Bear Creek Greenway and Riparian Corridor
Long-term Vegetation Management Plan

Rogue Valley Council of Governments
March 2018 Update

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Introduction

The Bear Creek Greenway and Riparian Vegetation Management Plan (Vegetation Plan) was developed to provide recommendations for the long-term vegetation management by providing a systematic approach to effectively control invasive plants, establish (plant) native vegetation, provide a competitive edge for existing native vegetation, and re-establish shade along the entire Bear Creek corridor. This Vegetation Plan integrates with the Bear Creek Greenway Management Plan (BCGMP) by providing specific actions to control invasive plants, enhance existing native vegetation, and restore native riparian vegetation where appropriate (e.g., transition and restoration areas) (RVCOG 2006). Actions include:

- Increasing public safety and reducing fire risk along the Greenway and the adjacent riparian corridor, consistent with section 2.1 of the BCGMP.
- Controlling invasive plants along the Greenway, consistent with section 2.3 of the BCGMP.
- Enhancing and establishing native vegetation along the Bear Creek riparian corridor; consistent with section 2.4 of the BCGMP.

This Vegetation Plan also notes the inherent conflict between management of vegetation for public safety and vegetation management to promote fish and wildlife habitat. When blackberry thickets are mechanically removed to reduce hiding cover and fuel loads this often results in the simultaneous elimination of native riparian vegetation and associated degradation of water quality. In some cases, a simple mechanical treatment will also result in a monoculture of blackberry or other invasive species as all competition is removed. The challenge for this plan will be to balance these goals appropriately to develop a greenway that reduces non-native vegetation, supports safe recreation, and provides the important ecological benefits to Bear Creek.

This plan is based on information and recommended actions found in the following planning documents:

- Bear Creek Master Plan (City of Medford 2003).
- Bear Creek Greenway Management Plan 2005-2010 (RVCOG 2006).
- Bear Creek Greenway Management Plan 2017-2022 (Bear Creek Greenway Joint Powers Committee 2017).
- The Medford Parks and Recreation Department (MPRD) Integrated Pest Management Policy (Appendix A).
- Oregon Conservation Strategy (Strategy) (ODFW 2016).
- Bear Creek Watershed Total Maximum Daily Load (ODEQ 2007).
- Final Recovery Plan for the Southern Oregon/Northern California Coast Evolutionarily Significant Unit of Coho Salmon (Coho Recovery Plan) (NMFS 2014).
- Bear Creek Watershed and Rogue Basin Planting Program Guide 2010
- Rogue Restoration Action Plan (RBP 2015).
- Rogue Basin Cohesive Forest Restoration Strategy: A Collaborative Vision for Resilient Landscapes and Fire Adapted Communities (Metlan et al. 2015).

For purposes of this Vegetation Plan the Greenway area is broader than just the recreational trail. Its value as wildlife habitat and riparian protection is given equal consideration in management

recommendations. Value for these uses are summarized in this plan and in documents referenced throughout the plan.

Background

Current Conditions: The Bear Creek Greenway (Greenway) is a 20-mile, paved, multi-use trail that links the cities of Ashland, Talent, Phoenix, Medford and Central Point. The Greenway is continuous from the Ashland Dog Park to the Dean Creek Frontage Road near Seven Oaks Interchange on I-5, north of Central Point. The Greenway provides a separated route from cars, with only two at-grade road crossings. The Greenway parallels I-5, Highway 99, and Bear Creek, and provides Rogue Valley residents and visitors to the area a close-in spot for bird watching and wildlife viewing, as well as exercise and general recreation. Parks along the route provide parking, restrooms, and drinking water.

An annual average of 250 trips per day are taken at any given point along the trail, making the trail as busy as many local streets and roads (Bear Creek Greenway Joint Powers Committee 2017). The visitation provides an excellent opportunity to provide local residents with information and examples of stream and riparian stewardship. In discussions with Greenway users in 2016, reasons provided for using the greenway include: enjoying the open space along the Greenway and associated streams, as a source of recreation close to home, and as a transportation corridor between home and work (C.Tuss, personal communication. September 2016).

The Bear Creek watershed, located entirely within Jackson County, is the most urbanized watershed in Southern Oregon. Bear Creek is over 30 miles long and is ranked in the "poor" water quality category by the Oregon Department of Environmental Quality (DEQ) due to a number of pollution concerns. The communities surrounding Bear Creek have been negatively impacted by water pollution. In 1992, a Total Daily Maximum Load (TMDL) was established for Bear Creek. The TMDL was the second for Oregon, following the Tualatin River.

Bear Creek and its tributaries run directly through urban residential and industrial areas serving as home to over 200,000 people. The creek flows through five communities, the largest being Medford, before it joins the Rogue River at river mile 127. The riparian area is comprised of thick patches of invasive plants while the creek is water quality limited for phosphorus, dissolved oxygen, temperature, and bacteria. Bear Creek is used for spawning, rearing, and migration for adult Chinook and Coho salmon as well as steelhead. Coho salmon are currently listed as threatened under the Endangered Species Act. Bear Creek is very warm for much of the late spring, summer, and early fall. The TMDL goal for water temperature is 64.4°F for Bear Creek. During the hottest period of the year (usually first part of August), water temperatures exceed 68°F. Young steelhead and Coho salmon are only able to survive the hot summer months by finding pockets of cool water.

The presence of a vegetative canopy over water courses is critical in providing protective cover for fish and other wildlife species in these habitats, and in regulating water temperature within the stream ecosystem. A DEQ report estimated Bear Creek currently has 15 percent shade, but has the capacity for 54 percent shade (ODEQ 2000, Bear Creek Riparian Shade Assessment).

Vegetation management actions to increase stream shading and improve riparian corridor conditions would improve water quality in Bear Creek. Establishment and/or enhancement of riparian shade will lead to meeting established shade targets (maximizing shade potential) and result in subsequently lower temperatures which will help meet the shade and pollution reduction goals of local TMDL programs. Establishment and long-term management of vegetation along riparian corridors has been identified as a priority need throughout the Bear Creek watershed and Rogue Basin. The Freshwater Trust, with funding from the Oregon Watershed Enhancement Board, recently developed a Riparian Extent and Status Tool ("REST" v1.0). REST is complete and available on the Rogue Basin Partnership website: http://www.roguepartners.org/rogue-restoration-action-plan/ . This tool was designed to assist with planning, prioritizing and grant writing for riparian restoration work in the inland Rogue, especially that which compliments in stream anchor habitat priority areas.

In addition, control of invasive species and implementation of restoration efforts using native plant species are key items in local TMDL implementation plans.

Bear Creek is on the eastern edge of the Klamath Ecoregion described in the Oregon Conservation Strategy (Strategy) (ODFW 2016). The Strategy identifies land use changes, disruption of natural disturbance regimes and invasive species as the key issues for this area. Specifically:

- Land Use Conversion and Urbanization
    - Rapid urbanization can strain the ability of sensitive habitat, such as valleys, wetlands, and aquatic habitats to continue to provide valued ecological functions and services. Rapid development increases the potential for conflict between people and wildlife. For example, increasing road traffic increases the potential for collisions with migrating species, creating a hazard to both motorists and wildlife.
- Altered Fire Regimes
    - Historically, the area was dominated by fire-adapted vegetation and experienced widely variable fire regimes, ranging from areas with relatively short fire return intervals to areas with 50+ year return intervals. Fire suppression has damaged forest health, resulting in undesirable changes in vegetation and increased intensity of wildfires as a result of increased fuel loads. Efforts to reduce fire danger can help to restore fish and wildlife habitat, but require careful planning.
- Loss of Habitat Connectivity
    - The area is naturally diverse and heterogeneous. Some habitat types have been particularly disrupted by fragmentation and loss of connectivity, including late-successional forests and valley-bottom habitats. Opportunities for large-scale protection or restoration of native landscapes are limited. Existing development, growth pressures, high land costs, and the fragmented nature of ownerships and remaining native habitats all present barriers to large-scale ecosystem restoration.

      Broad-scale conservation strategies will need to focus on restoring and maintaining more natural ecosystem processes and functions within a landscape that is managed primarily for other values. This may include an emphasis on conservation-oriented management techniques for existing land uses and

restoration of some key ecosystem components, such as river-floodplain connections and riparian function.

- Invasive Species
    - Invasive plants are of particular concern in the area. Invasive plants disrupt native communities, diminish populations of at-risk native species, and threaten the economic productivity of resource lands. Invasive plants have been on the increase for the last 20 years. While not nearly as extensive as invasive plants, non-native animals also have impacted native fish and wildlife populations. This Vegetation Plan will:
        - Emphasize prevention, risk assessment, early detection, and quick control to prevent new invasive species from becoming fully established.
        - Use multiple site-appropriate tools (e.g., mechanical, chemical, and biological) to control the most damaging invasive species.
        - Prioritize efforts to focus on key invasive plant in high priority areas, particularly where Strategy Habitats and Strategy Species occur.
        - Cooperate with partners through habitat programs and county weed boards to address invasive species problems.
        - Promote the use of native species for restoration and revegetation.

Some of the native species identified in the Strategy occurring in the Bear Creek corridor include Acorn woodpecker, Lewis woodpecker, Monarch butterfly, Pacific lamprey, Coho salmon, Chinook Salmon, and summer Steelhead.

Management Issues

Invasive plants: Invasive plants have been introduced into an environment outside their native range. Within their native range they have factors (such as climate, pests, diseases and competitors) that regulate their reproduction and spread. In the new environment, these factors may not be present and the introduced plants may soon out-compete the native plants and even exclude vegetation. Invasive plants are known to reduce biodiversity, displace native plants and wildlife, reduce land values, inhibit recreational activities and tourism, reduce water availability while increasing soil erosion, increase fuel loading for wildfires and are toxic to domestic animals, native wildlife and humans (OSU 2003). Invasive plants such as Himalayan blackberry (blackberry) form dense patches that exclude other vegetation (OSU 2006) and provide fuel for wildland fires (OSU 2003). Known invasives found along the Greenway and/or the riparian corridor include blackberry, poison hemlock, English ivy, puncture vine (goat head), tamarisk, purple loosestrife, and reed canary grass.

Use of Herbicides to Control Invasive Plants: The use of herbicides to control invasives varies by jurisdiction and is not allowable in all areas. However, use of herbicides is recommended as part of an integrated approach to weed control when used properly and applied by a certified, licensed applicator.

It's important for the public to know that areas of widespread plants like poison hemlock can't reasonably be controlled without some careful herbicide applications. In addition, the sheer amounts of star thistle, puncturevine, blackberry and other thorny/nasty (aka, weeds that are hard

to get volunteers to help remove) weeds are too abundant to keep in check without some herbicide use. Spot spraying noxious weeds in public areas (e.g., park lands) is quite different from applying it to fields with plants that people will eat.

All herbicides must be approved by the National Oceanic and Atmospheric Administration and the Oregon Department of Agriculture (RVCOG 2005). Herbicides will only be used by licensed, certified, applicators. Herbicide applications will be "spot" treatments, targeting specific invasive plants during specific season(s) of the year when the target species are most vulnerable to the treatment. We recommend areas to be treated with herbicides be noticed for 24 hours prior to treatment. Signs should stay in treatment areas a minimum of 24 hours after treatment. We recommend the use of Aquaneat, approved for use in and around waterways by the Environmental Protection Agency, rather than Roundup because some of the additional ingredients aren't as safe around water. It should be realized that Aquaneat, or any systemic herbicide can translocate from the root hairs of the 'treated or target' plants to the roots of 'desired' plants, thus eliminating both.

It is recommended these actions be part of an Integrated Pest Management Plan (IPM Plan). An IPM Plan is one of the major strategies used by Medford Parks and Recreation Department in the maintenance of park, facilities. Although there are numerous definitions of IPM, the following definition is taken from the Pacific Northwest Insect Control Handbook:

> "Integrated pest management is an ecologically-based pest control strategy that relies heavily on natural mortality factors such as natural enemies and weather, and seeks out control tactics that disrupt these factors as little as possible. IPM uses pesticides, but only after systematic monitoring of pest populations and natural control factors indicates a need. Ideally, an integrated pest management program considers all available pest control actions, including no action, and evaluates the potential interaction among various control tactics, cultural practices, weather, other pests, and the crop to be protected."

Appendix A contains the IMP Plan adopted by the City of Medford.

Management of Riparian Vegetation for Fish and Wildlife Concerns: Removal of any vegetation (native or invasive) with the 50 foot riparian corridor of Bear Creek or its tributaries must be approved by the Oregon Department of Fish and Wildlife as part of a riparian planting plan. The riparian planting plan may also be part of a larger permitting process including Jackson County and or any of the local municipalities. Using actions and techniques outlined in this plan provides a guide and information to meet ODFW riparian concerns. Generally speaking, any invasive plant that is removed needs to be replaced with desirable species, preferably natives. In addition, ODFW requests a stem density per acre of 600 stems. It is recommended that actions taken to remove/control invasive plants and enhance/restore native vegetation within the riparian buffer area be addressed as part of a programmatic approach to ensure consistent treatment and achievement of the Vegetation Plan's goals and objectives.

Stream corridors are among the most productive habitats in southwest Oregon. They represent a small percentage of the landscape, but wildlife species diversity and density are high in riparian zones, making riparian corridors vital in regards to wildlife habitat (Oakley 1985). Riparian areas

are particularly important in arid and semi-arid landscapes. The vegetation in most riparian zones is structurally more diverse and biomass production is higher than the adjacent upland areas providing an increased diversity of niches for wildlife to exploit. In addition, water, aquatic insects, and fish provide resources supporting wildlife species that require both aquatic and upland environments. (Oakley et al. 1985). Some of the key species occurring in this area are Coho and Chinook salmon, summer steelhead, Monarch butterflies, Pacific lamprey, beaver and bald eagles.

Riparian areas also offer many benefits including:

- Delivering large woody debris to increase instream habitat complexity or create habitat in the riparian corridor,
- Providing important habitat for a variety of species, controlling erosion, increasing streambank stability, reducing pollutants and sediment, moderating stream flow, and insulating streams from high air temperatures,
- Supporting "*…the most diverse bird communities in the arid and semiarid portions of the western United States (Knopf et al. 1988, Dobkin 1994, Saab et al. 1995)."* Quoted from RHJV 2007,
- Creating microclimates that support unique invertebrate communities (Rykken et al. 2007),
- Providing habitat for riparian obligate amphibian species and supporting higher overall herptile abundance (Gomez and Anthony 1996).

Removal of large patches of invasive plants such as blackberry by heavy equipment should be scheduled outside of the general nesting period for migratory birds (March through July).

Emphasis should be placed on retaining existing trees and snags. Restoration projects should focus on enhancing or establishing a shade canopy. See Appendix B and Maps for suggested areas where shade should be a management objective.

