habitat, and restore and maintain those natural functions; b) control peak runoff rate and quantity of discharges from new development to approximate pre-development rates; and c) preserve and protect resources and beneficial functions and values through maintenance of stable channels, adequatel low flows, and reduction of future storm flows, erosion, and sedimentation." (CA-9) "...Jurisdictions shall coordinate land use planning and management of fish and wildlife resources with affected state agencies and the federally-recognized Tribes." (CA-11)

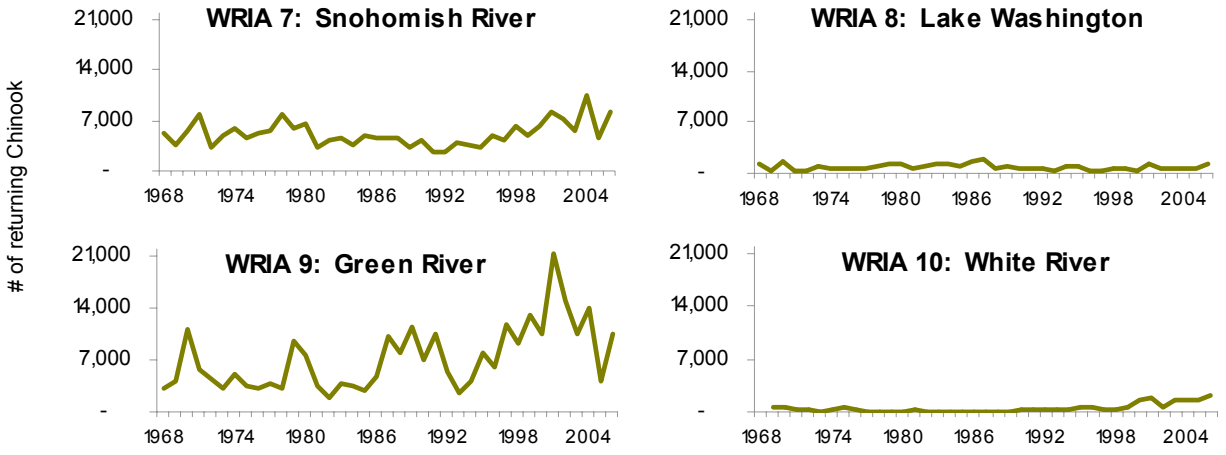
Salmonid fish species native to King County include chinook, coho, sockeye/kokanee, pink and chum salmon, rainbow (including steelhead), cutthroat, bull and dolly varden trout and pygmy mountain whitefish. The Endangered Species Act currently identifies both the bull trout and chinook as threatened species in King County waters. Throughout much of Washington state, the maintenance of these fish populations is co-managed by the State of Washington and the treaty Indian tribes. While local jurisdictions do not manage fish populations directly, they do have responsibility for activities, such as land-use regulation, which influence salmon habitats.

This indicator looks at natural chinook escapement (the number of mature, adult chinook returning to their stream of origin to spawn naturally) in King County's four major Watershed Resource Inventory Areas: the Snohomish (WRIA 7), Cedar/ Sammamish (WRIA 8), Green/ Duwamish (WRIA 9) and Puyallup/ White (WRIA 10). Figure 18.1 shows the Chinook escapement from 1968 to 2006 in each WRIA and illustrates the annual variability of fish returns.

Escapement rates, while increasing over the past 30 years, are still drastically short of historical levels and 2055 targets set for chinook populations. As shown below, there is much variability in escapement returns, due in part to natural environmental conditions such as ocean warming cycles and precipitation but also to human activities including land-use practices that alter the natural stream flow. However, harvest and hatchery management efforts may contribute to increasing chinook returns, such as those seen in WRIA 9. Because habitat restoration activities have only just begun and have not yet been implemented in earnest, it is too early to attribute what are considered cyclical trends in chinook populations to these efforts.

