Thurston County’s 2011 Integrated Pest Management Report

History:
The Board of County Commissioners adopted the Thurston County Pesticide Use Policy in 1989 and the revised Pest and Vegetation Management Policy in 1993. The Board adopted these policies after significant public involvement and input from the Pesticide Use Study Committee. These policies established a mandate for all county departments using pesticides to adopt Integrated Pest Management (IPM) programs and prescriptions. Additionally, it created the Pest and Vegetation Management Advisory Committee (PVMAC). During this time, the county placed a moratorium on the use of pesticides until the IPM policies and programs were approved by the County Commissioners. The Pest and Vegetation Management Policy applies to only county departments and use of pesticides on County property or land managed by the County.

In 1990, the Thurston County Board of County Commissioners appointed nine citizens to the PVMAC, today the committee has six members with three positions open. The Committee has been directed to assist in the implementation of the Pest and Vegetation Management Policy. This Policy emphasizes development and implementation of IPM programs that provide effective pest and vegetation management with minimal environmental and public health impacts. Often, an indirect result of IPM is a reduction in pesticide use.

2011 IPM Program

In 2011, there was an overall increase in the use of pesticides by Thurston County due mostly to a ditch maintenance effort at the Waste and Recovery Center (WARC) and an increased effort for long-term Scotch broom control at the 1,100 acre prairie in Glacial Heritage Preserve. The WARC and the Noxious Weed Control program continued to manage a great deal of their vegetation problems with manual control efforts although not all of their areas can be effectively controlled mechanically or with hand pulling.

Public Works Department - Parks Maintenance Program:
The Public Works Department Transportation Division is responsible for the maintenance of all county rights-of-way. The vegetation control program is conducted almost entirely by mechanical means, primarily mowing. The Public Works’ Parks Maintenance Program provides building and grounds maintenance in a variety of locations.Outlined below are general descriptions of the type of areas maintained, the duties performed and a list of the specific sites:

1. COUNTY PARKS: Building and grounds maintenance of lawn areas, picnic shelters, trails, parking areas, restrooms, caretaker residences, park grounds, etc. The sites include: Burfoot Park, Kenneydell Park and Frye Cove Park.

2. ATHLETIC FACILITIES: Building and grounds maintenance of sports fields, picnic areas, trails, parking areas, restrooms, park grounds, etc. The majority of the work involves turf care. The sites include: Kenneydell Park Ball Fields and the Griffin Athletic Fields.

3. COUNTY TRAIL SYSTEM: Building maintenance of trailhead restrooms and kiosks and grounds maintenance of over 40 miles of trail. The majority of the work involves mowing and trimming vegetation along trails as well as control of noxious weeds. The Chehalis Western Trail and the Yelm-Tenino trail are paved and make up 35 miles of the system with the 12.5 mile Gate-Belmore trail held for future development.

4. COUNTY OWNED BUILDINGS AND FACILITIES: Landscape maintenance including; turf
care, weeding, pruning, etc. of the following sites: County Courthouse, Emergency Operations Center, Coroner’s Office, Youth Service Center, Building #4, Building #5, Ferguson (CSA) Building, Accountability and Restitution Facility (ARC), County Health Building, McLane Building, Tilley Shop Facility, and the Evaluation and Treatment Center.

5. PRESERVES AND HISTORICAL SITES: The sites include: Fort Eaton, Mima Cemetery, George Washington Bush Memorial, Glacial Heritage Preserve, Woodland Creek Wetlands, and the Johnson Point Wetlands. These sites require grounds maintenance of lawns, formal and native beds, control of non-native species, habitat protection, etc.

6. STORMWATER PONDS: The Parks Department controls invasive plants such as blackberry in county owned stormwater ponds. The treatments are necessary so the ponds can perform their necessary function.

**Public Works Department – Waste and Recovery Center (WARC)**
The WARC is Thurston County’s closed landfill that operates as a transfer station for solid waste and other waste recycling programs. Although the waste that is brought into the facility is shipped out of County for disposal, there are still areas where waste is separated and containerized. These areas of waste handling are an ongoing source for rodent pressure. The former landfill area is gradually being utilized for other community uses that are altering the pest and vegetation goals. Areas that used to be managed with a high tolerance of weeds have been converted to a dog park, a park and ride, and a high end demonstration garden for the master gardeners program. Vegetation selection and placement will be key components to the success of managing these areas with minimal pesticide usage.

**Resource Stewardship - Noxious Weeds Program:**
Herbicides are used only for noxious weed and other nuisance vegetation control within the county rights-of-way. The county’s Noxious Weeds Department oversees the control of listed noxious weeds in Thurston County.

**Resource Stewardship - Water Resources Program:**
The Resource Stewardship’s Water Resources Division manages the Long Lake and Lake Lawrence Management Districts and the county’s Stormwater and Surface Water Utility. The Lakes Program implements Commissioner approved IPM prescriptions to control the noxious white fragrant waterlily and nuisance aquatic plants using county approved herbicides. The Stormwater and Surface Water Utility uses the County’s Parks Maintenance Program staff to control vegetation on county owned stormwater facilities when they impede the performance of the structure.

