



Chapter
3

Fundamentals of Planning for the Region's Future Needs

One important element in planning the future of solid waste services is forecasting what and how much waste we will reduce, recycle, and dispose. This information, combined with an understanding of who uses the system, enables us to ensure that we have adequate services and facilities for the future.

A myriad of variables can affect how many tons of waste we generate. For example, increases in population, employment activity, and personal income are likely to lead to more consumption and hence more waste generated. These types of demographic trends, along with the County's existing data on the tons of garbage disposed each year, are used to develop planning forecast models. These models show how different variables affect disposal and recycling rates – both now and in the future – and provide the basis for system planning.

This chapter answers two fundamental questions needed for future planning:

- How much waste are system users currently generating and expected to generate in the future?
- What does the solid waste management system look like today and who uses it?

By answering these questions, we build the foundation upon which the recommendations presented throughout this Plan are based.

County Planning Policies

County policies that guide the planning process, set out in Ordinance 14236, are as follows:

PL-1. The county shall continue to monitor the type, amount and generation sources of waste entering the county's solid waste system.

PL-2. The county shall monitor and prepare an annual report on the amount of solid waste disposal at public transfer stations and at the regional landfill.

PL-3. The county shall complete a survey of self-haul customers at county transfer facilities, using zip codes to obtain more accurate information on where self-haul customers live.

PL-4. The county should support state legislation that would require the private haulers to provide accurate reports on curbside collection and recycling and disposal at private transfer stations.

PL-5. The county should continue to conduct waste characterization studies every three years as part of its ongoing waste monitoring program.

PL-6. Forecasts for waste tonnages should be updated every year to allow responsive planning for facilities and operations.

Snapshot of the Planning Area

King County spans more than 2,200 square miles, with an estimated population of 1.69 million. It is the most populated of Washington's 39 counties, and the 12th most populated in the nation.

King County's regional solid waste management system serves the citizens of all the unincorporated areas of the County as well as 37 of the 39 cities, excluding only Seattle and Milton. The system's service area has a population of about 1.14 million, or about 68 percent of King County's population as a whole. An estimated 55 percent of the jobs in King County are within this service area. Most of the system's customers live in incorporated areas.

Annual rates of population and employment growth typically vary with high and low periods of economic activity. Population in the system's service area has grown about 80 percent over the past 25 years. Employment has grown at an even faster rate – more than 200 percent over the same time period, and a higher proportion of the County's population is now in the workforce. Following a period of rapid growth in the mid-1990s, the region's rate of population and economic growth has showed signs of slowing. But

the service area's population is still growing by about 10,000 people per year. Of these new residents, approximately 6,000 will enter the region's workforce.



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King County is the 12th most populated county in the nation, covering an area of more than 2,200 square miles

Our Waste Stream – Past and Current

Plain and simple – people generate waste. And the rate at which solid waste is generated has been increasing because of growth in the region’s economy, population, and number of households. The Solid Waste Division routinely monitors the quantities and types of wastes disposed at the regional solid waste facilities to answer three fundamental questions:

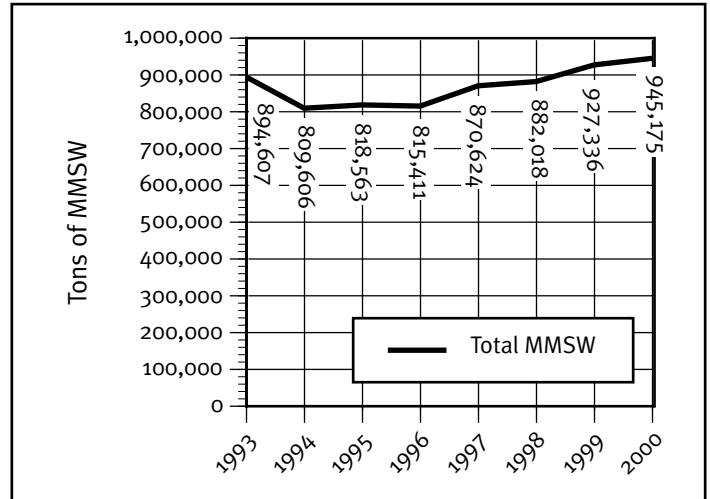
- How much waste do we dispose?
- What are we throwing away?
- Who is generating the waste?

Answers to these questions follow.

How Much Waste Do We Dispose?

The largest component of our regional system is the transfer and disposal of mixed municipal solid waste (MMSW) – or garbage. MMSW is the waste that residents and businesses put out at the curb for collection or bring to a transfer station for eventual disposal. In 2000, 945,175 tons of MMSW were disposed at the Cedar Hills Regional Landfill. Figure 3-1 shows the tons of MMSW received annually since 1993. (The drop in total tonnage delivered between 1993 and 1994 was due to a ban on construction, demolition, and landclearing debris at Cedar Hills that began in mid-1993.)

