Management of Unwanted Architectural Paint in Washington

A Comparison of Existing Programs and a Modeled Product Stewardship System to Manage Unwanted Architectural Paint

January 2013

Prepared by

Cascadia Consulting Group
DSM Environmental

Developed as a Project of the Northwest Product Stewardship Council

Funded by the King County
Solid Waste Division, Washington

King County

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Executive Summary

Washington State is considering an industry-managed product stewardship system funded by an assessment that is built into the sale price of paint to manage the diversion and recovery of unwanted and leftover architectural paint—a high-volume, costly, and wasted resource. *Architectural paint* refers to interior and exterior architectural coatings (both latex and oil-based) used on housing, buildings, and other structures; it does not include industrial, original equipment, or specialty coatings. *Product stewardship*, also called *producer responsibility*, refers to an environmental management strategy in which all parties involved in the design, production, sale, and use of a product take responsibility for minimizing its environmental impact throughout all stages of its lifecycle, with manufacturers typically funding material recovery programs and recovering costs from consumers through product sales.

Product stewardship of unwanted and leftover architectural paint has been proposed as a solution for improving system performance, convenience, and cost-effectiveness. Local and state governments have been in national negotiations with paint manufacturers through the American Coatings Association (ACA) to reach an agreement on paint producer responsibility since 2002. This effort led to a national Memorandum of Understanding signed in 2008 by the Washington State Department of Ecology and 17 local government agencies in Washington. Other states—Oregon, California, Connecticut, and Rhode Island—have already adopted a paint stewardship approach. Analyses conducted in these states have shown that paint stewardship can result in cost savings for local governments and ratepayers, more convenient service for residents and businesses, and better environmental outcomes.

Unwanted paint poses risks to human health and the environment if not properly managed. Oil-based paint is toxic and flammable. Unwanted and leftover latex paint in liquid form is a problematic material in the waste stream, can contain harmful components, and is challenging for consumers to manage properly. Moreover, paint is made of materials that can be captured for reuse, recycling, energy recovery, or safe disposal, but doing so requires a more convenient and effective collection infrastructure with long-term, sustainable financing.

Currently, local governments in Washington are the primary providers of collection infrastructure and public education programs related to safe and responsible management of unwanted paint. Architectural paint is one of the largest and most expensive waste streams managed by local governments' moderate risk waste (MRW) programs. In the interviews conducted for this study, local governments expressed concerns about the cost burdens of providing and funding paint management programs that are effective, convenient, and sufficient to meet the needs of Washington residents and businesses and to safeguard health and the environment. A number of local governments have already stopped collecting latex paint due, in part, to the high costs associated with latex paint collection and disposition.

This analysis compares Washington's existing programs with a modeled paint stewardship system for managing unwanted architectural paint. The study examines the infrastructure, performance, and costs of current and potential paint collection and recycling in Washington State. The manufacturer/consumer-funded stewardship program modeled in this report is based on real-world findings from currently operational paint stewardship programs, particularly in Oregon. The Oregon program is operated by PaintCare, a nonprofit organization created by ACA and funded through an assessment on architectural paint sold in the state. The paint stewardship program modeled for Washington State is assumed to represent a mature, fully implemented program operating at a stable level of collection and costs, which is envisioned to be achieved within three years of program implementation.

Key Findings and Comparisons

Paint Collection: A manufacturer/consumer-funded stewardship system will increase the number of collection sites and quantity of paint collected in Washington.

Washington's Existing Programs	Paint Stewardship System Model
Program Management	
Local government programs manage 94% of the unwanted paint collected in Washington State.	**A nonprofit product stewardship organization** would manage the statewide paint stewardship system on behalf of paint manufacturers.
Collection System	
50 fixed collection sites: Located in 31 of 39 counties.	**More than 220 fixed collection sites:** Located in 35 of 39 counties.
27 local government **MRW facilities** accept latex and oil-based paint. 17 local government MRW facilities accept oil-based paint only. 21 of 39 counties provide paint collection service to small quantity generators through public MRW programs, some at no charge and some for a fee.	36 local government MRW facilities would accept both latex and oil-based paint. 8 local government MRW facilities would accept oil-based paint only.
6 paint retail stores serve as collection sites under Clark County's MRW program.	180+ private retail paint stores would voluntarily serve as collection sites.
60% of state residents (in 16 counties) have no access to latex paint collection.	**100% of state residents would have access to latex paint collection.**
1 site per 136,000 residents (statewide average). **8 counties do not have permanent paint collection sites.**	**1 site per 30,000 residents** in urban areas. Convenience levels are assumed to be similar to Oregon's program, where 94% of residents live within 15 miles of a collection site.
No residential curbside programs currently collect paint separately for special handling. Private paint collection services can be hired to pick up paint from businesses for a fee.	The stewardship program will expand paint collection options available at no charge to residents and small businesses.

Washington's Existing Programs	Paint Stewardship System Model
Volumes Collected	
Approximately **507,000 gallons** of unwanted paint were collected in 2010. **38%** of the estimated 1.34 million gallons of available paint were collected.	Approximately **947,000 gallons of unwanted paint** are expected to be collected annually. **70%** of the estimated 1.34 million gallons of available paint would be collected. Paint collection volumes are projected to **increase by 87%**.
Statewide, latex paint collection has decreased by 44% since 2007. Many local governments have stopped collecting latex paint largely due to high operational and vendor costs.	Latex paint collection is projected to **increase by 205%** within the first three years of operation.

Table ES-1. Quantities of Paint Collected, by Collection Type—Existing Programs vs. Stewardship

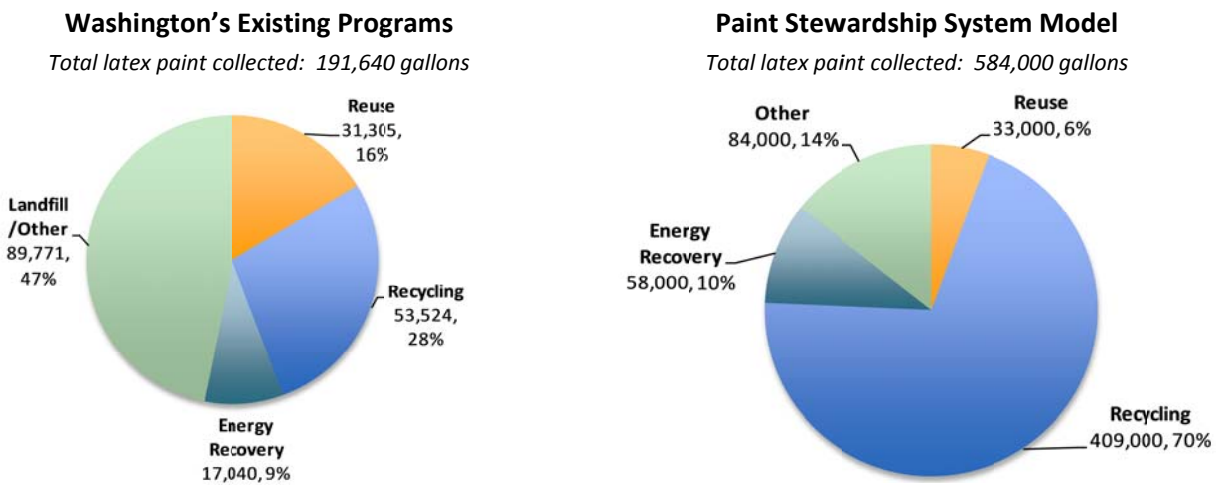
	Existing Programs			Stewardship System Model		
Collection Infrastructure	***# of sites***	***gallons***	***%***	***# of sites***	***gallons***	***%***
Public MRW Facilities	44	406,744	80%	44	527,650	56%
Retail Collection Sites*	6	10,281	2%	182	364,000	38%
Mobile Collection Events	83	60,085	12%	78	25,350	3%
Private Facilities and Large-Volume Pick-ups (contracted hazardous waste collectors)		30,125	6%		30,000	3%
TOTALS		**507,235**			**947,000**	

* *Retail collection sites under* Existing Programs *are part of Clark County's paint collection program, and disposition costs of paint collected by paint retailers are covered by Clark County.*

Paint Disposition: The modeled stewardship program estimates an increase in latex paint recycling from 28% to 70% when fully implemented.

Washington's Existing Programs	Paint Stewardship System Model
Disposition of Latex Paint	
16% (by volume) of latex paint collected in 2010 was **reused** in its original form. 28% was **recycled**, either back into paint or in the manufacture of other products, including cement. ▪ 86% of latex paint recycled was collected by Clark County. ▪ Only 4% of latex paint collected from remaining counties was recycled. 9% was **incinerated**, in Spokane's waste-to-energy facility. 47% was solidified and disposed of in **landfills**.	Paint reuse is expected to increase by 5% in volume from about 31,000 to 33,000 gallons. **70% of the latex paint collected is expected to be recycled** back into paint or used in the manufacture of other products, including cement. ▪ **Recycling levels** are assumed to be similar to Oregon's program, which recycles 70% of collected paint.
Disposition of Oil-based Paint	
3% of oil-based paint collected in 2010 was **reused** (in its original form). 5% was **recycled**, through solvent recycling. 85% was **incinerated** for energy recovery, usually in cement kilns. 7% was disposed of in **hazardous waste landfills** or managed directly at a private treatment, storage, and disposal (TSD) facility.	**15% more oil-based paint** will be collected and safely managed through reuse or energy recovery. (The modeled system assumes that 3% of oil-based paint would be reused, and the remainder would be sent for energy recovery.)

Figure ES-1. Comparison of Latex Paint Collection Quantities and Disposition Methods



Costs and Economic Impacts: Paint stewardship shifts costs from local governments and ratepayers to paint manufacturers and consumers when they purchase paint.

Washington's Existing Programs	Paint Stewardship System Model
Financing	
Local paint management programs are financed through garbage rates and local and state taxes.	A manufacturer/consumer-funded statewide paint stewardship program would be financed by paint consumers through the price they pay for paint. The stewardship program would cover transportation and disposal costs currently borne by local governments at MRW facilities and mobile events.
Costs	
Costs to local government for managing unwanted paint were nearly $3 million dollars in 2010. **$6.17/gallon on average for collection, transport, and disposition** (does not include administrative or facilities expenses) for various local government programs that do not serve all of the state. ▪ Approximately $7/gallon in Clark County for collection, transport, and **recycling**. Clark County is the only county in Washington where latex paint is consistently recycled.	**Costs to local governments for managing paint are expected to drop by 40%—more than $1.1 million per year in savings.** **Approximately $6.55/gallon for collection, transport, and disposition** (does not include administrative or facilities expenses) for a statewide system. The stewardship system is expected to bring a **substantial increase in collection service and recycling**: ▪ 439,000+ additional gallons **collected**. ▪ 340,000+ additional gallons **recycled**. ▪ 176 new paint collection sites.
User Fees	
Residents are not charged to bring their paint to a collection site. **In some counties, small businesses are charged $2 to $4 per gallon** of paint. 21 of 39 counties provide paint collection service to small quantity generator businesses through public MRW programs, some at no charge and some for a fee.	**Residents are not charged** to bring their paint to a collection site. **Small businesses are not charged** to bring their paint to a collection site. The assessment on paint sales included in the purchase price is assumed to be similar to Oregon and California: ▪ No charge for ½-pint container or less ▪ $0.35 for up to 1-quart container ▪ $0.75 for up to 1-gallon container ▪ $1.60 for up to 5-gallon container

1. Introduction and Overview

Washington State is considering an industry-managed product stewardship system funded by an assessment that is built into the sale price of paint to manage the diversion and recovery of unwanted and leftover architectural paint—a high-volume, costly, and wasted resource. *Architectural paint* refers to interior and exterior architectural coatings (both latex and oil-based) used on housing, buildings, and other structures; it does not include industrial, original equipment, or specialty coatings. *Product stewardship*, also called *producer responsibility*, refers to an environmental management strategy in which all parties involved in the design, production, sale, and use of a product take responsibility for minimizing its environmental impact throughout all stages of its lifecycle, with manufacturers typically funding material recovery programs and recovering costs from consumers through product sales.

Product stewardship of unwanted and leftover architectural paint has been proposed as a solution for improving system performance, convenience, and cost-effectiveness. Local and state governments have been in national negotiations with paint manufacturers through the American Coatings Association (ACA) to reach an agreement on paint producer responsibility since 2002. This effort lead to a national Memorandum of Understanding signed in 2008 by the Washington State Department of Ecology and 17 local government agencies in Washington.[1] Other states—Oregon, California, Connecticut, and Rhode Island—have already adopted a paint stewardship approach. Analyses conducted in these states have shown that paint stewardship can result in cost savings for local governments and ratepayers, more convenient service for residents and businesses, and better environmental outcomes.

Unwanted paint poses risks to human health and the environment if not properly managed. Oil-based paint is toxic and flammable. By law, Washington State businesses, such as paint contractors, must handle leftover oil-based paint as a hazardous waste and send it to proper facilities for incineration or use as fuel. In addition, many solid waste management systems prohibit disposal of oil-based paint from any generator, including residents.[2] Unwanted and leftover latex paint in liquid form is a problematic material in the waste stream, can contain harmful components, and is challenging for consumers to manage properly. Moreover, paint is made of materials that can be captured for reuse, recycling, energy recovery, or safe disposal, but doing so requires a more convenient and effective collection infrastructure with long-term, sustainable financing.

Currently, local governments in Washington are the primary providers of collection infrastructure and public education programs related to safe and responsible management of unwanted paint. Architectural paint is one of the largest and most expensive waste streams managed by local governments' moderate risk waste (MRW) programs. In the interviews conducted for this study, local governments expressed concerns about the cost burdens of providing and funding managing management programs that are effective, convenient, and sufficient to meet the needs of Washington residents and businesses and to safeguard health and the environment. A number of local governments have already stopped collecting latex paint due, in part, to the high costs associated with latex collection and disposition.

This analysis compares Washington's existing programs with a modeled paint stewardship system for managing unwanted architectural paint. The study examines the infrastructure, performance, and costs of current and potential paint collection and recycling in Washington State, and forecasts the effects of a paint stewardship program in Washington State.

The manufacturer/consumer-funded stewardship program modeled here is based on real-world findings from currently operational paint stewardship programs, particularly in Oregon. The Oregon program is operated by PaintCare, a nonprofit organization created by ACA and funded through an assessment on architectural paint sold in the state. The paint stewardship program modeled for Washington State is assumed to represent a mature, fully implemented program operating at a stable level of collection and costs, which is envisioned to be achieved within three years of program implementation.

1.1 Objectives

The primary goals of this study were to document Washington State's existing programs and infrastructure for management of unwanted and leftover paint and to assess the likely effects of a paint stewardship system on outcomes and costs.

1) To document the existing programs and infrastructure for collecting and managing unwanted and leftover architectural paint in Washington, specifically:

   - **Paint collection and management programs.** How much paint is collected and how is it managed (i.e., disposed, recycled, or reused) under the existing programs in Washington?
   - **Quantity of unwanted paint.** How much paint is sold in Washington and how much unwanted and leftover paint is estimated to be available for collection from residents and small quantity generators (SQGs)?[3]
   - **Program costs.** What are the costs associated with managing unwanted paint under the current programs? Who incurs these costs? What are weighted average unit costs for collection and for end-of-life management, and how can they be extrapolated to estimate total system costs for Washington under the existing programs?[4]
   - **Jobs impacts**. What is the full-time equivalent (FTE) employment related to the collection and management programs for unwanted paint?

2) To assess the likely effects of a paint stewardship system on local governments and on the overall system outcomes and costs, specifically:

   - **Paint collection and management under a modeled paint stewardship system.** How much unwanted and leftover paint might be collected under a paint stewardship system modeled after Oregon's pilot paint stewardship program, and how might management outcomes change? Given the comparison between how much paint is currently collected and how much might be collected under paint stewardship, how effective are current programs compared to a paint stewardship system?
   - **Costs of a paint stewardship system.** What are the estimated costs of a paint stewardship system, and who would incur these costs? How would these costs differ from existing programs?
   - **Jobs impacts under paint stewardship.** What effects would a paint stewardship system have on jobs in Washington? Would the paint management infrastructure expand or decrease?