**Central Services Department**
The Central Services Department Facilities Division is responsible for the maintenance of all county buildings and facilities. The primary focus of their control program is on insects such as carpenter and moisture ants, rats, and yellow jackets.

**Description of pesticide use:**
The county’s only use of pesticides between 1990 and 1996 was the use of fluridone on Long Lake to control Eurasian Watermilfoil using an approved IPM Prescription. However, due to the infancy of the program the amount of herbicide used wasn’t made a county record. Beginning in 1996 when the first IPM programs were approved the county began to track the amount of pesticides being applied annually. Figure 1 below, shows the total amount of pesticides used by the County over the past fourteen years. The “Pounds of active ingredient” in all the figures is based the percentage of active ingredient (or EPA’s determination of acid equivalents) within the pesticide product used (which includes other ingredients like water, clay, surfactant, etc.) The graph clearly shows variability in the
amount of pesticides applied annually.

The reasons for the differences in the amount of pesticides used from year to year vary. Some years it is due to new sites being added to the county’s inventory of areas to maintain and sometimes a department needs to focus on controlling a new problem pest. Examples of problem sites include the Thurston County Waste and Recovery Center, Glacial Heritage Nature Preserve, Thurston County Emergency Management Center, trails, the Roads Maintenance Facility, and Long Lake and Lake Lawrence. Pest and weed control at these sites is necessary due to a variety of site-specific goals identified in each of their approved IPM Programs and Prescriptions.

![Annual Pesticide Use by County](image)

Figure 1 – Total amount of pesticides used by Thurston County

Figure 2 breaks down the amount of total “pounds of active ingredient” of pesticides used by County departments at the County’s Waste and Recovery Center, the Glacial Heritage Park, at and around County buildings and parks, for control of noxious weed control, and the control of nuisance aquatic plants and noxious fragrant water lilies in Lake Lawrence and Long Lake. Each of these sites and control programs are explained below and more detail can found in the tables at the end of the report.
Waste and Recovery Center (WARC)
The landscape at the WARC, which is the County’s sanitary landfill, is a very challenging site to manage for weeds. The landscape is about eleven acres of various species of hardy ornamental shrubs. Planted in 1991; it included an irrigation system and two feet of topsoil on top of an impervious synthetic membrane. Initial weed control included hand-weeding and adding bark mulch to the open ground between the shrubs. The IPM Plan projected that the canopy of the shrubs would fill in and shade out competing vegetation thereby requiring only hand weeding and mulch for maintenance of the site.

Many of the shrubs have died due to the thin layer of topsoil, the heat generated by the underlying landfill material, problems with the irrigation system, damage to the shrubs from rabbits, and construction of a gas line. The shrubs continue to be replaced with varieties that survive harsh conditions. While mulch is continuously being added, the result is the canopy cover is not helping reduce the weed growth as planned. Much of this area has been recently redeveloped (park and ride lot, dog park, hazo house, and recyclable waste collection) and no longer has vegetation or is manually controlled. The dog park has been replanted and is designated as a “no pesticide” area.

In 2011 herbicides were used in the roadside ditches to assist in their maintenance. The ditches alongside the roads are lined with durable plastic overlain with rock and over the years weeds have gotten established in the accumulated sediment and obstruct water flow. The ditches with the most accumulated sediment and weeds were excavated and relined while the remaining ditches were sprayed. Ongoing use of rodenticides around the tipping floor area (where municipal garbage is managed) is also included in this report for the first time. Figure 3 shows the pounds of herbicides and rodenticides used at the WARC since 1996.
Glacial Heritage Nature Preserve

The Glacial Heritage Nature Preserve is a 1,020-acre site located in southwestern Thurston County that was historically dominated by prairie vegetation. The County owns the land, surrounding an 80-acre in-holding owned by The Washington Department of Fish and Wildlife, but the Nature Conservancy manages the entire property. The management goal of the Preserve is to restore it to native prairie with all associated species. In the 1980’s, when the County obtained the land, the site was wholly inundated with Scotch broom and was beginning to experience an invasion of non-native grasses (Figures 4a and 4b). The first step in prairie restoration efforts was to rid the site of Scotch broom. The Nature Conservancy developed an integrated program to control Scotch broom that began utilizing mowing or mechanical removal, followed by fire and chemical control, and finally hand pulling. By the end of 2003, most of the original stand of Scotch broom had been removed. Since Scotch broom seeds persist for up to 50 years in the soil, they continue to germinate and require control. Currently, 90% of Scotch broom infestations on the preserve are controlled by prescribed fire, hand pulling and spot spraying of herbicides. The remaining 10% requires the use of herbicides.

In 2010, 45 acres of Scotch broom infestation was managed with hand pulling and tractor mowing. Prescribed burning of 70 acres took place to help control Scotch broom by inducing seed germination and to further assist in the control non-native grasses. In 2011, about 400 acres were treated to control emerging Scotch broom in conjunction with controlled burns and glyphosate herbicide applications to further promote seed germination and reduce the available seed bank. The controlled burn and glyphosate applications also reduced the amount of non-native forbs within the treated area. Although the Scotch broom application increased the use of herbicides at the Preserve, it is expected to result in a great herbicide use reduction in a few years when the Scotch broom infestation and seed bank is under control, allowing for sufficient control by hand pulling.