Figure 18.1

Annual Chinook Escapements: 1968-2006



CHANGE IN NOISE FROM VEHICLES, PLANES AND YARD EQUIPMENT

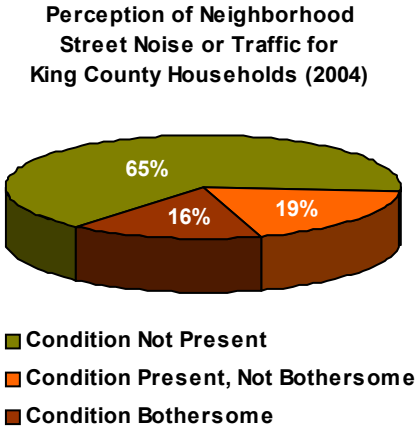
Outcome: Decrease Noise Levels

Countywide Planning Policy Rationale

Although the Countywide Planning Policies do not contain specific policy direction for noise, the Benchmark Task Force added this Indicator because there were concerns about noise levels in King County. The Task Force also wanted to monitor how growth management issues affected noise levels.

Figure 19.1

Street Noise The *American Housing Survey for the Seattle-Everett Metropolitan Area in 2004* asked respondents about their perception of neighborhood street noise or traffic. Although more than a third of the responding King County households acknowledged the presence of street noise or traffic in their neighborhood, less than half of them declared the condition to be bothersome. However, street noise and traffic is more troubling in Seattle, where over a fifth of the households perceived it as a bothersome condition.