1.2 Methodology

The analysis of the current paint collection system in Washington State and a modeled paint stewardship system was conducted in three steps:

1. The research team conducted primary and secondary research on existing paint management programs to assess the existing infrastructure in Washington State.
2. The research team collected data on costs and outcomes for paint collection programs in jurisdictions where product stewardship for paint has been implemented, focusing primarily on the pilot paint stewardship program implemented in Oregon beginning in 2010. Drawing on these data, in combination with information about Washington State's existing programs, the research team developed a state-level scenario for unwanted paint management costs and outcomes under a paint stewardship system in Washington.
3. The research team then compared the existing paint management programs to the results of the modeled paint stewardship scenario to assess the costs, potential jobs, and other outcomes of a paint stewardship system in Washington State.

Additional details about the study methodology, data sources, assumptions, and limitations of the analysis are provided in **Appendix A, Methodology, Assumptions, and Limitations**.

1.3 Report Overview

Following this overview, ***Chapter 2*** of this report describes the existing programs and infrastructure for managing unwanted architectural paint in Washington State. Findings are presented in four main areas:

- **Existing paint collection and handling infrastructure**, including types and methods of collection and handling.
- **Paint supply and capture rate**, including total paint sales, quantities collected, and estimated statewide collection.
- **Existing paint processing and disposition methods**, including estimated statewide rates of reuse and recycling.
- **Estimated paint management costs and economic impacts** of existing paint management programs.

Chapter 3 presents the analytical **model of a paint stewardship system** for unwanted architectural paint in Washington State and compares the outcomes under the modeled paint stewardship system with existing programs.

Chapter 4 provides a brief summary of conclusions derived from the findings of this study.

2. Washington's Existing Paint Management Programs

2.1 Existing Programs Research and Data Sources

This chapter examines the infrastructure, performance, and costs of existing programs for the collection and management of unwanted paint in Washington State. The information presented in this chapter is based on primary and secondary research conducted by the research team. Data on existing unwanted paint management programs were collected through the following sources and methods:

- **Washington State Department of Ecology's Waste 2 Resources**: 2010 paint collection quantities and disposition methods as reported to Ecology by all facilities required to support such data under WAC 173-350.[5]
- **Interviews with managers of public moderate risk waste (MRW) and household hazardous waste (HHW) facilities and mobile collection programs**: The research team conducted interviews with managers in 13 counties, including the 5 most populous counties in the state as well as a geographically diverse sample of other counties.[6] These public MRW programs represent the primary paint management services available for 80 percent of the state's residential population. (See Appendix A, **Table A-1**, for a list of MRW programs interviewed.)
- **Interviews with private paint collection and processing companies:** The research team conducted interviews with three private companies that provide paint collection and management services—Clean Harbors, Emerald Services, and PSC. These companies are contracted by public MRW programs to provide transport and disposition of paint collected by public MRW programs, and also provide large volume collection services for businesses, including some small quantity generators (SQGs), outside of the MRW program system. The research team also interviewed Amazon, a latex paint recycler that receives the majority of latex paint currently sent for recycling from Washington.

Additional details about the data sources, methodology, assumptions, and limitations of the existing programs analysis are provided in **Appendix A, Methodology, Assumptions, and Limitations**.

2.2 Existing Collection and Handling Infrastructure

2.2.1 Paint Collection Infrastructure and Types of Paint Collected

County and city governments manage 94 percent of the unwanted paint collected in Washington State. Of Washington's 39 counties, 35 offer paint collection services, provided through two primary channels:

- **Public MRW facilities,** which are either dedicated standalone facilities or areas within larger solid waste facilities such as transfer stations that have regular MRW collection hours. All public MRW facilities serve residents and some also serve SQGs. In most cases, public MRW facilities are owned, operated, and staffed directly by the county or city government. However, in a small number of jurisdictions, MRW collection services are financed by local governments but facility operations are contracted to private companies.

- **Public mobile collection events,** which are conducted at a temporary location or for a limited amount of time, often in areas that do not have convenient access to a fixed collection site. In most cases, mobile collection events are financed by local governments but staffing and operations are contracted to private companies, although a few local governments run their own mobile collection events.

Both government-operated and contractor-operated programs are referred to as "public MRW programs" because they are government-financed programs. Among the 13 public MRW programs interviewed, two programs (in Clark County and Whatcom County) are entirely operated by contracted private firms, both for fixed facilities and mobile collection. In three other programs, only the mobile collection events are operated by a contracted private firm, which is also contracted as the processor of material collected by those programs.

In addition, in Clark County, the county government has recruited a number of paint retail stores to voluntarily collect paint from residents free of charge. The County's contracted MRW facility operator provides the stores with empty collection containers and picks up full containers from the stores weekly or as needed. The costs of collection, transport, and disposition—including containers—are covered by Clark County's contracted operator, Waste Connections, under the terms of a broader solid waste management contract with the County. Quantities collected from these stores are included with data from public MRW facilities.

Private companies also provide paint collection services to SQGs via:

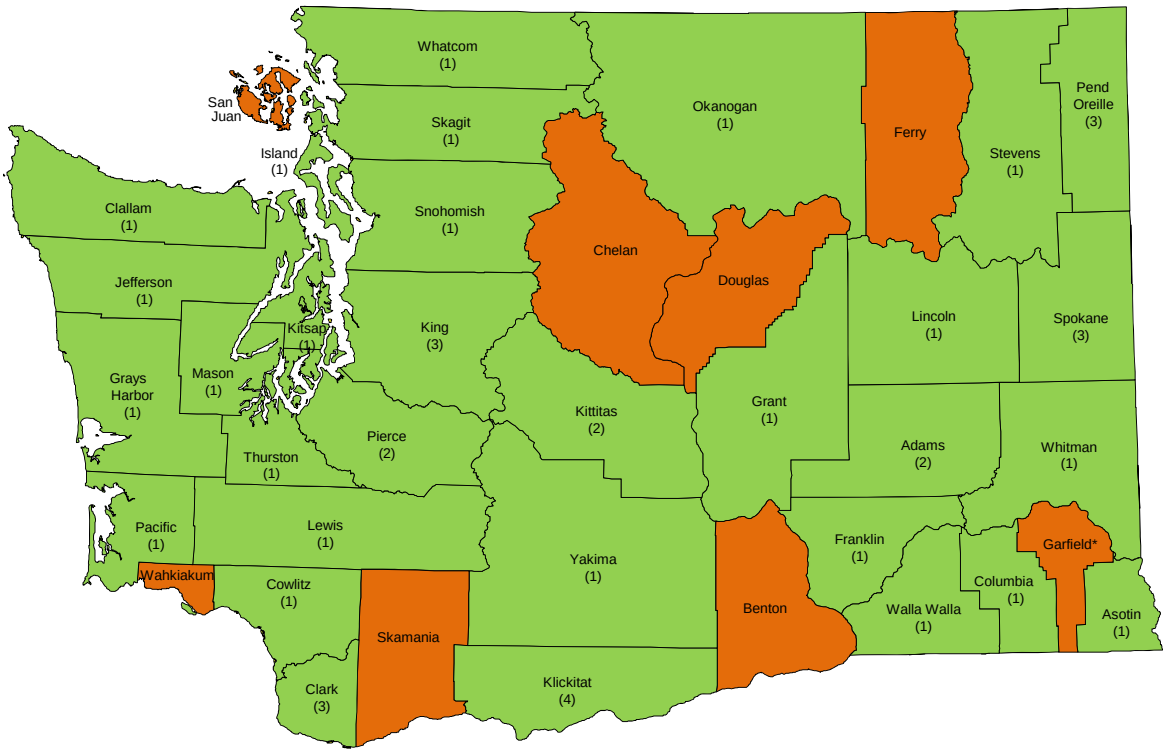
- **Large-volume pick-ups**, which are carried out by private paint collection companies that collect paint and other hazardous wastes from businesses, including SQGs.[7]
- **Private facilities**, which primarily serve as consolidation and processing facilities for private companies, also sometimes accept paint brought directly to their facilities by SQGs.

A very small amount of paint—not included in the collection quantities reported to the Department of Ecology—is also collected by the network of Habitat for Humanity reuse/resale stores (also called "re-stores") around the state. However, many of these re-stores accept only unopened or unused paint, often from large paint retailers.

Statewide, there are 50 fixed collection sites accessible to residents located in 31 of Washington's 39 counties (8 counties do not have permanent collection sites). This number of fixed collection sites equates to an average of one site per 136,000 residents. Of these sites, 44 are public MRW facilities and 6 are paint retail stores that collect unwanted paint as part of the Clark County paint collection program.

Figure 2-1 illustrates the counties with and without public MRW facilities, as of 2011 (the most recent year for which complete information is available).[8]

Figure 2-1. Washington Counties with Public MRW Collection Facilities in 2011
(number of MRW collection sites per county shown in parentheses)



GREEN = Public MRW facility(s) present in 2011: 31 counties
ORANGE = NO public MRW facility present in 2011: 8 counties

**Garfield County has an interlocal agreement with Asotin County for resident access to the MRW facility there.*

Overall, public MRW facilities collected 82 percent of all paint captured in 2010. Mobile collection events, which are also government-financed, collected 12 percent of paint, and private large-volume collection services captured 6 percent.

Also shown in **Table 2-1**, private facilities/large-volume pick-ups by private companies play virtually no role in managing unwanted and leftover paint from residents except as contractors to government-financed programs. They do, however, participate in providing services to small quantity generators, often through on-site pick-up of paint on a fee-for-service basis.

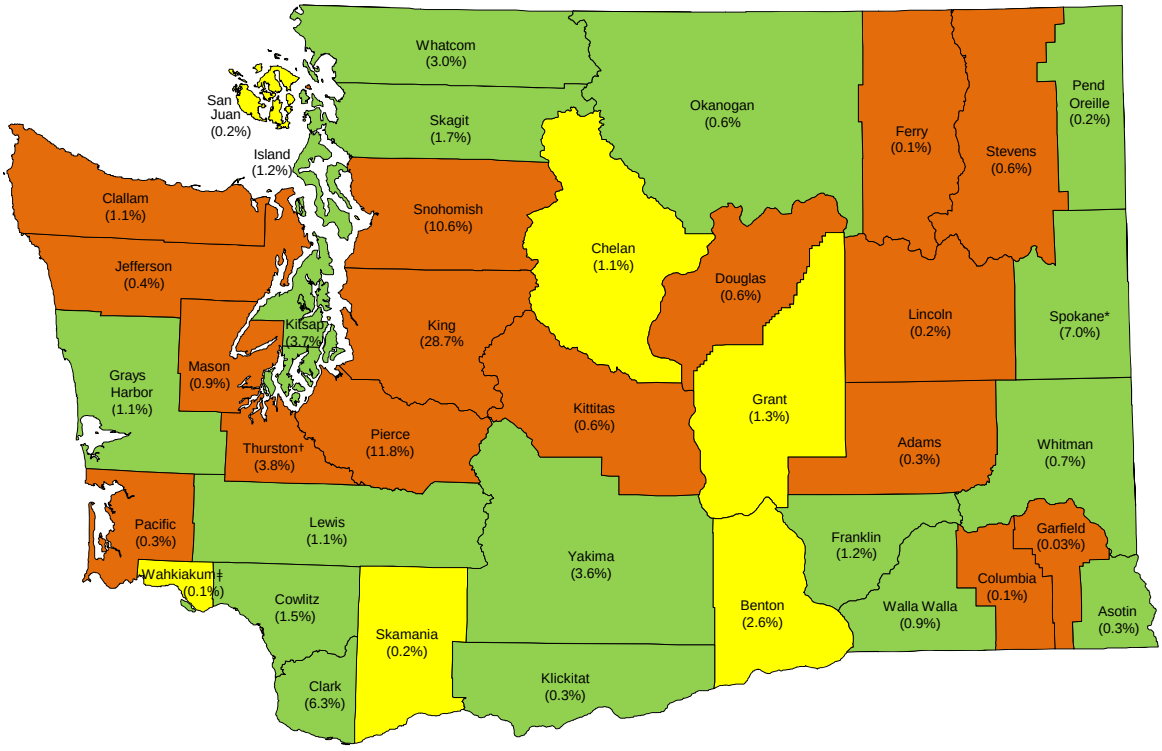
Table 2-1. Types of Paint Collection from Residents and SQGs in Washington in 2010

Collection Methods	# of Sites/ Collection Events	Residents		SQGs		Total	
		gallons	%	gallons	%	gallons	%
Public MRW Facilities	44	384,014	87%	33,012	51%	406,744	**80%**
Retail Collection Sites*	6	**	**	**	**	10,281	**2%**
Public Mobile Collection Events	83	58,985	13%	1,101	2%	60,085	**12%**
Private Large-Volume Collection Services		0	0%	30,125	47%	30,125	**6%**

* *Retail collection sites are part of Clark County's paint collection program, and disposition costs are covered by Clark County.*
** *Retail collection sites did not track paint from residents and SQGs separately.*

Two main types of paint are collected: latex paint and oil-based paint. As noted above, statewide, public MRW programs in 35 counties collect paint through their programs. However, some of these programs accept only oil-based paint while others collect latex and oil-based paint. Some programs that include both public MRW facilities and mobile collection events accept latex paint only at their facilities but not at mobile collection events due to space, labor, and financial constraints. **Figure 2-2** illustrates the availability of latex paint collection for residents in Washington by county.

Figure 2-2. Availability of Latex Paint Collection for Washington Residents, by County in 2011
(County percentage of Washington State's population shown in parentheses)



GREEN = Latex paint from residents accepted at public MRW facility(s): 17 counties
YELLOW = Latex paint from residents accepted via mobile collection only: 6 counties‡
ORANGE = Latex paint from residents NOT collected: 16 counties

**Spokane County accepts only latex paint that is believed to be reusable.*
†Thurston County stopped accepting latex paint in August 2011.
‡Wahkiakum County has an annual mobile collection event provided by Cowlitz County via an interlocal agreement.

To summarize, of Washington's 35 counties that provide public MRW programs that collect paint:

- 30 collect paint via public MRW facilities that serve as permanent collection sites; 12 of these also collect paint via mobile collection.
- 5 collect paint via mobile collection only; 1 additional county (Wahkiakum) receives mobile collection service provided by another county (Cowlitz) via an interlocal agreement.
- 21 accept paint from small quantity generators, some for a fee and others free of charge.

- 23 accept both latex and oil-based paint from residents; programs in 3 additional counties accept latex paint from small quantity generators only.
- 9 accept oil-based paint but not latex paint.

Statewide, there are 16 counties where residents lack access to latex paint collection services, either because there is no public MRW program or because latex paint from residents is not accepted by the program. These counties are home to 60 percent of the state population.

(See **Appendix B, Existing Public Programs for Paint Collection**, for a table of public MRW program characteristics for each county.)

2.2.2 Collection and Handling Methods

Public MRW facilities and collection events throughout Washington State employ a variety of procedures for collecting and handling paint from customers. The procedures used have a significant influence on the time required and costs associated with handling paint.

