

HABITAT ASSESSMENT FOR THE GOLDCREST HOA COMMUNITY AREAS, OLYMPIA, WASHINGTON



**City of Olympia Public Works, Water Resources, Environmental Services
February 2015—Draft**

Table of Contents

1.0 Introduction.....3

2.0 Aquatic Resources & Basin Information.....3

3.0 Assessment Methodology.....4

4.0 Current Site Conditions.....5

4.1 Forest Overstory.....6

4.2 Forest Regeneration.....7

4.3 Plant Communities.....7

4.4 Snags.....8

4.5 Coarse Woody Debris.....8

4.6 Fish Use & Habitat.....9

4.7 Other Wildlife Use.....9

5.0 Threats.....10

5.1 Invasive & Noxious Vegetation.....10

References.....12

Appendix 1: Maps.....13

Appendix 2: Invasive/Noxious Weed Factsheets.....20

Appendix 3: Sample Data Tables.....31

1.0 Introduction

In 2012, the City of Olympia Utility Advisory Committee directed the Stormwater Planning & Implementation section of Public Works to find potential opportunities for strategic land stewardship, targeted toward protecting and improving habitat in Olympia and its urban growth boundary. Following a detailed city-wide analysis, a Preliminary Habitat & Stewardship Strategy (City of Olympia 2014) was developed, which led to the creation of the Environmental Services Habitat Program in 2013. With the intent of engaging with landowners and land managers, both public and private, to facilitate the restoration and improvement of aquatic and associated habitat and ecological function, efforts were made to contact and begin working with potential partners who shared in this vision. Early on, the Goldcrest Homeowner's Association (HOA) partnered with the City of Olympia's Habitat Program, including work on a 2013 application for a National Estuary Program (NEP) restoration grant. A habitat survey of the Goldcrest Open Space tract (HOA—owned) was conducted in the summer of 2014. This report presents and summarizes the data collected in that survey, and is intended to be used as a tool to help both the Goldcrest Homeowners and the City of Olympia Department of Public Works maintain and improve our city's urban aquatic and wildlife habitat today and into the future.

The Goldcrest HOA owns a number of "Community Areas" as defined on the plat maps filed with Thurston County when the subdivision was developed. These areas encompass more than 32 acres of the subdivision. Many of these tracts lie between houses, along the roads, and edges of the development or are developed as landscape beds, parks, or playgrounds. The community area of the greatest interest to the Environmental Services Habitat Program and our aquatic habitat focus is the approximately 15 acres that surround the seasonal stream (and associated seeps and wetlands) running from 20th Ave south to 14th Ave through the middle of the development.

2.0 Aquatic Resources & Basin Information

The Goldcrest Open Space lies within the Green Cove Basin, one of 8 major stream basins within Olympia city limits and Urban Growth Area (UGA). The Green Cove basin ranks as one of the highest quality in the city in terms of riparian habitat; 48% of the basin landcover is under a tree canopy, and only 13% of area within the basin is impervious surface (roads, sidewalks, rooftops, etc.). Of that 13%, only 1% of stormwater runoff in the Green Cove basin within the City of Olympia is untreated when it reaches the Puget Sound (Roush 2012). Goldcrest neighborhood was constructed in the late 1970's, subsequently the entire Green Cove basin was designated "Low Impact Development" (LID) with Residential Low Impact (RLI) zoning adopted in 2001, when the zoning in the basin was changed to improve habitat protection and stormwater management in

this sensitive basin. The existence of the Goldcrest Open Space compliments the later RLI zoning for the area as critical stream, riparian, and wetland habitats were set aside and protected, and the neighborhood association has actively maintained the site.

The unnamed segment of creek flowing directly through the site is fed by wetlands and seeps along the slopes adjacent to the creek, seasonal groundwater, and stormwater runoff from the neighborhood streets, roves, and adjacent roads. This portion of the stream flows south, directly into the wetlands of Grass Lake Nature Refuge. Another small, ditched stream can be found along the eastern boundary of the Goldcrest neighborhood. This stream is fed by seeps along the hillside, runoff from Cooper Point Road, and runoff from areas to the northeast. This stream also drains into the Grass Lake network of wetlands. Many seeps and slope wetlands can be found in the main Open Space tract along the slopes leading down to the creek.

3.0 Assessment Methodology

Five sampling techniques were used to gather baseline habitat data,, in a “nested plot” configuration (five separate samples were taken from a single sample point). A total of seven nested plots were installed, each measuring forest overstory , forest regeneration , shrub and herbaceous vegetation plant community analysis, standing dead tree (snag) density, and the amount of coarse woody debris (CWD) found on the forest floor. Forest overstory data for plot N1 was not used in this analysis; reasons for this are discussed below. Even with the small number of samples taken, basal area was able to be calculated at a 95% confidence interval, $\pm 10\%$ allowable error. Or, 95% of the sample plots will fall within $\pm 10\%$ of the mean basal area. An additional seven vegetation plots were installed, to gain a better estimate of invasive plant density and distribution on site. Map 1 shows the location of nested plots, additional vegetation plots, and photo points (used to document weed infestations in non-forested areas), within the Goldcrest Open Space. The methods for each sample are further discussed below, for a more detailed explanation a copy of the City of Olympia Environmental Services Standard Operating Procedures (SOP’s) can be obtained from Environmental Services staff.

- Overstory

Forest overstory can be defined as the trees making up the top canopy layer of a forest and was sampled using variable plot, or point sampling techniques. This is a method of sampling trees based on their size, rather than frequency of occurrence. The sample point is located in the field, and a tool such as a wedge prism or angle gauge is used to view every visible tree at breast height (4.5 feet). Trees large enough or close enough to fill the sighting angle are tallied, while trees too small or far away are ignored. Data was collected for tallied trees, and a simple formula based on the basal area factor

(BAF) chosen for the plot gives the average basal area, in square feet, for each plot (BAF * # trees per plot= basal area for plot).

