City of Salem
Stream Cleaning Program
Annual Report

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Environmental Aide
Annual Report Overview

This report provides a detailed review of the 2013 Stream Cleaning Program's activities, accomplishments, and challenges. The specifics of each report section are provided below:

- **Section 1** – Stream Cleaning Program history, activities, and a summary of the 2013 season.
- **Section 2** – Discussion of the variability between seasons and trends of the Program from 1998 until 2013. Supporting graphs and data are included.
- **Section 3** – Results of the 2013 cleaning (organized by watershed), crew observations and activities, charts of materials removed and relevant pictures.
- **Section 4** – Restoration project, location, goals, and work completed.
- **Section 5** – Additional projects and water monitoring station clean-up projects.
- **Section 6** – Summary of the Stream Cleaning Program’s training and safety sessions.
- **Section 7** – Concluding remarks regarding the 2013 season
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1.0 Introduction

1.1 Program History

In 1996, extensive flooding caused damage across the City of Salem (the City) and the Willamette Valley. In 1998, the City added an annual Stream Cleaning Program (the Program) to its existing stormwater management strategies to reduce the risk of flooding during high flows. During the Program’s inception, the main objective was to ensure conveyance in Salem’s creeks by identifying and removing blockages to creek flow (Figure 1.1). Over the years, the Program has retained this objective, but also broadened its scope to include the restoration and maintenance of creek habitat.

In 2000, the Program began to include annual creek restoration projects. The goal of these annual projects was to enhance the natural functions of Salem’s creeks by establishing diverse native plant communities along the banks. These projects have also provided valuable opportunities for public outreach and education.

In 2003, the City began to require that crew members be current college students with a major focus in environmental sciences and natural resources. A strong background in environmental science has enabled crew members to make critical field decisions that have lasting impacts not only on maintaining water flow, but the health of the creeks as well. Furthermore, by being students, they have been more able to interact with interested community members and offer their perspectives based on course work in fields such as botany, ecology, and riparian management.

Over time, other improvements have been made to the Program to support the function and health of the local environment. For example, the Program has been able to include additional miles of creek to its cleaning schedule, as the trash levels have gradually subsided and the natural debris have become more manageable. Additionally, the 2009 crew initiated efforts to sort and recycle the trash removed from the creeks. The Program’s recycling work has continued, and even extends to recycling the plastic bags used to collect and transport materials from the creeks.

As identified in the City’s Stormwater Management Plan, the City has an annual goal to clean 50-percent of the 90 miles of creek within city limits and to conduct an annual creek restoration project. The Stream Cleaning Program is the primary contributor to meeting these goals.
Figure 1.1: Map of the Watersheds, Rivers, Lakes, Ponds, and Creeks within the City Limits of Salem, OR
1.2 Season Summary and Highlights

2013 marks the Program’s sixteenth summer of enhancing Salem’s creeks. This year, because of the winter storm and city-wide flooding that ensued, the crew focused on identifying and resolving major waterway flow issues around culverts and neighborhoods that had problems with flooding and high water. Even with the increased effort in removing more vegetation and debris that could decrease water flow, the diverse and experienced crew was still able to preserve riparian vegetation to prevent erosion and promote water quality and animal habitat. On a daily basis, the crew removed hundreds of pounds of trash and recyclables, as well as noxious weeds and debris jams. The crew also actively engaged community members and residents as they worked through the creeks.

The 2013 cleaning crew was composed of six crew members and two crew leads, smaller than the ten person team hired for the previous season due to the January 2012 flooding.

The crews worked from June 17th to September 27th. During those three months, they cleaned and inspected approximately 46.93 miles of creek (Figure 1.2). In total, the crew removed 12,025 pounds of trash, 117.25 cubic yards of natural debris, and 33 pounds of recyclable material (plastics and metals).

The following describes some of the highlights from the 2013 creek cleaning season:

A. Continued Focus on Stormwater Conveyance:
In January 2012, a major storm event brought flooding and high water flows to Salem and the rest of the Willamette Valley. The Program was created because of a similar storm back in 1996, so the importance of our work this summer was even more evident. Due to the lower than average amount of rainfall recorded this year, it was expected that overall trash and natural debris levels would be lower than last year. Due to this reduced garbage load, the crew was able to carefully inspect areas that are more prone to flooding and remove any limbs that may have been overlooked last year.

B. Revisiting Past Restoration Projects:
In continuation with last year, the crew went back to restoration sites to inspect and perform general maintenance (cleaning and weeding). This year the crew pulled four cubic yards of debris from the 2010, 2011, and 2012 sites. It is the goal of this program to conduct an extensive review of past restoration sites to determine which sites are still thriving and which have been lost due to lack of continued maintenance.

C. Field Inspections and Reporting
The Program provides vital functions beyond maintaining and enhancing creeks. These functions include the visual inspection of creeks to identify potential concerns such as illicit discharges, community compliance issues, and transient camp establishments. This involves collaboration with a variety of City workgroups, including Environmental
Services, Community Enforcement, and the Crime Prevention Unit of the Police Department. This season, the crews identified and reported a variety of potential concerns, which included: water pumps, dams, illicit discharges, yard debris dumping, drug paraphernalia, and transient camps.

D. Annual Restoration Project
This season’s restoration site was along Mill Creek. The section of creek had a steep bank on one side with invasive plants growing along the waterline. The crew removed these invasive species, replaced them with more than 300 native plants, and seeded the area with wetland grasses and wildflowers. Over time, the crew’s restoration site will grow into a dense native plant community, providing wildlife habitat, shade, and bank stability.