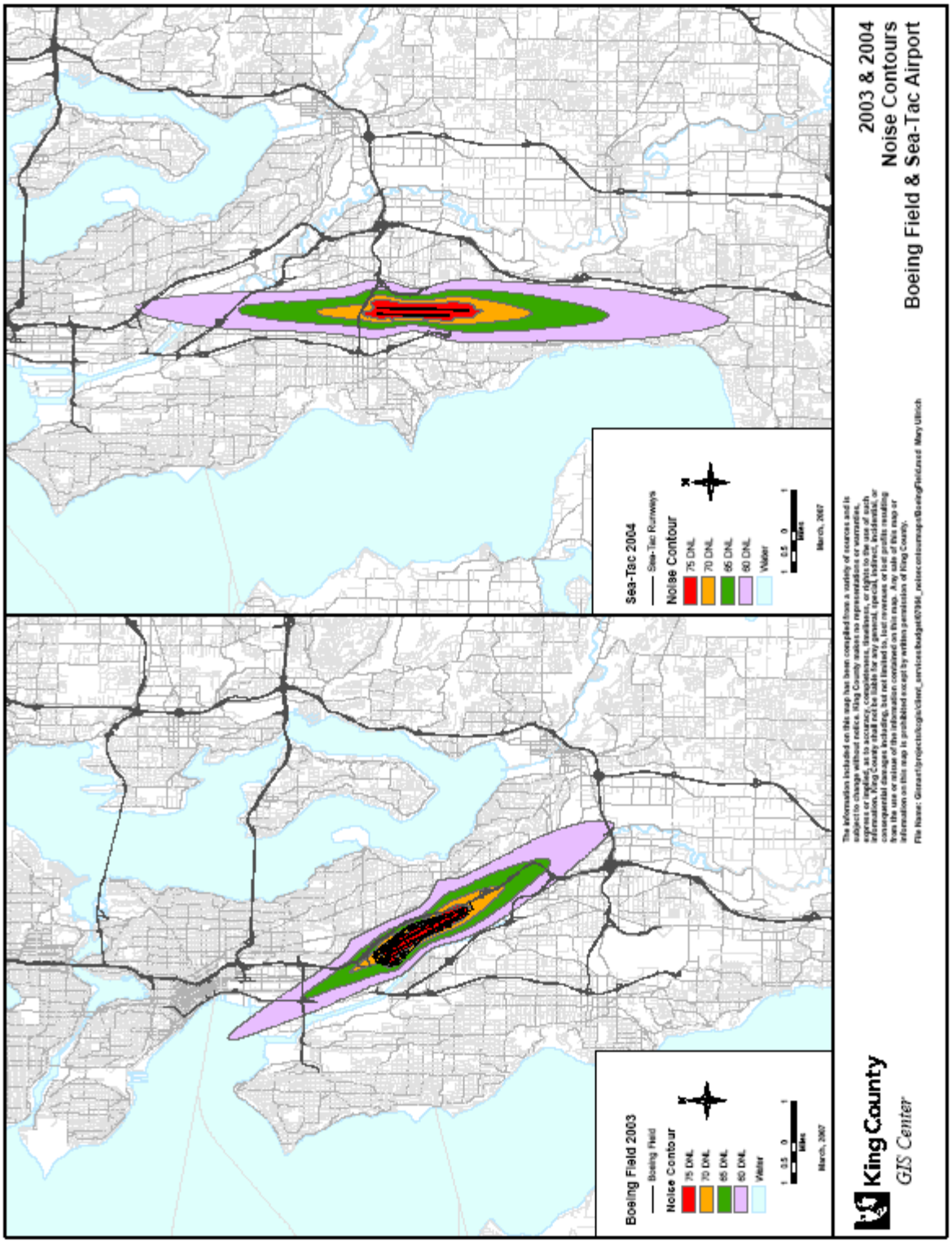


Aircraft Noise In a survey conducted on behalf of Puget Sound Regional Council in April 2006, fewer than a third (31%) of residents around Sea-Tac International Airport stated that they notice aircraft noise and found it bothersome. However, over half (56%) stated that while they notice aircraft noise occasionally it doesn't bother them. The remaining respondents claimed not to notice aircraft noise.

Figure 19.2 shows noise contours for both Boeing Field (2003) and Sea-Tac Airport (2004). Noises contours—established by modeling annual operations at each airport—graphically illustrate noise levels from air traffic by connecting points of equal noise exposure across an area. Noise exposure is measured in terms of ***DNL*** (Day-Night Average Sound Level) to represent cumulative exposure to aircraft noise over a 24 hour period. DNL is the average sound level in decibels over a given time, and include a 10 decibel penalty for noise occurring at night between the hours of 10 pm and 7 am to account for increased sensitivity to night-time noise.

Federal Aviation Administration (FAA) guidelines consider aircraft noise exposure levels below 65 DNL to be compatible with all land uses. The 65 DNL noise contour around Boeing Field encompassed nearly 3,000 acres, but only about one-sixth of the area is comprised of residential land uses, according to the 2003 modeling study for this airport. In contrast, the 65 DNL noise contour around Sea-Tac Airport encompassed over 4,000 acres. Land uses within the Sea-Tac Airport contours were not provided by the 2004 modeling study.

Other airports and airfields located in King County (but not included in this analysis) include: Auburn Municipal Airport, Bandera State Airport, Crest Airport, Kenmore Air Harbor, Renton Municipal Airport, Skykomish State Airport and Vashon Municipal Airport.


2003 & 2004
Noise Contours
Boeing Field & Sea-Tac Airport
King County
GIS Center
Boeing Field 2003
Boeing Field
Noise Contour
75 DNL
70 DNL
65 DNL
60 DNL
Water
Sea-Tac 2004
Sea-Tac Runways
Noise Contour
75 DNL
70 DNL
65 DNL
60 DNL
Water

POUNDS OF WASTE DISPOSED AND RECYCLED PER CAPITA

Outcome: Decrease Waste Disposal and Increase Recycling

Countywide Planning Policy Rationale

Although the Countywide Planning Policies do not include policy direction for reducing solid waste or promoting recycling programs, the Benchmark Task Force added this Indicator, because recycling and reductions in solid waste save resources and landfill space, and reduce the potential for soil and water contamination due to leakage from landfills.

Over five million tons of waste were generated in King County in 2005. Averaging about 14% annual growth, waste generation has increased over 50% since 2000. Along with this increase, recycling has become an increasingly popular alternative to disposal as shown in figure 20.1. The tons of waste recycled grew at a markedly faster rate than the tons of waste disposed. Between 2000 and 2005, the tons of waste recycled almost doubled, a rate about three times greater than that of disposed waste. By 2005, nearly one-half of the county's waste was recycled.