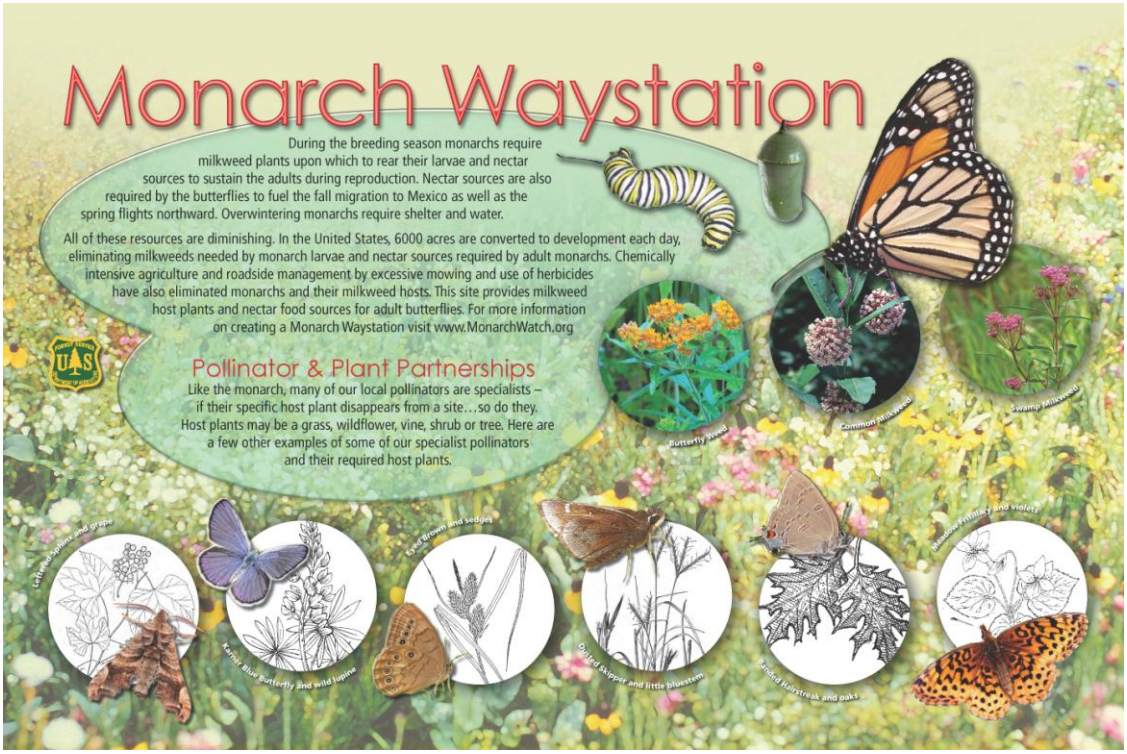
Management of Vegetation for Public Safety (fire and general safety): Fire regimes have been significantly disrupted for the last 100 years across the Mediterranean forests and woodlands of the Rogue Basin (McNeil and Zobel 1980, Agee 1991, Colombaroli and Gavin 2010, Sensenig et al. 2013), including lowland and mixed conifer riparian forests (Messier et al. 2012). Invasive, nonnative plants may be responsible for serious, long-term ecological impacts, including altering fire behavior and fire regimes. Invasive plants may affect fire behavior and fire regimes, often by increasing fuel bed flammability, which increases fire frequency. Therefore, knowing how to successfully manage invasive plants and their impacts on natural resources is crucial (Erickson and White 2007). Following management guidelines in this Vegetation Plan will reduce fire risk.

Invasive plants can also provide a dense monoculture of vegetation that provides hiding areas for criminal activities such as theft and assault. These dense patches can deter law enforcement from protecting lawful users of the area and the general public from using these open areas for recreational endeavors such as walking, hiking, bird watching and biking. Spacing requirements, plant selection, and management methods will help to address this concern.

Opportunities to coordinate restoration, management and public involvement events and tasks: Vegetation management along the Greenway in Medford and other areas has provided an

opportunity to engage local residents in stream cleanup events and native planting efforts. In addition, organizations such as Oregon Stewardship, the Rogue River Watershed Council, and the Lomakatsi Restoration Project have been working on similar restoration efforts along the Greenway as independent projects. There are other groups implementing or interested in implementing project and events that would contribute to the overall objective of this Vegetation Plan. An effort to seek out organizations and events should be undertaken. A coordinated effort could provide local community resources while building community investment in the Greenway and its long-term management.

Areas of special consideration: There are areas along the Greenway that have unique uses, attributes, or other factors that require additional management concerns. For example, they can be designated for a number of reasons including: control of invasive plants needing special control methods, management of areas for monarch butterflies and native pollinators, areas adjacent to fish spawning or fish observation areas, areas of unique or historical significance and right of way areas such as sewer and power lines.



Management Plan

Vegetation along the Bear Creek Greenway and the riparian area of Bear Creek will be managed to maximize native riparian trees, shrubs, forbs and grasses while controlling invasive plants, minimizing fire risk, and addressing safety concerns. By maximizing native plant species in this corridor, we will be restoring/enhancing the riparian area along Bear Creek, providing important habitat for aquatic and terrestrial wildlife and improving water quality conditions through providing increased shade for the stream as well as the associated riparian area. These improved conditions will benefit the residents and communities within the Bear Creek by providing clean water, open space to recreate in and an environment that communities will invest in to manage over the long-term.

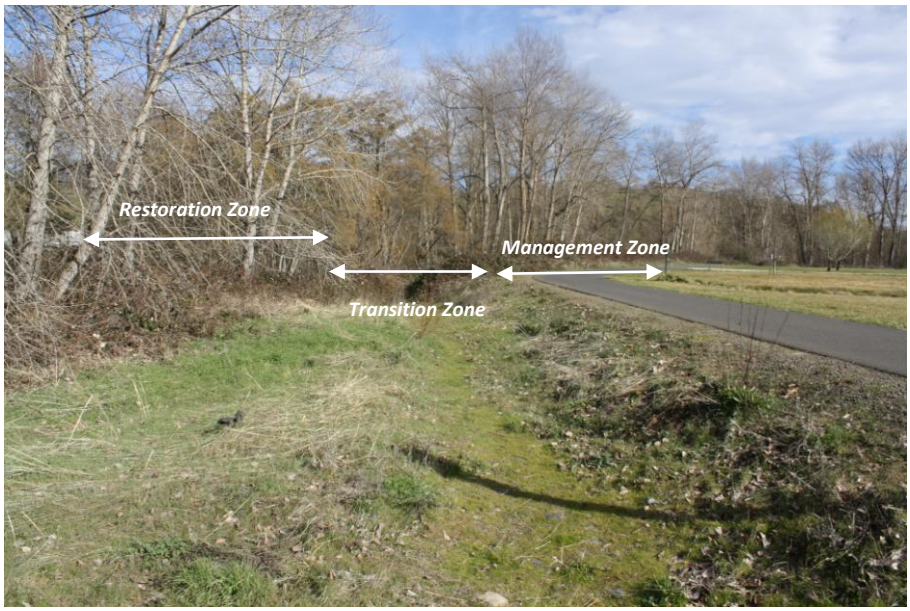
Management Zones

The BCGMP provides guidance within the 10-foot vegetation management zone adjacent of the Greenway (section 2.3 of the BCMP). This Vegetation Plan provides more detailed information regarding the areas outside of the 10-foot vegetation management zone. As a result, this section is not included in the management recommendations in this document. This area is represented by the "Management Zone" and includes the paved portion of the trail and the management area on either side.

For the purpose of the plan, we are focusing on strategies to manage the 30 foot "Transition Zone" and the 50 foot "Restoration Zone". Brief descriptions of the zones are provided below.

- 10' Management Zone – Includes the paved trail (8') and 10' on either side of the trail. This includes the portions of the trail actively managed for the Greenway and is not addressed as part of the recommendations of the report.
- 30' Transition Zone – Includes areas 30' on either side of the management zone. The zone represents a mixed management area transitioning from active trail management (Management Zone) to the areas that are being restored, protected or managed for special considerations (Restoration Zone).
- 50' Restoration Zone – 50' from both sides of the transition zone. This is the area that is being actively restored and/or protected to increase the shade canopy, understory, manage invasives, provide connectivity, wildlife habitat, etc.

Example of the different management zones:



General Management Recommendations

Transition Zone

Recommended strategies focus on managing invasive species, working on releasing natives, and planting larger trees (coniferous and deciduous trees) and understory vegetation. An example of

where this method has been applied is in Medford on the east side of the trail, south of McAndrews Road on the ODOT right-of-way (ROW).

Restoration Zone

Recommended strategies include focusing on managing invasive species, protecting existing native species, and understory enhancement. In many areas, there is existing canopy cover that needs to be maintained and the restoration should focus on habitat building and safety. In addition, these areas often are found within 50 feet of the stream, so they require additional care and consideration per ODFW requirements and local riparian ordinances. It is recommended these strategies are implemented through the riparian zone to the stream banks/ordinary high water (although not a requirement or specifically covered under this plan).

Removal and Control of Invasive plants (both zones)

<u>*Removal Option 1 (recommended)*</u>:

Blackberries

Established patches of blackberries should be removed in the fall. The plants should be spot sprayed with herbicide by a licensed herbicide applicator in early October. Dead blackberry canes should then be removed approximately 6 weeks after treatment. Expect some re-sprouting of new canes in the spring following the treatment.

Other weed species

Use a specialist to spot treat other small areas of invasive weeds. See Appendix C for more information on treatment of blackberries and other common invasives found along the greenway.

Removal option 2:

Blackberries

Remove established patches of blackberries in the spring. The plants should be cut down to the ground by mechanical equipment or hand tools. This task could result in vigorous growth of new canes over the late spring and summer. This option is not recommended for area more than five acres to avoid impacts to nesting migratory birds.

Other weed species

Use a specialist to spot treat other small areas of invasive weeds. See Appendix C for more information on treatment of blackberries and other common invasives found along the greenway.

Post Removal and Follow Up

Native "release" following blackberry removal

The removal of dense patches of blackberries often results in a "release" of native and nonnative vegetation that has been suppressed by the monoculture of blackberries. From experience, an explosion of poison hemlock is a typical response to removal of blackberries. Natives that respond to the release include roses, native blackberry, cottonwood, and snowberry.

Follow up work – re-sprouting of blackberries and "new" invasives replacing blackberries.

As mentioned above, blackberries will respond to the initial removal by re-sprouting. Removal of blackberries or other invasive plants may also result in the sprouting of a "new" crop of invasive plants. To manage the sprouting of existing or new invasive plants, spot application of herbicide by a licensed applicator should begin in mid to late February, with additional visits scheduled every three to four weeks through the spring. A fall spot treatment may be necessary. See Appendix C for more information.

This schedule may be necessary for several years, but should result in a decrease of sprouts after each successive treatment.

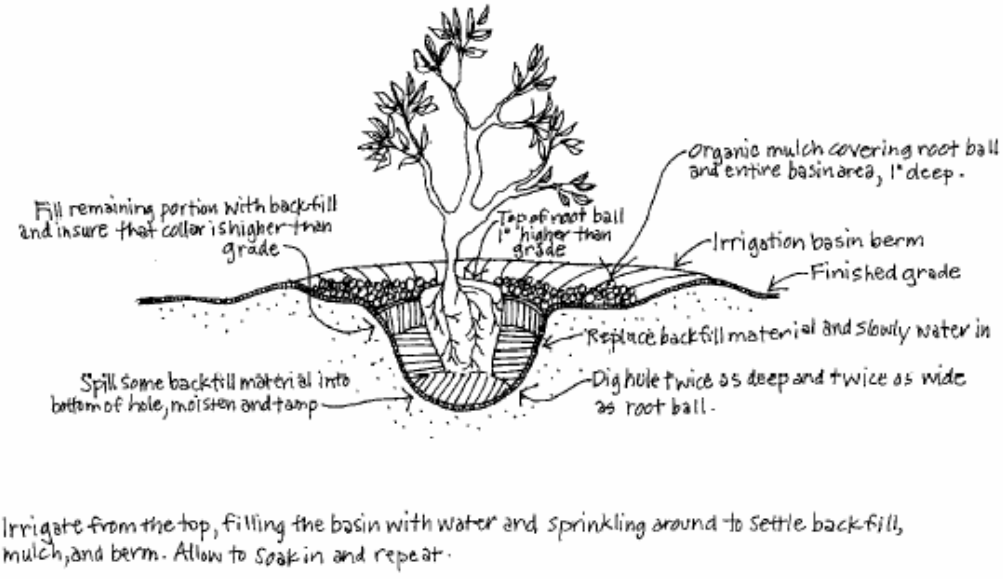
Monitoring

Monitoring the site through regular visits is needed to assess how effective this treatment is in each area.

Enhancement/Restoration of Native Vegetation

Planting:

Planting native vegetation should be used in addition to "volunteer" sprouting of native plant species. In some cases, the volunteer sprouting is sufficient to re-vegetate an area that has been recently cleared of invasive vegetation. Where a dense, established (three to five years old) monoculture of invasive plants has been removed/controlled, planting of native vegetation can assist the natural process. Some invasive plants, such as spotted knapweed, have allelopathic characteristics that inhibit other plants from growing. See Appendix D for more information. The figure below shows a graphic of planting a container stock.



Plant sizes and plant stock:

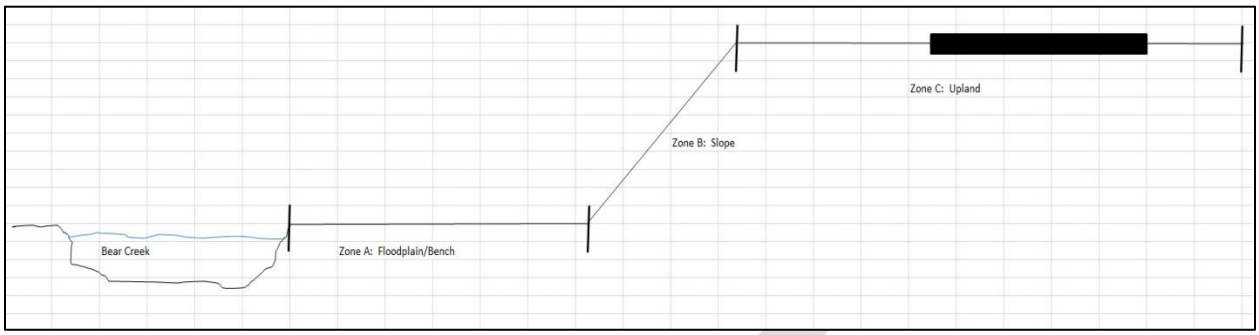
When planting native trees, one gallon (18") containers with locally sourced stock should be used to provide a competitive edge against the invasive plants. One-gallon container stock help attain the desired planting goals more rapidly. Larger containerized plant stock are more tolerant of existing local climate conditions because they are less vulnerable to transplant shock and are more capable of moisture retention during the transplanting process (National Tree Trust 1997).