E. Assisting Stormwater Staff
Crew members worked on other smaller projects as a means to round out the internship experience and learn about the functions of Stormwater Services by assisting the Stormwater Monitoring and Operations staff with various projects. Crew members were able to assist in the maintenance of the City’s water quality monitoring stations. The crew enjoyed the opportunity to shadow monitoring staff and expressed interest in the various aspects of the position.

F. Monitoring Station Cleanups and Yellow Flag Iris
The crew was able help the Stormwater Staff clear out several monitoring stations of invasive plants and helped install new steps. The crew pulled over 55 cubic yards of debris from monitoring stations and yellow flag iris from creeks that would not have been removed otherwise. Hopefully the crew can continue to aid the stormwater monitoring staff and manage populations of certain invasive species throughout the creeks.
Figure 1.2: Map of Salem Creeks Cleaned by the Stream Cleaning Program in 2013
1.3 Crew Members and Leads

This season, the cleaning crew consisted of two crew leads and six crew members (Figure 1.3). The crew leads were both returning members from the previous season. This valuable experience and knowledge of the creeks of Salem allowed the crew to move efficiently from point to point and maximize their cleaning time in the shortened summer. On a daily basis, the crew leads kept their teams focused, organized, motivated and maintained very high standards for their work and conduct. Fortunately, the Program had some amazing, hard working, and diverse new crew members who will be returnees next season.

**Figure 1.3: The 2013 Stream Cleaning Program crew** – From left to right, **Front Row**: Andy Smetana, Manny Munoz (Crew Lead), Sidney Mulder, Sarah Acker, Callie Walsh-Bailey. **Back Row**: James Derr, Jeremy Mills, Kate Pfeiffer (Environmental Aide), Mike McCauley (Crew Lead).
2.0 Annual Variability and Trends

A number of factors contribute to the distance of creeks walked by the crew, and the amount of debris removed. In part, these fluctuations derive from factors such as weather, construction projects, illegal dumping and transient activity. Other aspects include the crew size, duration of the summer work period, recycling efforts, side projects, and adaptive management of invasive vegetation. In reviewing the successes and challenges of the season, it is valuable to identify and address the variety of factors that can be attributed to this year’s results and to explore any trends that may be present.

The following describes the most significant variables from the 2013 cleaning season:

A. Crew Size and Experience
One of the greatest aspects of the Program that affects the miles of creeks covered in a season is the size and experience of the work crew. The 2013 crew, as stated before, consisted of six crew members and two crew leads.

In addition, the Program prospers from the return of past members whose knowledge and experience helps guide interns who are new to the crew. This year’s crew leads were both returning members from the previous season. Their leadership skills and work experience contributed greatly to the daily and overall successes of the crew.

B. Duration of the Season
This year the crew worked from June 17th to September 27th. The combination of strong work ethic and experienced crew leads exceeded expectations and the crew was able to walk more than half of the creeks within city limits, respond to periodic service requests, provide cleaning and maintenance on past restoration projects, help Stormwater staff on various side projects, and carry out the annual restoration project several weeks ahead of schedule. In the past, the length of the season has ranged from two to four months.

C. Coordination Efforts and Creek Access
The Environmental Aide (EA) is in charge of coordinating the crew’s daily actions. This involves walking (scouting) each creek to identify major challenges the crew may face. Scouting allows the EA to prepare crew members to work in a professional, safe, organized, and efficient manner. As in past seasons, the EA was able to scout the creeks and effectively prepare the crews for their daily tasks.

Furthermore, the EA establishes contacts with community members to coordinate access points. This allows crew members to navigate the creeks and remove materials safely and efficiently. Issues and delays with these coordination efforts can prevent the crew’s from cleaning certain areas quickly or entirely, because the Program works within a very tight schedule. In general, this season did not yield significant issues with access coordination.
D. Illegal Dumping and Transient Activity

The amount of illegal dumping and transient camps that occurs along the creeks contributes to the amount of material the crew removes in a season. Over the last sixteen years of the Program, the amount of trash found in the creeks has declined, even though additional miles of creeks were cleaned each year (Figures 2.1 and 2.2). This year the crew recorded the second lowest amount of trash and recycling material in the history of this program. The amount of illegal dumping and transient camps was still very minimal as seen from last year and I believe the trend will continue to decrease.

![Figure 2.1: Trash removed by the Stream Cleaning Program from 1998 - 2013](image1)

![Figure 2.2: Recycling removed by the Stream Cleaning Program from 2009 – 2013](image2)
E. Natural Debris

The crew removes a variety of natural debris, invasive vegetation and debris jams – to ensure proper flow in areas where the surrounding urban landscape is particularly vulnerable to flooding. The size and abundance of debris jams and dense invasive vegetation may impact the amount of miles of creeks the crew may clean in a season.

The method of invasive plant management that the crew employs in a given season also affects how much invasive vegetation is removed. The crew has cut back less invasive vegetation since 2010 to preserve the ecological benefits it may provide, while still ensuring proper creek flow. This approach has resulted in a decrease in the amount of natural debris removed by the crew over the last 5 years excluding last year's outlier caused by the January 2012 floods (Figure 2.3)

![Stream Cleaning Program](image)

Figure 2.3: Natural debris removed by the Stream Cleaning Program from 1998 - 2013

F. Weather

Weather can have a major impact on the crew’s ability to complete work efficiently. Heavy rain slows the crew’s progress and can make some sections of creeks too deep or swift to walk through. Additionally, high temperatures can cause hazards such as heat exhaustion and overexertion. This season, the hot weather did not hamper the crew’s progress.