Following the removal of the Scotch broom, the Nature Conservancy increased the planting of desirable forbs and bunch grasses, however, non-native grasses also began filling in open spaces. In 2007, an approved Non-Native Grass IPM Prescription was implemented. The increase in herbicide
use in 2007 was due to the addition of the control of various species of Eurasian grasses. Figure 4 below, shows the Glacial Heritage Preserve in 1996 and in 2009 (the shaded areas at the top of the 1996 picture is Scotch broom).

In 2011, a different herbicide was used (Fusilade DX) to control non-native grasses. The application did not provide the level of control that was expected, but Fusilade DX will be used again in 2012 with hopes of better efficacy. Trials with other herbicides are being undertaken at other Nature Conservancy sites for non-native grass control to assist in identifying a more effective alternative to Fusilade DX.

Figure 4a - Glacial heritage aerial in 1996. Dark patches are broom infestations.  
Figure 4b - Glacial heritage aerial in 2009

![Figure 5 – Total herbicide use at the Glacial Heritage Nature Preserve](image-url)
Water Resources Division (Lakes)
The Water Resources Division manages the Lawrence and Long Lake Management Districts. In the early 1990’s Long Lake had a treatment to eradicate Eurasian Watermilfoil a noxious, invasive, and non-native aquatic plant. Liquid SONAR-AS (active ingredient fluridone) was selected as the herbicide, due to its very low toxicity to animals and aquatic organisms.

In 1996, the Commissioners approved an IPM Prescription for the control of the noxious fragrant waterlily. That same year about 80 acres of fragrant waterlilies were treated in Lake Lawrence with herbicide; since then spot treatments have been conducted intermittently to keep them under control.

In 2006, herbicide treatment began for about 42 acres of waterlilies in Long Lake. Fewer than 4 acres remain to be treated; native yellow spatterdock lilies are re-colonizing the treated areas.

In 2007, the Commissioners approved an IPM prescription for the control of nuisance native aquatic plants in Long Lake and Lake Lawrence. The prescription allows for treatment up to 45 acres annually in each lake. The herbicides SONAR-PR and SONAR-Q (pellets containing the active ingredient fluridone) are now being used in the lakes. The pellets are 95% clay, which slowly releases the fluridone and prolongs the exposure time at extremely low concentrations, between 1-10 parts per billion.

In 2010, there was no need to treat fragrant water lilies in either lake. Sonar Q was used to treat a combined 88.6 acres in Long Lake and Lake Lawrence.

In 2011, the Lake Management Districts each applied fluridone (Sonar) to 45 acres of heavily vegetated littoral areas in the lakes. Water Resources consulted with technical staff from Sonar's manufacturer, SePro, to develop new application rates and schedules based upon data collected during the 2007, 2009 and 2010 seasons. As a result, two types of Sonar pellets were used: one that released the Sonar quickly (Sonar Q) and one that released the Sonar slowly (Sonar PR).

The new approach was effective in Lake Lawrence, and in Long Lake the control was variable. In the narrow passages, where Long Lake flows swiftly, Sonar concentrations could not be maintained and plant control was limited. It is expected that nuisance levels of plants in those areas will be harvested in the future. Where the treatment was effective, there is less need to treat again in 2012, and closer to a goal of alternate treatment years.
Noxious Weeds Program
The Noxious Weed Program is charged with the control of listed noxious weeds throughout Thurston County. Herbicides are applied to control noxious weeds when manual control is not effective. Figure 7 shows the pounds of herbicides used to control noxious weeds by the County.

During 2004, experiments began testing several application techniques (stem injection, cut stem, and foliar applications) for knotweed control on county rights-of-way. The results of these experiments were used to write the current knotweed IPM prescription. Treatment of Japanese knotweed along rights-of-way began in 2005. In 2006, there were 296 knotweed applications and in 2010 there were only about 50 applications. Besides a reduction in applications since 2006, there has been a significant reduction in the knotweed infestation size. Also in 2005, a great deal of Scotch broom was growing at the Roads Maintenance Facility located on Tilley Road in sand and gravel storage piles. These plants became a seed source that required control to stop the spreading of Scotch broom by county equipment.

In 2011, the Noxious Weed Program used less than one third of the amount of herbicide product than in 2010. The increase in pesticide use in 2010 was due to three stem injection applications for knotweed (spp.) control in areas where foliar applications may migrate to neighboring wetlands. Stem injection utilizes a higher concentration of product that is injected into each plant stem (over 1,200 stems injected). In 2011, knotweed control did not require stem injections, so the amount of herbicide used for knotweed control was about 33% of the herbicide used the previous year.