- Regeneration

Forest regeneration can be defined as the seedlings or saplings which will make up the next generation of forest overstory. Regeneration was measured in 1/50th acre circular plots, where any tree ≥ 1 foot in height and < 4.0 inches diameter at breast height (DBH) were tallied, by species and 5-foot height class. These data can be easily converted to total regeneration per acre, by species and height class.

- Vegetation/Plant communities

Using 1/50th acre fixed radius circular plots, vegetation was identified by species and percent cover estimated for three vegetation strata: trees, shrubs, and ground cover. Data collected identified native and non-native invasive plant species and communities found on site. This information can be used to guide future decisions regarding planting projects or invasive species removal.

- Snags

Snags were measured using 1/10th acre circular plots. Any snag within the plot equaling ≥ 4 inch DBH and 6 foot height was tallied by species, DBH, height, and decay class. This information was used to determine total number of snags per acre, by species, size, and decay class.

- Coarse Woody Debris

CWD was sampled using two 50-foot line intercept transects at each nested plot. A cardinal direction was randomly determined for the first transect, and a second transect installed 90° from the first. Any down log intercepting the transect, ≤ 3 feet in length, and ≥ 4 inches at midpoint diameter, was tallied by species, decay class, diameter at intercept point, and length. These data was used to determine volume and % cover of down wood per acre.

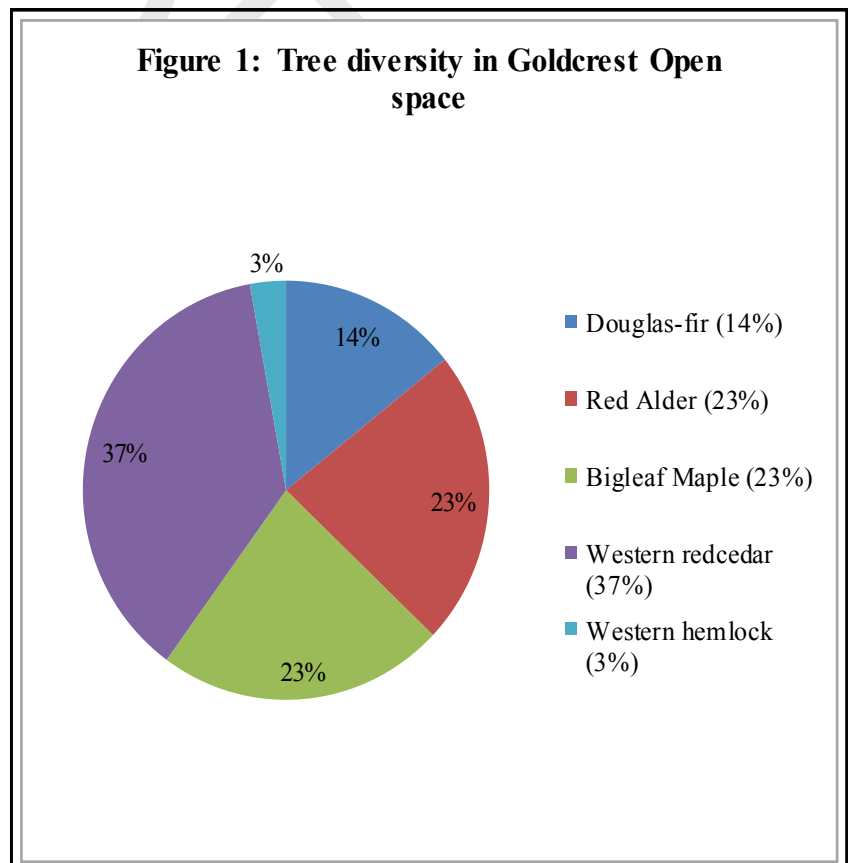
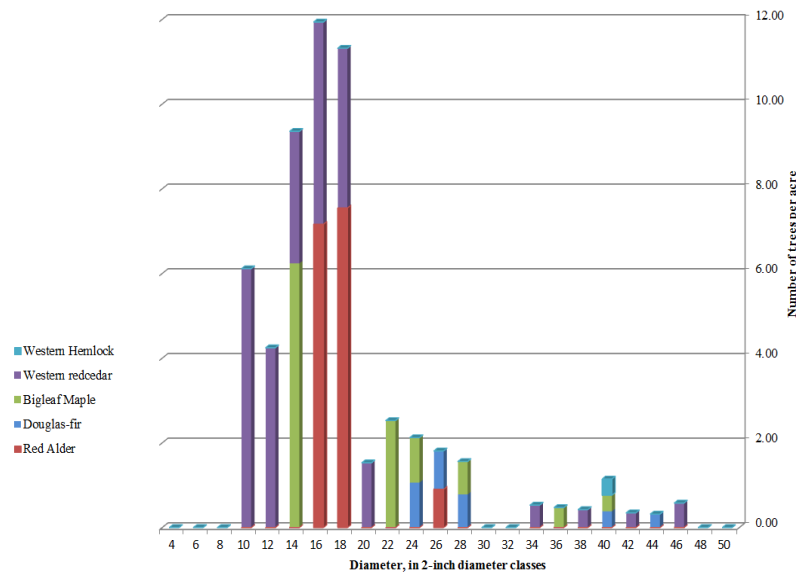


Figure 2: Trees per Acre, Goldcrest Open Space



In addition, a walkthrough of the property on December 8, 2014, with Environmental Services personnel (led by current HOA board member Bruce Livingston), was helpful in identifying invasive vegetation infestations with greater precision.