The amount of rain the area receives during the year can affect the amount of trash and debris found in the creeks. If there is less rain, then less trash and debris will be washed into and down the city’s waterways. One of the main reasons for the decrease in trash and recycling in the creeks this year was most likely due to lower than average rainfall recorded in 2013, particularly from January to June.
G. Water Levels

This summer, water levels on Shelton Ditch and Mill Creek had an impact on when the crew was able to get into these creeks. In years past, a small aluminum boat was used on both Shelton Ditch and Mill Creek to collect a greater amount of trash and allow it to be floated alongside the crew. Due to construction on some bridges downstream, the crew was able to walk the whole stretch of Shelton Ditch without a boat because it was dammed up, thus reducing the water height and flow. Because of this decrease in height on Shelton, it increased the height on Mill Creek forcing the crew to wait until Shelton Ditch’s water levels were restored to normal.

3.0 Cleaning Results

This section discusses the 2013 Program’s activities and results. A summary of the trash, recyclables, and natural debris removed per creek is illustrated in Figures 3.1 – 3.3.
Figure 3.2: Recyclable materials removed per creek by the Program in 2013

Figure 3.3: Natural debris removed per creek by the Program in 2013
3.1 Battle Creek Watershed

The Battle Creek watershed is located in South Salem and encompasses Battle, Cinnamon, Jory, Powell, Scotch, and Waln Creeks (Figure 3.4). These creeks are tributaries of Mill Creek and flow primarily in an easterly direction. With the exception of Waln Creek, large sections of these creeks are not cleaned by the crew, because they are located outside of city limits or run through privately maintained properties.

Battle Creek enters the city through the Creekside Golf Course. The banks of some sections are abundant with invasive blackberry, while others have stands of native vegetation. In many sections of this creek, debris jams are found where natural debris have collected from winter flows. Several sections also exhibit signs of erosion and sediment build-up.

Waln Creek is located entirely within city limits; it is 2.6 miles long and the longest creek within the Battle Creek watershed. Many sections of Waln Creek have Poison oak, Armenian blackberry, and numerous debris jams.

Powell enters the city limits through the Creekside golf course. Scotch Creek enters the city limits further south. The banks of Scotch Creek have substantially more invasive vegetation than Powell Creek, and subsequently yield more debris jams most seasons. Jory Creek enters city limits near Liberty Rd and Cinnamon Creek flows into Battle Creek starting at some ponds at the southern edge of city limits.

![Figure 3.4: Map of the Battle Creek Watershed within the City Limits](image)
Cleaning Summary:

Table 3.1 shows the amount of materials removed and the miles of creek cleaned. Overall, the crew the same amount trash compared to 2011 and the least amount of recycling ever recorded. (Figures 3.5 and 3.6) The natural debris removed was the second lowest in the history of the program for this watershed (Figure 3.7). These lower numbers can be attributed to the reduced rainfall experienced in the area for the 2013 storm season. Photographs of some of the highlights from this watershed are provided in Figures 3.8 through 3.13.

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<thead>
<tr>
<th>Trash:</th>
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<th>Natural Debris:</th>
<th>Distance Cleaned:</th>
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<tr>
<td>760 lbs</td>
<td>80 lbs</td>
<td>29 yd$^3$</td>
<td>5.88 miles</td>
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Table 3.1: Type and Amount of Materials Removed from the Battle Creek Watershed in 2013

Highlights by Creek:

Waln Creek:
- Removed a portion of a tree and a large debris jam which required a chainsaw.
- Revisited an old restoration site from 2010 on Valleywood Dr SE and removed 1.5 cubic yards of invasive species (blackberry and morning glory).
- Removed several railroad ties from the creek.

Powell Creek:
- Crew pulled out a smaller debris jam in the creek.

Scotch Creek:
- Used chainsaw to cut up large log for removal near golf course property.

Battle Creek:
- Removed 8 cubic yards of vegetation between Commercial Street and Interstate 5. This area was prone to flooding and the removed vegetation should help mitigate that in the future.
- Removed some smaller debris jams along the creek.
- Inspected portions of the Creek in the Kookooksee area per service request.
Figure 3.5: Trash Removed from Battle Creek Watershed

Figure 3.6: Recyclable Material Removed from Battle Creek Watershed

Figure 3.7: Natural Debris Removed from Battle Creek Watershed
**Figure 3.8:** A trash-filled debris jam along Waln Creek. The Crew removed the dead debris blocking flow, leaving as much for permanent habitat as possible.

**Figure 3.9:** A same section of the debris jams after it was removed. A portion of the tree that caused the jam was also taken off to prevent future conveyance issues.

**Figure 3.10:** James starting to remove a debris jam in the Battle Creek Watershed.

**Figure 3.11:** Natural debris removed from Battle Creek.

**Figure 3.12:** A crew member loading branches into the back of the dump truck, space efficiency was key when loading natural debris from debris jams.

**Figure 3.13:** The crew accessing Battle Creek. Some access points required the crew to hike over difficult terrain safety.
3.2 Upper Claggett Creek Watershed

The Upper Claggett Creek watershed is located in north Salem west of the Little Pudding watershed (Figure 3.14). Claggett Creek flows primarily in a westerly direction toward Keizer. Large sections of this creek are not cleaned by the crew, because they are located outside of city limits.

The southern tributary of Claggett Creek has intermittent flow, courses in and out of the city limits, and eventually drains into the main creek near Fisher Rd NE. The creek channel near McKay Park is fairly muddy and banks are predominantly covered with invasive Reed canary grass. Where the tributary merges with Claggett Creek proper, the banks are dense with willows and other native vegetation.

The main stem of Claggett Creek enters the city from the east near the convergence of the southern tributary and is paralleled by a large detention basin. Many sections of Claggett Creek have steep sloping banks and thick riparian vegetation. Near the western city limits the creek runs through the Claggett Creek Natural Area (formerly the Northgate wetlands), a flourishing mitigated wetland with a diverse range of native birds and some resident beavers.

