

Puget Sound Georgia Basin Ecosystem Indicators Report
Technical Background Document
<http://www.epa.gov/region10/psgb/indicators/>
Solid Waste and Recycling Indicator

Indicator Name

Solid Waste and Recycling

Data Set Name

All solid waste types disposed and recycled/diverted in the Puget Sound Georgia Basin, both in absolute numbers (metric tons) and per capita (kg/person/day).

Data Type

Indicator data

SCOPE

1. Geographic Coverage

BC: The data sets for each of the indicators have been developed to follow the boundaries of the Georgia Basin portion of the bio-region as closely as possible. Georgia Basin area data encompasses data from the following regional districts in British Columbia: Greater Vancouver, Fraser Valley, Sunshine Coast, Squamish-Lillooet and Powell River on the mainland, and Capital, Cowichan Valley, Nanaimo and Comox-Strathcona on Vancouver Island. Data sets also include local health Areas of 48 Howe Sound, 71 Courtenay and 72 Campbell River.

WA: The data sets for each of the indicators have also been developed to follow the boundaries of the Puget Sound portion of the bio-region as closely as possible. Included are the twelve counties that share the Puget Sound shoreline: Clallam, Jefferson, King, Kitsap, Island, Mason, Pierce, San Juan, Skagit, Snohomish, Thurston and Whatcom.

2. Length of Data Series

1999-2003

3. Smallest Geographic Units

Georgia Basin area data: Regional Districts
Puget Sound area data: County

RELIABILITY

1. Assumptions and Caveats

BC: This report includes data on MSW disposed and recycled. “Diverted” as used in the Puget Sound data, is not a normal category in the Georgia Basin area, but for consistency sake, this category has been added to account, where estimated or known, for materials diverted through backyard composting, reuse programs, and tire-derived fuel burned by one cement kiln and a few pulp mills in the Georgia Basin area.

In British Columbia, MSW is defined in the *Environmental Management Act* as “refuse that originates from residential, commercial, institutional, demolition, land clearing or construction (DLC) sources”, and includes tires, lead-acid batteries and household hazardous waste. MSW is deposited in landfills operated in all but a few cases by municipalities or regional districts. There are only a few private landfills in BC and the biggest of these, Cache Creek Landfill, serves the Greater Vancouver Regional District, as well as accepting waste from several other regional districts. The other private landfills accept DLC waste.

Another significance to the Cache Creek Landfill is that over 25% of the waste requiring disposal in Greater Vancouver and most or all of the waste requiring disposal in Cowichan Valley, Nanaimo, and Powell River regional districts is disposed in this landfill, which is outside the Georgia Basin area.

WA: This indicator includes data on materials “recycled” and “diverted”:

- **“Recycled” materials** have been consistently measured by the Department of Ecology (Ecology) since 1986. They are defined as the recyclable portion of the municipal solid waste stream (as defined by the Environmental Protection Agency in the *Characterization of municipal Solid Waste in the United States: 1996 Update*). This includes durable goods, nondurable goods, containers and packaging, food wastes, and yard trimmings. The “recycled” portion measured does not include industrial waste, inert debris, asbestos, biosolids, petroleum contaminated soils, or construction, demolition, and landclearing debris. Revised Code of Washington 70.95.030 (16) defines “recycling” as transforming or remanufacturing waste materials into usable or marketable materials for use other than landfill disposal or incineration.
- **“Diverted” materials** are those that lie outside of the municipal solid waste (MSW) stream, and are diverted from landfill disposal or incineration through reuse, recycling or burning for energy recovery. Ecology maintains that the non-MSW sector of the waste stream is not well characterized and there is no definitive information on the total volume of waste generated. Unless the facility doing the diversion is one that is required to report, respondents choose on a voluntary basis to report quantities handled. This makes it difficult to figure a recycling rate for many of these materials because either there is not enough

information on the total amount of waste generated or the beneficial use does not meet the state's definition of recycling.