Figure 3-1. Tons of MMSW Received Annually Since 1993



Source: King County Solid Waste Division tonnage records

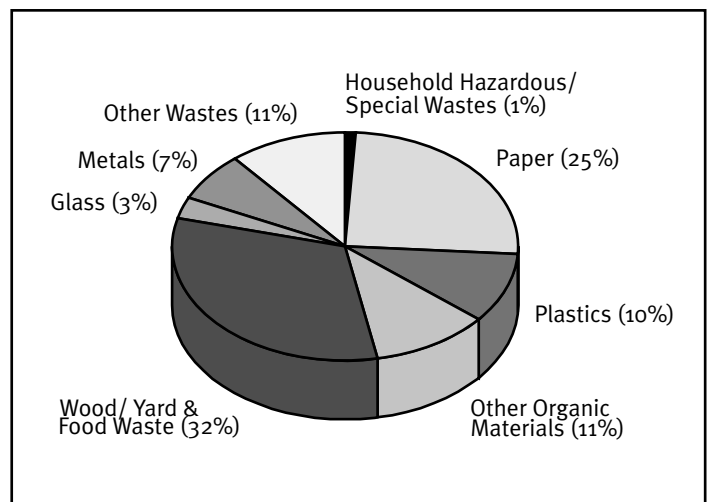
What Are We Throwing Away?

In addition to quantity, it is important to understand the kinds of wastes disposed. This information helps target programs for waste reduction and recycling to meet future goals.

To characterize the composition of wastes received in the regional system, the Solid Waste Division conducts waste characterization studies every three years as part of its ongoing Waste Monitoring Program. These studies provide an estimate of the types of garbage being thrown away at the transfer stations and Cedar Hills. Figure 3-2 shows the results of the most recent waste characterization study (Cascadia 2000).

More detailed information about the County’s waste stream and the Waste Monitoring Program can be found in the *1999/2000 Comprehensive Waste Stream Characterization and Transfer Station Customer Surveys – Final Report* (Appendix A-2).

Figure 3-2. Composition of the Disposed Waste Stream



Source: 1999/2000 Comprehensive Waste Stream Characterization and Transfer Station Customer Surveys – Final Report

Who Is Generating the Wastes?

Wastes that enter King County's solid waste system originate from both residential and non-residential sources. Non-residential sources include businesses, industry, government, and institutions. The Solid Waste Division estimates that residential wastes account for about 55 to 60 percent of the total waste stream, while non-residential wastes account for the remainder.

Forecasting for the Future

The King County Solid Waste Division plans for future needs through forecasting. Forecasts are built by combining historical data on waste generation with information about a number of variables known to affect it. The previous section of this chapter presented information on the region's past and current waste disposal stream. The forecast of the future waste disposal stream looks at projections for growth in the region. This information is folded into econometric models that give a baseline prediction of future waste generation. The final step in forecasting is to account for the expected effectiveness of future programs for reducing waste disposal in the region, as discussed in Chapter 4 of this Plan.

This section presents a brief look at the development of the waste generation forecast. More detailed information about the forecast methodology is provided in Appendix A-1.



Demographic Projections

Projections about population growth, regional employment, household size, and per capita income can help define who the customers of our system will be and what kinds and amounts of waste they will likely generate. These projections are used in the planning forecast model to estimate the tons of waste expected to be generated in future years.

The demographic projections presented in this chapter reflect data for the service area. Data used in making 20-year projections were obtained from the Puget Sound

Regional Council, who routinely prepares long-range forecasts for the region based on U.S. Census and other data sources (PSRC 1999). These 20-year projections were then adjusted for short-term variations using data provided in two reports – the *King County Annual Growth Report* and the *Economic Forecaster* (KCORPP 1999; Conway and Pedersen 1999). These latter reports are used to supplement data from the 20-year projections, particularly for the short term, because they are published more frequently, provide data in less than 10-year increments, and incorporate more specific data on individual communities in the system. Combining data from several sources allows for the best and most up-to-date estimate of trends for the future.

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Demographic projections help define the customers and the types of waste they will generate

A brief summary of projections for several key planning variables is presented here. More detailed information on the methods used to develop these projections is provided in Appendix A-1.

Population is expected to grow by about 1 percent annually through 2020, about 10,000 people per year. The population growth rate is significant for planning purposes since the amount of waste generated increases as population increases.