![Upper Claggett Creek Watershed Map](image)

**Figure 3.14:** Map of the Upper Claggett Creek Watershed within the City Limits
Cleaning Summary:

Table 3.2 shows the amount of materials removed and the miles of creek cleaned. In years past, the Upper Claggett Creek watershed has been adversely impacted by illicit dumping and transient activities. Claggett Creek often yields the highest amount of trash per mile of creek of any of the creeks cleaned. This year, like previous years, the usual dump sites and transient camps were significantly reduced in size and abundance, which drastically diminished the amount of trash and recyclables found (Figures 3.15 and 3.16). The large portion of the trash and recyclable materials came from the 1,500 foot stretch of Claggett Creek between Fisher Rd NE and I-5, which was a new addition to the Program’s cleaning schedule two years ago. The crew also cleared a section between ….. and ….., which was not done last year, resulting in a large amount of trash being found in this section.

Last year, 30 cubic yards of natural debris were removed in order to improve water quality and flow. Due to those efforts and a reduced rain level this past winter, there was a significant reduction in the amount of natural debris blocking conveyance in the creek. This year only four cubic yards of green waste were removed, most from one large debris jam. The removal of the large amount of green waste last year combined with the lower than average rainfall recorded in 2013 is the most likely explanation for the reduced amount of vegetation blocking conveyance (Figure 3.17). Photographs of some of the highlights from this watershed are provided in Figures 3.18 through 3.23.

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<td>5,000 lbs</td>
<td>1,200 lbs</td>
<td>4 yd³</td>
<td>2.40 miles</td>
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Table 3.2: Type and Amount of Materials Removed from Upper Claggett Creek Watershed in 2013

Highlights by Creek: (Done)

Claggett Creek:
- Crew cleared out a large debris jam requiring a chainsaw.
- Removed various transient camp related trash items, such as mattresses and tents, from creek off of Portland Rd.
- Removed several grocery carts from various sections of the creek.
- Filed a compliance report dealing with trash and yard waste being thrown over a bank.
Figure 3.15: Trash Removed from Upper Claggett Creek Watershed

Figure 3.16: Recyclable Material Removed from Upper Claggett Creek Watershed

Figure 3.17: Natural Debris Removed from Upper Claggett Creek Watershed
Figure 3.18: A trail of full trash bags following the crew as they progress through Claggett Creek.

Figure 3.19: Callie making friends with a curious craydad.

Figure 3.20: A typical debris jam on Claggett Creek containing shopping carts, assorted trash, and tree limbs.

Figure 3.21: A load of dumped furniture that was removed from the creek.

Figure 3.22: Another debris jam full of trash. Debris jams gather trash and reduce the conveyance of the stream.

Figure 3.23: The creek bend from figure 3.22 after the crew removed the debris.
3.3 Croisan Creek and Willamette Slough East Watersheds

The Croisan Creek and Willamette Slough East Watersheds are located in southwest Salem adjacent to the Pringle Creek and Battle Creek Watersheds (Figure 3.24). Croisan Creek and Golf Creek are the two creeks that the crew cleans annually. Both flow in a general northerly direction toward the Willamette Slough. Large sections of Croisan Creek are not cleaned by the crew, because they are located outside of city limits.

Croisan Creek is the primary focus of the cleaning efforts. The creek enters the city south of Kuebler Blvd. Some sections of the creek run through a series of wetlands with wide floodplain areas, and dense stands of grasses and trees. Other sections wind between residential units, where the banks are a mixture of trees, Armenian blackberry, and denuded areas. As the creek follows River Rd S and enters Minto Brown Island Park, the banks are dense with Reed canary grass. This invasive weed grows upwards of four feet and makes cleaning the area more difficult.

Golf Creek is a tributary of Croisan Creek and is located almost entirely within Minto Brown Island Park. The creek is wide and deep in some sections and the banks have fairly thick and continuous patches of riparian vegetation.

![Figure 3.24: Map of the Croisan Creek and Willamette Slough East Watersheds within the City Limits](image-url)
Cleaning Summary:

Table 3.3 shows the amount of materials removed and the miles of creeks cleaned. In previous years, the crew has removed more than 2,000 pounds of materials from these creeks, but these totals have dwindled in recent years (Figures 3.25 and 3.26). This season, most of the trash came from Croisan Creek north of Kuelber Rd.

This year there was no natural debris removed from Croisan Creek, Petijohn Creek, or Grey Oak Brook this season. Photographs of some of the highlights from this watershed are provided in Figures 3.28 through 3.33.

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<tr>
<td>270 lbs</td>
<td>200 lbs</td>
<td>0 yd³</td>
<td>4.70 miles</td>
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Table 3.3: Type and Amount of Materials Removed from Croisan Creek and Willamette Slough East Watersheds in 2013

Highlights by Creek:

Croisan Creek:
- Responded to a service request to clear out a section of Grey Oak Brook that was prone to flooding.
- Pulled remnants of an old car out of Croisan Creek to prevent further pollution.
- Several Crew members were stung by wasps off of Croisan Creek Rd and River Rd.
- Inspected a section of Croisan creek that had pool liner dumped into it and monitored its cleanup.
- Two tires were removed from Croisan Creek and disposed of properly.
Figure 3.25: Trash Removed from Willamette Slough East and Croisan Creek Watersheds

Figure 3.26: Recyclable Material Removed from Willamette Slough East and Croisan Creek Watersheds

Figure 3.27: Natural Debris Removed from Willamette Slough East and Croisan Creek Watersheds
Figure 3.28: The crew working together to clear a section of Croisan Creek.

Figure 3.29: Remnants of a TV that had been dumped off of Croisan Creek Road.

Figure 3.30: Manny inspecting an old car that was pushed into Croisan Creek.

Figure 3.31: The car cleared out and pulled out of the creek as much as possible.

Figure 3.32: A section of Croisan Creek that was contaminated by pool lining. This site was cleaned up.