4.0 Current Site Conditions

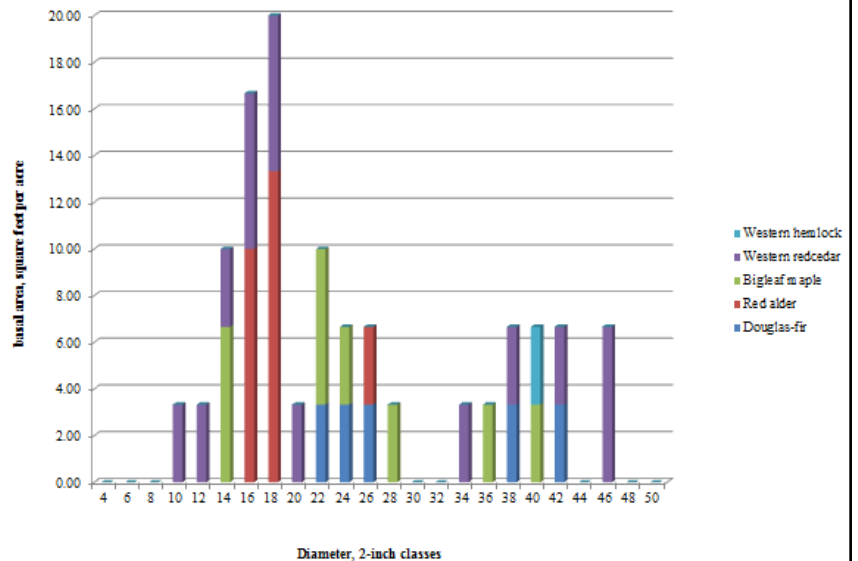
The Goldcrest Open Space, in all, is an excellent example of riparian habitat within an urban/suburban matrix. The forest overstory contains a variety of species and age

classes (see Figure 1, right), and the understory contains sufficient native understory diversity to be a functioning native plant community. While there are some incursions of invasive and even noxious vegetation, usually along the fringes of the forested tracts, issues with invasive plants appear small and controllable with some work and targeted outreach for residents regarding problematic landscape species.

4.1 Forest Overstory

Through data collected during the overstory survey, several characteristics of the forested open space were determined. The forest contains a variety of tree species, representing a range of successional stages of forest growth. The forest overstory is dominated by 5 tree species, as shown on Figure 1; other tree species can be found individually or in small clumps throughout the forest, though not in enough number to be noted during the survey (e.g. bitter cherry - *Prunus emarginata*). Two large black cottonwoods (*Populus balsamifera ssp. trichocarpa*) were located at plot N1, part of a larger clump of a half-dozen. Due to their size (68 & 36-inch DBH), plot 1 overstory data was not used during basal area and tree-per-acre analysis, as their size relative to other trees on site greatly skewed the sample. The cover photo for this document shows the two cottonwoods found on plot N1. These cotton-

Figure 3: Basal Area per acre, Goldcrest Open Space



woods, the 68-inch tree in particular, are potentially some of the largest found within Olympia city limits. Due to this factor, the trees certainly have value both aesthetically and relative to wildlife habitat and ecosystem function.

Plot data collected during the survey was used to chart species and diameter distribution, by both trees per acre and basal area (in square feet) per acre. Figure 2 shows number of trees per acre, by species and diameter.

Figure 3 shows basal area per acre, again by species and diameter. These data help illustrate the range of size and species present within the Goldcrest Open Space, and can be used for further calculations, detailed below:

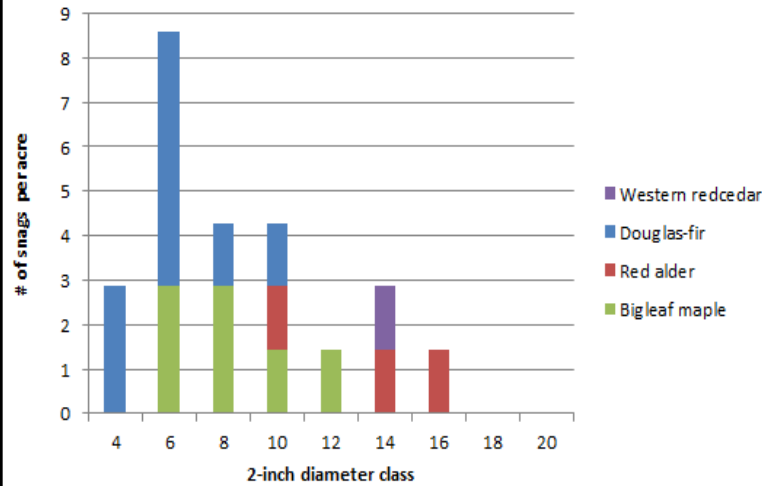
The diameter of a tree of average basal area is known as the quadratic mean diameter (QMD). QMD for the Goldcrest forest is 19.21 inches. This value, along with the average stand basal area of 113.33 square feet per acre, and average number of trees per acre, 56, can be used to mathematically derive a value known as Stand Density Index (SDI). SDI is compared to MAX SDI, the theoretical maximum stand density for a particular species in a particular forest type in an eco-region. MAX SDI represents the maximum number of 10-inch diameter trees, of a particular species, that can be grown on 1 acre. SDI for a particular stand can then be compared to MAX SDI, to determine relative density (RD). RD is the SDI value of a stand as a percentage of its theoretical maximum. The Goldcrest forest has a SDI of 323.13. When compared to the MAX SDI for western redcedar of 880 (Harrington and Gould 2010),

RD for the Goldcrest open space is calculated at 37%. Bottorff et al. (2003) suggest a target RD between 25%-45% when managing timber as wildlife habitat. A relative density within this range shows that there are ample gaps in the forest canopy, allowing light to reach understory vegetation and regenerating seedlings on the forest floor. Adequate light on the forest floor is vital for the establishment of the forest canopy future generations, and maintain an understory shrub layer that provides valuable food sources (berries and seeds) for birds and other wildlife.