Additional plant stock can also be used including smaller containers, plugs or cuttings. Cuttings can be used with appropriate species including willows and cottonwoods. If plugs are used, cluster planting of the plugs is recommended to increase the overall survival.

Plant recommendations

Figure: Example of a containerized planting. Drawing provided by Clean Water Services.

General Cross Section of Greenway and Bear Creek



Zone A Plants

Willows (toe of slope)	White Alder	Snowberry	Pacific dogwood
Western Dogwood	Pacific Ninebark	Rush species (Juncus)	Douglas Spirea
Blue Elderberry	Sedge species		

Zone B Plants

Dogwood	Snowberry	Rose (nootka, woodsii)	Douglas Hawthorne
Oregon Ash	Ocean Spray	Big Leaf Maple	Douglas Spirea
Willows (toe of slope)			

Zone C Plants

Oregon Ash	Big Leaf Maple	Incense Cedar	Ponderosa Pine
White Oak	Oregon Grape	Snowberry	Mock Orange
Oceanspray			

Transition Zone

Planting of larger stock (5 gallon or larger) increases canopy diversity, especially for conifers. Spacing of plants should be wider to reduce overcrowding, and the need for thinning in subsequent years.

Restoration Zone

Plant space approximately 11’ apart for larger trees and 4’ apart for the shrubs. The goal in this area is to maintain a minimum of 600 stems per acre per ODFW guidelines of native species including existing vegetation. Restoration zones are located in zones A and B. Recommended species can be found in Appendix D.

Soil Amendments

Soil amendments (fertilizer tablets and compost) and mulch should also be added during the planting process to increase planting success. Soil amendments are available at local nurseries, home improvement stores, and specialty stores (E.g., Grange Co-op).

Areas of Special Consideration

Areas of special consideration are designated for a number of reasons including: invasive plants needing special control methods, outbreaks of new invasive species, management of areas for monarch butterflies and native pollinators, areas adjacent to fish spawning or fish observation areas, areas of unique or historical significance and right of way areas such as sewer and powerlines.

Monitoring

Use of an adaptive management framework, that includes SMART goals (Specific, Measurable, Agreed Upon, Realistic, Time-based), and Citizen Science is recommended.

Cost Estimates of Management Actions

The cost estimates presented in this table are based on recent riparian restoration and invasive plant removal actions along Bear Creek since 2014. These costs should represent a guideline for budgeting future invasive removal, native plant installation and long-term invasive plant control tasks. The initial removal of invasive plants such as blackberry can be complicated due to what is hidden (such as trash, illegal camps) by the invasive plants. Costs for areas that have been treated and are in an "invasive plant control" phase are less variable due to the known nature of the area. Estimated costs shown in the table for initial removal add a 25 percent increase to address trash and debris clean up.

It is assumed that cost per unit of effort will be greatest where the initial entry to remove and control invasive plants occurs. Cost will decrease as subsequent maintenance efforts and entries are accomplished.

Task	***Description***	***Estimated Unit Cost (2016 Figures)***	***Comments***
Initial entry/removal of invasive plants – Method #1	Removal of Himalayan Blackberry using mechanical methods	$150 to $300/acre	Effective where there is no existing native vegetation. Will result in vigorous sprouting and could exacerbate the issue. Effective where terrain and access is conducive to equipment operation.
Initial entry/removal of invasive plants – Method #2	Removal of Himalayan Blackberry using hand tools and small equipment.	$300 to $500/acre	Effective where existing native vegetation or terrain limits equipment access. Will result in vigorous sprouting and could exacerbate the issue. This technique should be used to minimize impacts to spring nesting migratory birds (March through July).
Initial entry/removal of invasive plants – Method #3	Treat with herbicide in early fall. Removal of dead Himalayan Blackberry using hand tools and small equipment in early November.	$250 to $600/acre	Most effective based on experience. Minimizes re-sprouting which lowers cost of subsequent control tasks.
Ongoing	Hand removal (weed eaters,	$100 to	Recommend five visits:

invasive control using no herbicides	pulling or cutting) of invasive plants during late winter through late spring, then in early fall	$200/acre/trip	late February, late March, late April, late May and late September. This treatment should result in decreasing amount of re-sprouting after each subsequent treatment.
Ongoing invasive control using herbicides	Spot treatment of invasive plants during late winter through late spring, then in early fall	$55 to $100/acre/trip	Recommend four visits: late February, late March, late May and early October. This treatment should result in decreasing amount of re-sprouting after each subsequent treatment.
Debris removal	Removal dead invasive plants after herbicide treatment	$450/day	Community Justice Crew cost with agreement. Estimate 5 acres/day.
Native planting	Plant native trees and shrubs	$7.50 to $30/plant	One gallon or larger plants from locally sourced nurseries. Cost includes planting crew, soil amendments and mulch for each plant. Plant during the early winter months to increase root development before summer dry season.
Native plant establishment	Weed, water and care for planting for two years	$100/acre	From late spring to early fall for a minimum of two growing seasons. A minimum of three visits to water, weed and mulch plantings per year.
Irrigation system	Install a drip irrigation system	$100 to $150/acre	Cost depends on water source and maintaining water system through a minimum of 2 growing seasons.

Potential Funding Sources

In addition to funding being provided by the members of Bear Creek Greenway Joint Powers Committee there are several other public and private funding sources available that could be obtained to accomplish the type of long-term vegetation management and restoration actions identified in this document. These funding sources provide funding on a competitive basis periodically and require some level of matching contributions:

- *Oregon Watershed Enhancement Board*: The Oregon Watershed Enhancement Board (OWEB) is a state agency that provides grants to help Oregonians take care of local streams, rivers, wetlands and natural areas. OWEB grants are funded from the Oregon Lottery, federal dollars, and salmon license plate revenue. The agency is led by a 17 member citizen board drawn from the public at large, tribes, and federal and state natural resource agency boards and commissions. For more information visit the OWEB website: http://www.oregon.gov/oweb/Pages/index.aspx.

- *National Fish and Wildlife Foundation*: The National Fish and Wildlife Foundation (NFWF) provides funding on a competitive basis to projects that sustain, restore, and enhance our nation's fish, wildlife, and plants and their habitats. Each of the Program's initiatives has a business plan developed by scientists and other experts and approved by our Board of Directors. Grants are available to support the actions identified in the business plan. Additional programs support diverse projects for wildlife and habitat conservation across the country. For more information visit the NFWF website: http://www.nfwf.org/whatwedo/grants/pages/home.aspx.

- *Pacific Power Blue Sky Habitat Fund*: The Blue Sky Habitat Fund provides funding to restore and preserve habitats for native fish, including salmon, in Oregon. For more information visit the Blue Sky website: https://www.pacificpower.net/blueskyhabitat.

- *The Cow Creek Umpqua Tribe*: The Cow Creek Umpqua Tribe has a history of partnering with community organizations on restoration work benefiting culturally important species. Both research and restoration activities are necessary to that end. The Tribe has developed this grant to communities to support mutually beneficial projects. This grant program has funded community projects that benefit wildlife and plant species of cultural importance to the Tribe. We invite you to submit an application for consideration. For more information visit the CCUT website: http://www.cowcreek.com/natural-resources/grants/.

- *Five Star and Urban Waters Restoration Program*: The Five Star and Urban Waters Restoration Program seeks to develop nation-wide-community stewardship of local natural resources, preserving these resources for future generations and enhancing habitat for local wildlife. Projects seek to address water quality issues in priority watersheds, such as erosion due to unstable stream banks, pollution from stormwater runoff, and degraded shorelines caused by development. The program focuses on the stewardship

and restoration of coastal, wetland and riparian ecosystems across the country. Its goal is to meet the conservation needs of important species and habitats, providing me*a*surable and meaningful conservation and educational outcomes. The program requires the establishment and/or enhancement of diverse partnerships and an education/outreach component that will help shape and sustain behavior to achieve conservation goals. Funding priorities for this program include: on-the-ground wetland, riparian, in-stream and/or coastal habitat restoration, meaningful education and training activities, either through community outreach, participation and/or integration with K-12 environmental curriculum, measurable ecological, educational and community benefits and a diverse group of community partners to achieve ecological and educational outcomes. For more information visit the Program's website: http://www.nfwf.org/fivestar/Pages/home.aspx.

We also recommend the Bear Creek Greenway Joint Powers Committee look to partner with other local, state and federal entities to develop revenue sources that could be brought to bear to assist with the long-term maintenance. These could include:

- Oregon Department of Forestry
- Oregon Department of Fish and Wildlife
- Oregon State Parks Department
- Oregon Parks Foundation
- U.S. Fish and Wildlife Service

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Appendix A. City of Medford Parks and Recreation Department Integrated Pest Management Policy

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Mission Statement

The mission of Medford Parks and Recreation Department (MPRD) Integrated Pest Management Policy is to maintain the health and aesthetic value of parks, open spaces, facilities and resources. MPRD endorses the principles of Integrated Pest Management (IPM). The MPRD IPM Program uses multi-faceted pest control strategies that are safe, cost-effective, sustainable, and minimize the negative impact on the environment and human health.

Integrated Pest Management

Integrated Pest Management is one of the major strategies used by MPRD in the maintenance of park, facilities. Although there are numerous definitions of IPM, the following definition is extracted from the Pacific Northwest Insect Control Handbook.

> **"Integrated pest management (IPM) is an ecologically-based pest control strategy that relies heavily on natural mortality factors such as natural enemies and weather, and seeks out control tactics that disrupt these factors as little as possible. IPM uses pesticides, but only after systematic monitoring of pest populations and natural control factors indicates a need. Ideally, an integrated pest management program considers all available pest control actions, including no action, and evaluates the potential interaction among various control tactics, cultural practices, weather, other pests, and the crop to be protected."**

A few examples of the MPRD IPM Program:

- Mowing high grass and brush to reduce weed seed crops in rough areas.
- Pruning of trees and shrubs to increase air circulation and reduce susceptibility to disease and insect problems.
- Appropriate fertilizing to encourage plant health and resistance to pests (i.e., weeds, insects, and disease).
- Using plants with natural resistance to pests.
- Combining turf aeration and over-seeding along with any application of broadleaf weed control to eliminate the cause of the problem and, therefore, the need for repeated applications.
- Manual cultivation of weeds in shrub & landscape beds

Key elements of an IPM program are information gathering and informed decision-making. MPRD staff is skilled in identifying and evaluating pest problems. When pest problems occur that are unusual or beyond the scope of in-house experts, contracts are made with private laboratories or advice is obtained from the State Universities, Departments of Agriculture, or Oregon State University Extension Service experts. The Public Pesticide Applicators License re-certification courses reinforce employee skills and provide the latest information concerning laws and safety, weeds, disease, insect control methods and the IPM approach.

Pesticide Use

Pesticide is a general term for any substance used to control pests. Pests include but are not limited to weeds, insects, diseases, disease-carrying organisms, and rodents. To control these pests, our personnel select the best methods available. When it is necessary to use chemical controls, MPRD feels it can avoid or minimize risks by careful selection and application of the control measures.

MPRD has found that pesticides have been helpful tools in ensuring a high standard of performance when used in conjunction with other control methods. MPRD employees are required to comply with all pesticide label directions, safety laws, and local, state, and federal pesticide regulations.

Sustainable management practices attempt to eliminate waste in any program. MPRD employees avoid generating pesticide waste by use of several strategies. Advanced planning, purchasing the amount needed, and mixing only the precise amount needed to complete the job can usually avoid elimination of waste material. When waste material is generated, MPRD adheres to the Oregon Department of Environmental Quality and the U.S. Environmental Protection Agency regulations for disposal.

Worker Protection Standard

In 1992, the U.S. Environmental Protection Agency (EPA) issued regulations pertaining to the Worker Protection Standard (WPS) for pesticides. The WPS is designed to protect employees engaged in pesticide application from occupational exposure to pesticides.

The WPS is intended to reduce the risk of pesticide poisoning and injuries to pesticide applicators through appropriate measures.

The WPS contains requirements for notifying employees of applications, the use of personal protective equipment (PPE) and restrictions on entry into treated areas. The WPS also requires that certain actions be taken by employers to ensure worker safety.

WPS provisions are intended to:

1. Eliminate worker exposure to pesticides.
2. Mitigate any exposure that might occur.
3. Inform employees about the hazards of pesticides.
4. Eliminate pesticide exposure during handling. Handlers are prohibited from applying pesticides in a way that will expose workers or others.
5. PPE – The employer is required to provide PPE and appropriate training for the handlers.
6. Handlers are required to utilize, store, and maintain PPE as stated on the product label.

Definition of PPE: Apparel and devices worn to protect the body from contact with pesticides or pesticide residues. Although the following attire may not be defined as PPE, the labeling of pesticides may require the applicators to wear it for application tasks. If such non-PPE is required, the employers and applicators must follow minimal product label requirements for PPE and make sure that it is worn.

- Long-sleeved shirt
- Long pants
- Shoes and socks
- Appropriate footwear as listed on the label
- Other items of regular work clothing
- Gloves—hand coverings listed on the label. Gloves or glove lining made of cotton, leather, or other absorbent materials must not be worn during the handling or application of pesticides.
- Protective eyewear—goggles; face shields or safety glasses with front brow and temple protection.
- Respirator—A device that will protect the respiratory system. The respirator will be appropriate for the pesticide product.

Policies and Procedures

Approved Pest Control Strategies

This is a short list of examples of possible control strategies among the many available. Prevention through policy, planning, and maintenance practices is the first priority. Next in priority are controls through cultural and mechanical practices, trapping, and biological controls. Applications of biological products and chemical products are to be considered last.

Prevention

- **Acceptance of natural settings and natural appearances must be considered:** Where it is appropriate for a given park site, the landscape can be left alone or can receive a reduced level of care. This can serve the dual purpose of reducing or eliminating pest control measures and reducing maintenance costs.
- **Prioritization of park areas for control measures:** Different park areas have differing standards of acceptable care and appearance.
- **Establishment of thresholds for action and the level of tolerance for different pests:** These thresholds vary according to plant, pest, and site. Determination of action thresholds will be made on a case-by-case basis.

Design and plant selection

- Use of disease or pest-resistant/tolerant plant species, which may include native varieties.
- Replacement or removal of pest-susceptible plants.
- Elimination or modification of problematic areas.
- Proper and adequate spacing of plant material to reduce the incidence of insect and disease problems.
- Maintenance of high species diversity and elimination of monocultures in plantings.
- Elimination of alternate hosts for diseases.