Figure 20.1

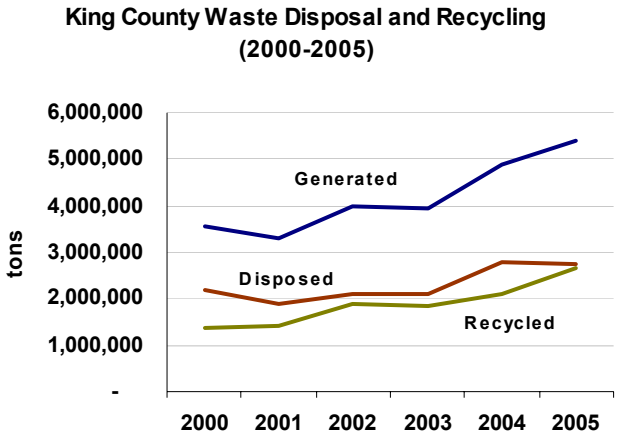


Figure 20.2

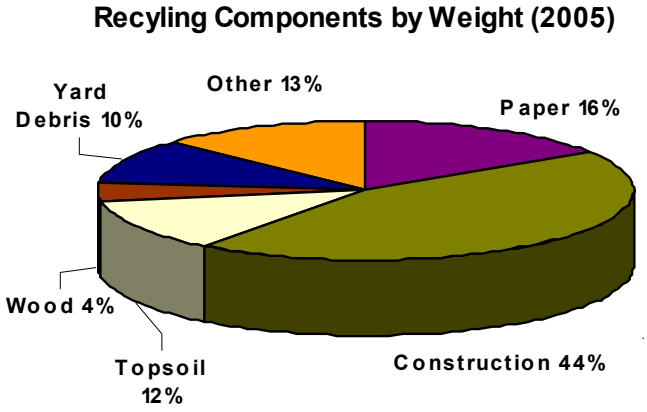
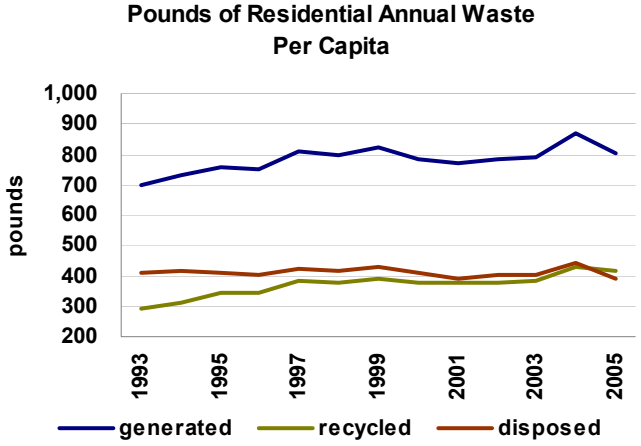
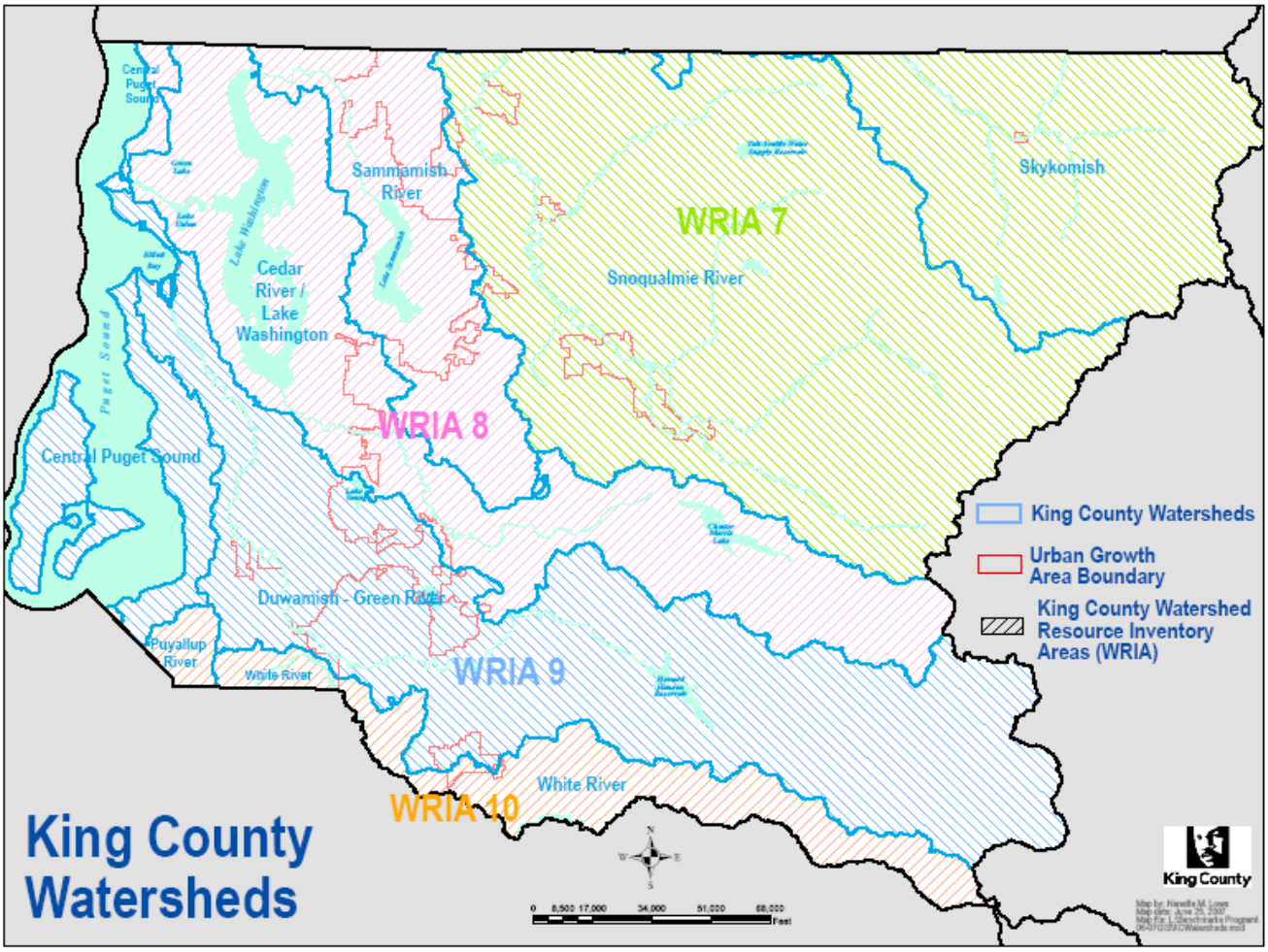