Landfills and incinerators are asked to report 12 categories of wastes on annual reports to Ecology and local jurisdictional health departments. Some facilities do not disaggregate the categories of waste but include all materials under one or two waste types. This means that exact numbers are not obtainable for specific materials. Materials **included** in the data for the Puget Sound region that were disposed at landfills and incinerators includes:

MSW, demolition debris, inert wastes, commercial wastes, wood wastes, tires, medical waste and "other" wastes.

Materials **excluded** from the data for this report are: industrial wastes, sludge, asbestos and petroleum contaminated soils. The basis for excluding industrial waste is that the recycling or diversion in this sector is not tracked with the current methodology in the Washington data, so there would be no way to determine a recycling rate for this sector. The other wastes are excluded because they are related to "cleanup" activities and are not considered applicable to programs addressing waste diversion or recycling.

The geographic area of the reported data includes counties that border on the Puget Sound, although in some cases the majority of the county lies well inland. Jefferson County, for example, reaches from the Puget Sound at the town of Port Townsend over to the other side of the Olympic Peninsula at the Pacific Ocean. In all cases, however, the largest population centers border on the Puget Sound.

2. Quality Assurance Procedures

BC: For the MSW Tracking Reports, the contractor preparing the reports for the ministry requested the data from regional districts using a standard format, but did not verify the data other than to clarify obvious discrepancies. Regional districts and/or municipalities were responsible for the quality of the data.

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In British Columbia, MSW is defined in the *Environmental Management Act* as "refuse that originates from residential, commercial, institutional, demolition, land clearing or construction (DLC) sources", and includes tires, lead-acid batteries and household hazardous waste. MSW is deposited in landfills operated in all but a few cases by municipalities or regional districts. There are only a few private landfills in BC and the biggest of these, Cache Creek Landfill, serves the Greater Vancouver Regional District,

as well as accepting waste from several other regional districts. The other private landfills accept DLC waste.

Another significance to the Cache Creek Landfill is that over 25% of the waste requiring disposal in Greater Vancouver and most or all of the waste requiring disposal in Cowichan Valley, Nanaimo, and Powell River regional districts is disposed in this landfill, which is outside the Georgia Basin area.

WA: Survey and annual reporting forms are sent to recycling facilities, firms, haulers, and local governments to obtain information about the types and quantities of recyclable materials collected. Each reporting form received is individually checked for accuracy before entering data. Discrepancies are checked on an individual basis with the contact person for the reporting entity. Since reporting on the recycling survey portion of the measurement tool is not mandatory, and there is no penalty for not returning the information, some firms do not respond.

Some firms respond with estimates of the amount and origin of the materials, which can affect the accuracy of the survey. These caveats create the need for intensive cross-checking of the data. This is done through a phone and e-mail survey of the end-users of recyclable materials, recycling facilities, other intermediate collectors of recyclables and local governments. Aggregate figures for each commodity are developed, which are compared to the results collected.

Ecology bases the reliability of the results on review of draft numbers sent to local governments, and comparisons to waste characterization, disposal data, and commodity end-user information. Companies reporting on the recycling survey are asked to report only tonnage collected directly from generators. Facilities responding to annual reports are required to submit tonnage information for all materials handled at their facility. Additionally, county recycling coordinators and solid waste managers are asked to review the figures and provide their input. Finally, figures are checked against double-counting by verifying exchange of materials between reporting entities.

For the disposal numbers, some facilities do not break out the numbers for each material type, but rather report under a general category. This means that totals for specific waste types are not always obtainable. In addition, some landfills report in cubic yards rather than measured tons. A standard set of conversions numbers is used but this likely results in some inaccuracies.

3. Data Confidence Limits

BC: The disposal data is the most credible, since virtually all MSW in the area is disposed at landfills with weigh scales. The biggest source of slippage is DLC waste. In some regional districts, DLC waste goes into the same landfill as the rest of the MSW, and the district may or may not track it separately. In other regional districts, much of

the DLC waste goes to private landfills and to at least one incinerator, and the district may or may not have access to the quantities. In at least one regional district, a significant and only estimated portion of the DLC waste is transported outside the district and disposed to landfills on First Nation land.