4.2 Forest Regeneration

A total of 15 trees were tallied during the regeneration survey, on 7 plots. Of these 15, six were determined to be naturally regenerating (plot 2 and plot 7), with the remainder made up of planted trees on plots 3, 5, and 6. Deer browse was noted on 6 of the planted seedlings. Total number of seedlings per acre was determined to be 107. The Washington Forest Practices Board Manual and Chapter 222-34-10 of the Washington Administrative Code require a minimum of 190 vigorous, undamaged seedlings per acre to meet acceptable stocking levels, on a harvested unit (clear-cut). 107 seedlings per acre, growing within the forest understory, should be adequate to maintain a healthy forest canopy in years to come. As discussed in the previous section, a relatively low density in the overstory forest canopy should facilitate future seedling establishment and growth, whether natural or planted by hand. A summary of regeneration data can be found in Appendix 3.

Figure 4: Snags per acre, by diameter, Goldcrest Open Space



4.3 Plant Communities

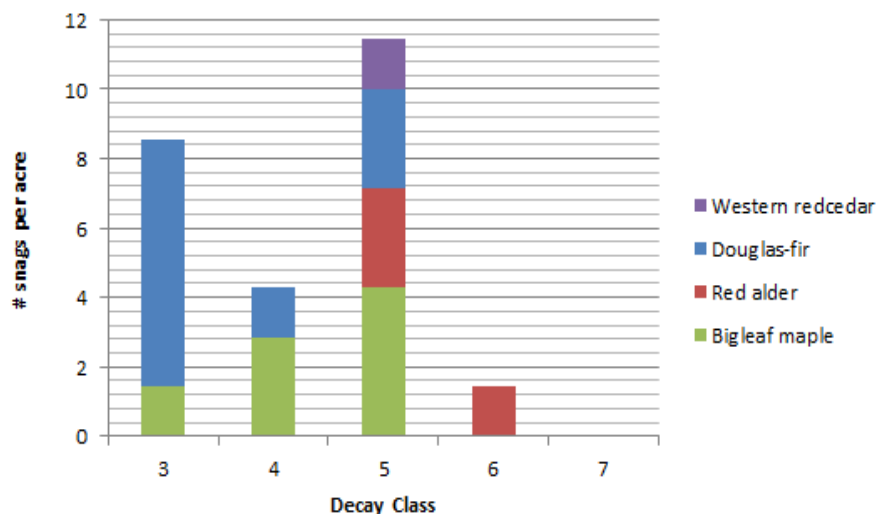
Using data from 14 vegetation plots, the likely pre-development plant communities on site consist of a Douglas-fir-western hemlock/ dwarf Oregon grape-sword fern community in the upland areas, and red alder/sword fern community in the riparian buffer zones. Plant community designations were based on both plant species found on site, and USGS soil data. Some small areas within the open space (1/4 acre or less each) contained obli-

gate wetland plant species, such as skunk cabbage (*Lysichitum americanum*) and slough sedge (*Carex obnupta*), and some small seeps were found on the slope along Cooper Point road, creating some interesting slope wetland conditions, where wetland indicator plants are found midway up the slope. Dominant understory shrub species include salmonberry (*Rubus spectabilis*), dull Oregon grape (*Mahonia nervosa*), and salal (*Gaultheria shallon*) with smaller amounts of oceanspray (*Holodiscus discolor*), beaked hazel (*Corylus cornuta*), common snowberry (*Symphoricarpos albus*), bald-hip rose (*Rosa gymnocarpa*), willow (*Salix* sp), red huckleberry (*Vaccinium parviflorus*) and evergreen huckleberry (*Vaccinium ovatum*) also present. A table summarizing collected vegetation data is found in Appendix 3.

4.4 Snags

Eighteen snags were found on seven 1/10th acre nested plots; this equates to an average of 26 snags per acre. Distribution of snags is shown on the graphs below: Figure 4 shows snags per acre by diameter; Figure 5 shows snag density by decay class. Decay class was measured on a scale of 3-7: 1 would be a healthy tree, 2 a tree in decline, 3 being a freshly dead snag, and 7 showing advanced stages of decay. (See Figure 6). Bunnell et al. (2002) suggest one