Figure 20.2 shows the allocation of the county's recycled waste. Of the 2.7 million tons of waste recycled, 44% of the tonnage was in construction debris including asphalt, concrete and other land clearing debris. Since 2000, the tons of construction debris recycled increased over 140%. Paper products (including newsprint, corrugated and mixed paper) contributed 16% of the recycled tonnage. Though the amount of paper recycled increased 18% since 2000, it accounted for a smaller share of recycled tonnage in 2005.

Figure 20.3



Striking changes in residential waste practices have occurred in the last 12 years as shown in figure 20.3. From 1993 to 2005, residential waste generation has grown (15% increase), but at a rate just slightly ahead of population growth (14% increase). At the same time, residential recycling increased by 43%, while waste disposal actually decreased (by 5%). This is notable because waste disposal was surpassed by recycling in 2005 with 52% of the county's residential waste being recycled.



Notes and Data Sources

Indicator 9: Percent of Land Developed

The Growth Management Act is codified in Chapter 36.70A Revised Code of Washington. For more information about critical areas requirements, see http://www.gmhb.wa.gov/gma/index.html. Figures 9.1 and 9.2 data provided by King County Department of Natural Resources and Parks (DNRP), Water and Land Resources Division (WLRD), at http://dnr.metrokc.gov/wlr/index.htm.

Indicator 10: Air Quality

Figure 10.1 data provided by *2005 Air Quality Summary*, prepared by Puget Sound Clean Air Agency (PSCAA), http://www.psceanair.org/news/library/reports/2005AQDSFinal.pdf. In 1999, the EPA added PM2.5 to the Air Quality Index and divided the "unhealthy" category into "unhealthy" and "unhealthy for sensitive groups" making direct comparability to previous annual ratings inappropriate. Figure 10.2 data provided by *2005 Air Quality Summary*, prepared by PSCAA, http://www.pscleanair.org/news/library/reports/2005AQDSFinal.pdf. Air toxics sources measured in Puget Sound Region in 2002. For information regarding Puget Sound EPA designation of air toxics, refer to the *National Air Toxic Assessment, 1996* from the U.S. EPA at http://www.epa/gov/ttn/atw/nata/. Figure 10.3 data provided by *2005 Air Quality Summary*, prepared by PSCAA, http://www.psceanair.org/news/library/reports/2005AQDSFinal.pdf. State emissions data provided by *Washington's Greenhouse Gas Emissions: Sources and Trends, 2006*, prepared by the Washington State Department of Community, Trade and Economic Development (CTED), http://www.cted.wa.gov/energy/archive/papers/wa-ghg99.htm. King County greenhouse gas emissions data also provided by *2003 Inventory of King County Air Emissions*, prepared King County DNRP, http://dnr.metrokc.gov/dnrp/air-quality/pdf/2003-inventory-report.pdf.