In general, however, the collection and handling process can be divided into four main steps:

1. **Receive materials from customer and unload.** This step can involve either directly unloading, assisting the customer in unloading, or self-service unloading by customers. At MRW facilities, paint is usually placed on carts and separated by type (latex vs. oil-based paint).
2. **Visually inspect paint.** This step determines material type and ensures material acceptability. If the collection site has a reuse program, the visual inspection can be time-consuming, and it sometimes includes shaking and/or opening cans to evaluate the condition of the contents. Typically, only cans with original labels that can be clearly read are accepted for reuse.
3. **Send paint to appropriate area.** At this point, paint is either sent directly to the packing area or to intermediate storage, depending on how much space is available, how busy the collection staff members are, and what packing method is used. For example, if the paint will be bulked—which requires an additional step of handling—then it is usually stored first. If a reuse program is in place, material that has been deemed acceptable for reuse is usually sent there directly, though sometimes it is sent to an intermediate area for more thorough inspection before being transferred to the reuse area.
4. **Pack paint for transport for disposition.** Paint is typically packed for transport by type (latex vs. oil-based) in one of three ways:
    a. Cans are placed (“loose-packed”) into 55-gallon drums.
    b. Cans are loose-packed into cubic-yard “Gaylord” boxes.
    c. Cans are opened and contents are emptied (“bulked”) into 55-gallon drums. In some cases, partly full cans are opened, combined, and loose-packed into drums or boxes.

Whether paint is loose-packed or bulked is not usually dependent on type: latex and oil-based paint are both packed both ways at various facilities around Washington State.[9] The handling method is also not exclusively based on price, although the choice of packing method does significantly affect disposition costs. On a per-pound basis, the disposition costs for bulk drums and Gaylord boxes are lower than loose-

packed drums; however, packing bulk drums requires additional employee time, which increases labor costs. Many MRW facilities that bulk paint also have paint can crushers. The bulk collection drum is placed below the crusher, so the paint goes into the drum as the can is crushed. These crushers can also add additional costs to the program.

For MRW facilities, the choice of packing methods typically is made at the facility level based on available space, transport and disposition costs, labor time required and available labor, amount of material collected, and equipment available. At mobile collection sites and collection events, paint is usually loose-packed into drums or boxes. It is either picked up by the processor directly from the site or transported back to an MRW facility.

2.3 Existing Unwanted Paint Supply and Capture Rate

2.3.1 Paint Sales and Estimated Amount Available for Collection

Architectural paint sales in the U.S. totaled nearly 652 million gallons in 2010, or an average of 2.11 gallons per person.[10] However, per-capita paint sales in the Pacific Northwest are lower than the national average. As shown in **Table 2-2**, an average of U.S., Oregon, and British Columbia per-capita sales figures was used to estimate paint sales for Washington in 2010. Applying the per-capita sales estimate to Washington State's population yields estimated total paint sales of 13,449,000 gallons, equal to 2.0 gallons per capita.

Table 2-2. Projected Paint Sales in Washington (in gallons per year)

	Total	Latex	%	Oil-Based	%	Population
United States (2010) *Gallons sold* *Gallons sold per capita*	651,600,000 2.11	521,280,000 1.69	80%	130,320,000 0.42	20%	309,300,000
Oregon (2011) *Gallons sold* *Gallons sold per capita*	7,583,946 1.96	6,578,436 1.70	87%	1,005,510 0.26	13%	3,871,859
British Columbia (2011) *Gallons sold* *Gallons sold per capita*	8,718,664 1.92	6,974,932 1.54	80%	1,743,733 0.38	20%	4,529,674
Washington (2010 estimate) *Gallons sold* *Gallons sold per capita*	**13,449,000** **2.00**	**10,759,000** **1.60**	**80%**	**2,690,000** **0.40**	**20%**	6,724,540

According to a study conducted by the U.S. EPA, approximately 10 percent of all paint sold annually in the U.S. is unwanted or leftover and available for collection.[11] Applying the U.S. EPA calculation to Washington's estimated sales suggests that there were approximately 1.34 million gallons of unwanted and leftover paint available for collection in Washington State in 2010.

2.3.2 Total Unwanted Paint Collected and Estimated Capture Rate

According to data collected by the Washington State Department of Ecology, which tracks activities related to paint management through its Waste 2 Resources program, a total of 507,235 gallons (4.42 million pounds) of paint were collected from residents and SQGs in Washington in 2010.[12] As shown in **Table 2-3**, this figure represents a capture rate of 38 percent of the estimated amount of unwanted or leftover paint available for collection in 2010.

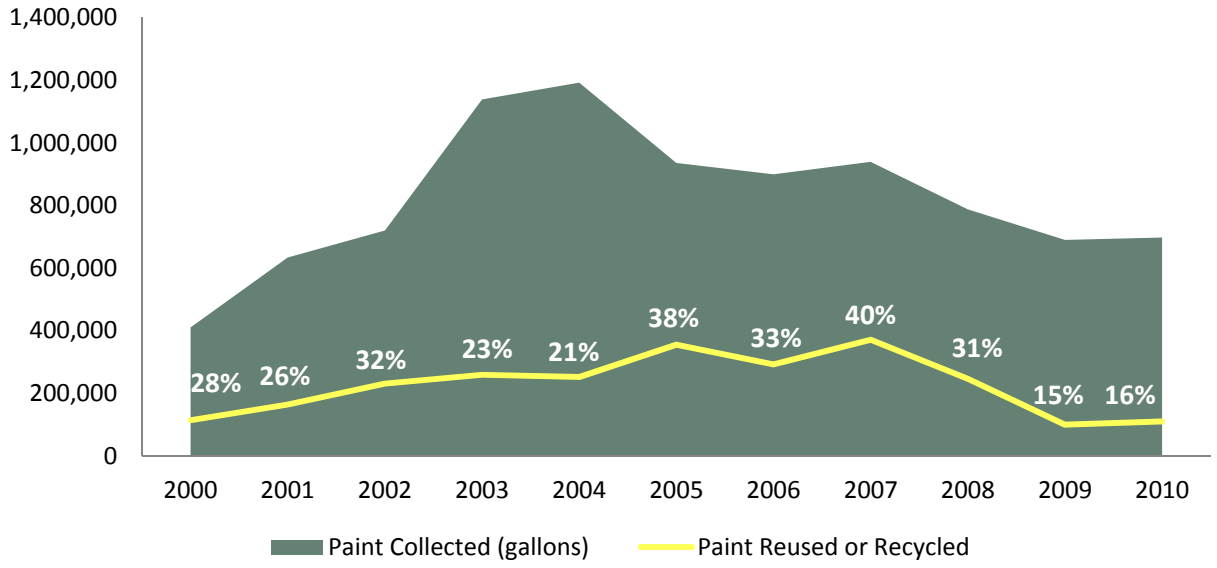
Table 2-3. Total Amount of Paint Collected and Estimated Statewide Recovery Rate in 2010

Total Collected *gallons*	Estimated Leftover *gallons*	Capture Rate *% of estimated leftover*	Per-capita Share *gallons*
507,235	**1,344,908**	**38%**	**0.075**

Figure 2-3 shows the total quantity of paint collected and the percentage of collected paint that was reused or recycled in Washington from 2000 to 2010. As shown, total paint collection has dropped dramatically from the high point in 2004, and has decreased by 44 percent since 2007. The portion of paint that is reused or recycled has also dropped since 2007.

The decline in quantity of paint collected and in the reuse/recycling rate is likely explained by the fact that, during that time period, a growing number of public MRW programs stopped accepting latex paint, beginning with King County in 2008, followed by Seattle Public Utilities and Snohomish County in 2009, and several others in subsequent years.

Figure 2-3. Quantity and Percent of Paint and Related Materials Collected in Washington in 2000-2010



Note: Figure 2-3 includes all paint and paint-related materials (PRM) collected, even though a portion of these materials (likely between 5 and 30 percent) are assumed not to be covered by a potential paint stewardship program. This approach was used for consistency in 2010, as only aggregate collection totals were available for previous years. (Source: WA Department of Ecology)

Table 2-4 shows the sources and types of paint collection in Washington State in 2010, by weight and by volume. Of paint collected in 2010, 88 percent by weight was collected from residents, while 12 percent was collected from businesses or other entities classified as small quantity generators (SQGs).

By weight, 47 percent of paint collected was latex, and 53 percent was oil-based. By volume, the difference is more pronounced: only 38 percent of paint *collected* was latex, and 62 percent was oil-based paint. In contrast, roughly 80 percent of paint *sales* were estimated to be latex and 20 percent oil-based, according to national U.S. Census product sales data for paints and allied products. This difference is largely because a significant number of public MRW programs in Washington State do not accept latex paint. In addition, some residents solidify and dispose of latex paint themselves, and it is also possible that consumers use up relatively more of the latex paint they buy.[13]

Table 2-4. Sources and Types of Paint Collected in Washington State in 2010

	Residents *pounds*	SQGs *pounds*	% of Total Weight	Residents *gallons*	SQGs *gallons*	% of Total Volume
Latex Paint	1,945,697	143,175	**47%**	178,504	13,135	**38%**
Oil-Based Paint	1,957,256	378,152	**53%**	264,494	51,102	**62%**
% of Paint Collected	**88%**	**12%**		**87%**	**13%**	

2.4 Existing Paint Processing and Disposition Methods

According to the MRW reports submitted to the Department of Ecology, unwanted or leftover paint collected in 2010 was managed at end-of-life in seven different ways. **Table 2-5** presents statewide quantities by disposition method and paint type; the table also shows the percentage of paint managed by each method.

Table 2-5. Management and Disposition Methods for Paint Collected in Washington State in 2010

Disposition Methods	Latex Paint		Oil-Based Paint		TOTAL	
	gallons	*%*	*gallons*	*%*	*gallons*	*%*
Reuse	31,305	16%	10,464	3%	41,768	8%
Recycling	53,524	28%	15,053	5%	68,577	14%
Energy Recovery	17,040	9%	269,499	85%	286,539	56%
Landfill/Other	89,771	47%	20,580	7%	110,351	22%
TOTALS	**191,640**	**100%**	**315,596**	**100%**	**507,235**	**100%**

2.4.1 Reuse and Material Exchange

Statewide, 8 percent of all paint reported as collected (3 percent of oil-based and 16 percent of latex paint) was *reused* in 2010. Residents contributed 83 percent of reused paint, while 17 percent came from SQGs. While additional quantities of paint were also collected and sold for reuse by Habitat for Humanity (HFH) reuse/resale stores, these "re-stores" are not required to track or report paint quantities to Ecology, so data on reuse are underestimated. Anecdotal information based on conversations with two HFH store managers suggests, however, that their operations account for a very small amount of additional paint reuse.

Of the 13 public MRW programs surveyed, 7 have some type of efforts to facilitate reuse of paint collected through their programs. Four facilities have substantial reuse areas (where reuse accounts for more than 20 percent of all paint collected through the MRW program), and 3 have small reuse areas. As shown below in **Table 2-6**, the percentage of all paint collected that is diverted for reuse varies dramatically among facilities, from 82 percent of all paint collected in Lewis County to just 1 percent in Kittitas and Kitsap counties.

At MRW facilities with reuse activities, staff members typically evaluate potentially reusable paint, either by simply shaking the paint can or by opening the can and inspecting or stirring the contents, to determine if the paint is in good condition and the can is sufficiently full to warrant placing it in the reuse area. Some reuse programs consider cans that are at least 25 percent full to be reusable, while other programs consider cans to be reusable only if they are more than half full. Most programs keep reusable paint in its original container when placing it in the reuse area. Some programs have been reported to combine latex paint into 5-gallon containers of like colors before placing in the reuse area, but none of those interviewed reported currently performing this practice. All of the reuse programs require customers to fill out a form when taking material from the reuse area, but most programs do not collect specific information about the type or quantity of paint taken for reuse.

All of the MRW programs with reuse programs surveyed stated that virtually all of the paint placed in reuse areas was claimed, leaving none to be managed by the facility. However, some of the programs that accept potentially reusable paint from customers find that, upon inspection (before placing it in a reuse area), paint is not reusable, and they direct that non-reusable paint to other management options.

Table 2-6. Paint Reuse as Percent of Paint Collected at Public MRW Facilities in 2011

MRW Facilities with Reuse Program	Percent of Collected Paint Diverted for Reuse		
	Latex	Oil-Based	Total
Kitsap County	8%	3%	6%
Kittitas County	-	1%	1%
Lewis County	93%	58%	82%
Lincoln County	-	31%	31%
Snohomish County	32%[i]	-	5%
City of Spokane	87%[ii]	19%	61%
Whatcom County	65%	15%	33%
Yakima County	20%	21%	21%
Statewide Total (in 2010)	**16%**	**3%**	**8%**

[i] *Snohomish County accepts latex paint only from SQGs.*

[ii] *Spokane only accepts latex paint that is deemed reusable at the point of collection.*

Operating a reuse program has both costs and benefits for MRW facilities. Running a substantial reuse program requires a significant investment of staff time and of facility space. For example, at the Lewis County MRW facility, called the HazoHut, which runs the most substantial paint reuse program of any public facility in the state, facility staff members spend about one-third of their time on paint reuse-related activities. The HazoHut has among the lowest per-gallon paint management costs of all public MRW facilities surveyed. In general, diverting paint to reuse increases labor costs but lowers per-unit disposition costs. (Detailed discussion of management costs appears in *Section 2.5, Existing Paint Management Costs and Economic Impacts.*)

2.4.2 Recycling

Recycling is defined as "transforming or remanufacturing waste materials into usable or marketable materials for use other than landfill disposal, energy recovery, or incineration."[14] Paint recycling is a process primarily available for latex paint, which can be recycled back into paint or used as a binder or dust control agent in the manufacture of other products, including Portland cement.

Recycling latex paint yields numerous lifecycle benefits, including reduced greenhouse gas emissions, lower ecological toxicity potential, reduced energy and water use, and reduced demand for non-renewable fossil fuel resources.[15]

Oil-based paint can be partially recycled, particularly when combined with paint thinners or other solvents, through distillation and other methods for solvent recycling, in which solvents are separated from other solids and components for reuse. However, solvent recycling still leaves a large portion of the processed material as waste that must be disposed, so it does not entirely eliminate disposal.

In Washington, approximately 28 percent of latex paint and 5 percent of oil-based paint collected in 2010 was managed for recycling, accounting for 14 percent of all paint collected. The vast majority (93 percent) of latex paint recycling collection occurred in Clark County, where public and private MRW facilities and mobile collection activities sent more than 48,500 gallons of latex paint for recycling in 2010. Outside Clark County, only 4 percent of latex paint collected in the state was reported as recycled.

Almost all of the oil-based paint collected for solvent recycling was collected from SQGs around the state by Emerald Services, which operates a solvent recycling facility in Tacoma, Washington.

Among the 13 public MRW programs interviewed regarding their management practices in 2011, only three (including mobile services) sent latex paint for recycling in 2011. All three contracted with PSC to manage this service. These three counties are as follows:

1. **Benton County**: 100 percent of latex paint collected at Benton County's 2011 mobile collection events was picked up by PSC and sent for recycling.
2. **Clark County**: 97 percent of latex paint collected at Clark County's three contracted facilities and 100 percent of latex paint collected through mobile collection and participating retail and reuse/resale stores was picked up by PSC and sent for recycling.
3. **City of Seattle**: 100 percent of latex paint collected at the facilities was picked up by PSC and sent for recycling (although this amount contributes only a small volume, since the City does not officially accept latex paint).

PSC first brings latex paint collected for recycling to either its Tacoma or Kent treatment, storage, and disposal (TSD) facilities or to its Washougal 10-day storage facility. Then PSC consolidates the latex paint for shipment to Amazon Environmental in Riverside, California, or GDB International in Nashville, Illinois, for recycling.

The low recycling rate of all paint (oil-based and latex) results largely from two factors. First, a number of public MRW programs do not accept latex paint from residential customers (in 16 counties that are home to 60 percent of the state's population), and most recycling currently available is for latex paint only. Second, the costs of recycling latex paint in Washington State are often significantly higher than landfill disposal. This higher cost is partly because no latex paint recycling facility is operating in Washington. To be recycled, Washington's latex paint is currently trucked to Amazon Environmental in California or GDB in Illinois. (Previously, latex paint could go to Portland, Oregon, for recycling at MetroPaint—a regional government-run paint recycling facility that handles much of Oregon's latex paint recycling—but Metro is no longer accepting latex paint from Washington.)