Employment in the region is expected to increase at an annual rate of about 1.3 percent through 2010, reflecting a strong economy and the growth of job opportunities outside the City of Seattle. Since the 1980s, employment in the region has grown faster than population, averaging about 2.5 percent in the 1990s. In 2010 to 2020, the employment growth rate is expected to drop below 1 percent, due to factors such as the higher number of retired persons in the region. Employment is an important forecasting variable because its growth reflects an increase in economic activity, which in turn leads to increased consumption and waste generation.

Household size is expected to decrease by about 0.5 percent per year through 2010, reflecting national trends toward smaller family size and an aging population. A decrease in average household size means that the number of households is growing faster than the population as a whole, resulting in more households per population. Since a “household” implies a certain level of maintenance, mail, purchasing, and so on, a decrease in household size tends to increase waste generation.

Per capita income is expected to increase around 1 percent per year during the planning period. During the 1990s, per capita income (adjusted for inflation) increased approximately 2.4 percent per year, due primarily to the influx of higher-paying technology jobs in the region and a strong local economy. Increases in income generally result in increases in consumption, and likewise in wastes generated.

A question frequently asked is why waste generation – which is defined in this Plan as *waste disposal + recycling* – continues to rise even though as individuals we are recycling more than ever before. At least three primary factors come into play:

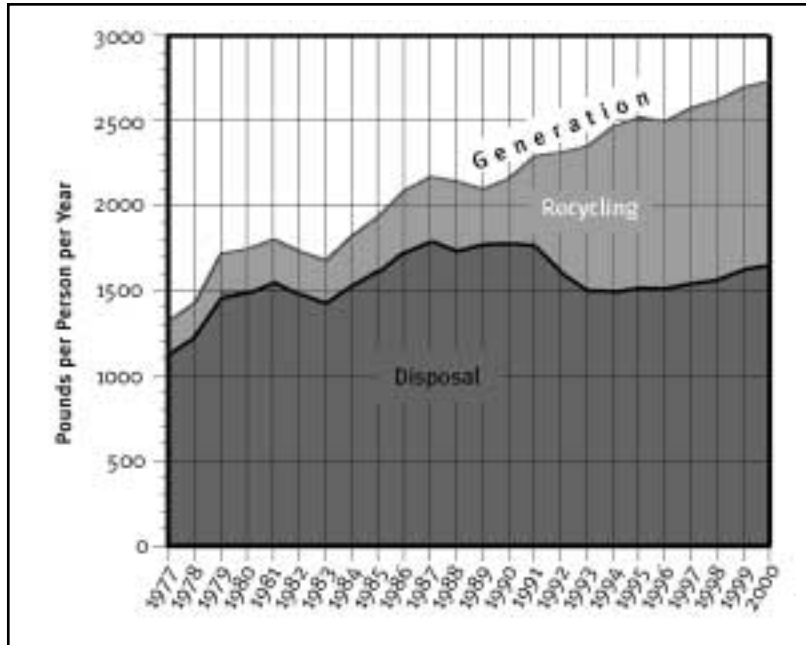
- First, the number of people and jobs in the region continues to grow
- Second, household sizes are smaller, which means there are more households with fewer residents per home; each household adds a certain quantity of disposable packaging, junk mail, food waste, yard waste, and other types of household wastes to the stream
- Third, when economic growth is occurring, people consume more, buy more goods, and in the process create more wastes

All of these factors keep generation of solid waste on the rise. Figure 3-3 shows the trends in recycling, disposal, and generation per person since the 1970s. During this period, recycling increased from an estimated 250 pounds per person per year in the late 1970s to around 1,000 pounds per person today. The sharp increase in per capita recycling coincided with a dip in disposal in the early 1990s. Overall, as the chart shows, per capita waste generation has continued to rise while per capita recycling has stabilized. More information about the recycling challenges facing the system is contained in Chapter 4.

The Forecasting Methodology and Results

Forecasting future waste generation entails a two-step modeling process (a detailed explanation of the forecasting process is provided in Appendix A-1). In this Plan, waste generation is predicted using both waste disposal and recycling. The first step is to develop econometric models that relate historical data for disposal and recycling to past demographic trends in the region. In the Solid Waste Division’s forecasting process, separate models are used to predict the waste disposal and recycling portions of

Figure 3-3. Estimated Generation, Disposal, and Recycling Per Person



Source:
 - King County Solid Waste Division tonnage records and estimates
 - Recycling estimates from consultant R.W. Beck (1977-1987), Washington Department of Ecology survey data (1988-1996), and Solid Waste Division regression model
 - Population estimates compiled by King County and Puget Sound Regional Council

the equation. Once developed, the models are used to predict future waste generation by plugging forecasts of the demographic variables (discussed above) through 2020 into the models to see how they affect future disposal and recycling.