Indicator 11: Energy Consumption

This indicator measures trends in the usage of the four primary energy sources in King County: gasoline, diesel, electricity and natural gas. It does not include renewable energy sources, nuclear-powered sources or usage of other fossil fuels including aviation/ jet fuel or coal in energy production. Due to these exclusions, energy consumption at the county level is not strictly comparable to state and national totals where such measurement is made. Diesel consumption data was not collected until 1996. Improved data collection methodology may be partly responsible for the sharp rise in diesel usage from 1996-2000. Figure 11.2: Electricity consumption data provided by Puget Sound Energy (PSE) and Seattle City Light. Natural gas consumption data provided by PSE. Gasoline and diesel consumption data provided by Washington State Department of Transportation (DOT) and is based on annual Washington State Office of Financial Management (OFM) population estimates for King County. Additional information regarding state and national energy consumption trends is available from the Energy Information Adminstration (EIA), a statistical agency of the U.S. Department of Energy.

Indicator 12: Vehicle Miles Traveled

Figure 12.1 data provided by Washington State Department of Transportation (DOT). Data on statewide trends taken from *Measures, Markers and Mileposts: The Gray Notebook for the Quarters Ending June 30 and September 30, 2006* from the WA State DOT, available at http://www.wsdot.wa.gov/accountability/default.htm.

Indicator 13: Surface Water Quality

Lakes: Figures 13.2 data provided by King County Department of Natural Resources and Parks (DNRP), Water and Land Resoures Division (WLRD). For more information about large lakes monitoring, see WLRD at http://dnr.metrokc.gov/wlr/waterres/lakes/TSI.htm. Figure 13.3 data provided by King County DNRP, WLRD. 31 small lakes were tested throughout King County in 1998, 2000-2004. Due to funding limitations, 30 lakes were monitored in 1999, 24 were monitored in 2005 and 26 in 2006. Figure 13.3 includes the testing results for the 23 lakes that were tested every year. For findings specific to those lakes monitored, see King County DNRP, WLRD at http://dnr.metrokc.gov/topics/lakes/LKStopic.htm. Small lakes testing samples taken in summer months. While each major division (10, 20, 30 etc) of the Trophic State Index (TSI) represents a doubling or halving of algal biomass and is related to nutrients and water clarity, the TSI values are a continuum and some lakes may be in a borderline range, exhibiting some qualities of upper and lower classifications. Subsequently, small lakes with TSI values of 39.9 to 40.1 are included in the oligotrophic range and those with TSI values of 49.9-50.1 are included in the mesotrophic range. Eutrophication is not interpreted here as a statement of water quality but an indication of the conditions existing in lakes. For more information about small lakes monitoring and the Trophic State Index, see WLRD at http://dnr.metrokc.gov/wlr/waterres/smlakes/.

Marine Waters: The 12 offshore sites monitored by King County DNRP for eutrophication and fecal choliform include both ambient (sites away from any known source of pollution) and outfall (those situated close to a know source of pollution) sites. The offshore site testing includes parameters for temperature, salinity, density, dissolved oxygen, nutrients, chlorophyll and fecal coliform bacteria. The State of Washington's fecal coliform standard indicates that organism counts should not exceed a geometric mean value of 14 colony-forming units (CFU) per 100 ml. For more information about marine water quality monitoring, see King County Department of Natural Resources and Parks Marine and Sediment Assessment Group, at http://dnr.metrokc.gov/wlr/waterres/marine/. Figure 13.4 data and findings taken from *Sediment Quality Triad Index in Puget Sound*, prepared by the Washington State Department of Ecology Marine Sediment Monitoring Program available at http://www.ecy.wa.gov/pubs/0403008.pdf.