2.4.3 Energy Recovery

If oil-based paint is not set aside for reuse, nearly all of the remaining oil-based paint collected by public MRW programs interviewed is picked up by PSC and sent for energy recovery to one of six cement kilns or other permitted "beneficial reuse" facilities that have relationships with PSC, including the following:

- Ashgrove Cement, with facilities located in Kansas and Arkansas.
- Giant Resource Recovery in Alabama.
- Lonestar Industries in Missouri.
- Reinco in Arkansas.
- Systech Environmental Corporation in Kansas.

In most cases, paint and paint-related materials are fuel-blended at the beneficial reuse facility, where flammable waste is converted into fuel for use in a conventional cement production facility. In the fuel-blending process, flammable wastes are first classified as suitable by testing for physical, chemical, and thermodynamic properties to ensure the required energy value and compatibility with the cement-making process can be met. Any solid wastes are then crushed into fine particles with a grinder and suspended in the organic liquid wastes. This mixture is blended with other suitable liquid wastes to produce a secondary solvent-based fuel. Samples of the secondary fuel are tested to ensure they meet state and federal environmental permitting standards.[16]

Of the public MRW programs interviewed, only one sends oil-based paint for energy recovery through a company other than PSC. In 2011, Snohomish County sent its loose-packed and bulked oil-based paint through Clean Harbors. The county has since started sending its *loose-packed* oil-based paint through PSC; Clean Harbors still manages the county's *bulked* oil-based paint, however.

Approximately 9 percent of all latex paint collected in the state, all collected through Spokane's MRW program, is also sent for "energy recovery" at Spokane's waste-to-energy facility. This paint is sent for disposition through combustion because, although Spokane's three MRW collection sites accept only latex paint that appears to be reusable, a portion of that paint turns out not to be of sufficient quality or quantity for reuse.

2.4.4 Landfill and Other Disposal

If latex paint is not reused or sent for recycling, the remaining latex paint is typically solidified in drums at a TSD facility by the processing company (PSC, Clean Harbors, or Emerald Services) and then sent for landfill disposal. The primary destination landfills for solidified latex paint from Washington are:

- **Columbia Ridge Landfill** in Arlington, Oregon, operated by Waste Management.
- **Simco Road Landfill** in Mayfield, Idaho, operated by Idaho Waste Systems.

In addition, a few of the public MRW programs surveyed with access to their own disposal services choose to *dispose* of non-reusable latex paint as follows:

- **Lewis County**: MRW facility staff members solidify latex paint that appears sludgy, and they combine this non-reusable paint at the transfer station with other waste that is sent for landfill disposal.
- **City of Tacoma**: Tacoma's MRW facility does not accept latex paint, but it still receives a substantial amount—through illegal dumping, by removing cans of liquid latex paint from the tipping floor at the transfer station, and through the "blight" program, which collects abandoned material. To dispose of this latex paint, the MRW facility staff members mix it with cement and alkaline batteries and place it in 55-gallon drums. These drums are then landfilled.

Although none of the programs surveyed as part of this analysis reported using latex paint as alternative daily cover (ADC) at landfills, there have been reports of several counties in Washington using unwanted and leftover latex paint in this way. In most cases, latex paint used as ADC is not included in the collection totals reported to the Department of Ecology and thus is not factored into this analysis.

A small amount of oil-based paint is also sent for treatment and disposal at either a designated landfill permitted to accept such material or is managed directly at a privately operated TSD facility.

2.5 Existing Paint Management Costs and Economic Impacts

2.5.1 Paint Management Costs at Public MRW Collection Facilities

Table 2-7 presents the average per-unit costs of paint management reported by the MRW programs interviewed, weighted by the portion of total paint collected. It is important to note that per-unit collection costs are derived by dividing total collection costs by the total amount of paint collected and do not account for the number of containers or the average amount of paint collected in each container. This distinction is significant because collection of a single gallon of paint may actually represent collection of numerous separate (partly full) containers from multiple customers. This situation significantly increases the time and labor required to collect and handle paint, translating into much higher per-unit collection costs than may be otherwise expected.

Table 2-7. Weighted Average Paint Management Costs of Public MRW Facilities in 2011

Cost Category	Average Costs	
	per pound	*per gallon*[i]
Collection costs (fixed facilities)	**$0.41**	**$3.57**
Collection costs (mobile collection)	**$0.26**	**$2.26**
Transport and disposition costs, by method[ii]		
Recycling	$0.52	$5.64
Energy recovery	$0.34	$2.48
Landfill and other	$0.25	$2.71
Average total costs	**$0.71**	**$6.17**

[i] *Per-gallon disposition costs were calculated using paint type-specific conversion factors of 7.4 lbs/gal for oil-based paint (energy recovery) and 10.9 lbs/gal for latex paint (recycling/landfill). All other conversions were calculated using the weighted average of 8.7 lbs/gal.*

[ii] *Disposition costs presented are average costs for each method; they are not additive.*

These weighted average per-unit costs most accurately represent counties where the proportions of latex and oil-based collected and the disposition methods used are similar to the aggregate statewide values. In counties that deviate significantly from the mean, real costs are also likely to deviate from these cost estimates. For example, in Clark County, where the proportions of latex collected and recycled is far higher than the levels statewide, per-unit costs are approximately $7 per gallon overall.[17]

2.5.2 Estimated Statewide Paint Management Costs

Using the weighted average costs in **Table 2-7**, an estimate of the total costs to local governments of managing unwanted paint under existing programs (fixed facilities and mobile collection) was developed. This estimate uses the paint management and disposition methods reported in 2010 (**Table 2-5**) and assumes that the collection and handling methods employed and the associated costs reported for 2011 by the 13 public MRW programs surveyed are representative of all public MRW programs collecting paint in Washington in 2010.

Because most of the private companies operating private facilities and providing large-volume collection services for SQGs declined to provide sufficient cost data to be used in the analysis, the per-gallon costs for private large-volume collection services are assumed to be the same as for MRW programs. These companies only account for six percent of paint collection reported statewide, so the effects of any discrepancy between actual and estimated costs in this sector on the statewide estimates are expected to be small.

Table 2-8 presents the estimated statewide costs for managing paint under existing programs.

Table 2-8. Estimate of Total Costs for Paint Management in Washington State in 2010

Cost Category	Total Collection *gallons*	Total Costs *$*
Collection (public facilities, retail collection, and private facilities/large-volume pick-up)	**447,150**	**$1,597,000**
Collection (mobile collection)	**60,085**	**$136,000**
Transport and disposition		**$1,398,000**
Reuse	41,768	$0
Recycling	68,577	$387,000
Energy recovery	286,539	$712,000
Landfill and other	110,351	$299,000
Totals	**507,235**	**$3,132,000**

None of the 13 surveyed programs charged residents for handling paint, but in some SQGs are charged $2 to $4 per gallon of paint.[18] Of those programs that charge SQGs for paint collection, the fees are typically described as disposition charges and are intended to cover only direct disposition costs and not the costs of collection labor, which is more than half the cost of managing paint.

Residents and businesses typically pay indirectly for MRW programs through solid waste tipping fees, curbside solid waste collection charges, and other fee or taxation mechanisms.

Many MRW programs around the state also receive funding through the Department of Ecology's Coordinated Prevention Grant (CPG) program to cover a portion of their costs. These CPG funds usually cover only a small part of total program costs, however, and some paint-related expenses, such as landfill disposal for latex paint, are not eligible for coverage through the program.

2.5.3 Employment Related to Paint Management in Washington

Among the 13 public MRW programs interviewed, those with labor data collected a total of 292,055 gallons (2.9 million pounds) of paint using labor hours equal to approximately 15 full-time equivalent (FTE) employees (defined as 2,080 hours per year). Assuming the same ratio of labor per unit collected (18,787 gallons collected per FTE) for the whole state, Washington's current paint collection system is estimated to use approximately 27 FTE public-sector collection employees around the state.

Note that some employees classified here as public-sector employees may be private-sector employees of private firms that are contracted to operate public MRW facilities (such as in Whatcom and Clark counties). This estimate does not include private-sector workers staffing mobile collection events that are funded by government but are contracted entirely to private companies. It also does not include staff members from private companies performing paint transport and treatment or disposition tasks.

Public-sector collection jobs range from part-time and seasonal employees to full-time, salaried positions with benefits. Typically, these employees are trained on federal Occupational Safety and Health Administration (OSHA) labor standards covering such topics as equipment operation (such as forklifts), worker health and safety, and personnel protective equipment.

These employees are also trained regarding national Resource Conservation and Recovery Act (RCRA) environmental regulations including hazardous waste identification, classification and labeling (for storage or shipment), and proper management and containment.

To develop job estimates for managing paint for the entire state, the private firms engaged in contracted collection, transport, and management of MRW were contacted and asked to make rough estimates of the number of FTEs involved in paint management. From these discussions, an estimated 24 private-sector FTE employees are involved in collection and management of paint in Washington.

These private-sector jobs are typically in bulking and loading leftover paint (and other MRW materials) at or from collection sites, transporting MRW (requiring a commercial driver's license and hazardous materials endorsement) within a local area, and operating hazardous waste transfer stations. These employees may also be responsible for the identification, treatment, packaging, and labeling of waste for the purposes of transport.

Finally, workers may be involved in operating the facility or equipment required to treat wastes. These private-sector jobs fall under the North American Industry Classification System (NAICS) code 562112, *Hazardous waste collection*, and NAICS 562211, *Hazardous waste treatment and disposal*.

Combining the estimated 27 public-sector FTE employees and 24 private-sector FTE employees yields a total of 51 FTEs devoted to paint management under the existing programs, as shown in Table 2-9.

Table 2-9. Estimated Employment Related to Paint Management in Washington in 2010

Employment Type	Existing Programs Current Employment *FTE employees*	Average Annual Salary
Collection (typically public-sector)	27	$60,000[i]
Transport and disposition (typically private-sector; includes private collection services)	24	$53,500[ii]
Other program delivery	0	
Total employment	**51**	

[i] *Estimate based on survey data for all MRW employees, including supervisors, working at public facilities or for public programs.*

[ii] *Average wage under NAICS codes 562112 and 562211 for Washington State in 2010 (Source: County Business Patterns).*

3. Modeled Paint Stewardship System

To evaluate the potential effects of paint stewardship in Washington, an analytical model of a paint stewardship system was developed. The modeled paint stewardship system is assumed to represent a mature, fully implemented program operating at a stable level of collection and costs, which is envisioned to be achieved within three years of program implementation. The assumptions underlying the modeled paint stewardship system discussed here are described in detail in Section 3.2, below.

3.1 Paint Stewardship System Model and Data Sources

To analyze the effects of paint stewardship in Washington, the research team first developed a set of assumptions about the modeled paint stewardship program that served as a framework for the analysis. The assumptions and analytical methodology were based on these main sources:

- **Oregon's pilot paint stewardship program**. The results of Oregon's pilot paint stewardship program, run by PaintCare, formed the basis of many of the quantitative assumptions about performance of a modeled program in Washington. Data used include publicly available information from PaintCare's 2011 and 2012 annual reports, as well as unpublished data about the Oregon program's Year 2 performance that PaintCare provided to the research team specifically for this analysis.
- **MetroPaint (Oregon**). Interviews with a representative from the regional government agency that operates a latex paint recycling facility in the Portland area.
- **Washington legislation**. Assumptions about the number and type of collection sites in the modeled program were based on language related to customer convenience standards included in the paint stewardship legislation introduced in Washington in 2012 (Substitute Senate Bill 6145).[19]
- **Stakeholder input**. Three primary groups of stakeholders were consulted in the assumptions development process:
  - Members of the Northwest Product Stewardship Council's Paint Subcommittee reviewed all proposed assumptions and provided input on assumptions in cases where data from other sources did not provide clear guidance on appropriate values.
  - The PaintCare program manager of Oregon's pilot paint stewardship program also provided input on assumptions related to program operations and performance, based on her experience in Oregon.
  - Managers of MRW programs that do not currently collect latex paint were asked to provide input regarding the likelihood that their programs would begin accepting latex paint under a paint stewardship system.

The assumptions developed and used in this model are summarized in the following section.

Table 3-1, on the following page, describes the key assumptions applied in developing a modeled system for paint stewardship in Washington State. Additional details on the sources for these assumptions are included in Appendix A.

Table 3-1. Key Assumptions Used in the Modeled Paint Stewardship System

Topics	Assumptions
Program implementation	The paint stewardship system is assumed to be fully implemented and in compliance with all program requirements.
Producer role	A single *producer responsibility organization* (PRO) operates a single stewardship *program* on behalf of all obligated paint producers.
Collection System	
MRW facility participation	All existing MRW facilities participate in a paint stewardship program. However, 8 facilities collect only oil-based (not latex) paint.
Number, distribution, and type of fixed collection sites	226 fixed collection sites, made up of: – 36 MRW facilities collecting both latex and oil-based paint – 8 MRW facilities collecting only oil-based (not latex) paint – 182 private sites (incl. retail, re-stores) collecting both latex and oil-based paint
Mobile collection events	95 percent of current publicly run/contracted mobile collection will continue. Average volume collected per event is 325 gallons.
Private large-volume collection services	Large-volume collection (for SQGs that have too much paint to transport to a collection site) accounts for 3% of total paint collected, including collection by private companies.
Quantities	
Paint Sales	Annual paint sales are 2.0 gallons per capita; 80/20 split of latex/oil-based paint.
Increase in collection	Substantial increase in latex paint collection under paint stewardship, equal to 80 percent of the per-capita collection rates achieved in Oregon in 2012. Modest increase in oil-based paint collection, equal to a 15 percent increase over current per-capita collection rates in Washington.
Capture rate	70% of available unwanted and leftover paint is collected under the modeled paint stewardship system.
Processing and Disposition	
Reuse	MRW programs are reimbursed $0.25/container for direct reuse (“paint exchange”). Reuse increases by 5 percent as a result of increased promotion of reuse by MRW facilities.
Recycling	70 percent of all latex paint collected is recyclable. Recyclable latex paint is sent outside of Washington State for processing until a sufficient collection volume warrants building an in-state recycling facility. However, model includes analysis of jobs benefit of a potential in-state facility. Processing cost is expected to be the same under either scenario.
Other	All oil-based paint not reused is sent for energy recovery. No source-separated latex paint collected through the paint stewardship system is sent directly to landfill for disposal as waste (higher-value disposition methods are used).

Topics	Assumptions
Costs, Revenues, Jobs	
Collection (labor) costs	Per-gallon collection costs are reduced by 10 percent at MRW facilities due to efficiencies from streamlined collection and handling procedures (including eliminated bulking, streamlined packing and shipment) gained under the paint stewardship system. Mobile collection costs remain the same. Retail collection sites incur labor costs of $1.59 per gallon collected.
Transport and Disposition costs	Per-gallon transport and disposition costs are 90 percent of the transport and disposition costs of the Oregon program in Year 2, due to higher paint throughput volume in Washington.
Other program costs	Per-gallon costs for other program-related expenses including administration are 90 percent of the other program-related costs of the Oregon program in Year 2, due to system efficiencies and higher paint throughput in Washington.
Employment	Employment increases are projected for 3 types of employment: – Collection at MRW facilities and retailers – Disposition services, including transport from collection sites – Other program related employment, including potential employment with in-state latex paint recycling

3.2 Modeled Paint Stewardship Infrastructure

3.2.1 Projected Changes in Paint Collection Infrastructure

Under the pilot paint stewardship program in Oregon, public MRW programs collect nearly two-thirds of all paint, with 62 percent of all paint collected in Year 2 of the program collected by MRW facilities, and an additional 3 percent collected through government-financed mobile collection events.[20] One-third (33 percent) was collected by paint retailers and re-stores, and the remaining 1 percent was collected directly by PaintCare through its own collection events and large-volume collection services.