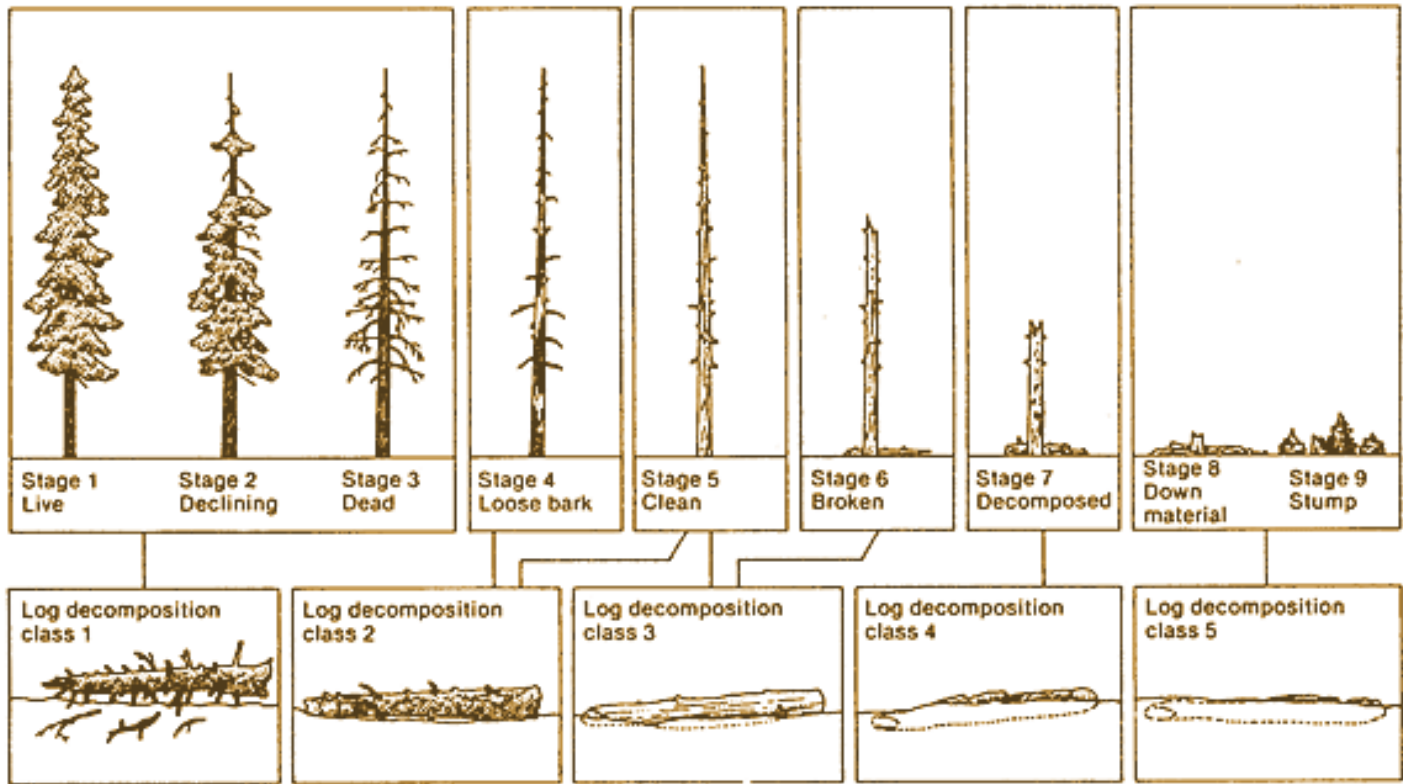
Figure 5: Snags per acre, by decay class, Goldcrest Open Space



large (> 12-inch diameter) snag, and 4-8 smaller snags per acre, as a target for acceptable snag habitat in Pacific

ic

Figure 6: Snag and downed wood decay classes (image obtained from US Forest Service)



Northwest forests. The Goldcrest site contains an average of 22 smaller snags and 4 larger snags per acre, well within the target range. Data is summarized in Appendix 3.

4.5 Coarse Woody Debris

A total of nine logs fit the criteria for CWD sampling, using fourteen 50-foot line transects. These data were used to estimate percent cover and cubic foot volume per acre of CWD found within the site; these data are summarized in Appendix 3. Recommendations regarding volume of CWD in a healthy forest range between 1400-2800 cubic feet of downed wood per acre (Bunnell et al. 2002). Mean volume of CWD in the Goldcrest forest is around 480 cubic feet per acre, below the target range. However, the abundance of snags in the open space suggests that amounts of CWD on the forest floor will increase, when snags of the higher decay classes fall and become downed wood.

4.6 Fish Use & Habitat

The tributary of Green Cove Creek which runs through the center of the Goldcrest Open Space was listed as “Ns”, or non-fish bearing seasonal, meaning no known fish use and no surface flow during a portion of the

year. South of 14th Avenue, within Grass Lake Nature Refuge, the stream retains the listing of “F”, or fish-bearing. It is possible that the culvert under 14th Ave. serves as an impassible fish barrier, preventing fish travel into the northern stream segment. Olympic mudminnow (*Novumbra hubbsi*), an endemic fish species listed as “sensitive” by Washington Department of Fish & Wildlife, have been found in the Green cove basin, including the eastern stream within the Goldcrest Tree Tract that runs along Cooper Point Road in a ditch. The storm pond south of plot N1 was also surveyed for mudminnow by Wild Fish Conservancy; no mudminnow were found at that time (2007). Map 2, in Appendix 1, shows the Goldcrest Open Space connections to the Green Cove stream system.

4.7 Other Wildlife Use

The Goldcrest Open Space serves as part of a habitat corridor connecting Grass Lake Refuge with habitat to the north; including other HOA open space tracts, city-owned property, The Evergreen State College campus, and the rest of the Green Cove basin. Black-tailed deer, raccoon, opossum, chipmunk, squirrel and other small mammals likely use the forest for food, cover, and as a movement corridor; frogs, toads, and salamanders are likely to inhabit the areas near the intermittent stream and wetlands. The forest offers an abundance of habitat and food resources for passerine birds, and raptors may use the taller trees for hunting and roosting. The high density of snags offers value for woodpeckers and cavity-nesting rodents. Map 2 in appendix 1 shows habitat connections within the Green Cove basin.