Policies and Procedures

CONTROL THROUGH IPM TECHNIQUES

Cultural practices

- Knowledge of culture of individual genera or species to provide the proper conditions for optimum plant health and pest-resistance.
- Adequate site preparation before plantings is installed. This can include soil improvements, pruning of surrounding vegetation, soil grade adjustments, drainage improvements, and installation of irrigation systems.
- Grafting of disease-tolerant or resistant rootstock to susceptible scion wood.
- Proper timing and use of water. Elimination of drought and flood stress to promote plant health.
- Proper timing and use of fertilization to eliminate over- and under-fertilization. The effects of over-fertilization on the target plant as well as run-off to surface and groundwater must be considered.
- Use of cover crops to improve soil structure and reduce soil erosion.
- Rotation of crops or planting of resistant plant species as replacements for removed plants.
- Aeration and/or over-seeding of turf and compacted areas.
- Raking and debris removal to remove possible contaminants.
- Using proper sanitation to prevent spread of pests.
- Proper timing of mowing to reduce and/or avoid weed seed production.

Mechanical controls

- Removal of diseased, damaged, or dead wood from the plant.
- Pruning and plant removal to promote air circulation and light penetration for healthier plant growth.
- Fan placement for greenhouse air circulation.
- Mulching of beds for weed seed crops in nursery areas.
- Mechanical edging of turf.
- Removal of spent flowers on shrubs and annuals.
- Hand clearing in rough areas.
- Hand weeding in shrub beds.
- Tilling to remove large areas of weed seed crops.
- Mowing of rough areas for vegetation control.

Non-chemical controls

- Traps: yellow sticky boards, traps for mammalian pests.
- Biological Controls: naturally occurring and introduced insect or disease parasitoids, predators, and microbial products.

Policies and Procedures

CHEMICAL OR SPRAY CONTROLS

- Pheromone traps
- Petroleum based horticultural oils
- Insecticidal soaps
- Botanically and bacterially derived pesticides (some disease control products contain fungi as biocontrol agents)
- Artificially synthesized pesticides

Criteria for Choosing a Pest Control Method

All personnel responsible for pest control should consider all of these and any other factors that are relevant to the selection of a pesticide.

POSSIBLE HEALTH EFFECTS AND TOXICITY

Both acute and chronic to the:

- Applicator
- Public
- Target pest
- Beneficial and non-target organisms including insects, birds, aquatic organisms, and mammals.
- Non-target plants
- Surrounding environment, bioaccumulation.

COSTS

Both short and long term as it relates to:

- Environmental costs
- Material costs
- Application cost
- Length of control

PHYSICAL CHARACTERISTICS OF THE PRODUCT

- Residual effect and length, decomposition rates and breakdown products.
- Ability to be tank mixed with other products.
- Volatility at different temperatures.
- Product and package size and form.
- Leachability: Solubility, surface and soil bonding capability of the pesticide.
- Flammability of the product.
- Ease of cleaning equipment after use.

Policies and Procedures

SPECIAL CONSIDERATIONS

For each situation, consider:

- The kind of use a given area might receive. Take into account what will enter the area treated and what kind of activities will take place.
- Application equipment available and the method of delivery.
- Current and anticipated weather conditions such as wind, rain, humidity, and temperature. The applicator should be aware of any existing or forecast temperature inversions
- Site conditions such as soil type, slope, grade, drainage patterns, and the presence of open or seasonal water.
- Previous pesticide applications to the site and the interval between treatments.
- Development of pest resistance to particular control methods. Proper rotation of chemicals, such as alternating pesticide products, can minimize the risk of resistance in certain cases.
- Residual buildup of pesticides in soil, water, or target site. The cumulative effect of repeated applications may need to be taken into account.
- Positive and negative synergistic effects of combining pesticides. Compatibility of different pesticides may be of concern, both regarding their physical traits, as well as their effects on the target pest or beneficial organisms.

Licensing and Continuing Education of Pest Control Personnel — Policy #1

BACKGROUND

This policy defines the education and licensing requirements for MPRD personnel who are applying pesticides or supervising others applying pesticides. MPRD desires to remain current in the practices of the trade. Continuing education helps to keep personnel up-to-date on pest control methods.

MPRD requires that pesticides be applied by a licensed pesticide applicator. In order to maintain licensing, the applicator must acquire a minimum of 40 hours of accredited supplementary education over a five-year period. No more than 15 hours may be accumulated per year. MPRD makes re-certification training available to its employees each year. MPRD desires to maintain the highest standards for professional conduct and will continue to equal or exceed the minimum requirements of the State.

POLICY

All MPRD personnel handling, or applying pesticides shall be a licensed applicator or supervised by a licensed applicator. MPRD will continue to provide supplementary education to maintain

licensing. All pesticide applicators are expected to participate in these training opportunities to enhance and maintain their expertise in pest management. Ultimate responsibility for maintaining a valid license lies with the applicator.

MPRD will keep pesticide applicators informed of, and will pay for, approved supplemental education and licensing fees to meet continued certification and licensing requirements.

Control Methods for Pest Problems **Policy #2**

BACKGROUND

MPRD uses the principles of Integrated Pest Management in managing property. The following terms are used as defined:

- Threshold: The level of pest presence above which unacceptable amounts of danger or injury are likely to occur.
- Action level: The point at which control measures are necessary to prevent a pest population from exceeding the threshold.

POLICY

MPRD shall use Integrated Pest Management principles in controlling pest problems. Staff shall monitor plant status, pest presence, thresholds, and action levels. The staff shall use the "Approved Control Strategies" to determine a cost-effective and environmentally sound pest control method.

If a pesticide is chosen as the best method for control, then staff shall use the "Criteria for Choosing a Pest Control Method." After controls have been made, the results should be monitored for effectiveness.

Use of Protective Clothing and Clothing **Policy #3**

BACKGROUND

This policy outlines the requirements for the use of protective clothing and equipment by Parks personnel when applying pesticides. Specific information on protective equipment is available on the product label and in the Material Safety Data Sheets.

POLICY

Personnel engaged in any way with the contact of pesticides shall follow all of the clothing and equipment requirements listed on the pesticide label, or in the Material Safety Data Sheets for the appropriate pesticide.

The clothing and personal protective equipment shall be provided by MPRD on a regular basis. Time will be made available to wash up before lunch and at the end of the day. The applicator is responsible for cleaning, storing, and maintaining spray clothing and equipment in a safe and useful manner.

MPRD shall monitor the cholinesterase levels of those employees frequently exposed to organophosphate and carbamate insecticides. This testing monitors the potential depletion of the enzyme cholinesterase in the blood, which is an indicator of exposure. Insecticides are not commonly used at MPRD.

Storage of Pesticides **Policy #4**

BACKGROUND

This policy defines the method and procedure for storing pesticide materials. Several agencies are involved in regulating certain aspects of pesticide storage. No agency has comprehensive authority. Agencies involved include State of Oregon Department of Agriculture, Oregon Department of Environmental Quality, U.S. Environmental Protection Agency, Oregon State Fire Marshall, and Medford Fire Department.

POLICY

Pesticides or pesticide containers shall be kept in secure and safe locations in accordance with existing laws. They shall be kept locked up and, if possible, in a heated, well-ventilated area. Areas used for storage shall be labeled.

Pesticides shall be safeguarded from environmental damage (for example, including, but not limited to freezing, vaporizing, photodecomposition or exposure to excess moisture). All pesticides in stock shall be inventoried annually and, if necessary, rotated on the shelf to assure that the oldest dated items are used first.

MPRD staff will clean each pesticide storage facility. The frequency of cleaning will be monitored by supervisory personnel, but will not be less than once per year.

MPRD staff will inventory each pesticide storage facility. The frequency of inventory will be monitored by supervisory personnel, but will not be less than once per year.

Pesticides being transported shall be appropriately and safely secured in the vehicle. Only licensed pesticide applicators shall transport pesticides. An appropriate spill kit must be immediately available for the materials being transported.

Pesticides shall not be transported in passenger cabs of vehicles.

Pesticide Application and Record Keeping **Policy #5**

BACKGROUND

This policy outlines methods for record keeping related to pesticide application by MPRD personnel. State law requires that written records be kept and all pesticide applications by MPRD personnel be reported online using the Pesticide Use Reporting System (PURS). The law requires that licensed applicators record the details of pesticide applications and keep these records for no less than three years. These records must be stored in a central location and be available for review. (PURS has been temporally suspended, Lack of Funds).

POLICY

It is the policy of MPRD to record and keep records of all pesticide applications performed by MPRD personnel. A master file of copies of these records shall be kept at the Service Center and overseen by the Parks Maintenance Supervisor. Each Park Zone shall keep records of applications made by their own personnel. Duplicate copies shall be sent to the Parks Maintenance Supervisor to be entered into the database. These records shall be retained for no less than three years.

All pesticide applications by MPRD personnel shall be reported online using the Pesticide Use Reporting System (PURS). All applications shall be reported before January 31 of the calendar year following the application. (Temporally suspended).

Pesticides Approved for use by Medford Parks and Recreation Personnel **Policy #6**

BACKGROUND

This policy defines the process of selection of pesticides that are approved for use on MPRD property. MPRD policy requires strict adherence to all of the label requirements concerning the safe and effective use of pesticides.

MPRD experience has shown that it is more desirable to have a specialized selection of products that target specific pests, rather than a smaller number of general-purpose pesticides. This acts to confine the effects of the control to the target pest only. It reduces the number of resistant pests that may arise from continued use of a small number of products. It leads to an overall reduction of pesticide usage required.

POLICY

MRPD shall maintain a list of pesticides approved for use by the Parks Maintenance Supervisor on park managed property or right-of-ways. The list shall be used in choosing the proper

pesticide for an area. The least toxic, cost-effective pesticide from the approved lists shall be used. The lists shall be reviewed no less than yearly to keep them current.

Applicators must make sure that any pesticides used are on the approved list. Special consideration is to be taken when applications covered under the Waterways Pest Management Policy take place. Pesticides allowed for those purposes are clearly defined within that policy.

Notification of Pesticide Use at a Site **Policy #7**

BACKGROUND

This policy outlines the methods and procedures for notifying the public that an application of a pesticide has been or is being made at a site. If no mention of re-entry is made on the label, the general rule is to wait until the liquid pesticide is dry or any dust has settled in dry or granular applications before removal of notification or before re-entering an application site.

POLICY

It is the policy of MPRD to notify the public of pesticide application sites through ***Do Not Enter*** signs. These ***Do Not Enter*** signs are posted in clearly visible locations, at conspicuous entries and at trailheads, with a maximum interval of 200 feet between each sign. The intent of sign placement is so that park users will encounter them before they enter the treated area.

Signs will be removed after the re-entry specification(s) have been met.

Rodent Control **Policy #8**

BACKGROUND

This policy outlines procedures for rodent control measures on MPRD managed property.

POLICY

Control of rats is considered a vector problem. Beaver will be controlled by out sourced trapping.

No license is required for mechanical control of rodents.

If necessary, chemical control will be done or supervised by licensed Park Pesticide Applicators.

Pesticide Application on MPRD Managed Property — Policy #9

BACKGROUND

This policy outlines procedures for pesticide application in a safe and legal manner on property that is maintained by MPRD employees. Directions for use, safety, mixing, diluting, storage, and disposal, as well as restrictions on re-entry must be met as per state rules and product labels.

The law allows an applicator to:

- Apply a pesticide at any dosage, concentration or frequency less than that listed on the label,
- Use any equipment or method of application not prohibited by the label,
- Mix a pesticide or pesticides with fertilizer if the mixture is not prohibited by the label,
- Mix two or more pesticides, if all the dosages are at or below the recommended rate.
- All applications shall be recorded on the online Pesticide Use Reporting System.

POLICY

It is the policy of MPRD for their employees to apply pesticides in a safe and legal manner on MPRD-managed property and to adhere strictly to all requirements for the safe and efficient use of pesticides.

The following criteria shall be met when applying pesticides. Some of these are addressed further in other policies.

- The label is the law.
- Safety equipment and protective clothing shall be used wherever indicated and maintained in a safe condition.
- Spray equipment shall be maintained in a safe and useful condition. Spray equipment shall be calibrated regularly.
- Anti-siphoning devices shall be used when filling spray equipment.
- "Criteria for Choosing a Pest Control Method", as outlined in "Approved Pest Control Strategies," shall be considered in making choices.
- Pesticides used shall be from the approved listed as provided for the appropriate divisions.
- Pesticides shall be applied only when appropriate weather conditions exist.
- All applications shall be recorded on approved application forms.
- All applications shall be recorded on the online Pesticide Use Reporting System.

PROCEDURES

Applying Pesticides on MPRD-Managed Property.

1. Skilled staff will determine the threshold and action levels for the specific pest problem.

2. Control strategies are decided on by the Park Technician, licensed applicator, supervisor (or designee) or inspector. (Special situations may require expertise from outside MPRD). The "Approved Pest Control Strategies" shall be used as a guide for decision-making.

If pesticides are to be used:

1. Choose the pesticide using the "Criteria for Choosing a Pest Control Method".

2. Check and calibrate application equipment for safety and efficiency.

3. Check weather conditions, including wind, rain, humidity, and temperature. Applications should be done with calm wind conditions to prevent drift. Adjustments should be made for droplet size and pressure if marginal conditions exist. No pesticide application should be done where there is unacceptable drift.

4. Post ***Do Not Enter*** signs at the pesticide application site in accordance with the label.

5. List re-entry specifications on the signs if required by the label, as in greenhouse applications.

6. Apply material according to the label and in accordance with state and federal regulations.

7. Record applications of pesticides on the Pesticide Application Record.

8. Remove signs after suitable re-entry requirements have been met. This is usually when the liquid pesticide has dried, unless indicated otherwise on the label.

9. Evaluate the results of control measures.

Use of Remaining Pesticides Solutions and Rinses — Policy #10

BACKGROUND

This policy outlines methods for use of remaining pesticide solutions and rinses in a legal and safe manner. Applicable laws require that all pesticide solutions and rinses be applied to target areas according to label directions. These solutions and rinses may also be disposed of at an authorized pesticide disposal site.

POLICY

It is the policy of MPRD to conduct our pesticide operations so that disposal of material is not necessary. Pesticide solutions and rinses are applied according to the label and to legal target areas so there are no remaining pesticides. This shall be accomplished by accurately gauging the amount of pesticide needed for the job. MPRD promotes the use of advance planning to

minimize the number of times it is necessary to switch pesticides in spray equipment. In order to reduce the amount of excess rinsate, it is the policy of MPRD to rinse equipment only at the end of the spray cycle or when changing to pesticides that are incompatible with those in the tank.

PROCEDURES

Following are some considerations to make before starting to spray in order to ensure the proper amount of pesticide is mixed.

Advance considerations:

- Weather conditions and predictions.
- Acreage / square footage of the job site.
- Calendar: special events, mowing, irrigation, etc.
- Type and size of the equipment appropriate to do the job.
- Mix only enough products to perform the job.

Rinse the sprayer if the following conditions apply:

- It is necessary to use a pesticide incompatible with that previously used.
- It is the end of a spraying cycle.