In Washington State, the paint collection and handling infrastructure under the modeled paint stewardship system is expected to expand from one that is primarily provided by public MRW programs to one in which retail collection sites play a significant role. Public MRW facilities are expected to continue to collect the largest portion of unwanted and leftover paint (56 percent), but based on the experience in Oregon, retail collection sites are projected to account for much of the growth in collection volume, collecting 38 percent of paint under the modeled system.

Because of the increased availability of more convenient collection options, mobile collection is projected to decrease as a collection pathway. Collection from SQGs by private companies through private facility drop-offs and large-volume pick-ups are expected to continue at their existing collection volumes.

Overall, the number of collection sites is projected to increase to more than 220 throughout the state. Fixed sites will exist in 35 of 39 Washington counties. **Table 3-2** provides numerical projections for each element of the paint collection infrastructure, and the following section explains key changes for each type of collection.

Table 3-2. Current and Projected Paint Collection in Washington, by Type

Collection Methods	Existing Programs			Paint Stewardship			Increase	
	# of sites/ events	*gallons*	*%*	*# of sites/ events*	*gallons*	*%*	*gallons*	*%*
Public MRW facilities	44	406,744	80%	44	527,650	56%	110,625	25%
Public mobile collection	83	60,085	12%	78	25,350	3%	-34,735	-8%
Retail collection sites[i]	6	10,281	2%	182	364,000	38%	364,000	83%
Private large-volume collection services[ii]		30,125	6%		30,000	3%	-125	0%
Totals		**507,235**			**947,000**		*439,765*	

[i] *Retail collection sites under Existing Programs are part of Clark County's paint collection program. Collection volumes from retail sites were not tracked separately in 2010, and are included in public MRW facilities totals. Disposition costs of paint collected by paint retailers are covered by Clark County.*

[ii] *Under a paint stewardship system, some or all large-volume pick-ups from SQGs may be directly provided by the PRO.*

3.2.2 Public MRW Programs—Facilities and Mobile Collection

In Washington, it is anticipated that MRW facilities would continue to play a major and largely unchanged role in the collection of paint under a paint stewardship system, although more MRW programs are expected to accept latex paint from HHW customers. The amount of paint collected by MRW facilities is projected to increase by 25 percent overall, due to increased acceptance of latex paint as well as growth in collection of paint statewide.

Based on interviews with MRW programs that run mobile collection throughout the state, the number of mobile collection events held is not likely to be substantially affected by a paint stewardship system because mobile collection events are typically designed to collect a large number of hazardous materials, not just paint. For this model, the number of mobile collection events is assumed to be at 95 percent of the existing program levels (it is assumed that the number of mobile collection events in some counties, especially those that hold multiple collection events each year, may be scaled back slightly under paint stewardship). The average amount of paint collected per event is expected to drop dramatically, however, because under paint stewardship, most residents in the state will have access to more convenient and regular collection options, and fewer will use collection events for paint disposition as a result.

Under a paint stewardship system, a small number of these collection events would likely be organized and financed directly by the producer responsibility organization, rather than by public MRW programs. (For comparison purposes, PaintCare held four collection events in Oregon in the past year.) To facilitate comparison against the existing programs, all projected mobile collection events in this model are grouped together and assumed to be run by public MRW programs.

3.2.3 Retail Collection—Paint Retailers and Reuse Stores

The largest change to paint collection under a stewardship system is the addition of paint retailers and resale/reuse stores (referred to collectively as "retail collection" sites), which are expected to become a significant part of the paint collection infrastructure under paint stewardship.

For this analysis, the modeled paint stewardship system is assumed to include a convenience standard that determines a specific number of fixed collection sites required under the paint stewardship system. The research team estimated the number of retail collection sites that would be needed to achieve an assumed convenience standard of one permanent collection site per county and at least one site per 30,000 residents. More detail on the assumptions related to this convenience standard is provided in Appendix A.

Based on this analysis, it is projected that 182 retail collection sites would be needed to meet the convenience standard. (For reference, Oregon had 83 retail collection sites by the end of the paint pilot program's second year of operation).

Under the paint stewardship program in Oregon, retail collection sites collect an average of 2,351 gallons per year. To project the total volume of paint collected by retail collection sites under the modeled program in Washington, it is estimated that retail collection sites will collect an average of 2,000 gallons per year per site, accounting for 38 percent of all paint collected.

3.2.4 Private Facilities and Large-Volume Pick-up Services

Private facilities and large-volume pick-up services currently manage approximately 30,000 gallons of paint from small quantity generators in Washington. (Although SQGs must generate less than 220 pounds per month of hazardous waste, there is no limit to how long material may be stored on-site before collection. In addition, latex paint is not classified as a hazardous waste and may be stockpiled in unlimited quantities by any generator.) Under a paint stewardship system, SQGs are expected to continue managing a similar amount of paint, although the arrangements for large-volume pick-up services may be somewhat different.

In Washington, a few private firms currently provide large-volume pick-up services for a fee. SQGs interested in arranging a pick-up must select a service provider and are responsible for paying the fee, which may vary depending on the type or amount of paint being picked up. In contrast, Oregon's pilot program has contracted a single service provider to offer large-volume pick-up services to SQGs in Oregon covered by the paint stewardship program. The service is paid for through the program, and small quantity generators are not charged for pick-up.

There is not sufficient information to project what portion of paint currently collected by private facilities and large-volume pick-up services would be covered by a paint stewardship system in Washington, or how much might be collected through a large-volume pick-up service provided directly by the producer responsibility organization.

3.2.5 Projected Changes in Collection and Handling Methods

Under the modeled paint stewardship system for Washington, it is projected that the processing for collecting and handling methods for paint will be coordinated across all collection sites through the use of loose-packed tubskids (reusable cubic-yard boxes), the collection method used at almost all sites under the Oregon pilot program. Collection using tubskids is more efficient for collection facilities than bulking (combining paint from different cans together into a 55-gallon drum), a practice currently used by a number of MRW facilities in Washington for oil-based paint and (less frequently) for latex paint. Facilities typically bulk paint because it saves on disposition costs, though it increases labor costs.

Under a paint stewardship system, tubskids of loose-packed paint cans will be shipped to a processing facility, where they will be consolidated and prepared for final disposition. The elimination of on-site paint bulking is expected to reduce collection and handling costs at public MRW facilities by approximately 10 percent statewide.

3.3 Modeled Paint Supply and Capture Rate

3.3.1 Projected Increase in Amount Collected and Capture Rate

During the first two years of the pilot paint stewardship program in Oregon, collection of paint increased 26 percent over the 2008 baseline. It is expected that paint collection would increase at an even higher rate in Washington under paint stewardship because per-capita latex paint collection in Washington (0.028 gallons per person in 2010) is much lower than it was in Oregon prior to that state's program (0.073 gallons per person in 2008). In Oregon, total annual latex paint collection increased 51 percent between the 2008 baseline and Year 2 of the paint stewardship program (July 2011–June 2012), and per-capita collection increased to 0.109 gallons per person.

Under the modeled paint stewardship system in Washington, per-capita collection of latex paint is projected to increase from 0.028 gallons to 0.087 gallons, 80 percent of the per-capita collection rate in Oregon. This increase results in a tripling of total collection volumes for latex paint. Per-capita collection is not expected to rise to fully match Oregon's per-capita collection rates because it is expected that a number of the MRW programs in Washington that currently do not accept latex paint would not add latex paint collection to their service offerings. Under the Oregon pilot paint stewardship system, MRW programs continue to handle 65 percent of all paint collected. Assuming Washington's paint stewardship program experiences a similar collection pattern, per-capita latex collection would likely be somewhat lower in areas where MRW programs do not accept it.

Oil-based paint collection is projected to increase 15 percent, from 0.047 to 0.054 gallons per person annually. This more modest collection increase reflects that Washington's existing MRW collection infrastructure provides a strong baseline of service to Washington residents. In addition, because a relatively larger percent of oil-based paint (compared to latex) is already collected in Washington, it is anticipated that increasing the collection volume is likely to be marginally more difficult.

Overall, the total volume of paint collected is expected to increase by 87 percent, equating to a collection rate of 0.141 gallons of paint (latex and oil-based) per capita, and an estimated capture rate of 70 percent of unwanted paint available for collection annually.

Table 3-3 and **Table 3-4** present the current and projected total and per-capita paint collection volumes, as well as the current and projected capture rates of all unwanted paint estimated to be available for collection.

Table 3-3. Current and Projected Paint Collection Volumes in Washington, Total and Per Capita

Paint Type	Existing Programs *gallons*		Paint Stewardship *gallons*		Collection Increase
	Total	*Per Capita*	*Total*	*Per Capita*	*%*
Latex	191,640	0.028	584,000	0.087	205%
Oil-based	315,596	0.047	363,000	0.054	15%
Totals	**507,235**	**0.075**	**947,000**	**0.141**	**87%**

Table 3-4. Current and Projected Paint Recovery Rates in Washington

System Type	Total Collected	Estimated Sales	Estimated Leftover	Capture Rate
	gallons	*gallons*	*Gallons*	*% of estimated leftover*
Existing programs	507,235	13,449,000	1,344,900	**38%**
Paint stewardship	947,000	13,449,000	1,344,900	**70%**

3.4 Modeled Paint Stewardship Processing and Disposition

One of the primary outcomes of the modeled paint stewardship system in Washington is that it is projected to dramatically increase the amount of latex paint that is recycled into new paint or other products. This increased recycling is because the modeled paint stewardship system is assumed to include a requirement that paint disposition follow the waste management hierarchy, which prioritizes waste prevention, reuse, and recycling over disposal.

In Oregon, the effect of this requirement has been modest because there was already a robust latex paint recycling program in place in the Metro area (greater Portland), Oregon's most populous region. But Washington currently has virtually no latex paint recycling infrastructure in place, and very few MRW programs send the latex paint they collect to out-of-state facilities for recycling because of the high cost. However, latex paint recycling *is* available, and it is expected that the producer responsibility organization would be required to use this disposition method for all recyclable latex paint collected. Thus, latex paint recycling under the modeled paint stewardship system is projected to increase nearly five-fold.

Table 3-5 shows the projected breakdown of paint processing and disposition methods, expected under a paint stewardship system, including the percentage change in gallons managed by method. The section following the table describes the key changes for each type of collection.

Table 3-5. Projected Paint Disposition under Paint Stewardship, by Volume and Percentage Change

Disposition Methods	Latex		Oil-Based		Total		% change from current
	gallons	%	gallons	%	gallons	%	
Reuse	33,000	6%	11,000	3%	44,000	5%	+5%
Recycling	409,000	70%	0	0%	409,000	43%	+496%
Energy Recovery	58,000	10%	352,000	97%	410,000	43%	+43%
Landfill/Other	84,000	14%	0	0%	84,000	9%	-24%
Total:	**584,000**		**363,000**		**947,000**	**100%**	

3.4.1 Reuse and Material Exchange

Following the precedent of the Oregon pilot paint stewardship program, under a modeled paint stewardship program in Washington, the producer responsibility organization is expected to provide participating collection sites with an incentive to encourage and facilitate paint reuse through a payment of $0.25 per container of paint collected for direct reuse. In most cases, collection sites that take advantage of this incentive operate a "paint exchange" area or program. Based on the availability of this incentive payment, which at least partially covers the cost of the labor and supplies required to operate a paint exchange, the volume of paint reused is projected to increase by 5 percent over current reuse levels for both latex and oil-based paint. However, because the total volume of paint collected is projected to increase substantially, the relative percentage of paint reused is expected to drop—from 8 percent of all paint collected under the existing programs, to 5 percent of paint collected under product stewardship.

3.4.2 Recycling

Because the modeled product stewardship program is required to prioritize recycling over energy recovery and waste disposal, it is projected that latex paint collected that is of sufficient quality to recycle (and is not reused) will be sent for recycling, resulting in a recycling rate of 70 percent of all latex paint collected. Under these conditions, the Oregon paint program achieved a 71 percent recycling rate for latex paint in Year 2.

Because Washington does not currently have a latex paint recycling facility, it is expected that the latex paint collected in Washington will be sent to an out-of-state facility for recycling, at least until quantities reach sufficient volume to justify the development of an in-state facility. Based on interviews with paint recycling companies with facilities in other locations, it is unlikely that a facility would be built and start operating in Washington under the modeled paint stewardship system in the near term.

Even with latex paint recycling occurring out of state, increasing latex paint recycling confers substantial lifecycle benefits over landfill disposal in terms of reduced greenhouse gas emissions, ecological toxicity, energy and water use, and use of non-renewable resources.[21] By prioritizing latex paint recycling, the modeled paint stewardship system achieves much better environmental outcomes than if it allowed the latex paint collected under the program to be managed through landfill disposal.[22]

3.4.3 Energy Recovery

Oil-based paint that is not reused would be sent for energy recovery, equating to 97 percent of all oil-based paint collected. The portion of latex paint sent for energy recovery will increase slightly under the modeled paint stewardship system, to a projected 10 percent of all latex paint collected. This change is because the volume of paint collected by the Spokane MRW program (as with all MRW programs) is projected to increase under a paint stewardship system. Although Spokane seeks to limit its collection of latex paint to only reusable paint, it is likely that a portion of the increased volume of material collected will not be suitable for reuse or recycling and will be sent to Spokane's waste-to-energy facility.

3.4.4 Other Disposition

Under the modeled paint stewardship system, latex paint collected through the program that is *not* reused, recycled, or sent to Spokane's waste-to-energy facility—which is projected to compose 14 percent of all latex paint collected—will be disposed in some other way. In Oregon, this remaining paint is either processed into a biomass product or injected into a landfill in a pilot project to promote biodegradation. No paint collected through Oregon's program is sent directly to a landfill for disposal as waste.

3.5 Modeled Paint Stewardship Costs and Economic Impacts

3.5.1 Projected Costs of Paint Management under Paint Stewardship

Paint stewardship will affect both the total costs and the distribution of costs for managing paint in Washington, as the disposition, consumer education, and a portion of other program costs will be paid for through a fee on paint sold in the state.

In Oregon, local governments have avoided $3.4 million dollars in paint disposition costs over the first two years of the state's pilot paint program.[23]

Collection Costs

As in the Oregon pilot paint stewardship program managed by PaintCare, it is assumed that under the modeled paint stewardship system in Washington, the producer responsibility organization will cover the costs of transport and disposition of paint collected by participating collection sites but will not provide additional payments to cover the costs of collection labor.[24] The overall costs incurred by local governments in Washington for paint management are projected to drop substantially, but MRW programs that continue to collect paint will continue to incur some costs as part of providing this service. These costs are associated with staff time at MRW facilities spent collecting paint from customers and packing paint cans into tubskids, as well as costs associated with facility operations.

Collection efficiencies gained through the paint stewardship system, including elimination of on-site paint bulking, are projected to reduce per-gallon collection costs at MRW facilities by 10 percent. The model estimates that mobile collection costs will be unchanged on a per-gallon basis, but the overall costs of mobile collection will drop as the amount of paint collected through mobile methods decreases due to the addition of convenient retail collection sites.

Retail collection sites will emerge as a major part of the paint collection infrastructure. As paint retailers and re-stores accept a growing volume of paint from customers, they will incur some costs in the form of staff time related to paint collection. Based on interviews with paint retailers in Oregon and Washington and on U.S. Census data on industry wages, retail collection costs are estimated to be approximately $1.59 per gallon. As discussed in *Section 3.4, System Costs and Economic Impacts*, per-gallon collection costs are measured based on the collection volume and do not account for the number of containers or average amount collected per container. These figures are often multiple times higher than is reflected in the total gallons (that is, collectors may handle many partly full containers for each gallon of paint collected), resulting in seemingly high per-gallon costs. The per-gallon collection cost estimate translates into annual collection costs estimated at $3,175 on average for each of the 182 retail collection sites projected to participate in the paint stewardship system in Washington State.

Because the total amount of paint collected is expected to increase by 87 percent, the *total costs* of collection are expected to increase overall. *Unit costs* are expected to decrease on a per-gallon basis, from an average of $3.42 under the existing programs to $2.55 per gallon under paint stewardship.