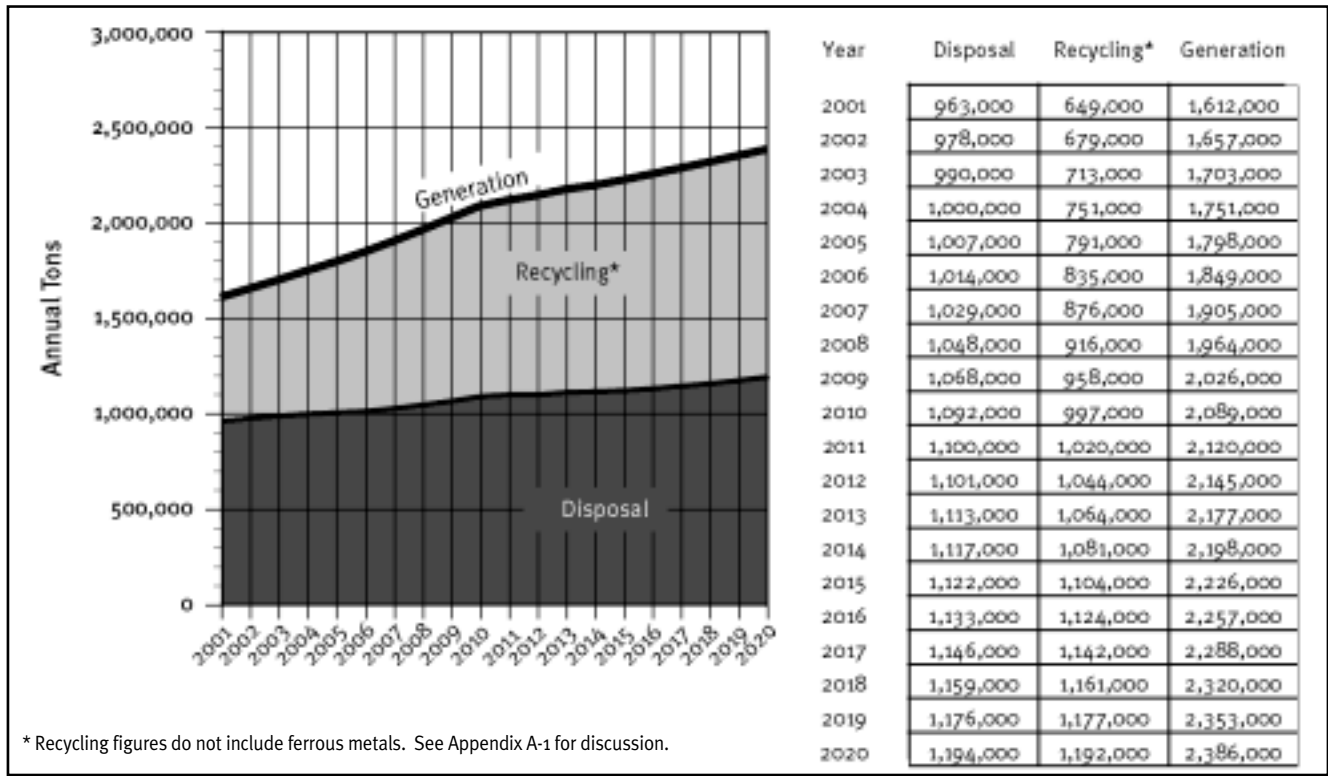
This first step produces what is called a baseline disposal forecast. The term baseline means the forecast assumes that only existing waste reduction and recycling programs are in place. It does not account for any additional waste diversion from baseline disposal expected to result with the implementation of future waste reduction and recycling programs and policies presented in this Plan. Thus, the second step in the forecasting process is to adjust the baseline forecast to reflect the expected additional waste diversion.

Since 1995, the policy set by the King County Council has been, in part, to divert as much material as possible from disposal in a manner that reduces the overall costs of solid waste management. As discussed in

Chapter 4, the recommended approach in this Plan is to strengthen current waste reduction and recycling programs and to implement new programs aimed at market demand. To complete the forecast, additional waste reduction and recycling is estimated and applied to the baseline forecast. The estimated amount of reduction and recycling is subtracted from the amount of waste predicted by the disposal model, and the increased amount recycled is added to the amount predicted by the recycling model. The result is an adjusted estimate of waste disposal and recycling that completes the final forecast of waste generation.