Figure 3.33: The crew worked on a section of Grey Oak Brook attempting to help reduce flooding on a homeowner’s property.
3.4 Glenn/Gibson Creek and West Bank Watersheds

The Glenn/Gibson and West Bank watersheds are located in West Salem (Figure 3.34). The crew annually cleans Glenn Creek and Gibson Creek, their respective tributaries, and Turnage Brook. These creeks have a predominantly westerly flow and drain into the Willamette River. Turnage Brook lies entirely within the limits of the city. The other creeks have small sections that are located outside of the city and are not cleaned by the crew.

Glenn Creek and its tributaries are the primary focus of cleaning within West Salem. The creek runs through some sections with wide riparian buffers and floodplains, which can be sources of natural debris that may accumulate as jams. Other sections of the creek are adjacent to residential properties, and tend to have numerous debris jams, dense invasive blackberry, and even some beaver activity.

Gibson Creek is a tributary of Glenn Creek, and converges near Wallace Rd NW. This creek tends to have large debris jams and banks with dense vegetation and Poison oak.

Turnage Brook begins at Eola Ridge Park, a wetland area restored by local residents. Many sections of this creek are dense with vegetation, invasive blackberry, Poison oak, and debris jams. The parts of the creek closest to the Willamette River are not cleaned due to water depth and issues with access.

Figure 3.34: Map of the Glenn/Gibson and West Bank Watersheds within the City Limits
Cleaning Summary:

Table 3.4 shows the amount of materials removed and the miles of creeks cleaned. This summer saw the second lowest amount of trash and recycling removed in the history of the program. This was likely due to the limited amount of rainfall seen since January, reducing the amount of trash being washed into the creeks (Figure 3.35 and 3.36).

The natural debris removed from these watersheds was a combination of invasive blackberry and debris jams. The totals were lower than what was found last year (Figure 3.37). Photographs of some of the highlights from this watershed are provided in Figures 3.38 through 3.43.

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<td>925 lbs</td>
<td>190 lbs</td>
<td>25.5 yd³</td>
<td>6.97 miles</td>
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Table 3.4: Type and Amount of Materials Removed from Glenn/Gibson and West Bank Watersheds in 2013

Highlights by Creek:

Glenn Creek:
- Crew removed several debris jams in Orchard Heights Park and several large debris jams off of Ptarmigan St NW.
- Several crew members received bee stings in various sections of the creek.
- Responded to a service request off of Orchard Heights Road and cleared out some branches that had fallen in the creek.
- Removed 3 cubic yards of green waste from a water quality monitoring station (GLE3).

Gibson Creek:
- While working in Brush College Park, the crew was exposed to Poison oak.
- Removed several debris jams within the park that had collected trash.

Turnage Brook:
- Construction in the area prevented access to sections of the creek until later in the summer.
Figure 3.35: Trash Removed from Glenn/Gibson and West Bank Watersheds

Figure 3.36: Recyclable Material Removed from Glenn/Gibson and West Bank Watersheds

Figure 3.37: Natural Debris Removed from Glenn/Gibson and West Bank Watersheds
Figure 3.38: Andy, with the proper PPE, removing a large log from Orchard Heights Park. The log had caused a large debris jam that was cleared out.

Figure 3.39: The crew working together to remove one of the many debris jams in Glenn Creek.

Figure 3.40: A debris jam that included an old tire in Glenn Creek.

Figure 3.41: The crew had to gain access and exit creeks in some tricky spots throughout the summer’s work.

Figure 3.42: Obtaining valuable observations about creeks that would not normally been seen, such as this illegally installed culvert, was another job the crew performed.

Figure 3.43: A culvert that had a fence covering it.
3.5 Little Pudding Watershed

The Little Pudding Watershed is located in northeast Salem, adjacent to the Upper Claggett Creek and Mill Creek Watersheds (Figure 3.44) Of the various creek branches that meander in and out of the city, the crew usually cleans the East and West Forks of Little Pudding River.

These forks run between Lancaster Ave and Cordon Road within city limits. During the summer, these forks are a combination of dry creek bed and muddy pools of water. Reed canary grass is the most prolific plant species found in and along the creek banks of the East and West Forks and makes maneuvering difficult for the crews. The amount of invasive blackberry is very limited, and often does not present an issue for creek flow.

![Figure 3.44: Map of the Little Pudding River Watershed within the City Limits](image-url)
Cleaning Summary:

In previous years, the crew has cleaned the Forks of Little Pudding River. This work has ranged from simply removing trash and obstructions to flow, to mowing and removing many cubic yards of Reed canary grass. Stormwater Operations and Maintenance (O/M) went through this area again knocking down the Reed canary grass and picking up trash, but this year the crew cleaned the two forks after the work for better access and visibility to see trash (Figures 3.45 and 3.46).

Table 3.5 shows the amount of materials removed and the miles of creek cleaned. The amount of trash that the stream crew pick up this year was the lowest collected amount recorded as the Storm O/M had cleared out most of it when they removed the Reed canary grass. The only natural debris removed from this area was not recorded by the O/M work (Figure 3.47). Photographs of some of the highlights from this watershed are provided in Figures 3.48 through 3.50.

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</tr>
<tr>
<td>Recycling:</td>
<td>15 lbs</td>
<td></td>
</tr>
<tr>
<td>Natural Debris:</td>
<td>0 yd³</td>
<td></td>
</tr>
</tbody>
</table>

Table 3.5: Type and Amount of Materials Removed from Little Pudding Watershed in 2013

Highlights by Creek:

Little Pudding River:
- Crews found various spots along the creek where nearby dumpsters had contributed to trash being dumped into the creek.
Figure 3.45: Trash Removed from Little Pudding Watershed

Figure 3.46: Recyclable Material Removed from Little Pudding Watershed

Figure 3.47: Natural Debris Removed from Little Pudding Watershed
Figure 3.48: The stream crew can run across some interesting structures in and over the creek.