Use the following rinse process:

1. Read the pesticide label. The following should not conflict with label information or state or federal regulations. Contact your supervisor if you see a conflict or have questions.
2. Wear protective clothing, as listed on the label or in the Material Safety Data Sheets when handling pesticides, pesticide containers or pesticide equipment.
3. Fill the spray equipment approximately 1/4 full with clean water. Add a neutralizing agent if the pesticide label recommends one. Shake or agitate so that all inside surfaces are washed. If possible use the spray hose to rinse the inside surface of the tank. These procedures should coincide with all label regulations.
4. Spray the rinse water out of the spray equipment onto an approved target area. Rinse water should be run through all hoses, booms, etc. Filters should be cleaned. Because of the dilute nature of the pesticide in the rinse water, a coarse spray can be used and it is recommended to save time. Do not “pond” or saturate the soil.
5. If the tank is to be stored, repeat steps 3 and 4 above, without a neutralizing agent.

Disposal of Empty Pesticide Containers, Unusable Pesticides — Policy #11

BACKGROUND

This policy defines the methods and procedures for disposing of pesticide containers and unusable pesticides or those pesticides whose registrations have been totally or partially suspended.

MPRD considers proper disposal of pesticides and pesticide containers to be of the utmost importance to the safety and well-being of employees and the public.

Several governmental agencies regulate pesticide disposal. No one agency has comprehensive authority. Agencies involved may include the Oregon State Department of Agriculture, Oregon Department of Environmental Quality, U.S. Environmental Protection Agency, and state and federal Occupational Safety and Health Administration (OSHA) programs.

POLICY

MPRD shall dispose of pesticides and empty pesticide containers in accordance with all State and Federal regulations and label recommendations. The disposal of these materials requires care in handling and use of all necessary protective equipment.

PROCEDURES

Read the pesticide label. The following steps should not conflict with label information or state and federal regulations. Contact your supervisor if you see a conflict or have questions.

Wear protective clothing when handling pesticides or pesticide containers, as listed on the label or on the Material Safety Data Sheets.

Non-rigid containers including bags and sacks.

1. Pesticide material must be emptied into application equipment to the extent made possible by physical agitation of the container.
2. Visually verify that residues have been removed.
3. Roll up the container when empty.
4. Dispose as per label.

Rigid containers such as plastic or metal.

1. Pesticide material must be emptied into application equipment to the extent possible by pouring, then visually verifying that the residues have been removed.
2. The container must be at least triple-rinsed with clean water until clean, with the contaminated rinse water being poured into the spray equipment. Empty the pesticide and all rinses into the sprayer before the full amount of diluting water is added to the spray equipment. After the container is clean, it shall be punctured and crushed.
3. Dispose as per label.

STORAGE OF EMPTY PESTICIDE CONTAINERS

1. Containers must be labeled (needs rinsing) and stored in a locked cabinet until they can be rinsed and dispose of per the label.
2. Special containers needing special handling must be delivered, deposited and recorded by a licensed applicator in the waste storage container located in the Pesticide Storage Container. Drop material into the appropriate waste storage box.

   Record the date, name of the pesticide, quantity and size of the container and the applicator signature. These records shall be maintained at the site and copies forwarded to the Park Maintenance Superintendent on a twice yearly basis.

DISPOSAL OF UNUSABLE PESTICIDES

Unusable pesticides are ones that: 1) are damaged through vaporization, freezing, infiltration of moisture to containers, or photo decomposition; 2) have exceeded their shelf life; or 3) have visually changed their composition or structure in some manner.

1. The Park Maintenance Supervisor and Superintendent should be informed of the plans in advance to dispose of pesticides.
2. The person disposing of pesticides should keep a record of distribution on file for three years stored with the other spray records.
3. If the pesticide has reduce effectiveness for example, due to the long storage, moisture or freeze damage, follow the recommendations of the dealer, manufacturer, or licensed consultant and use procedures in this policy as they apply.
   - One option could be to apply the material realizing that full control may not be achievable using the damaged pesticide.
   - If this option cannot be followed legally, follow recommendations of the dealer or manufacturer or licensed consultant. It is not legal to transfer damaged or altered pesticides to another party for use. It may be necessary to arrange for disposal of the pesticide in a manner recommended by D.E.Q.

Disposal of Pesticides with Totally or Partially Suspended Registrations, which are rendered legally unusable by MPRD.

1. Keep up-to-date on the industry news and use of materials before they are legally banned if possible.
2. Follow recommendation of the manufacturer or dealer in finding a legal user for the pesticide.
3. If the pesticide is unopened and/or still retains its integrity, it may be possible to transfer the pesticide to a legally registered bureau, agency or group for use.

4. Dispose of the pesticide in a manner recommended by D.E.Q.

Emergency Information Concerning Accidental Pesticide Exposure **Policy #12**

BACKGROUND

This policy defines MPRD response to inquiries by employees and the general public concerning adverse health effects as a result of accidental exposure to pesticides. Due to public concerns, handling of inquiries needs to be professional, calm and prompt.

MPRD does not have toxicological or other medical expertise on staff. This expertise is however, readily available in the community. Therefore, these concerns will be referred to the medical community.

POLICY

MPRD will keep employees who apply pesticides informed of proper procedures to be taken in case of pesticide exposure. Anyone inquiring about pesticide exposure will be referred to his or her personal physician, the Oregon Poison Center (OPC), and the Pesticide and Analytical Response Center (PARC). A list of these authorities and their phone numbers are listed in Appendix 10. A physician who does not deal in these issues could use this list for reference. This list shall be reviewed and updated yearly.

Material Safety Data Sheet information is available to all personnel for their own use. This information includes symptoms produced by the product and procedures for handling overexposure to individual pesticides. If symptoms of illness occur during or shortly after applying pesticides, call OPC or get the patient to medical attention immediately.

Non-emergency questions received by MPRD shall be referred to the Park Maintenance Supervisor. He / she will refer the questioner to the appropriate individuals or sources for more information.

PROCEDURES

Use planning to avoid emergencies and to expedite aid should an accident occur.

- Research symptoms and problems of each pesticide to be used in Material Safety Data Sheets.
- Use all safety procedures and protective gear as recommended on the label or in the Material Data Safety Sheets.
- Have a copy of the appropriate label available while applying or transporting pesticides both concentrated and dilute.

In case of a medical emergency related to suspected pesticide exposure:

- Handle any emergency situation as per First Aid instructions.
- Call for emergency backup if necessary.
- Refer to Oregon Poison Center.
- Take a label for reference for medical personnel if it is necessary to leave the site.
- Inform your supervisor as soon as possible.

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In response to a non-emergency inquiry:

- Respond to simple direct questions.
- Refer detailed or technical questions to the Parks Maintenance Supervisor
- Inform your supervisor.

Pesticide Applications around Community Gardens — Policy #13

BACKGROUND

The existence of community gardens within parks raises the need for special considerations. The gardeners of the Community Gardens Program are of diverse backgrounds and have differing views about pesticide applications in and around the gardens. Since many of the crops derived from the gardens are food crops, care is needed to ensure its quality.

POLICY

In order to protect food derived from Community Garden sites, be sensitive to the differing viewpoints of the program participants, the following rules are in effect:

- Garden guidelines state that no herbicides can be used on Community Garden sites. This specifically refers to garden plots, pathways, fence lines and any areas within the garden boundary. Spraying perimeters of the gardens from outside the fence is not permitted.
- Park employees are required to keep applications of all pesticides at least 50 feet from the outside perimeter of Community Garden sites.
- Mechanical means, such as cutting, hoeing and mulching, can be used to remove or control weeds in the Community Garden sites and perimeters.
- The Park Maintenance Supervisor shall establish internal guidelines regarding pesticide us by participants of the program.
- Requests for exceptions should be directed to the Park Maintenance Supervisor.

Pesticide Spill Response Policy — Policy #14

Level Description and Training

The **base level** is for individuals who become aware of a possible pesticide spill. They must be able to recognize and respond to an emergency situation by keeping people out of the area and immediately informing a supervisor.

The **second level** is for licensed applicators that apply or transport small volumes of pesticides. This level includes response to incidental spills and is covered by OSHA's Hazard Communication regulation. Individuals at this level are trained to prevent spills from occurring. Should one occur, they are trained to stop the release, keep it from spreading and do cleanup. MPRD's licensed pesticide applicators are in this category.

Individuals at this level will receive training in addition to that, which is given to pesticide applicators, along with hazard communication and respiratory protection training.

The **third level** of training includes individuals who apply or transport over 50 gallons of dilute pesticide or more than 1 gallon or 10 pounds of concentrate. They are trained to stop the release, keep it from spreading and do cleanup. They will receive 9 hours of training additional to that which is required for the second level.

This level includes the Park Maintenance Supervisor who will be responsible for notifying regulatory agencies, documenting incidents, ensuring that the cleanup is complete, and for making arrangements for the disposal of hazardous waste.

SPILL PREVENTION

MPRD personnel will employ a variety of practices to reduce the potential of a pesticide spill. These will include the following:

Purchasing

When procuring chemicals, a factor in determining which chemical formulation to purchase will be the ease with which it can be cleaned up in the event of a spill. Types of packaging and formulations that may help to prevent a spill from occurring will be
factors as well. Characteristics of the pesticide, such as toxicity and reactivity that may affect the seriousness of a spill, will also be considered.

Preparation

Planning, training of personnel, and acquisition and maintenance of equipment and supplies will be done to reduce the risk of a spill occurring, and to minimize damage, should one occur. For example, regular preventative maintenance will be done on sprayers, replacing hoses and valves before they wear out.

Work Practices

Medford Park personnel will use practices to minimize the potential for a spill to occur and to ease clean up should one occur. For example, pesticides should be placed in a leak-proof container while being transported.

Waterways Pest Management Policy **Policy #15**

General Goals and Philosophy

MPRD recognizes the special importance of the rivers, streams, ponds, water quality facilities, and wetlands that fall under our stewardship. The sensitive nature of such habitats, their plant and animal communities, and their direct link with other waterways require that we establish specific policies to ensure their health.

Integrated Pest Management principles will be employed in all landscape management decision-making. Control of unwanted vegetation, diseases, and pests will follow the IPM decision-making rationale.

- Proper planning and management decisions begin the IPM process.
- Cultural methods of vegetation and pest control are preferred and will be employed next.
- Mechanical means of vegetation and pest control are next in line of preference, and will be utilized where feasible.
- Biological methods of vegetation and pest control are to be considered before chemical means, where they are feasible.
- Botanical and synthetic pesticides will be used only when no other feasible methods exist.

Management Practices, Materials, and Limitations For Parks Waterways and Buffers

Definitions

The buffer zone and high water line referred to in this policy is defined as a corridor of land that is defined by Oregon Division of State Lands

Application Equipment Used

Pesticide delivery for all listed areas in this policy will be carried out by hand with directed, low volume, single wand sprayers, wiping, daubing, and painting equipment, injections systems, or drop spreaders. Typically, this is done by backpack sprayers, but may also include sprayers with larger fill tanks as long as the same kinds of hand application methods are used. These methods of delivery result in low volume applications and low pressure spraying. This minimizes the formation of fine mists that might be carried off target. These practices ensure that applied materials will reach targeted plants or targeted soil surfaces.

Pesticide Drift

When applications of pesticides are being made within the buffer zone, great care will be exercised in the process. Managing drift is of particular importance when surface waters are nearby. Equipment used in the application shall employ all necessary methods to limit drift. Nozzle size, pressure regulation, droplet size, and height of spray wand, are all techniques that can be modified to reduce unwanted drift of pesticides.

Spray applications will not be allowed in the buffer zone when:

- Wind speed is above 5 mph.
- Wind direction or activity would carry pesticides toward, or deposit them upon open water.

Pesticides Available

To more clearly regulate any possible aquatic impacts, the MPRD Pesticide Approval Committee shall approve the herbicides used in these buffer zones.

Materials available for tree injections in buffer zones:

In the event a pest or disease threatens the health of important and valuable trees within a buffer zone, there may be a need to treat them. Instances of this occurring are rare. However, in these special cases, the use of injectable pesticides may be employed when necessary, with the following limitations. The pesticide applied must be delivered by methods that inject or otherwise distribute the material entirely within interior tree tissues. Pesticides will not be injected into the soil surrounding the tree. Tree surfaces will not be sprayed or treated with pesticides. The MPRD Pesticide Approval Committee shall approve the insecticides and fungicides used in these injection systems. The intent and limit of this exception to the approved buffer zone pesticide list is to allow only the insecticides or fungicides necessary to combat direct threats to the health of valuable trees.

Materials for all other areas:

MPRD general Pest Management Policy approved pesticides may be used outside the waterway and buffer zones, where not otherwise prohibited by this policy.

Record Keeping Requirements

All regular application record keeping requirements will be adhered to for all pesticide applications. This includes date and the time intervals of the application, temperature and wind conditions, location of application, chemicals used, (including surfactants and dyes), concentrations used, amount applied, coverage rate, equipment used, applicator information and license number.

Personnel Requirements

All those applying pesticides to MPRD lands must be Oregon Department of Agriculture licensed applicators. Licensed personnel who have received an additional aquatics license certification will only do application of pesticides to aquatic sites.

Use of pesticides and fertilizers within buffer zones of all waterways

**Requires approval of Parks Maintenance Superintendent.*
USE OF MULCHES

Mulches and other ground coverings are often employed during the installation and restoration of landscapes as well as their ongoing maintenance. They are utilized for a variety of reasons. Mulches suppress weeds, help to retain moisture around plants, reduce possible erosion, and provide visual enhancement.

Use of landscape mulches in buffer areas should take into account any possible impacts to the buffer as well as nearby waterways. These impacts may include:

- Inadvertent introduction of non-native weeds to the site.
- Migration of mulch material into waterways.
- Nutrient leaching into waterways.

Management Practices within Bodies of Water, Biofilters and Wetlands

The following describes specific practices that may be used within the actual bodies of water:

Within Streams
In the rare need for control of noxious weeds and invasive non-native plants within a stream itself, mechanical and biological means will be utilized where possible. When these methods are not feasible, emergent weeds only may be controlled with an approved herbicide and surfactant if needed. Although rare, control of noxious and invasive weeds may be needed to maintain a healthy environment. These treatments will take place at mid-summer. Frequency of these treatments shall not exceed once a year even in the worst of infestations. Applicable permits from appropriate outside agencies will be obtained before this kind of treatment takes place. Submerged weeds will not be controlled by chemical means in streams and rivers or other moving waters.

Mulch Management Policy — Policy #16

USE OF MULCHES
Mulches and other ground coverings are often employed during the installation and restoration of landscapes as well as their ongoing maintenance. They are utilized for a variety of reasons. Mulches suppress weeds, help to retain moisture around plants, reduce possible erosion, and provide visual enhancement.

Use of landscape mulches in buffer areas should take into account any possible impacts to the buffer as well as nearby waterways. These impacts may include:

- Inadvertent introduction of non-native weeds to the site.
- Migration of mulch material into waterways.
- Nutrient leaching into waterways.