Once complete, the two-step modeling forecast incorporates the projected demographics of the area, waste generation history, and the recommendations of this Plan

Figure 3-4. 20-Year Forecast of Waste Generation in the King County Regional System



Source: MMSW Waste Reduction and Recycling Measurement Technical Paper (Appendix B-1)
 Methodology: Solid Waste Forecast Methodology Technical Paper (Appendix A-1)

into a best estimate of how many tons of waste we can expect to generate annually through 2020. Figure 3-4 presents the final forecast. Table 3-1 (on page 3-8) presents a further breakdown of the forecast by facility. Projected tonnages shown in Table 3-1 do not account for unexpected changes in business practices within the system over time and are for illustrative purposes only.

It should be noted that a forecast is just that – a best estimate of future trends based on data from the past and projections about the future. The Solid Waste Division has refined the forecasting approach over the past decade, as more data have become available and more is understood about factors that influence waste generation and disposal. As described in detail in Appendix A-1, however, the forecast model is subject to uncertainty, including future projections of economic and demographic growth, unforeseen influences on generation patterns from policies and programs, and under or over estimates of the anticipated success of waste reduction and recycling programs. For example, forecasts prepared in 1995 projected that disposal tonnage in 1999 would be 846,000 tons, which turned out to be about 11 percent lower than actual tons disposed that year. The difference between actual vs. realized tonnage can largely be attributed to the unanticipated economic growth in the County between 1995 and 2000. After 2001, the tonnage may change due to the actual and anticipated economic downturn in the county.

Table 3-1. 20-Year Forecast of Waste Generation by Facility ^a

Transfer Station and Drop Box Waste	2001	2005	2010	2015	2020
Factoria	164,600	173,000	189,000	193,200	204,500
Houghton	181,900	191,400	209,200	217,100	233,300
Renton	67,200	69,900	75,200	76,100	79,800
Algona	95,500	100,900	110,900	116,800	127,300
Bow Lake	123,200	128,300	138,500	143,800	154,500
First Northeast	58,400	59,500	62,300	61,600	62,900
Enumclaw	20,500	20,900	21,900	20,900	20,600
Cedar Falls Drop Box	3,800	4,000	4,300	4,400	4,700
Skykomish Drop Box ^b	1,000	1,000	1,100	1,100	1,200
Vashon	8,800	8,900	9,300	9,300	9,500
Subtotal Transfer Stations/Drop Boxes	723,900	756,800	820,600	843,200	897,100
Cedar Hills					
Regional Direct	222,700	232,800	252,500	259,400	276,100
Special Waste	2,000	2,000	3,000	3,000	3,000
Other Waste	16,400	17,400	18,900	19,400	20,800
Subtotal Cedar Hills	965,000	1,009,000	1,095,000	1,125,000	1,197,000
MMSW Total	963,000	1,007,000	1,092,000	1,122,000	1,194,000

Notes: a) The forecast is consistent with the Plan as drafted in March 2001, with the following uncertainties:

- Facility tonnage levels are highly variable, primarily due to significant fluctuations in patterns of transfer station use among commercial haulers. These fluctuations are due to internal business reasons, changes in the proportion of tonnage brought as regional direct, changes in traffic patterns, and changes in collection contracts between haulers and cities.
- Since it is not possible to predict changes in hauler patterns, the facility area forecasts listed here are merely the current distribution of tonnage among facilities multiplied by the annual tonnage forecasts, adjusted slightly to account for externally provided forecast changes in population in the area surrounding existing transfer stations.
- The use of these forecasts is very limited: they only reflect the potential distribution of tonnage among facility areas, assuming no changes in patterns of customer use.