Disposition Costs

The modeled paint stewardship system is expected to increase the collection and recycling of latex paint. As a result, total disposition costs are expected to increase because latex paint recycling is more expensive than other disposition methods (though it brings greater lifecycle benefits).

Only average disposition costs are reported for Oregon's pilot paint stewardship program, so it is not possible to compare costs by disposition method. But the overall average per-gallon cost of disposition in Year 2 of the Oregon program—$4.65 per gallon—is much closer to the per-gallon cost of latex paint *recycling* in Washington ($5.64) than to the cost of energy recovery ($2.48) or landfilling ($2.71). This cost figure reflects that 49 percent of all paint collected (and 71 percent of all latex paint collected) in Year 2 of the Oregon program was recycled.

Under the modeled paint stewardship system in Washington, the higher volume of paint collected through the program is expected to facilitate program efficiencies that reduce the average disposition costs to 10 percent below Oregon's 2012 average per-gallon disposition cost of $4.65 per gallon—lowering the cost to $4.18 per gallon for paint that is not reused. Disposition costs for *reused* paint are estimated to be $0.25 per gallon, based on the incentive paid to MRW facilities for reuse.

These disposition costs, which include the costs of collection containers and transport from the collection facility, will be paid for by the producer responsibility organization and financed by an assessment built into the price of paint.

Administration and Other Program Costs

In addition to paying for the transport and disposition of paint, producers under a paint stewardship system are often held responsible for informing consumers about the program, educating them on proper disposition, and providing other program support services. Producers also incur administrative costs associated with operating, monitoring, and reporting on the stewardship program.

Under the Oregon pilot paint stewardship program, costs included in "Other Program Costs" are:

- **Communications**, including marketing and advertising throughout the state, website support, and point-of-sale materials.
- **Other program services**, including the fees charged by the PRO's program administrator (Product Care) to administer the Oregon program, license fees associated with an online collection center locator tool, travel, and bank fees.
- **Program administration**, including a share of the "corporate costs" or indirect costs for the PRO (PaintCare). Expenses not directly benefiting a state program are captured in the indirect cost pool and allocated to each state program. The basis for this allocation is an estimated level of effort on the part of the PRO's staff. In fiscal year 2012, 35 percent of PaintCare's total indirect costs were allocated to the Oregon program. Examples of indirect costs include:
  - Salaries and benefits of corporate staff.
  - Insurance.
  - Legal fees.
  - Administrative fees charged by the American Coatings Association.
- **State agency administrative fees** of $10,000 are paid annually to Oregon's Department of Environmental Quality.

Under the modeled paint stewardship system for Washington, other program costs in these categories are projected to be equal to 90 percent of the costs reported for Year 2 of the Oregon program, due to efficiency gains and higher overall throughput of paint under the Washington program.

Table 3-6 summarizes current and projected costs for paint management in Washington. It is important to recognize that the current and projected costs are not for comparable systems or outcomes. Under the modeled paint stewardship system, the volume of paint collected is projected to increase by 87 percent, and the percentage of collected paint that is reused or recycled is projected to climb from less than one-quarter (22 percent) to nearly one-half (48 percent). The number of fixed collection sites accepting paint from residents is projected to increase nearly four times, from 57 to 226 fixed collection sites. This greatly expanded collection system necessarily increases costs under the modeled paint stewardship system.

In addition, the stewardship model includes administrative costs that do not have a comparable cost estimate in the current system. This difference does not mean that there are not administrative costs associated with the existing paint management system, just that they are not known. The sources and methods used to estimate the costs of the existing programs are described in *Section 3.4, System Costs and Economic Impacts.*

Table 3-6. Current and Projected Total Paint Management Costs and Outcomes in Washington

	Existing Programs		Paint Stewardship	
	$/per gallon	*$*[i]	*$/per gallon*	*$*[i]
Collection Costs	**$3.42**	**$1,734,000**	**$2.55**	**$2,428,000**
Public MRW facilities (labor costs only)	$3.57	$1,490,000	$3.22	$1,697,000
Mobile collection events	$2.26	$136,000	$2.26	$57,000
Retail collection sites (labor costs only)	included in MRW facilities[ii]		$1.59	$578,000
Private facilities and large-volume pick-up services	unknown/included in total[iii]		unknown/included in total	
Transport and Disposition Costs	**$2.75**	**$1,398,000**	**$4.00**	**$3,786,000**
Reuse	included in MRW facilities collection costs[iv]		$0.25	$11,000
Recycling	$5.64	$387,000	$4.18[v]	$1,710,000
Energy recovery	$2.48	$712,000		$1,714,000
Landfill and other	$2.71	$299,000		$351,000
Admin./Other Program Costs	**n/a**	**n/a**	**$1.46**	**$1,385,000**
Communications	n/a	n/a	$0.45	$425,000
Other program services	n/a	n/a	$0.65	$618,000
Program administration	n/a	n/a	$0.35	$328,000
State agency administrative fees	n/a	n/a	$0.01	$14,000
Total costs:	$6.17	$3,132,000	$8.01	$7,599,000
Fixed collection sites	**57**		**226**	
Gallons collected	**507,235**		**947,000**	
Percent reused or recycled	**22%**		**48%**	
Percent energy recovery	**56%**		**43%**	
Percent landfilled/other	**22%**		**9%**	

[i] *All total cost calculations are rounded to the nearest thousand.*

[ii] *Retailer costs under the existing programs are estimated based on retailer surveys to illustrate scale of current participation.*

[iii] *Due to insufficient data, no unique cost estimates were developed for private facilities and large-volume pick-ups. Instead, the average costs of MRW facilities are used to estimate total system costs.*

[vi] *The costs of reuse under the existing programs are incurred by public MRW programs in the form of labor and are included in* ***Collection Costs*** *totals.*

[v] *Disposition costs under the modeled paint stewardship system are not separated by disposition method because these costs are based on costs under the Oregon pilot paint stewardship program, which does not report by disposition.*

3.5.2 Projected Changes in Allocation of Management Costs

Table 3-7 shows current and projected allocations of costs for managing paint. Based on the projected paint collection volumes, disposition rates, and per-gallon costs described above, under the modeled paint stewardship system, local governments are projected to realize a nearly 40 percent reduction in total costs for paint management—equal to a net annual savings of more than $1.1 million statewide.

Local governments are expected to receive additional cost savings through reduced administration and public education/communications expenditures, but the magnitude of these savings was not estimated as part of this study.

Small quantity generators that paid for paint disposition through private facilities and large-volume pick-ups are also projected to realize annual savings of $152,000 on collection by using paint management services under the paint stewardship system. This figure includes both SQGs that use MRW facilities and those that currently use private contractors, assuming that obtain access free service through the stewardship program in the future.

Under the modeled paint stewardship system, paint producers are responsible for overseeing the implementation of the program and covering the costs for collection, transport and disposition, consumer education, and additional program costs, totaling nearly $5.2 million.

Under the paint stewardship systems, the program costs incurred will be funded through a small assessment built into the price of paint. In Oregon, the fees are $0.35 for containers less than one gallon (containers of ½-pint or less incur no fee), $0.75 for 1-gallon containers (the most common size sold), and $1.60 for containers larger than 1 gallon.

Table 3-7. Current and Projected Allocation of Costs for Paint Management

	Existing Programs Costs[i]		Paint Stewardship Costs[i]			Net (Savings) or Costs[i]
	Collection	Disposition	Collection	Disposition	Admin/Other	
Municipal/ Government	$1,628,000	$1,253,000	$1,754,000	$0	$0	**($1,127,000)**
Small Quantity Generators	$103,000	$145,000	$96,000	$0	$0	**($152,000)**
Retailers[ii]	$2,500	$0	$578,000	$0	$0	**$575,500**
Producers	n/a	n/a	$0	$3,786,000	$1,385,000	**$5,171,000**

[i] *All total cost calculations are rounded to the nearest thousand.*

[ii] *Retailer costs under the existing programs are estimated based on retailer surveys to illustrate scale of current participation.*

3.5.3 Jobs and Economic Impacts

This analysis assessed the economic impacts of a modeled paint stewardship system in Washington in terms of jobs and payroll, paint sales and consumer response, and other economic impacts described below.

Jobs and Payroll

The economic impacts of a paint stewardship system in Washington State are expected to mainly be in the form of additional jobs and payroll. From informal interviews with PaintCare, its contractors, and Metro (Oregon), it is estimated that the paint stewardship system in Oregon resulted in the creation of approximately 11 jobs in Oregon related to transport and disposition of unwanted and leftover paint.

This estimate does not include jobs related to on-site collection and handling of paint at retailers and at public MRW facilities. This estimate also excludes any added jobs related to marketing and sale of additional recycled paint produced by MetroPaint—quantities that increased substantially under the pilot paint stewardship program in Oregon.

Based on the projected growth in paint collected and in the number and type of collection sites, the paint stewardship system modeled for Washington is projected to require additional labor hours equivalent to 37 FTE employees.[25] Unlike in Oregon, where added collection jobs were not tracked, this estimate includes added labor hours related to collection.

Of the estimated 37 FTE jobs, it is estimated that 18 FTEs would be related to collection. These jobs would include additional public-sector or contracted workers at MRW facilities and mobile collection events as well as private-sector employees at paint retail stores.

In addition, 16 jobs are estimated to be added in Washington related to the transport and disposition of the additional paint collected. These jobs are expected to be commercial-licensed drivers to run specific routes to collect paint from retailers or MRW facilities that participate in the program, along with jobs related to handling, labeling, bulking, treatment, and loading paint for its final disposition.

Finally, an estimated 3 jobs are assumed to be required related to the administration of the paint stewardship system, including management and monitoring of any service contracts and performance. These jobs would be within the producer responsibility organization.

The result of adding these jobs is an estimated **$1.6 million in new payroll**. These results are shown below in **Table 3-8**.

As noted earlier, Washington currently has no latex paint recycling facility located within the state. For this analysis, the research team assumed that this gap would remain the case until sufficient volumes of latex paint were created to warrant locating a paint recycling facility in the state. Based on interviews with paint recycling companies with facilities in other locations, it is uncertain whether a facility would be built and begin operating in Washington under the modeled paint stewardship system. This situation is mainly the result of existing competitive options for recycling latex paint located outside of Washington. Unless the cost to transport and recycle latex paint rises, capitalizing and operating a paint recycling plant in Washington may not be feasible.

Given the potential impact of a local latex paint recycling facility on paint-related employment in the state, however, the research team developed estimates of the economic impact (in added jobs and payroll) of a latex paint recycling facility. The estimate indicates that an in-state recycling facility could result in 12 additional jobs, bringing total additional employment due to paint stewardship up to 49 FTEs, at an estimated additional payroll of $2.2 million.

Table 3-8. Current and Projected Paint-Related Employment in Washington

	Existing Programs	Paint Stewardship	
	Current Employment	Projected Employment	Projected, with in-state latex recycling facility
Total Estimated Employment	**51**	**88**	**100**
Collection	27	45	45
Transport and Disposition	24	40	40
Program Administration	0	3	3
Latex paint recycling facility	0	0	12
Increase in Employment		**37**	**49**
Total Added Payroll		**$1,601,000**	**$2,225,000**

Paint Sales and Consumer Response

According to the American Coatings Association, since Oregon's pilot paint stewardship law has been in effect, paint sales in the state have increased. This change is likely a result of broader economic conditions, but it suggests that the product stewardship program—including the use of consumer fees as a funding mechanism for the program—has not negatively affected sales of paint in Oregon.

In a consumer awareness survey conducted in Oregon in Year 2 of the pilot program, only 10 percent of residents that had purchased paint reported they had purchased less paint as a result of fee, and 77 percent of residents surveyed felt that the fees were reasonable.[26]

Other Economic Impacts

Changing the way that unwanted and leftover paint is collected and managed in Washington has other potential economic impacts, including the following:

- Changes to the traffic and ultimate volume of paint and other types of MRW brought to public MRW collection facilities and events, due to the addition of retail collection sites for paint.
- Changes to per-unit or total prices negotiated and charged for transport and disposition of other types of MRW when paint is no longer part of the transport and disposition arrangement or contract (and therefore total volumes of MRW collected from events or facilities decrease).

Quantifying these impacts is beyond the scope of this analysis, but they are worth noting, as they could affect the costs and performance of Washington's overall system for managing MRW, although it is unclear without further analysis whether the effects would be positive or negative.

4. Conclusions

Implementing paint stewardship in Washington State is expected to greatly increase the number of paint collection sites available (from 50 to more than 200) and to nearly double the quantity of leftover and unwanted paint collected for proper management in the state, from 507,000 gallons in 2010 to 947,000 gallons under a well-developed stewardship system.

Increases in *latex* paint collection options and quantities collected are particularly dramatic, as 16 counties—representing 60 percent of the state's population—currently lack collection opportunities for latex paint. A stewardship program is expected to boost recycling of latex paint from its current amount of 53,500 gallons in 2010 to 409,000 gallons annually under paint stewardship, more than a sevenfold increase.

Costs per gallon for collection, transport, and disposition of paint under a paint stewardship system are estimated at a similar level to the existing program average (in the $6 per gallon range). Paint stewardship is expected to shift costs from local governments and their ratepayers to paint manufacturers and consumers, reducing paint management costs to local governments by 40 percent, or more than $1.3 million annually.

Overall, a paint stewardship system in Washington State is expected to deliver substantially more collection sites, higher convenience levels, expanded program promotion, larger quantities of unwanted paint collected and managed properly, increased recycling, and improved environmental results.

Endnotes

[1] Product Stewardship Institute, Paint Product Stewardship Initiative Memorandum of Understanding. October 6, 2004. http://www.productstewardship.us/associations/6596/files/Final_Paint_MOU.doc.

[2] Jurisdictions prohibiting oil-based paint from disposal in the solid waste stream include the cities of Seattle and Tacoma and King, Kitsap, Pierce, Snohomish, and Thurston counties.

[3] Small Quantity Generators (formally defined by the Washington Department of Ecology as Conditionally Exempt Small Quantity Generators) are businesses or other entities that generate less than 220 lbs per month of hazardous waste. They are conditionally exempt from the Dangerous Waste Regulations if they manage their wastes properly.

[4] Weighted average costs are calculated by dividing the sum of the total costs to manage paint (at representative programs providing data) by the sum of the pounds managed by the same representative programs, to obtain an average cost per pound to manage leftover paint.

[5] Data on quantities and disposition methods for all regulated facilities in Washington were provided by Al Salvi at the Washington State Department of Ecology's Waste 2 Resources program. While the Cascadia/DSM team also received data on quantities and disposition methods from some facilities in 2011, Ecology's data collection process for 2011 is still underway, providing an incomplete picture of total quantities and disposition methods at the state level. As a result, the more complete 2010 dataset was used for the statewide analysis.

[6] Public MRW programs are provided by county and city governments, and they are either directly run by government agencies or, in a small number of cases, financed by government but operated by contracted private firms.

[7] To be considered a small quantity generator, a business or other entity must generate less than 220 pounds per month of hazardous waste. However, SQGs are not required to remove these wastes from their premises at a specified frequency and may store waste from multiple months on-site in order to minimize the marginal costs of hazardous waste pick-up and management. In addition, latex is not classified as a hazardous waste and may be stockpiled in unlimited quantities by any generator.

[8] Figure 2-1 and Figure 2-2 present information from 2011, despite that data on quantities of paint collected statewide are available only for 2010. The maps are intended to represent the most up-to-date information available.

[9] Among the 13 MRW programs interviewed, 9 programs used more than one method for packing unwanted paint. Six facilities reported bulking at least some latex paint, and nine facilities reported bulking oil-based paint.

[10] U.S. Census Bureau, *Current Industrial Report: 2010 Annual Report – Paints and Allied Products*. Available at http://www.census.gov/manufacturing/cir/historical_data/ma325f/index.html

[11] U.S. Environmental Protection Agency, *Quantifying the Disposal of Post-Consumer Architectural Paint*. Prepared by ABT Associates, Inc., April 2007.