Fertilizer Application Management Policy — Policy #17

BACKGROUND

This policy outlines procedures for fertilizer application on property that is maintained by MPRD employees. Directions for application, notification, timing, justification, safety and use are defined within this policy.

POLICY

It is the policy of MPRD for their employees to apply fertilizers in a safe and environmentally conscience manner on MPRD-managed property. Application of fertilizer provides the following benefits:

- Promotes plant health of turf, trees, annual flowers, and perennial shrubs
- Reduces water usage through enhanced root growth
- Promotes turf health and density
- Reduces broadleaf weeds in turf
- Enhances appearance of properties promoting recreation

PROCEDURES

The following guidelines must be met by skilled staff to apply fertilizers in MRPD managed property.

Guidelines:

1. Skilled staff will only apply fertilizers during the growing season months of the year.

2. A schedule of fertilizer application dates for the year will be posted on the Parks and Recreation website at the start of each year.

3. Skilled staff will apply fertilizers in a manner that reduces public exposure to the application process.

4. Skilled staff will apply fertilizer in a manner that reduces exposure to the applicator during the application process.

5. Applicators must wear proper Personal Protective Equipment (PPE) when applying fertilizer. (i.e. long pants, long sleeves, eye protection, gloves)

6. Applicators will post signs within MPRD-managed property 24 hours after fertilizer application to properly inform the public.

7. Skilled staff will not apply fertilizers within 50 feet of riparian corridors, bodies of water, or streams unless approved by the Department of Fisheries and Wildlife.

8. Skilled staff will take care to ensure that fertilizer does not leach into City of Medford storm drains.

9. Care will be taken to select fertilizers low in Phosphorus to reduce the risk of Phosphorus leaching.

10. Rate in which fertilizer is spread is not to exceed 1.5lbs of Nitrogen per 1000 square feet for each application to reduce waste and undesired effects.

11. Fertilizer spreaders are to be rinsed and cleaned after each application to prevent corrosion.

Equipment Calibration:

All fertilizers spreaders are to be calibrated prior to each application to the desired rate. Calibration of equipment is performed in the target area and **not** to be performed on impervious surfaces.

Fertilizer Storage:

Fertilizers shall be stored in secure and safe locations. They shall be safeguarded from environmental damage. (E.g. photodecomposition, moisture) All fertilizers in stock shall be inventoried annually and, if necessary, rotated to assure that the oldest dated items are used first.

MPRD staff will keep fertilizer storage area clean. The frequency of cleaning will be monitored by supervisory personnel, but will not be less than once per year.

MPRD staff will inventory fertilizer stored onsite. The frequency of inventory will be monitored by supervisory personnel, but will not be less than once per year.

Transporting Fertilizer:

Fertilizers being transported shall be appropriately and safely secured in the bed of the vehicle or trailer. Skilled staff shall inspect fertilizer bags for tears or leaks prior to transporting. If leakage is found, staff shall repair prior to transporting. An appropriate spill kit must be immediately available for deployment if spills are encountered through the transport process.

Pesticide Applicator Acknowledgement Management Policy — Policy #18

POLICY

MPRD utilizes best practices when handling, disposing, and applying pesticides. These best practices are:

1. **Read and Follow Labels- Be Cautious**

Label information, requirements, and directions provided on the label are there for applicator safety as well as the safety of the public. After following all label directions, applicators are to treat pesticides with special caution.

2. **Use Protective Clothing and Equipment Always**
   Prevent exposures to skin, lungs, eyes, and mouth. Utilize protective clothing, respirators, goggles, or any other label required personal protective equipment.
3. **Prepare for the Unexpected**
   When applying pesticides, anticipate potential problems that could be encountered before, during, and after the application is complete.
4. **Avoid any Possible Ingestion**
   Never eat, drink, or use tobacco products when you are mixing, loading, or applying pesticides.
5. **Wash Equipment Frequently and Clothing Separately**
   To reduce unwanted exposure to pesticide solution and residue equipment needs to be washed and serialized frequently. Additionally, clothing used when applying pesticides need to be laundered separately from other clothing.
6. **Control Waste**
   Follow label recommended disposal and storage of pesticides.
7. **Riparian Area Restrictions**
   All applications of pesticides within 50 feet of flowing water are restricted unless application is observed by the Oregon Department of Agriculture and approved by the immediate supervisor.
8. **Application Timing and Window**
   All pesticide applications will be conducted between the hours of 4:00am and 9:00am dependent on weather. Applications performed before or after this window must be approved by the immediate supervisor.
9. **Expect Tougher Enforcement**
   Pesticides are under tremendous scrutiny. More people are reporting applicators who are not utilizing best practices. Those who do not follow best practices not only endanger themselves and others, but undermine the department's professional reputation.

All Publically Licensed applicators are required to abide by the best practices described above in the Employee Acknowledgement of Responsibilities and Obligations pesticide use form.

References

1. Oregon Department Environmental Quality *www.**deq**.state.or.us*

2. Fisher. Glenn, et al. Pacific Northwest Insect Control Handbook, March, 2009. Agricultural Communications, Oregon State University, Washington State University and University of Idaho.

3. Shenk, Myron, Oregon Pesticide Safety Education Manual, January, 2004. Agricultural Communications, Oregon State University, Washington State University, and University of Idaho.
4. Oregon Department of Agriculture-web site http://www.oregon.gov/ODA/PEST/index.shtml
5. Myron Shenk. Oregon Pesticide Applicator Manual. 2006. Pesticide Safety Education Program Coordinator, Oregon State University, Washington State University, and University of Idaho.

Appendix B

Riparian Shading Priorities for Bear Creek:

Based on DEQ's *TMDL Assessment Report: Riparian Shade* and Table 1.1, the following recommendations are made to assist in achieving temperature compliance through riparian restoration or protection. Restoration may include planting of large canopy trees and native shrubs, eradication of invasive plants, and releasing existing native vegetation from invasive plants. In addition, it is recommended that local jurisdictions review riparian ordinances for adequacy in protecting riparian shade and native species. Education and outreach activities to landowners will also help protect and restore riparian areas.

Large portions of Bear Creek have been identified as needing shading and restoration. Generally, riparian cover is more limited near the mouth of Bear Creek with portions listed as 0 percent up to 8 percent along the first 3.5 miles of Bear Creek (Jackson County). The upper portions of the watershed have a greater existing percent shade but many sections are listed as having 0 percent up to 20 percent existing shade and include:

- Bear Creek from river mile 3.6 to mile 7.6 has an average existing shade of 6.6 percent with an average potential increase in shade of 43 percent.
- Bear Creek from river mile 7.9 to mile 13.6 has an average existing shade of 8 percent with an average potential increase in shade of 41 percent.
- Bear Creek from river mile 15.6 to mile 18.1 has an average existing shade of 8 percent with an average potential increase in shade of 46 percent.
- Bear Creek from river mile 21 to mile 21.8 has an average existing shade of 11 percent with an average potential increase in shade of 48 percent.
- Bear Creek from river mile 22.2 to mile 22.7 has an average existing shade of 10 percent with an average potential increase in shade of 57 percent.
- Bear Creek from river mile 23.7 to mile 24.6 has an average existing shade of 12 percent with an average potential increase in shade of 51 percent.
- Bear Creek from river mile 29 to mile 32 has an average existing shade of 7 percent with an average potential increase in shade of 39 percent.
- Bear Creek from river mile 32.7 to mile 33.8 has an average existing shade of 7 percent with an average potential increase in shade of 42 percent.
- Bear Creek from river mile 34 to mile 35.2 has an average existing shade of 7 percent with an average potential increase in shade of 30 percent.

Appendix C

Invasive plants and control techniques:
The following information regarding Invasive plants is not intended to be the sole source of information. There are several invasive plants that occur in this area. The plants mentioned here are known to occur in the area. This information is taken from OSU 2003.

English ivy *(Hedera helix)*

Life cycle: Perennial

Identification: Woody, evergreen vine. Long, trailing stems with alternate waxy leaves. Leaves are diamond shaped. Green or white flowers produce black berries.

Origin: English ivy is a native of Europe. It was brought to North America in colonial times as an ornamental and is now widely distributed and sold to gardeners worldwide.

Impact: Rapid and massive vegetative growth tops trees, other ornamentals, and displaces native vegetation. English ivy becomes intertwined with other species and therefore is difficult to manage mechanically or with herbicides. The shallow root system leaves soil prone to erosion after other species are displaced.

Habitat and ecology: English ivy is adaptable to many soil and light conditions. Established plants have an extensive but shallow root system that relies on shallow soil moisture. English ivy does not flower until the plant is mature, which can take up to 40 years. Flowers produce berries that are toxic to animals. Plants also reproduce vegetatively.

Management:
Cutting/mowing: Cutting and mowing are ineffective because of the extensive root system and potential for regrowth.
Manual removal: Manual removal is effective in small areas when repeated often. Vines climbing tree trunks are difficult to manage. Cut vines a few feet above the base of the tree to deplete resource translocation from the roots to vegetation in the upper portions of the tree.
Biological control: Not available.
Burning: Burning often is impractical because English ivy cohabitates with native and desirable species that would be injured.
Herbicides: Herbicides can be effective but will damage or kill native plants in a broadcast application. Spot treatment can be effective. Apply in late summer through fall to leaves or regrowth after cutting. Basal bark applications absorbed by stem bark for effective control. Herbicide recommendations are based on their ability to control invasive weeds, not on crop or desirable vegetation tolerance. Always check the herbicide label for current rates and labeled uses.

Garlic mustard *(Alliara petiolata)*

Life cycle: biennial

Identification: Plants form basal rosette of kidneyshaped leaves in the first year, with a flower stalk elongated in the second year. Upper leaves are alternate on stem and triangular in shape.
Leaves produce a distinct garlic odor when crushed. Single flower stem with white flowers produced in second year.

Origin: Native to Europe but now found extensively in North America. First recorded in 1868 in Long Island, NY. Most frequent in New England and Midwestern United States, but increasing in population in the Pacific Northwest.

Impact: Competitive with native desirable species in deciduous forests, possibly through allelopathy (natural, plant-produced chemicals that negatively affect nearby plants). Native species that are critical to wildlife are displaced.

Habitat and ecology: Commonly found in deciduous forests and shaded roadsides in soils with abundant nitrogen and occasional disturbance. Garlic mustard germinates from seed in spring, develops a rosette in the first year, and produces a seed stalk and seeds in the second year. This species has a low tolerance for drought in the first summer or for acidic soils. Populations are evenaged: a site will contain only rosettes in the first year and none in the second year when the entire population is flowering. Seed is dispersed primarily **by** humans and animals and not to any great extent by wind or water. In Europe, populations are kept in check by natural insect and fungal enemies.

Management:
Cutting/mowing: Cutting can be very effective during flowering but prior to seed production. When seed is present, remove seed stalks from site and burn. Prior to seed production, cut stalks can reflower.

Manual removal: Effective with small, localized populations.

Biological control: Potential biological controls are under investigation.

Burning**:** Control with burning is variable and can stimulate germination of seeds in the soil.

Herbicides**:** Most effective when applied in early fall of rosette year. Apply when actively growing Herbicide recommendations are based on their ability to control invasive weeds, not on crop or desirable vegetation tolerance. Always check the herbicide label for current rates and labeled uses.

Himalayan blackberry (Rubus *discolor)*

Life cycle: Perennial

Identification: Root buds produce upright trailing stems with alternate
compound leaves with serrate margins. Reddish stems with sharp spines. White flowers result in black aggregate berry fruit.

Origin: Himalayan blackberry is a native of Western Europe. It is thought to have been introduced in the United States as a cultivated crop in about 1885 and had spread from coast to coast by 1945.

Impact: Himalayan blackberry displaces native plant species, prevents water flow in streams and irrigation ditches, and inhibits recreational activities.

Habitat and ecology: Himalayan blackberry is most prolific in areas with more than 30 inches annual precipitation and is adaptable to a wide range of soil types and pH. It forms impenetrable thickets in noncropland, pastures, tree plantations, and roadsides. Reproduction is both by seed and vegetatively. Seven thousand to 13,000 seeds are produced in a square meter of growth. Roots reproduce vegetatively at cane apices. Canes can grow more than 20 feet per season with rootstocks more than 30 feet long. Long distance dispersal occurs when seeds are carried by birds and animals.

Management
Cutting/mowing: Effective when regrowth is treated with herbicides.
Manual removal: Manual removal is difficult and often ineffective.
Biological control: Not available.
Burning: Burning after cutting vegetative growth can be effective when regrowth is treated with herbicides.
Herbicide: Repeated applications necessary. Most effective when applied from flowering through the first hard frost. Apply to young plants during active spring growth.
Herbicide recommendations are based on their ability to control invasive weeds, not on crop or desirable vegetation tolerance. Always check the herbicide label for current rates and labeled uses.

Poison hemlock (Conium *maculatum)*

Life cycle: Biennial or perennial

Identification: Erect stems up to 10 feet tall with purple spots. Multiple branches with shiny leaves finely divided with segmented leaflets. Foliage with musty odor. White flowers in clusters.

Origin: Native of Europe, western Asia, and North Africa. Poison hemlock was brought to the United States from Europe as an ornamental in the early 1800s and is now spread worldwide.

Impact: Poison hemlock is very poisonous to humans and livestock. While all plant parts are toxic, the seeds are particularly potent. Poison hemlock displaces native vegetation, particularly as an early colonizer in disturbed ground.

Habitat and ecology: Poison hemlock is common along roadsides, noncropland, irrigation ditches, and streambanks. Reproduction is by seed. Seed germinates in fall, and plants may flower and produce seed in the first summer. Seed is spread by humans and animals, machinery, and water.

Management

Cutting/mowing**:** Repeated mowing can be effective and is most effective when regrowth is treated with herbicides.

Manual removal**:** Pulling plants is dangerous due to toxicity to humans. Pulled plants will not survive, but will remain toxic for years.

Biological control**:** The hemlock moth (Agonopterix aktroemeriana) in the larval stage severely defoliates poison hemlock.

Burning**:** Burning is not effective or practical given the areas that poison hemlock inhabits.

Herbicides**:** Effective when seedling plants are treated during active growth. Herbicide recommendations are based on their ability to control invasive weeds, not on crop or desirable vegetation tolerance. Always check the herbicide label for current rates and labeled uses.

Puncturevine *(Tribulus* terrestris)

Life cycle: Annual

Identification: Prostrate plant that forms a mat with stems up to 4 feet in length. Opposite, hairy leaves divided into four to eight oval leaflets. Yellow flowers borne in leaf axils. Fruits break into sections that are very sharp and spiny.

Origin: Puncturevine is a native of the Mediterranean region. It was first documented in the Pacific Northwest in 1924 and is suspected to have been introduced as seed in wool from Europe.