Figure 3.49: Digging through some grass to pick up a dumped bottle.

Figure 3.50: Using teamwork to get the job done efficiently.
3.6 Mill Creek Watershed

The Mill Creek Watershed is one of the largest watersheds in Salem and is flanked by several other watersheds (Figure 3.51). Mill Creek, Mill Race and Shelton Ditch are all found within this watershed. The three waterways have a general westerly flow toward the Willamette River.

Mill Creek is one of the widest and longest creeks the crew cleans. Various reaches of Mill Creek are prone to deep, fast moving waters, which prevent the crew from walking those areas. Some reaches of Mill Creek are channelized and lack riparian buffers, while others have gentle slopes and dense vegetation.

Mill Creek has two diversions. Shelton Ditch is diverted from Mill Creek just east of Airport Rd SE at Weir Dam, Shelton Ditch is also one of the widest creeks cleaned by the crew, and the banks are very similar to those of Mill Creek. Mill Race diverges from Mill Creek just west of Ferry St SE and 21st St SE at the Mill Race Park. This site has a fish screen at the mouth of Mill Race, and a check dam spanning across Mill Creek to control flow to both Mill Creek and Mill Race. This creek is much narrower and shallower than the other creeks in this watershed.

![Figure 3.51: Map of the Mill Creek Watershed within the City Limits](image)
Cleaning Summary:

Table 3.6 shows the amount of materials removed and the miles of creek cleaned. In previous years, the Mill Creek watershed has been adversely impacted by illicit dumping and transient activities. In continuation with last year, however, the usual dump sites and transient camps were significantly reduced in size and abundance, which drastically diminished the amount of trash and recyclable materials removed. This year saw the third lowest level of trash collected along with the lowest level of recyclables, continuing the downward trend of levels of trash (Figures 3.52 and 3.53).

Natural debris removal hasn’t been a focus for the crew for the past five years because the creeks in the Mill Creek watershed are wide enough for creek-bank vegetation to not significantly constrict flow (Figure 3.54). However, debris jams are common along these creeks under bridges where branches and debris are held against pylons. For example, the crew found several large debris jams under several bridges crossing Mill Creek. The crew helped the O/M crews remove the material by attaching choker cables and chains to the debris while an O/M crew member pulled it out with a backhoe loader. Photographs of some of the highlights from this creek are provided in Figures 3.55 through 3.60.

<table>
<thead>
<tr>
<th>Trash:</th>
<th>Recycling:</th>
<th>Natural Debris:</th>
<th>Distance Cleaned:</th>
</tr>
</thead>
<tbody>
<tr>
<td>3,120 lbs</td>
<td>995 lbs</td>
<td>23 yd³</td>
<td>8.47 miles</td>
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</table>

Table 3.6: Type and Amount of Materials Removed from Mill Creek Watershed in 2013

Highlights by Creek:

Mill Creek:
- The crew helped the O/M crew remove large debris jams beneath several bridges in the Mill Creek Watershed.
- The crew found several tires.
- The crew found a debris jam that contained over 200 hypodermic needles.

Mill Race:
- Crew removed several bags of trash out of Mill Race when the water level was down.

Shelton Ditch:
- Crew found several hundred pounds of recyclable metal in the creek.
Figure 3.52: Trash Removed from Mill Creek Watershed

Figure 3.53: Recyclable Material Removed from Mill Creek Watershed

Figure 3.54: Natural Debris Removed from Mill Creek Watershed
Figure 3.55: The 220-plus hypodermic needles the stream crew found in one debris jam.

Figure 3.56: Manny, Sidney, and Callie walking behind the boat to look for trash.

Figure 3.57: Crew members working together to get to the piece of metal in the distance.

Figure 3.58: One of the several transient camps found along Mill Creek. It was reported to the Salem Police Department.

Figure 3.59: Jeremy working hard removing some invasive Yellow Flag Iris from the creek.

Figure 3.60: Much of the crew’s time was spend scouring out streams and stream banks for elusive trash.
3.7 Pringle Creek Watershed

The Pringle Creek watershed is one of the most extensive watersheds within Salem, incorporating Clark Creek and Pringle Creek (Figure 3.61). Large sections of the East Fork of Pringle Creek are outside of the city limits and are not cleaned by the crew.

Pringle Creek starts in southeast Salem near Skyline Rd S. Many sections of this creek are covered with invasive blackberry, Poison oak, Japanese knotweed, and large woody vegetation. Sections of Pringle Creek running parallel to the Union-Pacific Railroad tracks are not cleaned due to a lack of sufficient access and the proximity of the railroad.

Clark Creek, Pringle’s largest tributary, begins just south of Ewald Ave SE. Invasive plants including English ivy, Armenian blackberry, and Japanese knotweed are prolific throughout the riparian buffer. There is also a fair amount of large, woody vegetation, which creates numerous debris jams that build up along various sections.

Three additional tributary creeks drain into Pringle Creek as it meanders throughout the city, including the East, West-Middle, and Middle Forks of Pringle Creek. Some sections of these forks also run parallel to the Union-Pacific Railroad tracks and are not cleaned by the crew. All three forks are dense with invasive blackberry, woody vegetation, and access to the creeks can be very limited. Near the confluence of the Middle Fork there is often some beaver activity and dams along the creek.
Cleaning Summary:

Table 3.7 shows the amount of materials removed and the miles of creek cleaned. Similar to the Mill Creek and Upper Claggett Creek watersheds, this year’s crew noted a reduced frequency of illegal dump sites and transient camps in the Pringle Creek Watershed, which has diminished the amount of trash and recyclable materials removed over the last three years (Figures 3.63 and 3.64).