[12] Only paint collected by facilities regulated under WAC 173-350 and required to report such data to the Washington Department of Ecology is included in this total; paint collected from large quantity generators or from facilities not required to report are not included. Data provided by Ecology were adjusted to correct for double-counting of paint reported by one large facility and to adjust for non-paint materials from total paint collected.

[13] Product Stewardship Institute, *Paint Product Stewardship: A Background Report for the National Dialogue on Paint Product Stewardship*, March 2004, page 18.

[14] The definition of recycling is from Substitute Senate Bill 6145 for paint product stewardship in Washington, http://apps.leg.wa.gov/billinfo/summary.aspx?bill=6145&year=2011

[15] The lifecycle benefits of latex paint recycling are based on findings from the Leftover Paint Management Life Cycle Assessment (LCA) conducted by Franklin Associates on behalf of the American Coatings Association as part of the Paint Product Stewardship Initiative. The stated benefits of latex paint recycling are based on the LCA's "pure methods, limited infrastructure – 100% displacement" scenarios for collection-based latex paint recycling through reprocessing as compared to collection-based disposal. Franklin Associates and Four Elements Consulting,

LLC, *Life Cycle Assessment Modeling Information for Six Methods for Managing Leftover Paint (Review Draft)*. Prepared for the Paint Product Stewardship Initiative, December 2009.

[16] U.S. Army Corps of Engineers, *Report on Treatment, Storage & Disposal Facilities (TSDF) for Hazardous, Toxic, and Radioactive Waste, 2006 Update*. Section 3, "Commercial Hazardous Waste Incinerators."

[17] Estimated per-unit costs in Clark County are based on data reported to the Department of Ecology Waste2Resources program, and from interviews conducted with the Clark County program manager.

[18] Five of the 13 public MRW programs surveyed reported directly charging SQGs for paint management, while 8 did not. Of those programs that charge SQGs for paint collection, the fees are typically described as disposition charges and are intended to cover only direct disposition costs and not the costs of collection labor, which is more than half the cost of managing paint. Disposition charges for SQGs range between $0.20 and $0.50 per pound. One notable exception is the contracted MRW program in Whatcom County, which charges SQGs a "fully loaded" fee for paint, intended to cover both direct disposition costs and applicable program operations costs. In 2011, these charges were $9.08/gal for latex paint, $2.95/gal for liquid oil-based paint, and $6.25/gal for sludge oil-based paint. The five facilities that charged SQGs for paint reported collecting a total of $32,110 in 2011. The total estimated costs of paint management for these same programs were $767,014, meaning that SQG fees covered about 4 percent of all paint-related costs.

[19] For the full text of Substitute Senate Bill 6145, see http://apps.leg.wa.gov/billinfo/summary.aspx?bill=6145&year=2011.

[20] This figure does not include paint collected for reuse, which accounted for 3 percent of all paint collected in Year 2 of the Oregon paint product stewardship program.

[21] Franklin Associates and Four Elements Consulting, LLC, *Life Cycle Assessment Modeling Information for Six Methods for Managing Leftover Paint (Review Draft)*. Prepared for the Paint Product Stewardship Initiative, December 2009. According to Franklin Associates' Life Cycle Assessment Report, the benefits of latex paint recycling are most significant when recycled paint is purchased by customers as a substitute for virgin paint. In a survey conducted by Metro (Oregon) of 300 customers purchasing MetroPaint (recycled latex paint), 97 percent of customers stated that if recycled paint were not available, they would purchase virgin paint instead.

[22] The findings from Franklin Associates' Life Cycle Assessment can be used to compare lifecycle benefits of latex paint recycling and landfill disposal under a modeled product stewardship system. Applying the global warming potential factors ($kgCO_2e$/1,000 gallons of paint) from the LCA's "modified methods, expanded infrastructure – 100% displacement" scenarios for collection-based latex paint recycling through reprocessing (484 $kgCO_2e$) and from collection-based disposal (1,908 $kgCO_2e$) to the projected amount of latex paint recycled under the modeled product stewardship system (409,000 gallons) shows that recycling results in a 83 percent net reduction of greenhouse gas emissions, equal to 780,000 kg CO_2e compared to landfill disposal.

[23] PaintCare paid $2,389,721 for transportation and processing of paint collected through the program in Year 1 (July 2010–June 2011), 67 percent of which was collected by local governments; in Year 2 (July 2011–June 2012), PaintCare paid $2,831,356 for transportation and processing of paint, 65 percent of which was collected by local governments. Avoided costs to local governments are derived by allocating payments based on these percentages. For more detail on program costs, see PaintCare's *Oregon Paint Stewardship Pilot Program Annual Report* for 2011 and 2012. Reports are available online at http://www.paintcare.org/oregon/index.php (accessed September 2012).

[24] It is possible that labor and facility operations costs at collection sites could be covered under a product stewardship system (such a provision was included in Substitute Senate Bill 6145). Because the modeled product stewardship system used in this analysis is based on the Oregon pilot program, however, collection costs were assumed not to be covered.

[25] The estimated 37 FTEs in additional labor hours projected under product stewardship does not necessarily mean that 37 unique new jobs would be created as a result of the program. These additional hours could be worked by existing staff with additional time available or with hours shifted from other tasks, or they could be shared as part-time efforts across a larger number of employees.

[26] PaintCare, *Oregon Paint Stewardship Pilot Program—Appendices*, 2011.

Glossary

Architectural paint	Interior and exterior architectural coatings (both latex and oil-based) used on housing, buildings, and other structures; does not include industrial, original equipment, or specialty coatings.
Coordinated Prevention Grants (CPG)	Grants provided to local governments by the Washington State Department of Ecology for planning and implementing some programs in their local solid and hazardous waste management plans.
Moderate risk waste (MRW)	A class of solid waste that covers household hazardous waste (HHW) and conditionally exempt small quantity generator (CESQG/SQG) waste, as defined by the Washington State Department of Ecology. "Moderate risk" does not mean that the material is moderately hazardous but rather that it is generated in small volumes and is therefore not regulated in the same way as larger-volume hazardous waste from businesses.
Producer responsibility organization (PRO)	The entity designated by a producer or producers to act on their behalf to administer an extended producer responsibility or product stewardship program. Usually a nonprofit organization or an industry association, a PRO may also be referred to as a "stewardship organization."
Product stewardship	Also called producer responsibility or extended producer responsibility, product stewardship refers to an environmental management strategy in which all parties involved in the design, production, sale, and use of a product take responsibility for minimizing its environmental impact throughout all stages of its lifecycle, with manufacturers typically funding material recovery programs and recovering costs from consumers through product sales.
Small quantity generators (SQGs)	Businesses or other entities that generate below 220 pounds of Dangerous Waste (including oil-based paint) per month. SQGs have no time limit on accumulating Dangerous Waste on their own premises. In Washington State law, SQGs are defined as "conditionally exempt small quantity generators" or CESQGs.

Appendix A. Methodology, Assumptions, and Limitations

A1 Existing Programs Analysis

A1.1 Data Sources for Existing Programs Analysis

Existing Infrastructure, Quantities Collected, and Disposition Methods

Data on existing unwanted paint management programs were collected through the following sources and methods:

- **Washington State Department of Ecology's Waste 2 Resources**: 2010 paint collection quantities and disposition methods as reported to Ecology by all facilities required to support such data under WAC 173-350.[27]
- **Interviews with managers of public moderate risk waste (MRW) and household hazardous waste (HHW) facilities and mobile collection programs**: The research team conducted interviews with managers in 13 counties, including the 5 most populous counties in the state as well as a geographically diverse sample of other counties.[28] These public MRW programs represent the primary paint management services available for 80 percent of the state's residential population. (See **Table A-1** for a list of MRW programs interviewed.)
- **Interviews with private paint collection and processing companies:** The research team conducted interviews with three private companies that provide paint collection and management services—Clean Harbors, Emerald Services, and PSC. These companies are contracted by public MRW programs to provide transport and disposition of paint collected by public MRW programs, and also provide large volume collection services for businesses, including some small quantity generators (SQGs), outside of the MRW program system. The research team also interviewed Amazon, a latex paint recycler that receives the majority of latex paint currently sent for recycling from Washington.

Existing Paint Supply and Capture Rate

Data on U.S. sales of architectural paint in 2010 are available through the U.S. Census Bureau's *Current Industrial Report, 2010 Annual Report – Paints and Allied Products*.[29] According to this source, architectural paint sales in the United States totaled nearly 652 million gallons in 2010, or an average of 2.11 gallons per

[27] Data on quantities and disposition methods for all regulated facilities in Washington were provided by Al Salvi at the Washington State Department of Ecology's Waste 2 Resources program. While the Cascadia/DSM team also received data on quantities and disposition methods from some facilities in 2011, Ecology's data collection process for 2011 is still underway, providing an incomplete picture of total quantities and disposition methods at the state level. As a result, the more complete 2010 dataset was used for the statewide analysis.

[28] Public MRW programs are provided by county and city governments, and they are either directly run by government agencies or, in a small number of cases, financed by government but operated by contracted private firms.

[29] U.S. Census Bureau, *Current Industrial Report: 2010 Annual Report – Paints and Allied Products*. Available at http://www.census.gov/manufacturing/cir/historical_data/ma325f/index.html

person. Per-capita paint sales in the Pacific Northwest are lower than the national average, however. In Oregon, annual paint sales average 1.96 gallons per person, and in British Columbia per-capita sales are 1.92 gallons. Sales data for Washington are not currently reported; reporting for Oregon and British Columbia is required under the stewardship laws. As shown in **Table 2-2** of the main report, an average of the national, Oregon, and British Columbia per-capita sales figures (2.0 gallons per person) was used to estimate paint sales for Washington in 2010. Applying the per-capita sales estimate to Washington State's population yields estimated total paint sales of 13,449,000 gallons.

A 2007 U.S. Environmental Protection Agency (USEPA) study, *Quantifying the Disposal of Post-Consumer Architectural Paint*, estimated the total amount of post-consumer architectural paint disposed annually in the United States at approximately 10 percent of all paint sold annually.[30] This figure is widely accepted and has been used in other studies in combination with state population data to estimate the *amount of unwanted and leftover paint available for collection* in a given state.

Applying the USEPA calculation to Washington's estimated sales suggests that there were approximately 1.34 million gallons of unwanted and leftover paint available for collection in Washington State in 2010.

It should be noted here that a lag likely exists between the year paint is purchased and the year paint is brought to a management facility, with deliveries to management facilities representing the accumulation of waste paint stored by residents. Past studies have shown that residents keep paint an average of 4.6 years before disposing of it.[31]

Estimated Paint Management Costs

Average costs for the management of unwanted paint management of existing programs were obtained through phone interviews with MRW program managers. For this analysis, costs were divided into two categories:

- **Collection (labor) costs**, which include the wages and benefits of MRW program employees (or contracted workers) for hours associated with collecting, handling, bulking (if done on-site), and preparing paint collected for shipment.
- **Transport and disposition costs**, which include direct fees paid to contracted processors for recycling, energy recovery, or disposal services, as well as any additional transportation or handling fees charged. The costs of empty containers used to pack paint, if paid for separately from disposition, are also included here.

Information about the costs of paint management was collected from all 13 public MRW programs surveyed. However, two public MRW programs—Benton and Clark counties—did not have sufficient cost data to be included in the analysis of system costs. Data from the remaining 11 programs interviewed, where costs could be disaggregated and matched to collection weights, were used to calculate average collection costs as well as transport and disposition costs.

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[30] U.S. Environmental Protection Agency, *Quantifying the Disposal of Post-Consumer Architectural Paint*. Prepared by ABT Associates, Inc., April 2007.

[31] National Paint and Coatings Association (NPCA), "Leftover Paint: An Overview," website: http://www.paintinfo.org/leftover/overview.htm

Table A-1. Public MRW Facilities and Collection Programs Surveyed

Public MRW Program Manager	Region[i]	Program Type[ii]	County Population[iii]	2010 Paint Collected (pounds)	Accepts Latex Paint from Residents	Reuse Program
Benton County Public Works	C	M	175,177	48,520	Yes	no
City of Tacoma Public Works *(serves all Pierce County)*	SW	F, M	795,225	84,753	No	no
Clark County Public Works *(operated by Waste Connections)*	SW	F, M	425,363	757,112	Yes	no
King County Solid Waste	NW	F, M	1,931,249	288,311	No	no
Kitsap County Public Works	NW	F, M	311,832	426,229	Yes	yes
Kittitas County Solid Waste	C	F	40,915	33,258	no[iv] (SQGs only)	no
Lewis County Public Services	SW	F, M	75,455	135,403	Yes	yes
Lincoln County Public Works	E	F	10,570	620	No	yes
Seattle Public Utilities	NW	F	*Included in King Co. total*	159,719	no[v]	no
Snohomish County Public Works	NW	F, M	713,335	190,092	no (SQGs only)	yes
City of Spokane Solid Waste *(serves all Spokane County)*	E	F	471,221	295,820	yes (reuse only)	yes
Whatcom County Disposal of Toxics *(operated by PSC)*	NW	F, M	201,140	106,805	yes	yes
Yakima County Public Works	C	F	243,231	218,851	yes	yes
Total of Surveyed Programs			**5,394,713**	**2,745,493**	**7 programs**	**7 programs**
Statewide Total			**6,724,540**	**4,424,281**[vi]	**22 programs**	**10 programs**
Percentage of State Total Surveyed			**80%**	**62%**		

[i] *Regions: C (Central), E (Eastern), NW (Northwest), and SW (Southwest)*
[ii] *Program type: F (fixed facilities), M (mobile collection events)*
[iii] *When a city provides MRW service on behalf of a county, the population noted is for the entire county served.*
[iv] *Kittitas County Solid Waste stopped collecting latex paint from residents in 2011.*
[v] *Seattle Public Utilities does not accept latex paint but still receives some latex paint, which is recycled.*
[vi] *The statewide total is adjusted to remove flammable non-paint material from the totals reported.*

A1.2 Methodology for Existing Programs Analysis

Existing Infrastructure, Quantities Collected, and Disposition Methods

The statewide summary of existing paint collection programs, infrastructure, and disposition methods was developed using Ecology's 2010 data set on paint collection quantities and disposition methods from all reporting facilities in Washington State.

Estimated Paint Management Costs

Average cost estimates were developed by aggregating total paint-related collection costs and quantities from the 13 MRW programs interviewed, calculating average per-pound costs in each cost category, and converting per-pound costs to per-gallon costs using the conversion factors described in the "Key Assumptions" section below.

Using average per-gallon costs, the statewide system costs for paint management were then calculated by multiplying the average per-gallon costs by the total gallons of paint collected statewide in 2010.

Weighted per-unit costs were derived by totaling all cost data reported for each cost area (e.g., collection labor, transport and disposition) and dividing it by the total pounds of paint collected by those programs. This calculation is different from an average cost, which averages all costs but does not weight them by the amount of paint managed. Per-pound costs, rather than per-gallon costs, were used in this estimate because the collection amounts reported by these programs were originally collected using pounds as the unit of measure. Per-pound costs were then converted to per-gallon costs.

A1.3 Assumptions for Existing Programs Analysis

Wherever possible, actual quantity and cost data provided by program managers and other direct sources were used. Where data were insufficient, estimates based on input from program managers, state-level or industry averages, or similar data from comparable programs were used.

As part of the research process, several key assumptions that have potentially significant impacts on the data analysis and findings were used:

- **Weight-to-volume conversion**. Paint data were typically collected in pounds, and most calculations were completed in pounds and then converted to gallons. The exceptions were annual paint sales and estimated amounts of paint available for collection, which were available only in gallons.
  - When converting information on quantities of latex and oil-based paint collected, conversion factors developed by the Department of Ecology were used, assuming a density of **10.9 pounds/gallon** (lbs/gal) for latex paint and **7.4 lbs/gal** for oil-based paint.
  - When converting information about program costs that could not be allocated to the specific paint type (oil-based or latex), a combined average of **8.7 lbs/gal** was assumed for all paint collected, which is the weighted average conversion factor based on the actual quantities of paint types collected in Washington in 2010.