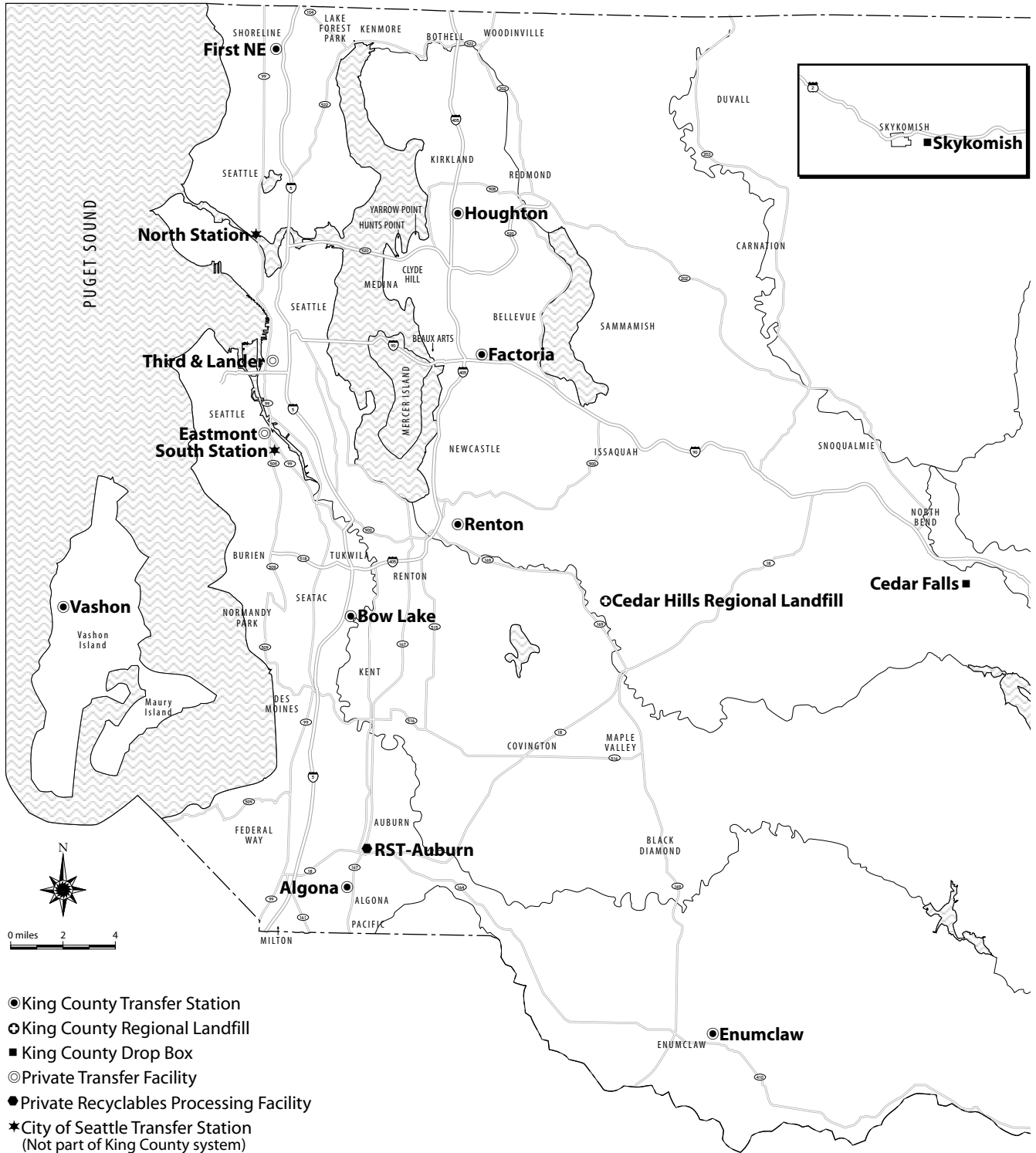
b) Skykomish tonnage is not added to totals (is taken to Houghton and is included in Houghton's tonnage).

The Regional Transfer and Disposal System and Its Users

The first part of this chapter describes waste generation by the area's population – past, present, and future. The other important component in planning for the future is understanding how the existing regional transfer and disposal system works and who uses it.

Figure 3-5 shows the layout of the system of mixed municipal solid waste (MMSW) and mixed recyclables handling facilities across King County, with locations of MMSW transfer stations, drop boxes, mixed recyclables processing facilities, and the Cedar Hills Regional Landfill. King County operates eight of the transfer stations shown in the figure and the two private solid waste management companies in the region operate

Figure 3-5. MMSW and Mixed Recyclables Handling Facilities



two. Both Rabanco's transfer station at Third & Lander and Waste Management's Eastmont transfer station are located in Seattle and serve both the King County and Seattle systems. Seattle also operates two transfer stations in addition to the privately operated stations in its territory. There is also a small recyclables processing facility in Auburn, owned by Waste Management, where some residual wastes are separated from recyclables and transported to the landfill. Disposable MMSW that is transported from County and privately owned transfer facilities within the service area is disposed at the Cedar Hills Regional Landfill. There are four privately owned construction, demolition and landclearing debris handling facilities. Two, the Black River facility and Third & Lander facility are operated by Rabanco. The other two, Eastmont and Argo Yard, are operated by Waste Management. The discussion that follows presents a profile of the regional transfer and disposal system and the customers who use it.



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A commercial hauler unloads at the Enumclaw Transfer/Recycling Station

Curbside Collection

Data collected by the Solid Waste Division indicate that about 90 percent of households in the system's service area subscribe to curbside collection. Approximately 87 percent of these households also have recyclables collection. About 75 percent of the waste disposed in the service area is taken to the County's transfer stations where it is consolidated and delivered to the Cedar Hills Regional Landfill. About 23 percent of the waste is transported to the two privately owned transfer stations and then to Cedar Hills for disposal. A small amount of waste, collected from households near Cedar Hills, is also transported directly to the landfill.

Most non-residential customers subscribe to collection services. Only about 5 percent of the waste from the non-residential sector is hauled to the transfer station by the generator instead of a private hauling company.