Streams: Figure 13.5 data provided by King County Department of Natural Resources and Parks (DNRP), Water and Land Resources (WLRD). For more detailed information about the results of this testing see http://dnr.metrokc.gov/wlr/waterres/streamsdata/trends.htm. Figure 13.6 WA State deparmtent of Ecology data provided by King County DNRP. For more information about Instream Flow Setting, see Washington State Department of Ecology at http://www.ecy.wa.gov/programs/wr/instream-flows/isfhm.html.

Indicator 14: Water Consumption

Figure 14.1 provided by King County Department of Natural Resources and Parks (DNRP). For more information about water resources in King County, see King County DNRP at http://dnr.metrokc.gov/wlr/. Figure 14.2 data provided by Seattle Public Utilities (SPU) and analyzes only SPU-provided water consumption, http://www.seattle.gov/util/Services/Water/index.asp.

Indicator 15: Groundwater Quality and Quantity

Figure 15.1 data taken from the 2001-2004 Ambient Groundwater Monitoring Results Report, prepared by King County Department of Natural Resources and Parks (DNRP), Water and Land Resources Division (WLRD) available at http://dnr.metrokc.gov/wlr/wq/ambient-groundwater-monitoring01-04.htm. Only 19 Vashon Maury Island well sites were tested in 2005 and 2006. Data for 2005-2006 testing provided by King County DNRP, WLRD at http://dnr.metrokc.gov/wlr/wq/WRE-data-report06.htm. Figure 15.2 data provided by King County DNRP, Groundwater Protection Program, at http://dnr.metrokc.gov/wlr/wq/groundwater.htm.

Indicator 16: Change in Wetland Acreage and Function

Indicator 16 is not reported in this bulletin as no new data exists. For the last reported data regarding the change in wetland acreage and function, see the 2005 Environmental Bulletin, available at http://www.metrokc.gov/budget/benchmrk/bench04/Environment/Environment_05.pdf#16.

Indicator 17: Continuity of Terrestrial and Aquatic Habitat.

Open space corridors are required by the Growth Management Act under RCW 36.70A.160. Figure 17.1 data taken from the March 2005 *Greenprint for King County*, prepared by the Trust for Public Land Northwest for King County Department of Natural Resources and Parks, Water and Land Resources Division available at http://dnr.metrokc.gov/wlr/greenprint/.

Indicator 18: Increase Salmon Stock

Figure 18.1 data provided by King County Department of Natural Resources and Parks, Water and Land Resources Division. For more information regarding salmon in King County waters, see http://dnr.metrokc.gov/topics/salmon/SALtopic.htm.

Indicator 19: Change in Noise Levels.

Figure 19.1 data provided by the *American Housing Survey for the Seattle-Everett Metropolitan Area in 2004* prepared by the American Housing Survey, http://www.huduser.org/datasets/ahs/Ahs04metroreports/Seattle.pdf, table 2-8. Figure 19.2. based on the *Sea-Tac Airport Community Impact Survey* conducted by the Puget Sound Regional Council, http://www.psrc.org/projects/air/pubs/prelimsurveyresults.pdf. Map prepared by King County GIS Center, http://www.metrokc.gov/gis/. Additional information provided by the Sea-Tac International Airport Noise Abatement website, http://www.portseattle.org/community/environment/noise.shtml and King County International Airport Noise Abatement website, http://www.metrokc.gov/airport/noise/. The FAA has sole authority over national airspace, and their air traffic controllers alone have authority to direct aircraft once airborne. The State of Washington, King County, and the City of Seattle exempt from regulation noise from the manufacture, operation, or testing of aircraft.

Indicator 20: Waste Disposed and Recycled

Data provided by the Washington State Department of Ecology through the King County Department of Natural Resources, Solid Waste Division. Figure 20.2: ***construction*** includes asphalt, concrete, construction/ demolition debris and land-clearing debris; ***wood*** includes wood for energy recovery; and ***paper*** includes newsprint, corrugated and mixed paper. For more information regarding solid waste, see http://www.metrokc.gov/dnrp/swd/index.asp.