5.0 Threats

The greatest threat to the health and ecological functionality of the Goldcrest Open Space is likely the encroachment of non-native, invasive, and noxious vegetation into the otherwise native forest. Some are probably brought in by birds, such as English holly (*Ilex aquifolium*) and Armenian (Himalayan) blackberry (*Rubus armenicus*). Others are escaped ornamentals, such as periwinkle (*Vinca minor*) and yellow archangel (*Lamium galeobdolon*). English ivy (*Hedera helix*) may be spread by both methods. Perhaps the plant of most concern is spurge laurel (*Daphne laureola*), identified on Thurston County’s 2014 noxious weed list for control and is a State of Washington class B weed. Thurston County has been working with the Goldcrest neighborhood for a number of years to manage the *D. laureola* infestation. For descriptions of physical characteristics, management options, and other details of each weed species, refer to the Species factsheets, found in Appendix 3. These were reprinted from the Thurston, King, and Jefferson county Noxious Weed Control Boards, as well as one “Weed of the Week” fact sheet from US Department of Agriculture.

5.1 Invasive & Noxious Vegetation

Spurge Laurel (*D. laureola*): The majority of *D. laureola* found in the Goldcrest Open space tract is located in the western and southern portions of the large 10-acre tract south of Goldcrest Drive bordered by Medallion Loop, 14th Avenue, and Sunnyvale Court. While no area is exclusively dominated by *D. laureola*, the area highlighted in red on Map 3 shows the area of heaviest infestation. Plants in the area range from small seedlings under 1 foot in height, to large shrubs 4-5 feet in height and diameter. It appears that the majority of *D. laureola* is concentrated under the Douglas-fir canopy mixed with salal and dull Oregon grape; areas dominated by alder and maple were not nearly as infested.

English Ivy (*H. helix*): The areas of heaviest *H. helix* infestation are typically along roads, where the plant was planted for landscaping and has escaped. Small clumps of *H. helix* can be found along Cooper Point Road, 14th Avenue, and Road Sixty-Five. Some *H. helix* was noted in the greenspace between Hillview Court and Briarwood court. Finally, a slope along the west side of Goldcrest Drive contains a large amount of *H. helix*, which is moving into the adjacent forested areas. Map 4 shows areas of *H. helix* infestation in the Goldcrest Open Space.

English Holly (*I. aquifolium*): While small, individual *I. aquifolium* can be found throughout the Goldcrest Open Space, no areas were found where *I. aquifolium* contributed to more than 15% total cover on a vegetation sample plot. While some specimens on the property may reach 10-12 feet in height, the majority of *I. aquifolium* found was smaller, within the 4-8 foot range. Due to the relatively small density of *I. aquifolium* within the open space, mapping of the heaviest infestations is difficult. Individual clumps or plants can be found interspersed throughout the open space tract.

Yellow Archangel (*L. galeobdolon*): This weed primarily seems to be creeping in from landscaped yards, or yard waste dump sites. It can be found on the edges of the open space, where back yards abut the forested tract. Map 5 illustrates the areas with the heaviest *L. galeobdolon* infestation, and is shown together with *V. minor*. *L. galeobdolon* can resprout vegetatively; this means that tiny fragments of the weed, such as yard clippings from a lawnmower, can re-sprout cause the plant to easily spread.

Armenian (Himalayan) Blackberry (*R. armenicus*): Perhaps one of the most prolific weeds in Washington, *R. armenicus* can form large, monotypic patches, prohibiting other native plants from establishing. The majority of *R. armenicus* within the Goldcrest Open Space can be found in two areas: along Cooper Point Road, and a large (1/4 acre) patch within the 10-acre tract. The plant can be found in other areas as well, including along the fence line between Goldcrest and Marshall Middle School, and under the treeline between Hillview and Briarwood Court. Map 6 shows the areas of heaviest *R. armenicus* infestation.

Periwinkle (*V. minor*): Similar to *L. galeobdolon*, this weed seems to be entering the open space from the back yards of adjacent landowners.. Like *L. galeobdolon*, *V. minor* can sprout vegetatively. For this reason, one must be careful in how the plant is disposed of. Due to the plants similar habits and growth characteristics, areas of *V. minor* and *L. galeobdolon* infestation were shown together, on map 5.

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Appendix 1: Maps

Map 1: Plot locations within Goldcrest Open Space.....14

Map 2: Green cove Stream Basin, Habitat Connections to Goldcrest Open space.....15