Use of the Transfer Facilities

Since 1990, the Solid Waste Division has conducted waste monitoring studies and customer surveys at its transfer stations, and made random telephone calls to residents, to characterize the wastes being received and the customers who bring them. About 68 percent of the households in the system's service area report that they never visit a transfer station or drop box. Those that do visit these facilities can be categorized into two basic types of users – the commercial garbage hauler and the self hauler. The commercial garbage haulers provide garbage and recycling collection across the service area. The self haulers are the residential and non-residential customers who choose to bring the garbage and recyclables they generate to the transfer stations themselves.

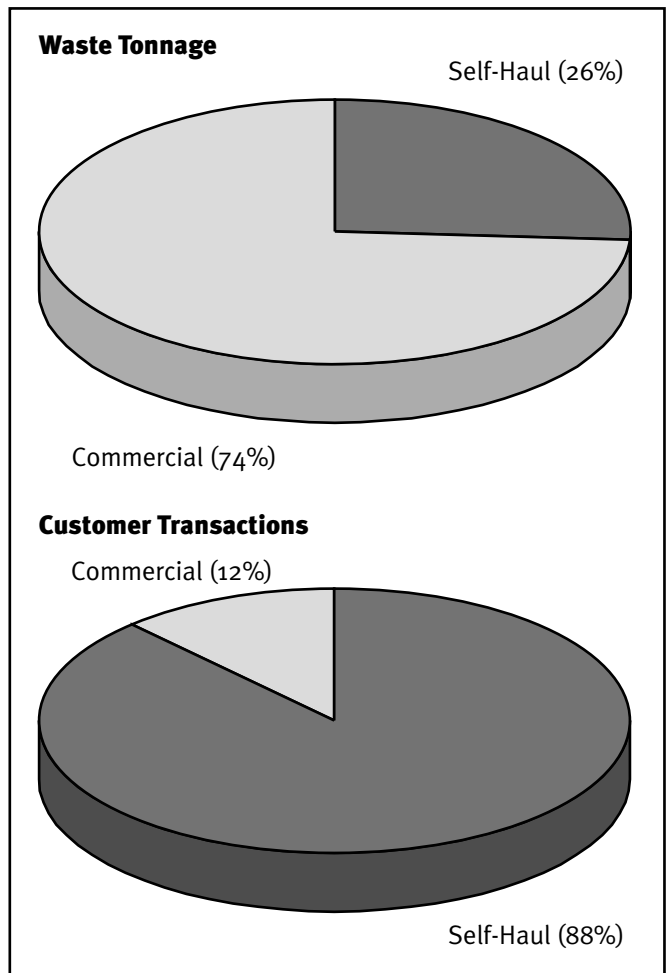
In 2000, Waste Management and Rabanco processed 175,536 and 38,199 tons of the King County system’s MMSW, respectively, through their own privately operated transfer stations. In that same year, County-operated transfer stations and drop boxes received 711,562 tons of MMSW. Seventy-four percent of the waste delivered to the County-operated facilities was brought by the commercial haulers, carrying loads averaging 5.5 tons each. Self haulers brought the remaining 26 percent, with loads averaging around a quarter of a ton. Of the 758,910 individual vehicle transactions at the transfer stations, 88 percent were with self haulers. Figure 3-6 illustrates the mix of tons of wastes and the customers who bring them.

As shown in Figure 3-6, while the majority of the County’s waste tonnage is received from commercial haulers, the overwhelming majority of the transactions are with self haulers. This high level of activity by self haulers has a significant effect on the way the County staffs and manages its transfer facilities.

To gain a better understanding of who the self haulers are and why they self haul, the Solid Waste Division conducts routine customer surveys at the system’s transfer stations. Detailed information about the survey methodology and results is contained in the transfer station customer survey report (Cascadia 2000; Appendix A-2). In summary, the most common reason customers give for bringing their wastes to the transfer station themselves is that they have a large amount of garbage or yard waste, or items too big for curbside pickup. Often a trip to the transfer station is the result of a major cleaning project, remodeling, or landscaping work at a home or business. Of those who use the transfer stations, 27 percent visit no more than once every 6 months; this group represents about 17 percent of the region’s service population.

Nine percent of the self-haul customers visit a transfer station at least once a month; these more frequent customers account for 43 percent of all self-haul trips. Among this group, the most common reasons for self hauling are that they don’t subscribe to curbside collection and they believe that hauling it themselves costs less.