Impact: Puncturevine produces spiny seeds that often puncture bike and vehicle tires. Livestock can be injured when the spiny seeds become embedded in feet, mouths, eyes, and digestive tracts. Nitrate levels in puncturevine can be toxic to livestock.

Habitat and ecology: Puncturevine is common along roadsides. Seeds germinate from spring through summer from shallow soil depths. Plants can flower as early as 3 weeks after germination, with seeds produced 1 to 2 weeks later. Individual plants produce over 1 million spiny seeds that penetrate tires and skin and are spread long distances. Puncturevine is tolerant of drought conditions and survives well in sandy or gravelly soils.

Management:
Cutting/mowing**:** Effective prior to seed production.
Manual removal**:** Effective prior to seed production. Burn removed plants if they are past the flowering growth stage to prevent seed maturation.
Biological control**:** Two species of weevils are available: one that feeds on seeds (puncturevine seed weevil, (Microlarinus lareynii), and one that feeds on stems (puncturevine stem weevil, *Microlarinus lypriformis).* Both species are moderately effective at best because of a lack of cold hardiness.
Burning**:** Burning can be effective in preventing seed production.
Herbicides**:** Apply to young plants during active growth. Most effective when applied in warm weather. Herbicide recommendations are based on their ability to control invasive weeds, not on crop or desirable vegetation tolerance. Always check the herbicide label for current rates and labeled uses.

Tamarisk, saltcedar *(Tamarix ramosissima* or T. *parviflora* or *T. chinensis)*

Life cycle: Perennial

Identification: Shrub or small tree up to 20 feet tall. Reddish bark. Small, scaly leaves. Pink or white flowers in branched clusters.

Origin: Native of Europe, Asia, and Africa. Introduced in early 1800s from Asia as an ornamental or to stabilize streambanks and provide a windbreak.

Impact: Tamarisk displaces native woody species and supported wildlife, increases soil salinity, and disrupts water drainage and movement. Individual plants can use hundreds of gallons of water each day.

Habitat and ecology: Invasive in riparian areas, wetlands, and floodplains. Once established, tamarisk can survive without access to groundwater. It is prevalent in high-salt habitats and can accumulate salts in leaves. Soil salinity increases as leaves are dropped, thus increasing soil salinity to such an extent that other species will not survive. Tamarisk reproduces primarily by seed, but also by root fragments or underwater stems. Tamarisk is susceptible to shading, which allows for revegetation as a management strategy.

Management

Cutting/mowing: Cutting plants can be effective, particularly when regrowth is cut repeatedly or treated with herbicides.
Manual removal: Manual removal can be effective with seedling plants.
Biological control: Not available because of closely related ornamentals.
Burning: Burning can be effective when regrowth is cut or treated with herbicides.
Herbicides: Effective but will damage or kill native plants in a broadcast application. Herbicide recommendations are based on their ability to control invasive weeds, not on crop or desirable vegetation tolerance. Always check the herbicide label for current rates and labeled uses.

Yellow starthistle (Centaurea *solstitialis)*

Life cycle: Annual, occasional biennial

Identification: Winged stems with multiple branches are covered with cobweblike hairs. Lower leaves are deeply lobed, while upper leaves are entire and narrowly pointed. Branches terminate with single yellow flower heads protected by long, sharp, tan thorns.

Origin: Native to Eurasia. Introduced to North America in 1850s as a seed contaminant in Chilean-grown alfalfa seed.

Impact: Displaces native vegetation. Livestock will not graze mature yellow starthistle because of its spines. When ingested by horses, yellow starthistle causes a neurological disease called chewing disease.

Habitat and ecology: Yellow starthistle is common in grasslands with well drained soils and an annual precipitation ranging from 10 to 60 inches. Yellow starthistle germinates rapidly and establishes an extensive root system that results in excessive water consumption compared to nearby native plant species. Reproduction is by seed. Plants are pollinated by bees. One plant can produce more than 10,000 seeds. Seeds are spread by vehicles, animals (including humans), and long distances in hay and uncertified crop seed or by birds.

Management:
Cutting/mowing: Mowing is effective on plants with a high branching pattern. Grazing with goats after stems bolt but before seed production can be effective because goats will eat the spiny plants.
Manual removal: Hand pulling prior to seed production is effective for small populations.
Biological control: Six control agents have been introduced in the western United States. The hairy weevil (*Eustenopus villosus)* and the false peacock fly (*Chaetorellia succinea)* have been most successful in California and can reduce seed production by up to 75 percent by attacking flowers and seedheads.
Burning: Burning is effective when yellow starthistle flower heads are dried.
Herbicides: Most effective when applied to seedlings from January to May.

Appendix D

General Planting Plan and Native plant lists for riparian, stormwater features and pollinator areas:

- Three planting zones (Figure1, Table 1):
  - Zone A focuses on plants that can tolerate flooding and like a wetter footprint,
  - Zone B plants are mixed and in some cases need tolerate extreme conditions due to the slopes and nature of the understory, and
  - Zone C plants that provide more shade and can tolerate sun and drier conditions.
- Use locally sourced, larger containers (one gallon or larger) for trees and shrubs to attain the desired planting goals more rapidly. Larger containerized plant stock is more tolerant of existing local climate conditions because they are less vulnerable to transplant shock and are more capable of moisture retention during the transplanting process. Additional plant stock can be harvested onsite using cuttings. Cuttings can be used with appropriate species including willows, dogwood and cottonwoods.

Figure 1.

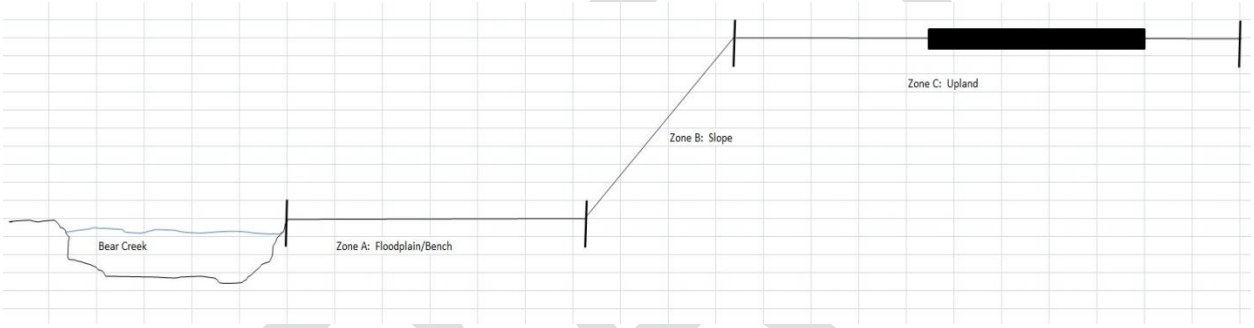


Table 1.

Zone A Plants

Willows (toe of slope)	White Alder	Snowberry	Pacific dogwood
Western Dogwood	Pacific Ninebark	Rush species (Juncus)	Douglas Spirea
Blue Elderberry	Sedge species		

Zone B Plants

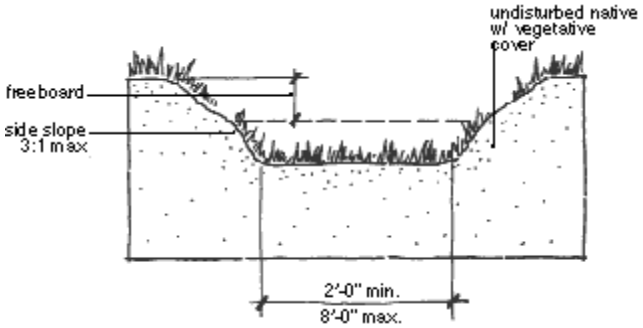
Dogwood	Snowberry	Rose (nootka, woodsii)	Douglas Hawthorne
Oregon Ash	Ocean Spray	Big Leaf Maple	Douglas Spirea
Willows (toe of slope)			

Zone C Plants

Oregon Ash	Big Leaf Maple	Incense Cedar	Ponderosa Pine
White Oak	Oregon Grape	Snowberry	Mock Orange
Oceanspray			

General Stormwater Treatment Plan: Install bioswale(s) (a long, channeled depression or trench that receives rainwater runoff (as from a parking lot) and has vegetation (such as grasses, flowering herbs, and

shrubs) and organic matter (such as mulch) to slow water infiltration and filter out pollutants) to collect stormwater runoff as needed. Plant these features with wetland plants to treat runoff prior to it flowing into Bear Creek.



Bioswale plant list:

Groundlayer		Overstory	
Scientific name	**Common name**	**Scientific name**	**Common name**
Carex obnupta	Slough Sedge	Cornus stolonifera	Redosier Dogwood
Deschampsia cespitosa	Tufted Hairgrass	Crataegus douglasii	Black Hawthorne
Eleocharis acicularis	Needle Spike-Rush	Rosa nutkana	Nootka Rose
Eleocharis ovata	(Common) Ovate Spike-Rush	Salix lucida	Pacific Willow
Glyceria occidentalis	Reed Mannagrass	Spiraea douglasii	Douglas' Spiraea
Juncus ensifolius	Dagger-Leaf Rush	Scirpus acutus	Hardstem Bulrush
Juncus oxymeris	Pointed Rush	Scirpus microcarpus	Small-Fruited Bulrush
Leersia oryzoides	Rice- Cut Grass	Carex obnupta	Slough Sedge

Pollinators and Monarch butterfly habitat areas.

A typical area managed for native pollinators and monarchs would include initial removal of invasive and undesirable species, preparation of the surface through tilling and other means, planting of native flowering plants, and management through timed mowing and monitoring.

Key components of managed corridor habitat:

- A mix of native flowers with different bloom times, including some overlap in flowering, to ensure a stable food source for butterflies. A combination of early, middle and late blooming species will fuel butterfly breeding and migration.
- Native milkweed to provide food for monarch caterpillars.
- Minimal, well-timed management that limits impacts to all pollinators, including butterflies, while eliminating woody species as needed. Preferably, mowing should be limited to times when plants have died back or are dormant. Mowing at any time (even in the winter) kills insects. In the summer, some insects can't get away from the mower, especially eggs and caterpillars. In the winter insects may be dormant in leaf litter or plant stems. Mowing in patches ensures that pollinators can recolonize the mowed areas.
- Avoidance of insecticides.

If needed, minimal, well-timed insecticide applications. If chemicals must be used, choose the least toxic alternative, and apply them early and late in the day, when fewer pollinators are present. Please note that chemicals will kill monarch larvae, if they are present. Herbicides, if required, should be applied with targeted spot treatments instead of a broadcast method. Whenever possible, mechanical removal of shrubs should be used in combination with herbicides to maintain butterfly habitat.

Natural areas may also be located in high traffic areas. Trail margins in prairie areas, campsites, and picnic areas present opportunities to enhance butterfly breeding and migratory habitat. Natural areas can be enhanced for monarchs using a few simple ideas.

Key components of natural/restored habitat:

- A mix of native flowers with different bloom times, including some overlap in flowering, to ensure a stable food source for butterflies. A combination of early, middle and late blooming species will fuel butterfly breeding and migration.
- Native milkweed to provide food for monarch caterpillars.
- Minimal management, including the avoidance of mowing until butterflies have migrated from the area. It is important to stress that mowing kills insects any time of the year. Mowing in patches ensures that pollinators always have access to undisturbed patches of habitat, and that surviving insects can recolonize the mowed area.
- Avoidance of pesticides; avoid herbicides, except for targeted invasive species control.

Pollinator/butterfly waystation plant list:

Scientific name	**Common name**	**Scientific name**	**Common name**
Asclepias speciosa	Showy milkweed	Cornus stolonifera	Red-osier Dogwood
Asclepias fascicularis	Narrowleaf milkweed	Ceanothus thyrsiflorus	blueblossom
Solidago canadensis	goldenrod	Rosa nutkana	Nootka Rose
Monardella villosa	Coyote mint	Spiraea douglasii	Douglas' Spiraea
Ericameria nauseosa	Rubber rabbitbrush	Mahonia aquifolium	Oregon grape
Eriogonum flavum	Yellow buckwheat	Red flowering currant	Ribes sanguineum

	Task	Area Size (acres)	Number of Units (days, visits, number of plants)	Year(s) Multiplier	Costs from Table		Calculated Costs	
					Low	High	Low	High
1	Initial removal of invasive plants - mechanical methods[1]	0	1	1	$ 150.00	$ 300.00	$ -	$ -
2	Initial removal of invasive plants - hand tools and small equipment[1]	1	1	1	$ 300.00	$ 500.00	$ 300.00	$ 500.00
3	Initial removal of invasive plants - herbicide use, hand tools, and small equipment[1]	0	1	1	$ 250.00	$ 600.00	$ -	$ -
4	Ongoing invasive control using no herbicides[2]	0	5	1	$ 100.00	$ 200.00	$ -	$ -
5	Ongoing invasive control using herbicides[2]	1	4	1	$ 55.00	$ 100.00	$ 220.00	$ 400.00
6	Debris removal	1	1	1	$ 450.00	$ 450.00	$ 450.00	$ 450.00
7	Native planting (per plant installed cost)	1	600	1	$ 7.50	$ 12.50	$ 4,500.00	$ 7,500.00
8	Native plant establishment (weeding, watering and care)	1	3	1	$ 100.00	$ 100.00	$ 300.00	$ 300.00
9	Irrigation system - Installing a drip irrigation system (recommended for a minimum of 2 years)	1	1	2	$ 100.00	$ 150.00	$ 200.00	$ 300.00
						Totals	$ 5,970.00	$ 9,450.00

[1] Select one of these three methods

[2] Select one of these two methods

[3] Select one of these two methods Green cells represent cells that have variables (number of days, visits, years) that need to be changed for each project

How to use this Calculator

Select a number of acres for the project, the invasives species removal method, number of trees, number of site visits, years of activities (1 or more) and use this information to complete the chart.

Select and Input the number of acres for the project in the first column. Note that for the first three items, you only need to select 1 of the three methods.

Put the preferred number of days, visits, etc in the green boxes.