The County monitored 754 noxious weed infestations and 330 (44%) had noxious weeds growing on them, a decrease of about 5% from 2010. Herbicides were used at less than a third (30%) of these weed sites with the remaining sites controlled manually. Manual control continues to be the most widely used control method for most noxious weed species in Thurston County.
Figure 7 – Total pesticides used by the Noxious Weeds Program
<table>
<thead>
<tr>
<th>Program</th>
<th>Pest Problem</th>
<th>Location</th>
<th>Date</th>
<th>Applicator</th>
<th>Product</th>
<th>Quantity of Pesticide Used</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Noxious Weeds Program</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Common bugloss</td>
<td>1 application</td>
<td>5/11</td>
<td>Contractor</td>
<td>RoundUp Pro</td>
<td>0.06 gallon mix / 0.16 oz product</td>
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<td></td>
<td>Hawkweed (spp.)</td>
<td>5 applications</td>
<td>5-7/11</td>
<td>Contractor</td>
<td>Milestone</td>
<td>0.75 gallons mix / 0.1 oz product</td>
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<td></td>
<td>Knapweed (spp.)</td>
<td>7 applications</td>
<td>6-7/11</td>
<td>Contractor</td>
<td>Milestone</td>
<td>2 gallons mix / 0.25 oz product</td>
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<tr>
<td></td>
<td>Knotweed (spp.)</td>
<td>42 applications</td>
<td>7-9/11</td>
<td>Contractor</td>
<td>Habitat</td>
<td>54 gallons mix / 116.2 oz product</td>
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<td>Poison Hemlock</td>
<td>7 applications</td>
<td>4-5/11</td>
<td>Contractor</td>
<td>Habitat</td>
<td>4.25 gallons mix / 5.4 oz product</td>
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<td>Purple loosestrife</td>
<td>1 application</td>
<td>9/11</td>
<td>Contractor</td>
<td>Habitat</td>
<td>0.125 gallon mix / 0.32 oz product</td>
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<td></td>
<td>Scotch broom</td>
<td>2 applications</td>
<td>6/11</td>
<td>Contractor</td>
<td>Milestone</td>
<td>127 gallons mix / 15.9 oz product</td>
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<td></td>
<td>Shiny geranium</td>
<td>7 applications</td>
<td>5-6/11</td>
<td>Contractor</td>
<td>Habitat</td>
<td>7.2 gallons mix / 9.2 oz product</td>
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<td>Shiny geranium</td>
<td>15 applications</td>
<td>10/11</td>
<td>Contractor</td>
<td>Milestone</td>
<td>23 gallons mix / 2.5 oz product</td>
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<td></td>
<td>Spurge laurel</td>
<td>2 applications</td>
<td>4/11</td>
<td>Contractor</td>
<td>Element 3A</td>
<td>0.5 gallon mix / 2 oz product</td>
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<tr>
<td></td>
<td>Sulfur cinquefoil</td>
<td>1 application</td>
<td>6/11</td>
<td>Contractor</td>
<td>Milestone</td>
<td>1.1 gallon mix / 0.14 oz product</td>
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<td></td>
<td>Tansy ragwort</td>
<td>1 application</td>
<td>7/11</td>
<td>Contractor</td>
<td>Milestone</td>
<td>6 gallons mix / 0.75 oz product</td>
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<td></td>
<td>Wild Chervil</td>
<td>9 applications</td>
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<td>Contractor</td>
<td>Habitat</td>
<td>17.9 gallons mix / 23 oz product</td>
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<tr>
<td><strong>Solid Waste (WARC)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td>Weeds and Grass</td>
<td>Waste and Recovery Center</td>
<td>7-8/11</td>
<td>County Employee</td>
<td>RoundUp Pro</td>
<td>171 gallons mix / 345 oz product</td>
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<td></td>
<td>Rodents</td>
<td>Waste and Recovery Center</td>
<td>2011</td>
<td>Contractor</td>
<td>Contrax Blocks</td>
<td>59.25 pounds</td>
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<td>Rodents</td>
<td>Waste and Recovery Center</td>
<td>2011</td>
<td>Contractor</td>
<td>Maki Mini Blox</td>
<td>2 pounds</td>
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<td></td>
<td>Rodents</td>
<td>Waste and Recovery Center</td>
<td>2011</td>
<td>Contractor</td>