- **Oil-based paint as a portion of paint-related materials.** Some paint collected is reported to the Department of Ecology as “paint-related materials” rather than listed by paint type (latex or oil-based). According to Department of Ecology staff and industry experts, the reporting category “paint-related materials” is often used to describe oil-based paint that is bulked or loose-packed together with other flammable liquids, meaning that only a portion of this category should be included in the analysis. Based on discussion with field personnel and industry specialists, it was determined that non-paint materials typically represent approximately 30 percent of “paint-related materials” reported; accordingly, the total quantities reported were adjusted to include only 70 percent of paint-related materials. It was also assumed that no latex paint was included in the “paint-related materials” category.

A1.4 Limitations of Existing Programs Analysis

Although the data set received from the Department of Ecology covering MRW collection in 2010 is extensive, the data may have gaps or potential errors that could affect the analysis:

- **Data accuracy.** The MRW reporting forms are designed to collect data on a wide variety of materials managed by reporting facilities, with paint being only one of the many materials. Often oil-based paint wastes are bulked together with other flammable liquids generated by residents and small business to minimize end-of-life management costs. The reporting form allows this material to be reported as "paint-related materials." Although interviews were used to ascertain what portion of materials consisted of oil-based paint on average, it was impossible to determine with accuracy the actual oil-based paint portion from each reporting location. This situation may result in inaccurate estimates of the amount of oil-based paint collected, although whether the true amount is likely to be higher or lower than the estimate is unknown.
- **Missing data**. A few jurisdictions did not submit MRW reports for 2010, even though they likely collected some material. Accordingly, the statewide collection totals may not include all paint collected by public MRW collection programs in the state in 2010. These non-reporters were small facilities or single-day collection events, however, so their impacts on the conclusions are expected to be minor. The likely effect is an underestimation of the total amount of paint collected by facilities regulated under WAC 173-350.

  In addition, the data used for this analysis do not include any paint collected by facilities not required to report to the Department of Ecology under WAC 173-350, so the totals used in this analysis do not represent all paint collected in the state.
- **Reporting errors**. All information about quantities and disposition methods was self-reported by facilities on their MRW reports. Any reporting errors made on the original forms would affect the analysis.

In addition to the limitations of the data received from the Department of Ecology, there are some limitations to the data collected from MRW collection program managers. In particular, cost data should be viewed with the following limitations in mind:

- Information about the costs to collect and handle unwanted and leftover paint was gathered from the public MRW programs surveyed, retail stores, and private facilities and processors interviewed. However, because facilities typically handle many different types of material and do not track their paint-specific costs separately, some of these costs were estimated. When estimated, program costs related to labor were allocated based on the quantity of paint collected as a percentage of the total quantity of materials collected by the program.
- While cost information was requested in two primary categories—collection and disposition—some program managers could not provide cost data in each category or could not disaggregate costs (e.g., separating contracted labor at a collection event from disposition costs). The data used to represent costs for labor, transport, and disposition came only from programs where costs could be disaggregated, which reduces the sample size for some cost categories.
- Because all of the private-sector companies operating paint collection facilities and large-volume pick-up services for small quantity generators interviewed declined to provide sufficient cost data to be used in the analysis, the costs for private facilities and large-volume pick-up

services are assumed to be the same as for MRW programs on a per-gallon basis. This assumption likely results in inaccurate cost estimates for private facilities and large-volume pick-ups, though it should not significantly affect the results of the analysis because private facilities and large-volume pick-ups represent only a small portion of total paint management.

- MRW programs incur facility operations, supplies, and capital costs associated with paint management, either directly—such as through paint-specific equipment purchases and maintenance—or indirectly as part of overall program operations. Many of these costs are not directly and incrementally tied to the volume of paint collected; thus, they were not included in this analysis. As a result, the costs of collecting and handling paint are likely underestimated.

The cost estimates in this report were developed for modeling purposes only and are not intended to fully represent the costs of paint management in Washington. The limitations of the cost data collected likely result in some deviation between the estimated costs used in this analysis and the true costs of paint management in Washington under the existing programs.

Comparing Costs for Government-Run and Contracted Public MRW Programs

As **Table A-1** shows, 2 of the 13 public MRW programs surveyed (Clark County and Whatcom County) are entirely operated by contracted private firms, for both fixed facility operations and mobile collection. In 3 other programs, mobile collection events are operated by a contracted private firm. In addition, retail stores in Clark County accept paint for recycling. Among the retail stores and public MRW collection programs surveyed, including both fixed facilities and mobile collection, roughly 25 percent of total paint collection operating hours in 2011 were provided through contracted collection services.

Unfortunately, the sample size and available cost data for wholly contracted programs (in Clark County and Whatcom County) were not sufficient to provide conclusive information about the comparative costs. The costs for contracted operations in Whatcom County (including a permanent facility and one annual mobile collection event) are above the average per-unit total costs for paint management. In Clark County, the program contractor declined to provide sufficient data on collection and disposition costs to be included in the analysis.

For mobile collection, the sample size and available cost data for government-run collection events were insufficient to allow for comparison. Only 2 of the 13 programs surveyed directly operated mobile collection events (Lewis County and Snohomish County), and only Snohomish County tracks the costs of mobile collection separately. Lewis County aggregates its facility and mobile collection costs.

A2 Modeled Paint Stewardship System

A2.1 Data Sources for Modeled Paint Stewardship System

To analyze the effects of paint stewardship in Washington, the research team first developed a set of assumptions about the modeled paint stewardship system that served as a framework for the analysis. The assumptions and analytical methodology were based on three main sources:

- **Oregon's pilot paint stewardship program**. The results of Oregon's pilot program, run by PaintCare, formed the basis of many of the quantitative assumptions about performance of a modeled program in Washington. Data used include publicly available information from PaintCare's 2011 and 2012 annual reports, as well as unpublished data about the Oregon program's Year 2 performance that PaintCare provided to the research team specifically for this analysis.
- **Washington legislation**. Assumptions about the number and type of collection sites in the modeled program were based on language related to customer convenience standards included in the paint stewardship legislation introduced in Washington in 2012 (Substitute Senate Bill 6145).[32]
- **Stakeholder input**. Three primary groups of stakeholders were consulted in the assumptions development process:
  - Members of the Northwest Product Stewardship Council's Paint Subcommittee reviewed all proposed assumptions and provided input on assumptions in cases where data from other sources did not provide clear guidance on appropriate values.
  - The PaintCare program manager of Oregon's pilot paint stewardship program also provided input on assumptions related to program operations and performance, based on her experience in Oregon.
  - Managers of MRW programs that do not currently collect latex paint were asked to provide input regarding the likelihood that their programs would begin accepting latex paint under a product stewardship system.

The assumptions developed and used in this model are summarized in the following section.

[32] For the complete text of Substitute Senate Bill 6145, see http://apps.leg.wa.gov/billinfo/summary.aspx?bill=6145&year=2011

A2.2 Assumptions and Methodology for Paint Stewardship Model

Table A-2 shows the key assumptions applied and methods use in developing a modeled system for paint stewardship in Washington State.

Table A-2. Key Assumptions Used in Modeled Paint Stewardship System

Topics	Assumptions
Program Implementation	The product stewardship program is assumed to be fully implemented and in compliance with all program requirements.
Producer Role	A single *producer responsibility organization* (PRO) operates a single paint stewardship *program* on behalf of all obligated paint producers.
Collection System	
MRW facility participation	All existing MRW facilities participate in a paint stewardship system. However, 8 facilities collect only oil-based (not latex) paint. *Based on self-reporting from MRW programs in Washington.*
Number, distribution, and type of fixed collection sites	226 fixed collection sites, made up of: – 36 MRW facilities collecting both latex and oil-based paint – 8 MRW facilities collecting only oil-based (not latex) paint – 182 private sites (incl. retail, re-stores) collecting both latex and oil-based paint *Based on an assumed convenience requirement of 1 fixed site for every county and 1 site for every 30,000 residents in a county.*
Mobile collection events	95 percent of current publicly run/contracted mobile collection will continue. *Based on self-reporting from MRW programs in Washington*. Average volume collected per event is 325 gallons. *Based on reported per-event mobile collection volume from Year 2 of the pilot product stewardship program in Oregon*.
Large-volume collection	Large-volume collection (for SQGs that have too much paint to transport to a collection site) accounts for 3% of total paint collected, including collection by private facilities. *Based on current volume of paint collected by private facilities*.
Quantities	
Paint Sales	Annual paint sales are 2.0 gallons per capita; 80/20 split of latex/oil-based paint. *Based on data on paint sales in the United States, Oregon, and British Columbia*.
Increase in collection	Substantial increase in latex paint collection under paint stewardship, equal to 80 percent of the per-capita collection rates achieved in Oregon in 2012. Modest increase in oil-based paint collection, equal to a 15 percent increase over current per-capita collection rates in Washington.
Capture rate	70% of available unwanted and leftover paint is collected under the modeled paint stewardship system. *Based on assumed increases in collection described above.*

Topics	Assumptions
Processing and Disposition	
Reuse	MRW programs are reimbursed $0.25/container for direct reuse ("paint exchange"). Reuse increases by 5 percent as a result of increased promotion of reuse by MRW facilities. *Based on pilot product stewardship program in Oregon*.
Recycling	70 percent of all latex paint collected is recyclable. *Based on reported results from Year 2 of the Oregon pilot program*. Recyclable latex paint is sent outside of Washington State for processing until a sufficient collection volume warrants building an in-state recycling facility. However, model includes analysis of jobs benefit of a potential in-state facility. Processing cost is expected to be the same under either scenario. *Based on feedback from paint recycling industry representatives.*
Other	All oil-based paint not reused is sent for energy recovery. No source-separated latex paint collected through the paint stewardship program is sent directly to landfill for disposal as waste (higher-value disposition methods are used). *Based on pilot paint stewardship program in Oregon*.
Costs, Revenues, and Jobs	
Collection (labor) costs	Per-gallon collection costs are reduced by 10 percent at MRW facilities due to efficiencies from streamlined collection and handling procedures (including eliminated bulking, streamlined packing and shipment) gained under the paint stewardship system. Mobile collection costs remain the same. *Based on input from producer responsibility organization for pilot program and MRW facilities in Oregon.* Retail collection sites incur labor costs of $1.59 per gallon collected. *Based on information provided by retailers collecting paint in Clark County, Washington, scaled to adjust for benefits and average retailer wages in Washington.*
Transport and Disposition costs	Per-gallon transport and disposition costs are 90 percent of the transport and disposition costs of the Oregon program in Year 2, due to higher paint throughput volume in Washington. *Based on input from producer responsibility organization for pilot paint stewardship program in Oregon.*
Other program costs	Per-gallon costs for other program-related expenses including administration are 90 percent of the other program-related costs of the Oregon program in Year 2, due to system efficiencies and higher paint throughput in Washington. *Based on input from producer responsibility organization for pilot paint stewardship program in Oregon.*
Employment	Employment increases are projected for 3 types of employment: – Collection at MRW facilities and retailers – Disposition services, including transport from collection sites – Other program related employment, including potential employment with in-state latex paint recycling *Based on interviews with industry representatives in Washington and Oregon, and scaled on a per-capita basis for estimated collection under paint stewardship.*

A2.3 Limitations of Modeled Paint Stewardship System

The analysis is limited or has the potential for error in several areas, described below:

- The analysis uses 2010 Washington population data to enable direct comparison between the existing programs and the modeled paint stewardship system. However, changes in per-capita paint sales and population growth would likely increase the amount of unwanted and leftover paint available for collection and the amount of paint collected under a paint stewardship system implemented in subsequent years.
- As in any analysis in which future performance is predicted based on past performance, there is some chance that changes in individual behavior or economic trends not captured in this model would result in different outcomes. In addition, it is possible that the presence of a paint stewardship system as modeled in this analysis would itself affect behavior and costs in a way that has not been accounted for in the model.
- The modeled paint stewardship system assumes that all paint collected by collection sites is covered by the stewardship program. However, the product stewardship program in Oregon has not covered 100 percent of paint collected by MRW programs—for example, cans without labels for which it is unclear whether they contain a product covered by the program or not—leaving local MRW programs to pay for disposition of a portion of the paint collected.
- This analysis does not address the potential costs for the Washington State Department of Ecology to oversee a paint stewardship program.
    - Ecology would likely incur additional staffing costs related to oversight of the paint stewardship program. However, the bill considered in the 2012 session (SSB 6145) established a finance mechanism that would allow Ecology to recover its program administration costs from the producers.
    - The agency already incurs some level of staff costs related to oversight of paint management through its MRW program. Through its Coordinated Prevention Grants program, the agency currently provides some funding to local governments to pay for MRW management, including paint collection and disposition, although the exact amount directed to paint management is unknown. Under paint stewardship, there would likely be reduced need for funding MRW facilities for paint transport and disposition, which would allow Ecology to direct those grant dollars to other projects, including other hazardous materials that pose environmental and health risks or are costly for local governments to manage.

Appendix B. Existing Public Programs for Paint Collection

County	Population (as of 4/1/10)	% of State Population	Public Facilities (# in 2010)	Mobile Collection (2010 events)	SQG Collection (Yes, No)	Latex Collection
Adams	18,728	0.3%	2	1	N	None
Asotin	21,623	0.3%	1	0	N	Residents
Benton	175,177	2.6%	0	4	N	Residents
Chelan	72,453	1.1%	0	2	Y	Residents, SQGs
Clallam	71,404	1.1%	1	0	N	None
Clark	425,363	6.3%	3	14	N	Residents
Columbia	4,078	0.1%	1	unknown	n/a	None
Cowlitz	102,410	1.5%	1	4	Y	Residents
Douglas	38,431	0.6%	0	0	n/a	None
Ferry	7,551	0.1%	0	1	N	None
Franklin	78,163	1.2%	1	0	N	Residents
Garfield	2,266	0.03%	0	unknown	n/a	None
Grant	89,120	1.3%	1	2	Y	Residents, SQGs
Grays Harbor	72,797	1.1%	1	0	Y	Residents, SQGs
Island	78,506	1.2%	1	0	Y	Residents, SQGs
Jefferson	29,872	0.4%	1	3	Y	None
King	1,931,249	28.7%	3	35	Y	None
Kitsap	251,133	3.7%	1	1	Y	Residents, SQGs
Kittitas	40,915	0.6%	2	0	Y	SQGs
Klickitat	20,318	0.3%	4	0	N	Residents
Lewis	75,455	1.1%	1	2	Y	Residents, SQGs
Lincoln	10,570	0.2%	1	1	N	None
Mason	60,699	0.9%	1	0	N	None
Okanogan	41,120	0.6%	1	0	Y	Residents
Pacific	20,920	0.3%	1	0	Y	SQGs
Pend Oreille	13,001	0.2%	3	0	N	Residents
Pierce	795,225	11.8%	2	2	Y	None
San Juan	15,769	0.2%	0	3	Y	Residents, SQGs
Skagit	116,901	1.7%	1	0	Y	Residents
Skamania	11,066	0.2%	0	1	N	Residents
Snohomish	713,335	10.6%	1	2	Y	SQGs
Spokane	471,221	7.0%	3	0	N	Residents
Stevens	43,531	0.6%	1	0	N	None
Thurston	252,264	3.8%	1	unknown	Y	None
Wahkiakum	3,978	0.1%	0	1	n/a	Residents
Walla Walla	58,781	0.9%	1	3	N	Residents
Whatcom	201,140	3.0%	1	2	Y	Residents, SQGs
Whitman	44,776	0.7%	1	0	N	Residents
Yakima	243,231	3.6%	1	0	Y	Residents, SQGs