The recycling data is much less credible than the disposal data, and in fact is significantly understated. In most of the regional districts in the area, the municipalities are responsible for recycling programs. However, firms in the private sector are actually operating the collection programs for significant parts of the community, often the multi-family residential and almost always the institutional and commercial sectors. In some cases, the municipality or regional district has access to the quantities collected, but in most cases it does not, and in these districts, only the amount of recyclables collected directly by the local government is reported.

There is no consistency in how the recycling data is obtained, and the quality and amount of information obtained depends in part on the resources each regional district and municipality can devote to the tracking project.

WA: For disposal data, a few landfills report all types of waste under the general “municipal” category so exact amounts cannot be determined for each waste type. Some landfills are not yet using scales and estimate the quantities collected in yards.

The reliability of the recycling and diversion data is dependent on the willingness of recyclers to report collected amounts and the accuracy of the tracking mechanisms they use. Some facilities face the possibility of monetary penalties for failure to turn in their reports to Ecology, thus the response rate with these firms is high. Since reporting is not mandatory for the recycling survey portion of the measurement tool and there is no penalty for not returning the information, some firms do not respond. The minimum response rate on the recycling survey, before closing the data collection, is 80 percent. However, data is obtained for large or critical companies at almost 100 percent, so Ecology considers the overall quantities of material reported to be much greater than the response rate of reports returned. Some firms respond with estimates of the amount and origin of the materials, which can affect the accuracy of the survey. These factors can especially affect the accuracy of the data for individual counties, but also affects the statewide information.

Neither backyard composting nor incineration of MSW for energy recovery are included in recycling/diversion data.

COLLECTION INFORMATION

1. Data Methodology

BC: Disposal data for the years 1999-2002 was taken from the ministry’s MSW Tracking Reports. The data for 2003 was provided by the regional districts in response

to a request from the ministry for the purpose of this report, since the ministry hasn't prepared an MSW tracking report since 2002.

Recycling data, the data for 1999 and 2000 was taken from the MSW Tracking Reports for those years. For 2001-2003, the recycling data was supplied by the regional districts in response to the ministry's request for the purpose of this report, since the 2001 and 2002 MSW Tracking Reports only addressed disposal.

There are also a number of products in the Georgia Basin (GB) collected under industry product stewardship programs (beverage containers; paint; lubricating oil filters and bottles, and residual oil, pharmaceuticals, solvent and flammable liquids, gasoline and pesticides) or by government-financed programs (tires and lead-acid batteries). In some cases the quantities collected cannot easily be converted to weight, and the amount collected in each regional district is often difficult to determine. The quantities of such products that were collected and recycled within the GB were therefore added only to the total figure for recycling and were assumed to be the same proportion of the total provincial quantities as the GB population is of the provincial population.

The following calculations were used in preparing the indicator:

Generation = amount disposed + amount diverted, in tonnes

Generation rate = generation / population / 365 in tonnes/cap/day

Diverted = backyard composting + recycled + amount of source-separated recyclables burned for energy recovery, in tonnes

Diverted Proportion = amount diverted / amount generated x 100, in per cent

Recycled Proportion = amount recycled / amount generated, in per cent

Recycling | disposal rate = amount recycled | disposed / population / 365, in tonnes/cap/day

WA: The Washington state legislature requires Ecology to conduct an annual measure of the recycling activity in the state and report the results to the appropriate stakeholders. From 1986 until 2002, the mechanism for quantifying the recycling and diversion activity in Washington included only the annual recycling survey. With the changes in the reporting requirements that were put in place with the implementation of chapter 173-350 WAC, *Solid Waste Handling Standards*, the measurement tools now include annual reports for recycling facilities and intermediate solid waste handling facilities or material recovery facilities, along with the annual recycling survey. To obtain information about types and quantities of recyclable materials collected, survey and annual reporting forms are sent to recycling facilities, brokers, recycling companies, firms, haulers, local governments, retail establishments and generators of recyclable material. Information is collected on recycling and diversion of over 50 materials, including all types of paper, metal, plastic, glass, organic material, construction debris and other types of material.