Appendix F – Mapping Evaluation Tool Pilot Area Maps

As part of the vegetation management plan, an evaluation tool was created using GIS data to:

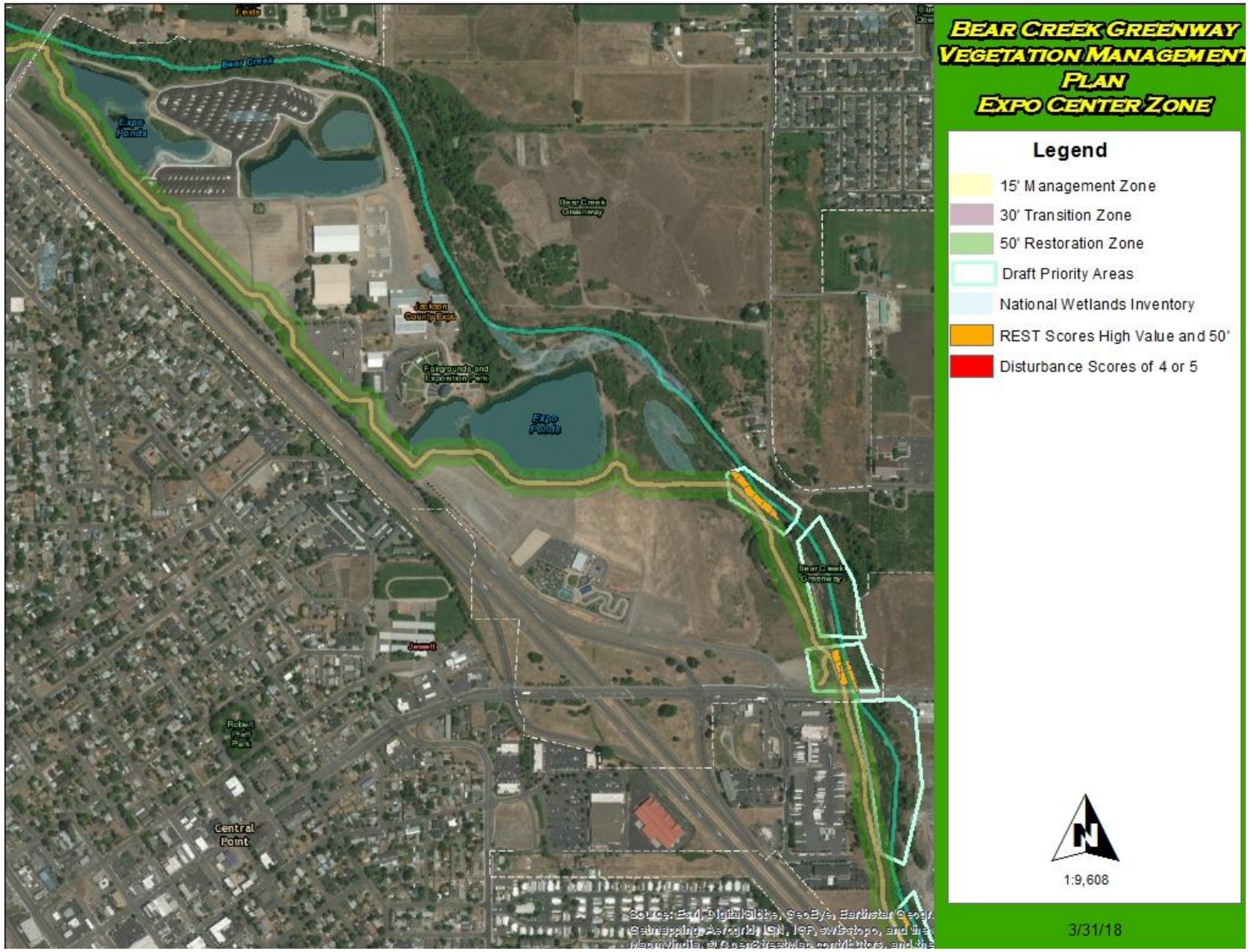
1. To map the locations (widths) of the transition and management zones. The maps provide a reference for what zone (if any) a planned project/activity is in and subsequently, what management measures are recommended.
2. Identify priority areas for restoration and/or application of management strategies outlined in this plan. Priority areas were identified using a number of factors including REST data, proximity to ongoing restoration, wetlands, flood hazard areas, and soils data.
3. Identify areas falling under the special consideration designation for existing or planned activities and resources.
4. Compile relevant data layers that will help with vegetation management and restoration decisions along the entire length of the greenway. Data layers can be used to refine prioritizations and add detailed information for proposed areas of activities.

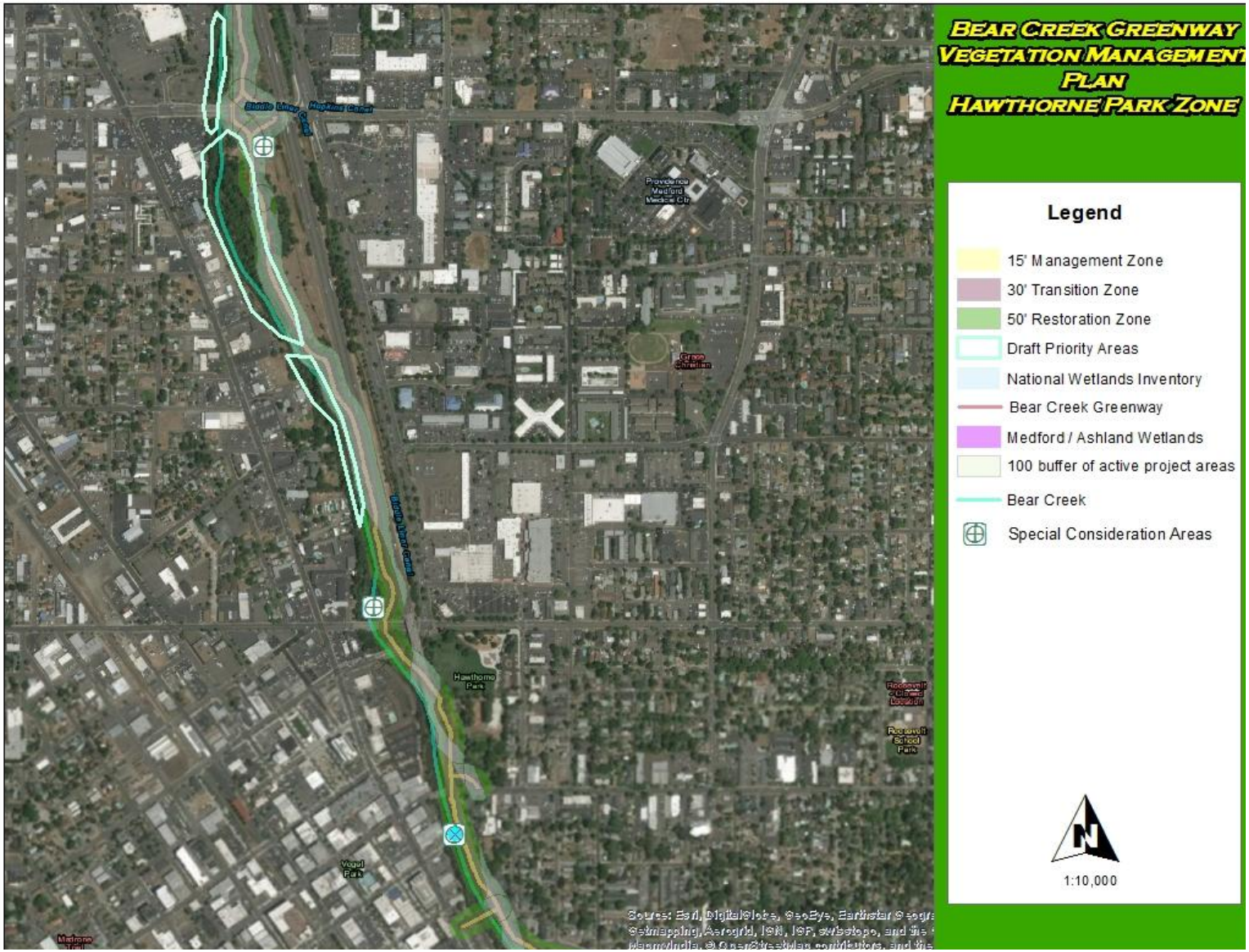
Selected data layers used in the mapping and identifying priority areas include:

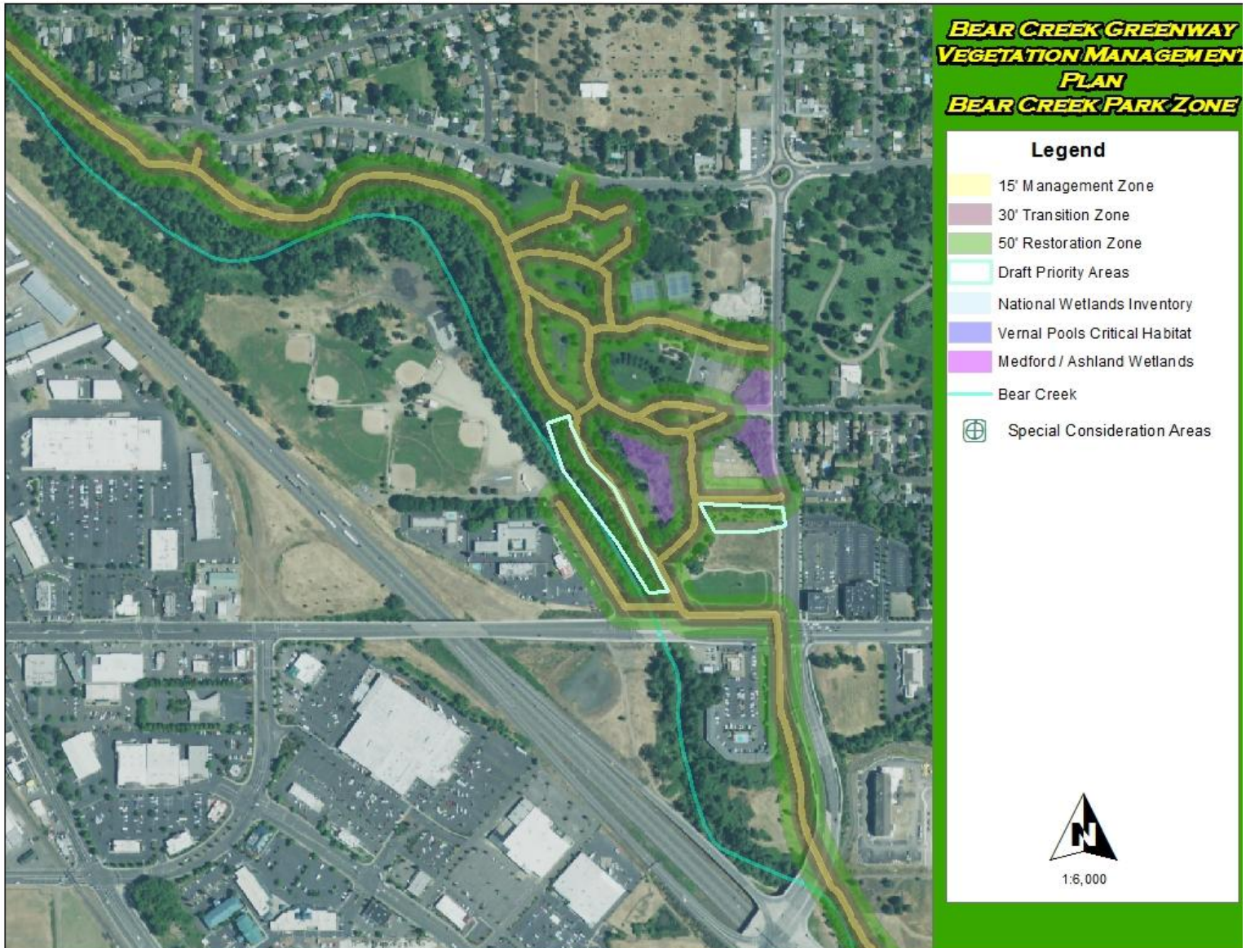
Layer	***Description including source (if applicable)***
Draft Priority Areas	Areas identified as potential priority areas for management. Includes areas that are in high need of restoration and/or invasive species control, areas identified as high priority based on tool metrics (e.g., TFT REST data, wetlands, soils), and areas that have been or are undergoing restoration activities.
Special Consideration Areas (SCAs)	Areas along the Greenway (existing or proposed) that have unique uses, attributes, or other factors that require additional management concerns. Examples include control of invasive plants needing special control methods, management of areas for monarch butterflies and native pollinators, areas adjacent to fish spawning or fish observation areas, areas of unique or historical significance and right of way areas such as sewer and power lines.
REST Data	Riparian Extent and Status tool data from the Freshwater Trust. Data evaluates riparian corridors and rates small units based on their restorability potential, disturbance conditions, connection to floodplain, existing vegetation, and other factors. REST data was combined with other factors to help identify priority areas.
Wetlands/Local Wetlands Inventories	National Wetland Inventory data and local inventory information from Medford and Ashland.
Special Flood Hazard Areas (floodplain)	Local flood hazard data. Frequency of potential inundation may influence plant selection and planting methodology.
Land ownership	Location of publicly owned lands.
Restoration Project Locations	Locations of restoration projects that are completed, underway, or planned were evaluated. Additional weight is given to projects that are near or continue restoration activities. Contiguous projects generally provide a greater overall lift to the system as

	opposed to doing pieces that are spread out. Data from RVCOG.
Soils	Underlying soil types were also evaluated when looking at restoration potential. USDA Soil Survey Data.
Proximity to the Stream	Identifies any zones that are within 50 feet of the stream. This is the minimum area identified by ODFW as needing to be protected for wildlife, birds, fish, and other species. As a result, additional management measures are recommended.
Vernal Pools	Evaluated primarily in the Central Point end of the greenway as an area of potential special consideration.

The maps on pages 62-65 show refined information for pilot areas. In addition to the transition and restoration areas, the maps show some draft priority areas, special consideration areas, and some underlying data used to develop the priority areas.


BEAR CREEK GREENWAY
VEGETATION MANAGEMENT
PLAN
EXPO CENTER ZONE
Legend
15' Management Zone
30' Transition Zone
50' Restoration Zone
Draft Priority Areas
National Wetlands Inventory
REST Scores High Value and 50'
Disturbance Scores of 4 or 5
1:9,608
3/31/18
Central Point
Jewett
Expo Ponds
Bear Creek Greenway
Jackson County Expo
Fairgrounds and Expansion Park
Robert Pfaff Park


BEAR CREEK GREENWAY
VEGETATION MANAGEMENT
PLAN
HAWTHORNE PARK ZONE
Legend
15' Management Zone
30' Transition Zone
50' Restoration Zone
Draft Priority Areas
National Wetlands Inventory
Bear Creek Greenway
Medford / Ashland Wetlands
100 buffer of active project areas
Bear Creek
Special Consideration Areas
N
1:10,000


BEAR CREEK GREENWAY
VEGETATION MANAGEMENT
PLAN
BEAR CREEK PARK ZONE
Legend
15' Management Zone
30' Transition Zone
50' Restoration Zone
Draft Priority Areas
National Wetlands Inventory
Vernal Pools Critical Habitat
Medford / Ashland Wetlands
Bear Creek
Special Consideration Areas
N
1:6,000


BEAR CREEK GREENWAY
VEGETATION MANAGEMENT
PLAN
BLUE HERON ZONE
Legend
15' Management Zone
30' Transition Zone
50' Restoration Zone
Bear Creek
Draft Priority Areas
National Wetlands Inventory
Prime Soils
REST Scores High Value and 50'
Special Consideration Areas
1:3,363
3/31/18
Blue Heron Park
50' Restoration Zone
30' Transition Zone
15' Management Zone