<td>Ditrac All Weather Blox</td>
<td>1 pound</td>
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<tr>
<td></td>
<td>Ants</td>
<td>Waste and Recovery Center</td>
<td>2011</td>
<td>Contractor</td>
<td>Conquer EC</td>
<td>0.5 gallons mix / 1 ounce of product</td>
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<tr>
<td>Program</td>
<td>Pest Problem</td>
<td>Location</td>
<td>Date</td>
<td>Applicator</td>
<td>Product</td>
<td>Quantity of Pesticide Used</td>
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<tr>
<td>Central Services</td>
<td>Ants</td>
<td>Court Buildings 2 and 3</td>
<td>6/11</td>
<td>Contractor</td>
<td>Phantom</td>
<td>0.25 gallons mix / 0.75 oz product</td>
</tr>
<tr>
<td>Rodents</td>
<td>Ants</td>
<td>Court Buildings 2 and 3</td>
<td>8/11</td>
<td>Contractor</td>
<td>Termidor</td>
<td>0.5 gallons mix / 0.4 oz product</td>
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<tr>
<td>Rodents</td>
<td>Ants</td>
<td>Mary Elder Blg. (CSTU)</td>
<td>9/11</td>
<td>Contractor</td>
<td>Tempo Ultra WP</td>
<td>0.25 gallons mix / 0.33 oz product</td>
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<tr>
<td>Rodents</td>
<td>Rodents</td>
<td>Emergency Operations Center</td>
<td>2011</td>
<td>Contractor</td>
<td>Generation Bait</td>
<td>133 blocks @ 0.71 oz / block = 94.4 oz.</td>
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<tr>
<td>Rodents</td>
<td>Rodents</td>
<td>Public Health and Social Services Blg.</td>
<td>11-12/11</td>
<td>Contractor</td>
<td>Generation Bait</td>
<td>16 blocks @ 0.71 oz / block = 11.4 oz.</td>
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<td>Rodents</td>
<td>Mary Elder Blg. (CSTU)</td>
<td>10-12/11</td>
<td>Contractor</td>
<td>Generation Bait</td>
<td>38 blocks @ 0.71 oz / block = 27 oz.</td>
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<td>Rodents</td>
<td>Rodents</td>
<td>Parks / WSU Co-op Blg.</td>
<td>10-12/11</td>
<td>Contractor</td>
<td>Generation Bait</td>
<td>32 blocks @ 0.71 oz / block = 23 oz.</td>
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<tr>
<td>Yellow Jackets</td>
<td>Yellow Jackets</td>
<td>Mary Elder Blg. (CSTU)</td>
<td>9/11</td>
<td>Contractor</td>
<td>Drione</td>
<td>0.2 oz</td>
</tr>
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<td>Water Resources</td>
<td>Potamogeton and Najas</td>
<td>Long Lake</td>
<td>4-6/11</td>
<td>Contractor</td>
<td>Sonar Q / Sonar PR</td>
<td>1,964 pounds product</td>
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<td>Water Resources</td>
<td>Potamogeton and Najas</td>
<td>Lake Lawrence</td>
<td>4-6/11</td>
<td>Contractor</td>
<td>Sonar Q / Sonar PR</td>
<td>1,631 pounds product</td>
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<td>Parks Program</td>
<td>Perennial Weeds</td>
<td>ARC</td>
<td>6-8/11</td>
<td>County Employee</td>
<td>RoundUp Pro</td>
<td>37 gallon mix / 74 oz product</td>
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<td>Parks Program</td>
<td>Perennial Weeds</td>
<td>Emergency Operation Ctr</td>
<td>7/11</td>
<td>County Employee</td>
<td>RoundUp Pro</td>
<td>5 gallon mix / 10 oz product</td>
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<td>Perennial Weeds</td>
<td>PH&amp;SS Building</td>
<td>7/11</td>
<td>County Employee</td>
<td>RoundUp Pro</td>
<td>4 gallon mix / 8 oz product</td>
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<td>Glacial Heritage</td>
<td>Eurasian grasses</td>
<td>Glacial Heritage</td>
<td>2011</td>
<td>Nature Conservancy</td>
<td>Fusilade DX</td>
<td>2,335 gal mix / 2,242 oz or 17.5 gal. product</td>
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<td>Glacial Heritage</td>
<td>Scotch Broom</td>
<td>Glacial Heritage</td>
<td>2011</td>
<td>Nature Conservancy</td>
<td>Garlon 4 Ultra</td>
<td>1,575 gal mix / 4,032 oz or 31.5 gal. product</td>
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<td>Glacial Heritage</td>
<td>Scotch Broom</td>
<td>Glacial Heritage</td>
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<td>Nature Conservancy</td>
<td>Mad Dog</td>
<td>41 gal mix / 105 oz. or 0.82 gal. product</td>
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<tr>
<td>Department</td>