Like many of the other watersheds and creeks this summer, the Pringle Creek watershed saw the lowest amount of trash and second lowest amount of recyclable materials removed in the history of the program (Figure 3.62 and 3.63). Because there was a reduced amount of rainfall, there a small amount of trash washed into the creek and fewer debris caused jams as well. This year saw the fourth lowest level of green waste removed from the creeks (Figure 3.64). Photographs of some of the highlights from this watershed are provided in Figures 3.65 through 3.70.

<table>
<thead>
<tr>
<th>Trash:</th>
<th>Recycling:</th>
<th>Natural Debris:</th>
<th>Distance Cleaned:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,870 lbs</td>
<td>545 lbs</td>
<td>30.75 yd$^3$</td>
<td>13.78 miles</td>
</tr>
</tbody>
</table>

Table 3.7: Type and Amount of Materials Removed from Pringle Creek Watershed in 2013

Highlights by Creek:

Clark Creek:
- Scouted out a section of a retaining wall that was being pushed back towards the creek by a large clump of knotweed.
- Removed blackberry surrounding a patch of knotweed in Clark Creek Park so staff could use stem injection to kill the plants.

Pringle/East Fork Pringle/West Middle Fork Pringle Creek:
- Removed a large debris jam near Leslie Middle School that had not been taken out the previous year.
- Crew came in contact with poison oak several times.
- Removed several cubic yards of yellow flag iris from sections in East Fork Pringle.
Pringle Creek Watershed
Trash Removed per Year (1998-2013)

Figure 3.62: Trash Removed from Pringle Creek Watershed

Pringle Creek Watershed
Recycling Removed per Year (2009-2013)

Figure 3.63: Recyclable Material Removed from Pringle Creek Watershed

Pringle Creek Watershed
Natural Debris Removed per Year (1998-2013)

Figure 3.64: Natural Debris Removed from Pringle Creek Watershed
Figure 3.65: A pump that was found in East Fork Pringle Creek.

Figure 3.66: Invasive blackberry can hamper to efforts of the crew to access and clean the waterways.

Figure 3.67: A debris jam the crew found in Clark Creek.

Figure 3.68: The same section of Clark Creek seen in picture 3.67 after the debris jam was removed.

Figure 3.69: A section of a retaining wall that is now leaning towards the creek due to a large clump of knotweed deforming the wall.

Figure 3.70: A large tree that caused a debris jam.


4.0 Restoration Project

Every year the crew implements a restoration project along a creek within the city. The main focus of these projects is to enhance the ecological functions of Salem’s creeks by planting native vegetation along various creek banks. The annual restoration project is a vital component of the crew’s public outreach efforts and adds a great educational experience for crew members, teaching them restoration ecology concepts and implementation techniques.

This year’s restoration project was conducted on a section of Mill Creek at the corner of State St and 21st St. There was no previous work done on this site due to the fact that a majority of the bank was comprised primarily of larger rocks with few plants growing along the bank (Figure 4.1-4.3). The property owners approached the City and wanted information on a soft restoration of the bank in comparison to bank armament. They were concerned with losing sections of the bank to erosion as the creek rose and fell during the winter. This site was selected because the property owners were very interested in using a soft approach to restoring the bank and it was a project that could feasibly be complete and managed by the stream crew in a reasonable time frame. The property owners were excited to enhance their section of creek and the crew enjoyed designing a project that benefited the residents, the public, and the creek.

The crew worked safely in removing some of the plants along the creek bank. Care was also taken when digging holes for the plants. Due to the rocky composition of the soil, the holes dug had the tendency to collapse if too many rocks were removed. Because there was no risk of soil falling into the creek and changing water turbidity, the crew did not have to use coir logs as they have done in the past. The crew planted over 300 native plants in the creek bank, including a small tree, shrubs, wetland sedges and rushes, and over groundcover (Figure 4.7 to 4.8). It is hoped that with a combined City and landowner effort, the site will have a 100% groundcover in three years, providing habitat and helping Mill Creek improve its' water quality.

This year’s restoration efforts were a definite success. The bare creek banks were filled with a great variety of native plants that will provide vital habitat, shade, erosion control, and bank stability. The crew members learned a lot from this project and enjoyed the opportunity to leave a lasting impact on a local creek. The property owners were very appreciative of the crew’s work and are looking forward to seeing the native plants and wildflowers grow and bloom next year.


Figure 4.1: (Looking east) Holes have been dug to prepare for planting. This soil is very rocky with little extra soil for plants making growing conditions difficult.

Figure 4.2: (Looking west) The bank has a short slope leading towards will creek with most vegetation near the vicinity of the creek.

Figure 4.3: (Looking west) The furthest section of the site. As before, more rocks and very few plants.

Figure 4.4: The crew works on planting a variety of plants.

Figure 4.5: James, Sidney, and Callie hard at working finishing up the eastern section of the bank.
Figure 4.6: Mike explaining the use of his wetland sod to the rest of the crew.

Figure 4.7: (Looking west) The site after planting.

Figure 4.9: (Looking west) Restoration site after all work is complete.
5.0 Additional Projects

Crew members are often provided opportunities to learn about different functions of Stormwater Services by working on a variety of smaller projects. This season, the crew was able to participate in a few different tasks:

- **Stormwater Quality Monitoring Station Maintenance**: Every crew member spent several days assisting the Monitoring staff in cleaning and maintaining the in-creek continuous water quality monitoring stations. Some of the crew members also helped collect creek flow data at these stations. The crew members expressed appreciation for the opportunity to shadow staff and learned some very useful skills.