Figure 3-6. Mix of Waste Tonnage and Customer Transactions at County Transfer Stations



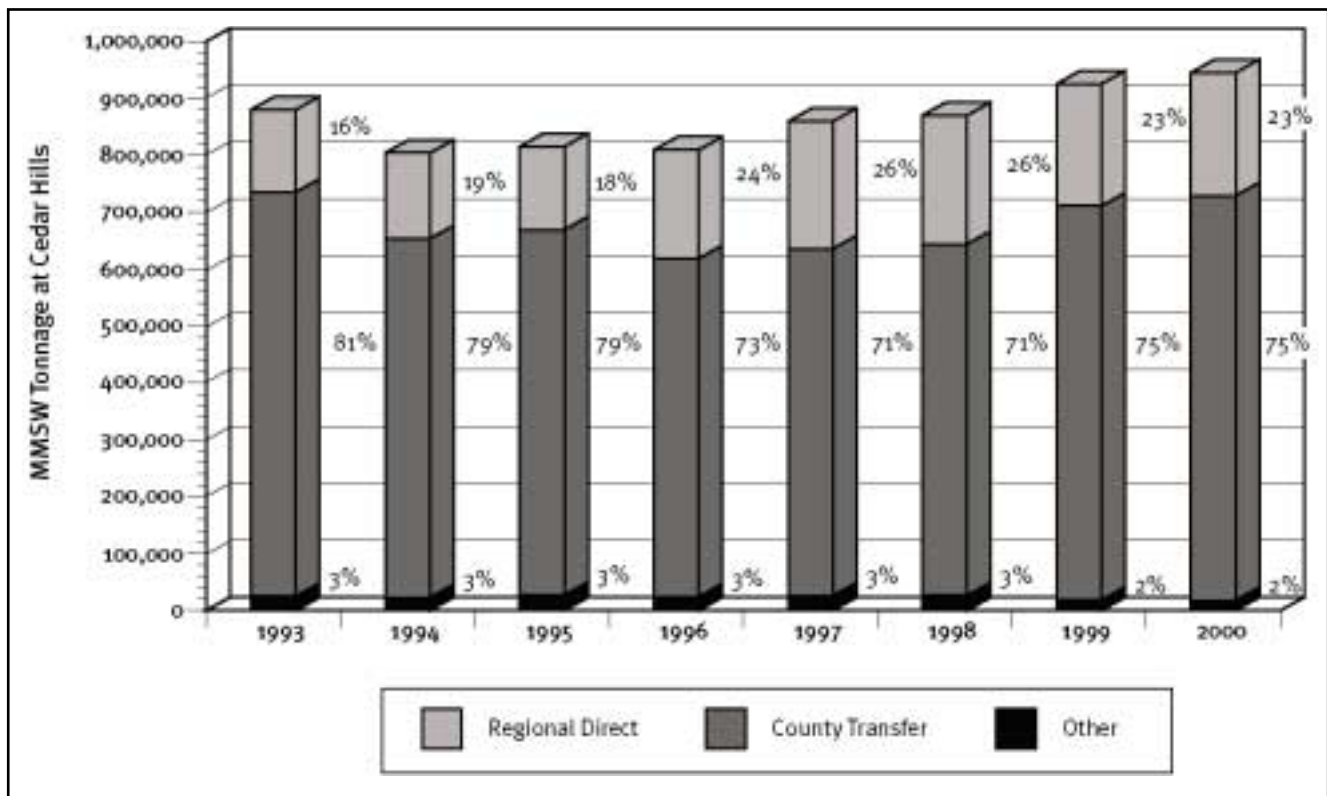
Source: King County Solid Waste Division tonnage and transaction records

Regional Direct Disposal at the Landfill

When commercial haulers choose to transport wastes via their own transfer stations to the Cedar Hills Regional Landfill, they are charged a lower disposal fee. This fee is called the regional direct fee, which is currently \$23 less than the transfer station tipping fee charged at the County facilities (see Chapter 10 for discussion).

According to County tonnage records, the amount of regional direct waste entering the landfill increased from 16 to 26 percent between 1993 and 1998, but took a downturn in 1999 to 23 percent. Figure 3-7 shows the comparison since 1993. (The drop in total tonnage delivered between 1993 and 1994 was due to a ban on construction, demolition, and landclearing waste at Cedar Hills that began in mid-1993.)

Figure 3-7. Trends in Regional Direct Activity at the Landfill



Source: King County Solid Waste Division tonnage and transaction records

Where Do We Go From Here?

This chapter of the Plan provides a foundation for the chapters that follow. The recommendations presented in Chapters 4 through 10 build upon the current status of the regional customer base and facility infrastructure, as well as projections of future growth and development in the service area.

The King County Solid Waste Division will continue to monitor the type, amount, and generation sources of waste entering the system. This information will be used to formulate and update recommendations regarding facility improvements and operations in the future.

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