Map 3: Spurge Laurel (*Daphne laureola*) Area of Infestation.....16

Map 4: English Ivy (*Hedera helix*) Area of Infestation.....17

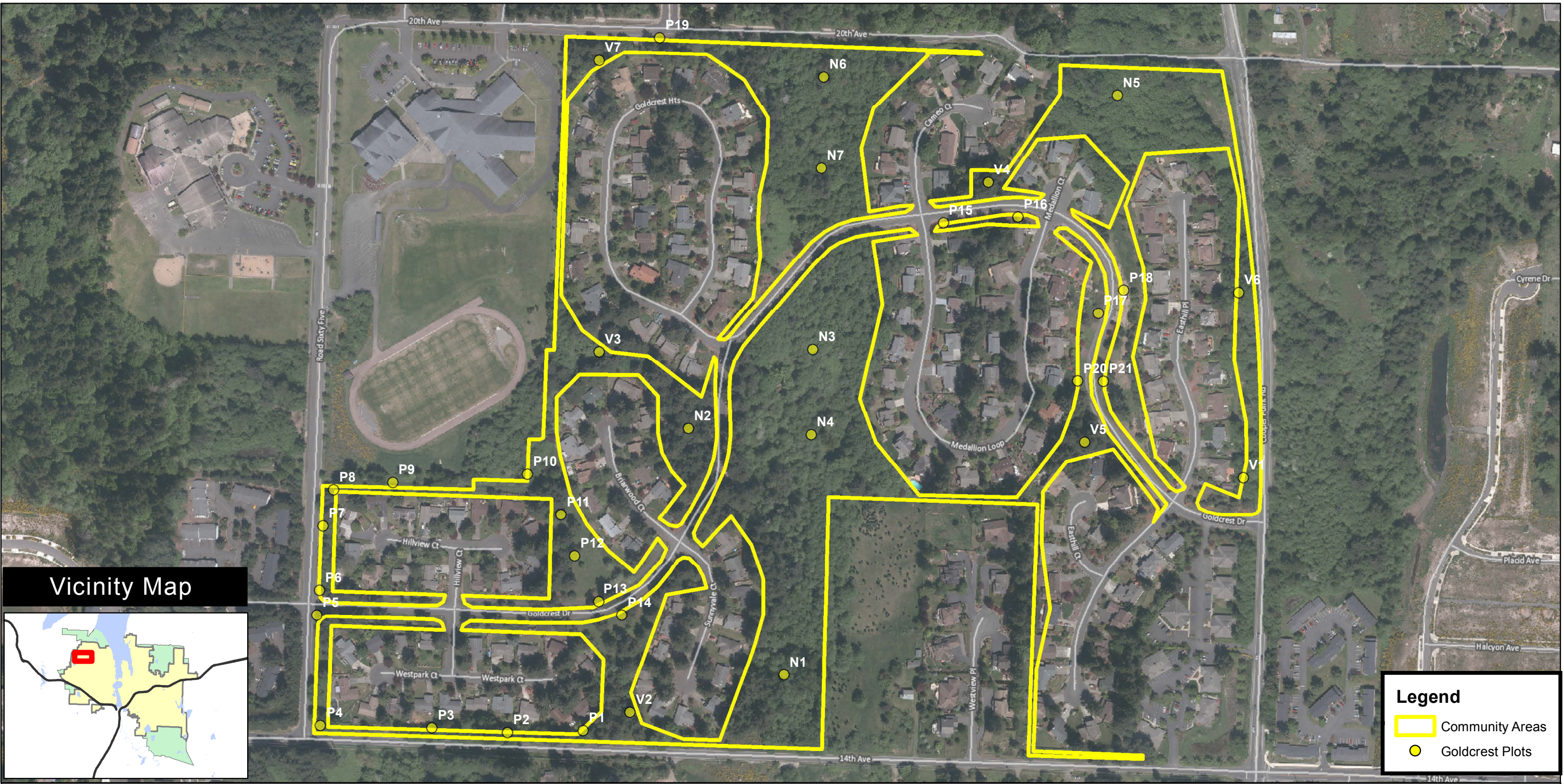
Map 5: Yellow Archangel (*Lamium galeobdolon*) and Periwinkle (*Vinca minor*) Infestations.....18

Map 6: Armenian (Himalayan) Blackberry (*Rubus armenicaus*) Area of Infestation.....19

Goldcrest Community Areas

Plot Locations

City of Olympia | Capital of Washington State



Map printed 2/2/2015
For more information, please contact:
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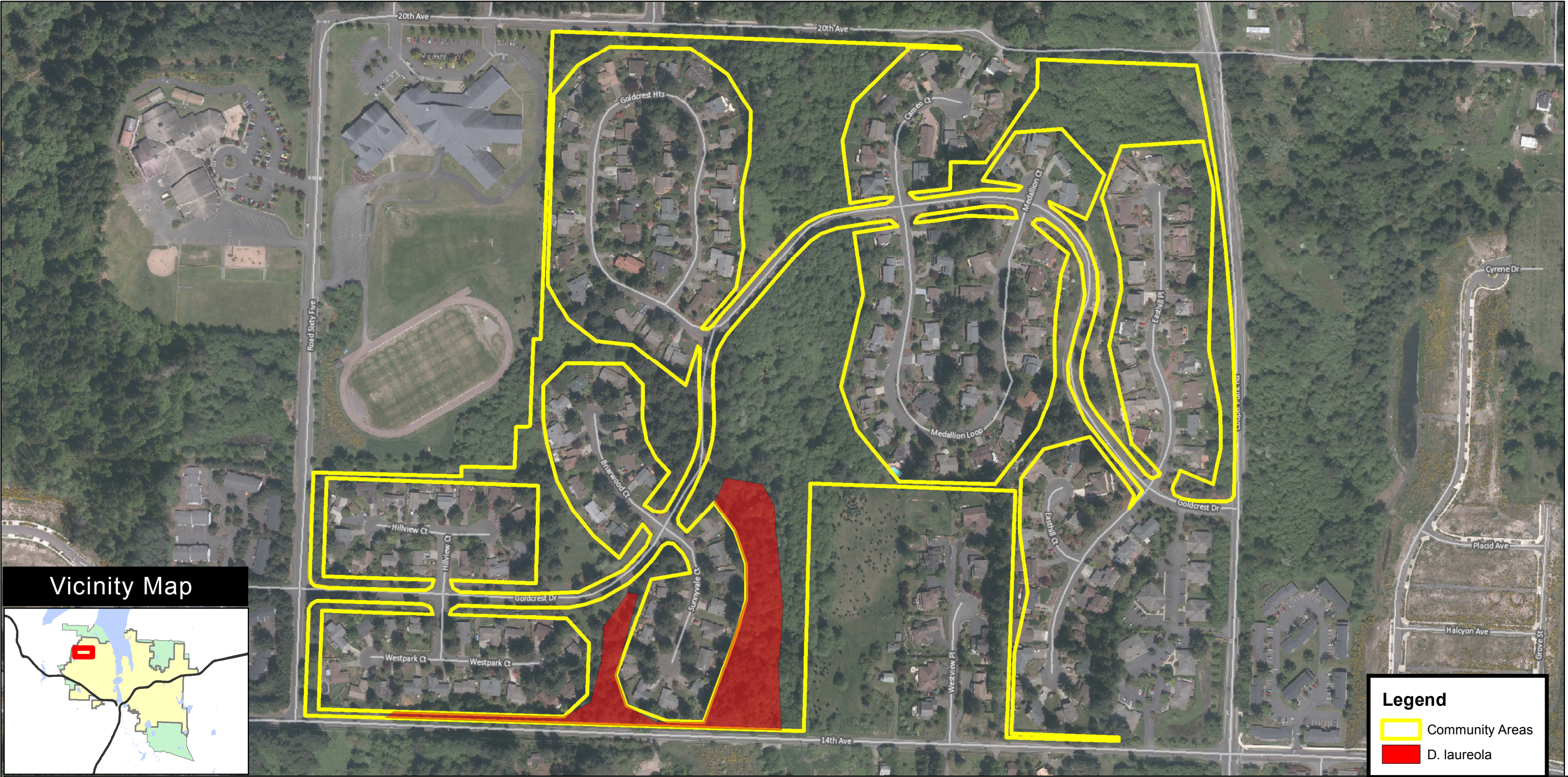