<td>Product</td>
<td>Amount of Product</td>
<td>Amount of Active Ingredient (acid equivalents for herbicides)</td>
<td>Amount of Product and Mix Applied</td>
<td></td>
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<tr>
<td>Noxious Weeds Program (Roads)</td>
<td>RoundUp Pro</td>
<td>0.16 fluid oz.</td>
<td>Glyphosate = 0.005 pounds</td>
<td>0.06 = gallons</td>
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<tr>
<td></td>
<td>Element 3A</td>
<td>2 fluid oz.</td>
<td>Triclopyra TEA = 0.05 pounds</td>
<td>0.5 = gallons</td>
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<td>Habit 1</td>
<td>155 fluid oz.</td>
<td>Imazapyr = 2.4 pounds</td>
<td>83.3 = gallons</td>
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<td></td>
<td>Milestone</td>
<td>19.6 fluid oz.</td>
<td>Aminopyralid = 0.3 pounds</td>
<td>160 = gallons</td>
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<tr>
<td>Solid Waste (WARC)</td>
<td>RoundUp Pro</td>
<td>345 fluid oz.</td>
<td>Glyphosate = 10.8 pounds</td>
<td>171 gallons</td>
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<td></td>
<td>Contra Blox</td>
<td>59.25 pounds</td>
<td>Bromadiolone = 0.003 pounds</td>
<td>59.25 pounds</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Maki Mini Blocks</td>
<td>2 pounds</td>
<td>Bromadiolone = 0.0001 pounds</td>
<td>2 pounds</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ditrac All Weather Blox</td>
<td>1 pound</td>
<td>Diphacinone = 0.00005 pounds</td>
<td>1 pound</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Conquer EC</td>
<td>1 fluid oz.</td>
<td>Esfenvalerate = 0.0025 fluid oz.</td>
<td>0.00002 gallons</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parks Program (Glacial Heritage Preserve)</td>
<td>RoundUp Pro</td>
<td>46 fluid oz.</td>
<td>Glyphosate = 1.4 pounds</td>
<td>92 gallons</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Garlon 4 Ultra</td>
<td>4,032 fluid oz</td>
<td>Triclopyra = 126 pounds</td>
<td>1,575 gallons</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mad Dog</td>
<td>105 fluid oz.</td>
<td>Glyphosate = 2.5 pounds</td>
<td>41 gallons</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fusilade DX</td>
<td>2,242 fluid oz.</td>
<td>Fluazifop-p-butyl = 35 pounds</td>
<td>2,363 gallons</td>
<td></td>
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<tr>
<td>Water Resources Program (Lakes)</td>
<td>Sonar Q and Sonar PR</td>
<td>57,520 oz.</td>
<td>Fluridone = 180 pounds</td>
<td>3,595 pounds</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Central Services</td>
<td>Generation Bait</td>
<td>155.5 oz</td>
<td>Difethialone = 0.004 ounces</td>
<td>9.7 pounds</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Phantom</td>
<td>0.75 oz</td>
<td>Chlorfenapyr = 0.0004 ounces</td>
<td>0.25 gallons</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Drione</td>
<td>0.2 oz</td>
<td>Silica gel = 0.08 ounces</td>
<td>0.01 pounds</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Termidor</td>
<td>0.4 oz</td>
<td>Fipronil = 0.036 ounces</td>
<td>0.5 gallons</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Tempo Ultra WP</td>
<td>0.2 oz</td>
<td>B-cyfluthrin = 0.02 ounces</td>
<td>0.01 pounds</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1Roundup Pro has 4# acid equivalents/gallon product  
2Aquamaster has 4# acid equivalents/gallon product  
3Garlon 4 Ultra has 4# acid equivalents/gallon product  
4Post has 1.5# acid equivalents/gallon product  
5Generation bait - 129 blocks x 0.71 oz per block = 92 oz product at 0.0025% = 0.002 oz difethialone at 0.01%  
6Phantom is a % by volume calculation (chlorfenapyr at 21.4%)  
7Contra Blox contain 0.005% active ingredient  
8Maki Mini Blocks contain 0.005% active ingredient  
9Conquer EC contains 0.25% active ingredient  
10Element 3A has 3# acid equivalents/gallon product  
11Tempo Ultra WP contains 10% of the active ingredient B-cyfluthrin  
12Habitat has 2# acid equivalents/gallon product  
13Milestone has 2# acid equivalents/gallon product  
14Sonar Q and PR have 5% fluridone by weight  
15Spectracide is a % by volume calculation (prallethrin at 0.025%) and (Lambda cyhalothrin  