- **Monitoring Station Cleanup**: In addition to assisting the monitoring staff, the crew was able to assist the stormwater staff complete some extra projects that may not have been completed otherwise. The crew removed 11.5 cubic yards of green waste from station GLE3 and installed some steps to provide safe access to the creek (Figure 5.1 to 5.3). They removed 16 cubic yards (2,540 lbs) of scotch broom from MIL12 (Figure 5.4 to 5.5). This site will need to monitored due to the well established seed bank and the fact that scotch broom seeds are viable for nearly 100 years. They also pulled 6.75 cubic yards (3,840 lbs) of yellow flag iris from Mill Creek and East Fork Pringle Creek (Figure 5.6). They removed 1.5 cubic yards of blackberry from PRI12, 2 cubic yards of ivy from PRI3, and 3 cubic yards of green waste from GLN3.

![Figure 5.1: The crew removing invasive species from BAT3.](image1)

![Figure 5.2: BAT3 after the invasive have been removed.](image2)
Service Requests: Throughout the season, the crew responds to a variety of service requests that the Stormwater services staff crews receive from the public. This season, the crew completed service requests ranging from removing mattresses and other trash from ditches, to sawing and removing downed trees that were obstructing creek flow.

Past Restoration Project Cleaning and Maintenance: This year it was decided to revisit the last three restoration projects and perform some basic native plant maintenance and removal of invasive species. Approximately four cubic yards of blackberry and poison hemlock were removed between the three sites. No additional plants were planted at these restoration sites this year (Figures 5.1 - 5.4).
Figure 5.1: The restoration project from 2011, the invasive hemlock came back, though not as aggressively as the year before.

Figure 5.2: The same area from figure 5.1 after removing the hemlock.

Figure 5.3: The restoration project from 2012, the ivy came back with a vengeance and overcrowded many of the plants planted.

Figure 5.4: The same bank after the ivy was removed. Some of the plants were killed by the ivy, but the ones that did survive seem to be doing well. This site will need continued monitoring to ensure its success.
6.0 Safety and Training Summary

Ensuring a safe work environment is a top priority for the crew. From wading through densely vegetated creeks to loading materials alongside busy roads, the crew encounters a diverse range of working environments, each with its own set of potential hazards. To address these dangers, the crew is provided with an array of personal protective equipment. Additionally, the crew attends various training sessions throughout the season to learn about various dangers and mitigating/preventative safety measures. With proper planning, equipment, and training, the crew members are able to complete their tasks safely, effectively, and professionally.

The crew may encounter a variety of risks as they perform their duties, including:

- Wildlife and domestic animals, including dogs, nutria, beavers, and water fowl.
- Spiders, insects, mosquitoes, and wasps.
- Toxic plants, including Poison oak, stinging nettle, and Poison hemlock.
- Biohazards from human/animal feces and blood.
- Sharp objects, including nails, hypodermic needles, broken glass, and sharp metals.
- Animal traps used for capturing fur-bearing animals and rodents.
- Illicit discharges and chemical spills, such as sewage leaks and oil/diesel spills.
- Adverse water conditions.
- Traffic and vehicles, when working along roads and in the right of way.

The cleaning crew members are outfitted with personal protective equipment to prepare them for a range of possible hazards. They wear long pants, boots or waders, heavy-duty work gloves, hats, retro-reflective safety vests, and eye protection. When conducting overhead work, such as loading materials into a dump truck, the crew members wear safety hard hats. The crew also carries Sharps disposal tubes for any hypodermic needles they find. All of the crew vehicles contain first aid kits, which include bee sting swabs and Poison oak oil-remover lotions. When working in deeper water, the crew utilizes a small boat, personal floatation devices, throw ropes/rings, and chest waders. If a crew member comes into contact with poison oak, they are allowed to take a cold shower and then use a poison oak oil remover called Tecnu.

In order to prepare them for the dangers of the job, the crew members attend extensive training sessions at the start of the season. The crew’s training schedule includes the following topics: aggressive dogs, chainsaw and machete use/maintenance, backing up trailers, operating dump trucks, personal safety and hostile people, blood-borne pathogen awareness, illicit discharge identification, fire extinguisher use, and work zone traffic control. These trainings require coordination with the City of Salem’s Police Department and Environmental Services, the Oregon Department of Transportation Technology Transfer Division, and Bio-med.

Although the crew may come across an assortment of risks and dangers, their commitment to proper procedures keeps them safe. This year, only one crew member required emergency hospital treatment for a back injury.
7.0 Conclusion

The end of the 2013 season marked the sixteenth year of this incredible program. The crew of dedicated interns spent nearly every day of their summer break wading through the city’s creeks, working across a variety of neighborhoods to enhance their local watersheds and mitigate potential flood hazards. Over a three-month period, the crew walked 46.93 miles of creek, removing a total of 12,025 pounds of trash and 117.25 cubic yards of natural debris, while also recycling 3,255 pounds of material. They also designed and constructed a restoration project along a reach of Pringle Creek.

The job of the cleaning crew is no easy task. Their work is both physically and mentally taxing, and requires the effort and commitment of every crew member to be successful. On a daily basis, the crew worked as a team, using their educational experiences to solve a variety of challenges. This season, the crew was very fortunate to have two returning members functioning as the crew leads. Their knowledge and work experience were vital for maintaining the crew's focus, organization, and safety. The crew also had some great new hires who will hopefully return for another season.

The expectations were high from the crew and they did not disappoint. They were able to finish the required mileage of creeks several weeks in advance, allowing them to help out various staff in ways they have not done in the past. The most rewarding experience for a majority of the crew was having a positive influence on urban stream health and their coworkers. On numerous occasions the crew had positive interactions with Salem residents living along the creeks thanking them for their work. Without the dedication the stream crew shows every summer to protecting Salem’s streamside residents, extreme storm events could be much more severe.