As part of the annual reporting requirements of chapter 173-304 WAC, the Minimum Functional Standards (MFS) and chapter 173-351, Criteria for Municipal Solid Waste Landfills, forms are sent to the various types of landfills for them to report the types and quantities of waste they received for disposal. The categories of solid waste specified on the form are municipal, demolition, industrial, inert, commercial, wood waste, sewage sludge, asbestos, petroleum contaminated soils, tires, special waste and other. The facilities were also asked to report the source of their waste: out-of-county, out-of-state or out-of-country.

In addition, three landfills in Oregon accept waste from Washington, Finley Butte, Wasco and Columbia Ridge. Waste information from each facility was used in preparing this report.

The other method of waste disposal in Washington is energy-recovery facilities. Annual report forms were also sent to these facilities. The same type of waste information was requested.

Materials **included** in the data for the Puget Sound region that were disposed at landfills and incinerators includes: MSW, demolition debris, inert wastes, commercial wastes, wood wastes, tires, medical waste and “other” wastes. Materials **excluded** from the disposal data for this report are: industrial wastes, sludge, asbestos and petroleum contaminated soils. The basis for excluding industrial waste is that the recycling or diversion in this sector is not tracked with the current methodology in the Washington data, so there would be no way to determine a recycling rate for this sector. The other wastes are excluded because they are related to “cleanup” activities and are not considered applicable to programs addressing waste diversion or recycling.

The following calculations were used in preparing this indicator:

$$\text{Waste Generation (MSW)} = \text{MSW Recycled} + (\text{MSW} + \text{Commercial Wastes Disposed})$$

$$\text{Waste Generation (Diversion)} = (\text{Diverted} + \text{Recycled Materials}) + (\text{MSW} + \text{Demolition} + \text{Inert} + \text{Commercial} + \text{Wood Waste} + \text{Tires} + \text{Medical} + \text{Other Wastes Disposed})$$

$$\text{MSW Recycling rate} = \frac{\text{Recycled Materials}}{\text{Waste Generation (MSW)}}$$

$$\text{Diversion Rate} = \frac{(\text{Diverted} + \text{Recycled Materials})}{\text{Waste Generation (Diversion)}}$$

$$\text{Kilograms per person per day disposed} = \frac{\text{Annual Kg disposed}}{\text{(Population/365)}}$$

$$\text{Kilograms per person per day recycled} = \frac{\text{Annual Kg recycled}}{\text{(Population/365)}}$$

$$\text{Kilograms per person per day diverted} = \frac{\text{Annual Kg diverted}}{\text{(Population/365)}}$$

$$\text{Kilograms per person per day waste generated} = \frac{\text{Annual Kg waste generated}}{\text{(Population/365)}}$$

2. Collection Frequency

BC: Data generation is an on-going process, with most disposal data generated at the time of disposal and most recycling data generated at least monthly. Data aggregation and reporting is done at least annually.

WA: Recycling, diversion and disposal data are collected annually. Data collection is an ongoing process.

NOTICE OF PROPRIETARY DATA

1. Acknowledgement

BC: None of the data in this report is proprietary.

WA: There were over 700 respondents to the recycling survey and facility annual reports, including recycling facilities, intermediate solid waste handling facilities, landfills, energy recovery facilities, transfer stations, compost facilities, haulers, brokers, recycling companies, local governments, retail establishments, and generators of recyclable material.

Recycling and diversion data from individual annual reports and recycling surveys are considered proprietary. In addition, recycling and diversion data for individual materials from single counties is also considered proprietary. Permission to use individual county data may be obtained by contacting the county recycling coordinator or solid waste manager. The data is no longer considered proprietary once aggregated

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into regional areas containing data from various counties, as in this report. Disposal data is not considered proprietary.

2. Data Sources

BC: Sources of raw data include the MSW Tracking Reports for 1999-2002, regional districts and industry product stewardship agencies.

WA: Sources of raw data for the indicator include the Department of Ecology Solid Waste and Financial Assistance Program annual reports for recycling and disposal facilities and the annual recycling survey. Ecology obtains information on materials disposed outside of Washington State from the individual landfills. Population information is obtained from the Washington State Office of Financial Management.

3. Contact Name

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