16Drione is a % by volume calculation (silica gel at 40%, piperonyl butoxide at 10% and pyrethrins at 1%)  
17Ditrac All Weather Blox contain 0.005% active ingredient  
18Teneraid contains 9.1% of the active ingredient fipronil  
19Mad Dog has 3# acid equivalents/gallon product  
20Fusilade DX has 2# acid equivalents/gallon product
<table>
<thead>
<tr>
<th>Year</th>
<th>Noxious Weeds</th>
<th>Parks &amp; Preserve</th>
<th>Solid Waste (WARC)</th>
<th>Water Resources</th>
<th>Central Services</th>
<th>Total Product Used*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1996</td>
<td>Roundup = 94 oz</td>
<td>Roundup = 1,719 oz or 13.43 gal</td>
<td>Combined with Parks data</td>
<td>Tempo 20 WP = 1 oz product Drione Dust = .25 oz Vengeance = 2 oz Rodeo = 5220 oz</td>
<td>Tempo 20 WP = 12.68 oz Drione dust = .5 oz Gentrol = 3.5 oz</td>
<td>7,042.04 oz = 440.13 lbs</td>
</tr>
<tr>
<td>1997</td>
<td>Roundup = 106.25 oz Manage = 20.25 g / .71 oz Stinger = 2.5 oz</td>
<td>Roundup =1,044.48 oz or 8.16 gal</td>
<td>Combined with Parks data</td>
<td>Rodeo = 1318 oz</td>
<td>No applications</td>
<td>2,471.94 oz = 154.50 lbs</td>
</tr>
<tr>
<td>1998</td>
<td>Roundup = 42 oz Manage = 10.8 g / .38 oz Stinger = 28.5 oz</td>
<td>Roundup Pro = 392 oz or 3.06 gal</td>
<td>Combined with Parks data</td>
<td>No applications</td>
<td>No applications</td>
<td>513.56 oz = 32.10 lbs</td>
</tr>
<tr>
<td>1999</td>
<td>Roundup = 61.875 oz Manage = 1.46 g / .05 oz Stinger = 4.7575 oz</td>
<td>Roundup = 793.6 oz or 6.2 gal Enforcer (Wasp) = 12 oz can</td>
<td>Combined with Parks data</td>
<td>No applications</td>
<td>No applications</td>
<td>872.28 oz = 54.52 lbs</td>
</tr>
<tr>
<td>2000</td>
<td>Roundup = 78.29 oz Manage = .05 oz Stinger = .16 oz</td>
<td>Roundup = 1,548 oz or 12.09 gal Fast Trac = .56 oz</td>
<td>Combined with Parks data</td>
<td>No applications</td>
<td>No applications</td>
<td>1,629.15 oz = 101.8 lbs</td>
</tr>
<tr>
<td>2001</td>
<td>Roundup = 16.62 oz Manage = 1.58 g. or .05 oz Transline = .14 oz</td>
<td>Roundup = 2,475 oz or 19.34 gal Spectracide = 40 oz Ortho Hornet &amp; Wasp = 24 oz</td>
<td>Combined with Parks data</td>
<td>No applications</td>
<td>No applications</td>
<td>2,555.81 oz = 159.7 lbs</td>
</tr>
<tr>
<td>Year</td>
<td>Noxious Weeds</td>
<td>Parks &amp; Preserve</td>
<td>Solid Waste (WARC)</td>
<td>Water Resources</td>
<td>Central Services</td>
<td>Total Product Used</td>
</tr>
<tr>
<td>------</td>
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<td>--------------------</td>
<td>-----------------</td>
<td>-----------------</td>
<td>--------------------</td>
</tr>
<tr>
<td>2002</td>
<td>Roundup = 20 oz</td>
<td>Roundup = 9,649 oz or 75.38 gal Fastrac = 32 g or 1 oz</td>
<td>Combined with Parks data</td>
<td>No applications</td>
<td>Drione = 2 oz Tempo 20 WP = 1 oz</td>
<td>9,673.13 oz = 604.57 lbs</td>
</tr>
<tr>
<td>2003</td>
<td>Roundup = 112 oz Transline = 1.98</td>
<td>Roundup = 5,030.33 oz or 39 gal</td>
<td>Combined with Parks data</td>
<td>Rodeo = 270 oz</td>
<td>Contrac Blox = 51.25 oz</td>
<td>5,466.16 oz = 341.64 lbs</td>
</tr>
<tr>
<td>2004</td>
<td>Roundup = 183.6 oz Aquamaster = 224.0 oz</td>
<td>Roundup = 2226.6 oz / 17.4 gal Fast Trac Blox = 96g = 3.4 oz</td>
<td>Combined with Parks data</td>
<td>Rodeo = 180 oz product</td>
<td>Contrac Blox = 46 oz Tempo 20 WP = 12 oz Talstar 1 = 8 oz Drione Dust = 0.2 oz Phantom = 34.5 oz</td>
<td>2,919.1 oz = 182.44 lbs</td>
</tr>
<tr>
<td>2005</td>
<td>Roundup = 112 oz Aquamaster = 3,322.2 oz</td>
<td>Roundup = 1,957.5 oz</td>
<td>Combined with Parks data</td>
<td>No applications</td>
<td>Contrac Blox = 122 oz Tempo 20 wp = .88 oz Drione dust = .5 oz</td>
<td>5,515.68 oz = 344.73 lbs</td>
</tr>
<tr>
<td>2006</td>
<td>Roundup = 32 oz Rodeo = 154 oz Aquamaster = 1,427.46 oz Habitat = 1,129 oz Milestone = 96 oz</td>
<td>Glyphosate = 585.5 oz</td>
<td>Combined with Parks data</td>
<td>Rodeo = 326 oz</td>
<td>Contrac Blox = 36 oz Tempo 20 WP = 10 g = .35 oz Drione Dust = 4 oz Phantom = 28.5 oz</td>
<td>3,819.42 oz = 238.71 lbs</td>
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<tr>
<td>2007</td>
<td>Roundup = 62.9 oz Aquamaster = 7.8 oz Habitat = 311 oz Milestone = 60 oz</td>
<td>Glyphosate = 6,660.5 oz / 52 gal</td>
<td>Combined with Parks data</td>
<td>Glyphosate =1203oz AquaPro = 2227 oz Fluridone = 720.2 oz or 55.4 lbs Sonar-PR = 1,107 pounds</td>
<td>Generation Bait = 30.3 oz Tempo 20 WP = 1.5 oz Drione Dust = 7 oz Phantom = .25 oz</td>
<td>9,065.15 oz = 566.6 lbs</td>
</tr>
<tr>
<td>Year</td>
<td>Noxious Weeds</td>
<td>Parks &amp; Preserve</td>
<td>Solid Waste (WARC)</td>
<td>Water Resources</td>
<td>Central Services</td>
<td>Total Product Used</td>
</tr>
<tr>
<td>-------</td>
<td>------------------------</td>
<td>---------------------------</td>
<td>----------------------------------------</td>
<td>------------------------------------------</td>
<td>-----------------------------------------</td>
<td>-------------------</td>
</tr>
<tr>
<td>2008</td>
<td>Roundup = 18 oz</td>
<td></td>
<td>Combined with Parks data</td>
<td>Glyphosate = 2,406.2 oz product</td>
<td>Generation Bait = 0.09 oz</td>
<td>7,352.3 oz</td>
</tr>
<tr>
<td></td>
<td>Habitat = 123.9 oz</td>
<td></td>
<td></td>
<td>AquaPro = 4,454 oz</td>
<td>Drione Dust = 2.5 oz</td>
<td>= 459.5 lbs</td>
</tr>
<tr>
<td></td>
<td>Milestone = 5.6 oz</td>
<td></td>
<td></td>
<td>Fluridone = 94 lbs.</td>
<td>Termidor = 0.8 oz</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Sonar-PR= 1,881 pounds</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Garlon 4 = 2551.6 oz / 20 gal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2009</td>
<td>Roundup = 11.7 oz</td>
<td>RoundUp = 1,600 oz</td>
<td>Round up = 248 oz</td>
<td>Glyphosate = 128 oz</td>
<td>Generation Bait = 0.12 oz</td>
<td>49,380 oz</td>
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<tr>
<td></td>
<td>Habitat = 126.6 oz</td>
<td>Spectracide Wasp and</td>
<td></td>
<td>AquaPro = 243 oz</td>
<td>Tempo 20wp = .75 oz</td>
<td>= 3,086 lbs</td>
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<tr>
<td></td>
<td>Milestone = 194 oz</td>
<td>Hornet Killer= 60 oz.</td>
<td></td>
<td>Sonar PR= 2,842 pounds</td>
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</tr>
<tr>
<td></td>
<td>Aquamaster = 4 oz</td>
<td>Milestone = 44 oz</td>
<td></td>
<td>Garlon 4 =1,248 oz</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Garlon 4 = 1,645 oz</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Garlon 4 Ultra = 2,518 oz.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2010</td>
<td>RoundUp Pro = 1.6 oz</td>
<td>RoundUp = 1,369 oz</td>
<td>RoundUp Pro = 34 oz</td>
<td>Sonar Q = 3,593 pounds</td>
<td>Generation Bait = 92 oz</td>
<td>Liquid = 5,962 oz</td>
</tr>
<tr>
<td></td>
<td>Aquamaster = 245 oz</td>
<td>Spectracide Wasp and</td>
<td></td>
<td>Phantom = 2.6 oz</td>
<td>Drione = 1.9 oz</td>
<td>= 388 lbs</td>
</tr>
<tr>
<td></td>
<td>Habitat = 126 oz</td>
<td>Hornet Killer= 20 oz.</td>
<td></td>
<td></td>
<td></td>
<td>Solid = 57,584 oz</td>
</tr>
<tr>
<td></td>
<td>Milestone = 3.4 oz</td>
<td>Poast = 1,645 oz</td>
<td></td>
<td></td>
<td></td>
<td>= 3,600 lbs</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Garlon 4 Ultra = 2,518 oz.</td>
<td></td>
<td></td>
<td></td>
<td>TOTAL = 3,988 lbs</td>
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<tr>
<td>2011</td>
<td>RoundUp Pro = 0.16 oz</td>
<td>RoundUp = 151 oz</td>
<td>RoundUp Pro = 345 oz</td>
<td>Sonar PR= 719 pounds</td>
<td>Generation Bait = 9.75 pounds</td>
<td>Liquid = 6,949 oz</td>
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<tr>
<td></td>
<td>Habitat = 155 oz</td>
<td>Fusilade = 2,242 oz</td>
<td></td>
<td>Phantom = 0.75 oz</td>
<td>Drione = 0.4 oz</td>
<td>= 453 lbs</td>
</tr>
<tr>
<td></td>
<td>Milestone = 19.6 oz</td>
<td>Garlon 4 Ultra = 4,032 oz.</td>
<td></td>
<td>Termitic = 0.4 oz</td>
<td>Tempo 20wp = 0.2 oz</td>
<td>Solid = 3,667 lbs</td>
</tr>
<tr>
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<td>Element 3A = 2 oz</td>
<td></td>
<td></td>
<td></td>
<td>Drione = 0.2 oz</td>
<td>TOTAL = 4,120 lbs</td>
</tr>
</tbody>
</table>

*Pounds of product was calculated for liquids by adding all the ounces together and dividing by 128 to obtain the number of gallons and multiplying that number by 8.34 (one gallon of water weighs 8.34 pounds).*