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Goldcrest Community Areas

Daphne Spurge Laurel (Daphne laureola) Area of Infestation



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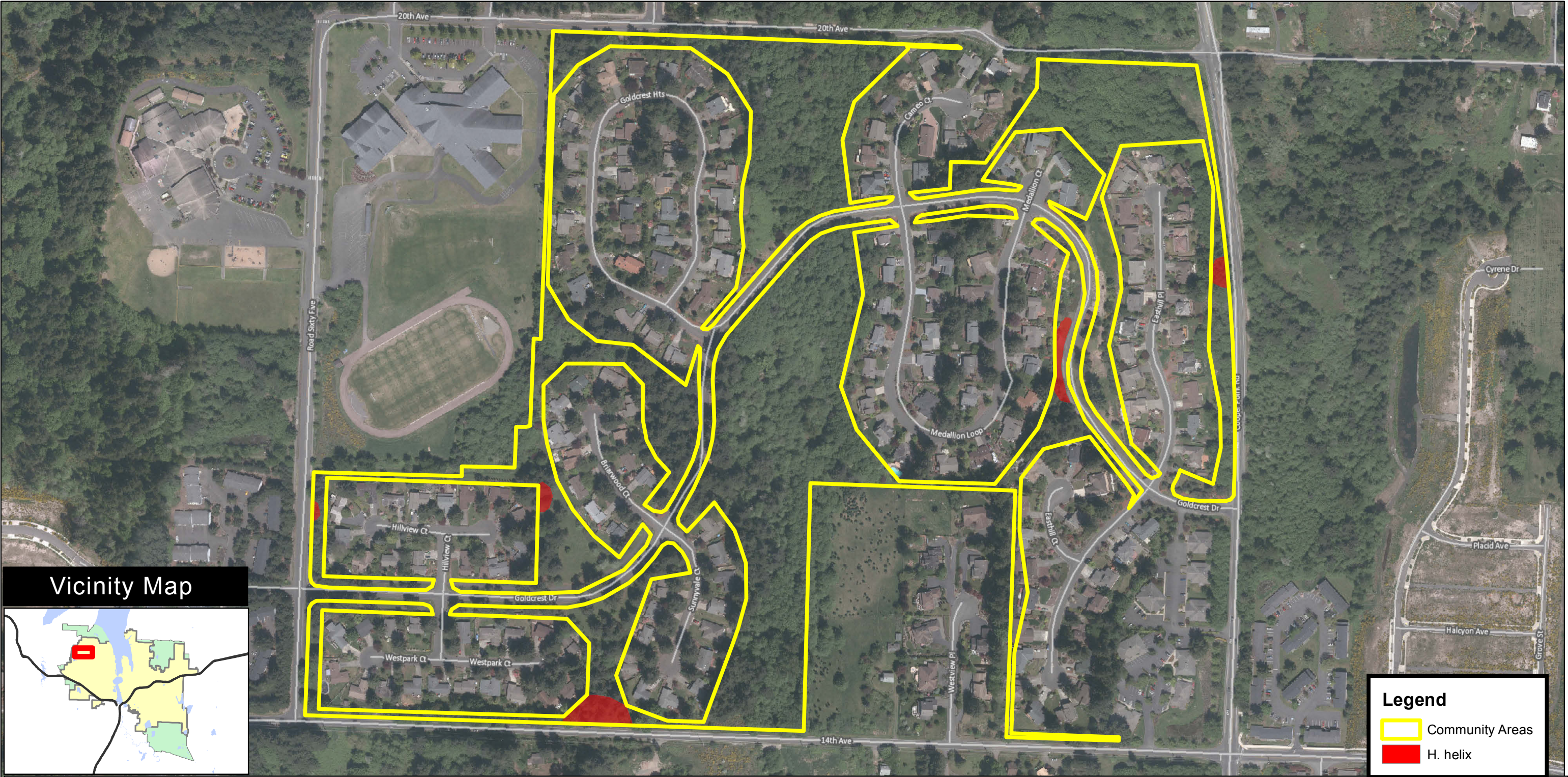


Goldcrest Community Areas

English Ivy (*Hedera helix*) Area of Infestation



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0 0.05 0.1 Miles 1 inch = 291 feet

Map printed 1/30/2015
For more information, please contact:
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(360) 570-3806

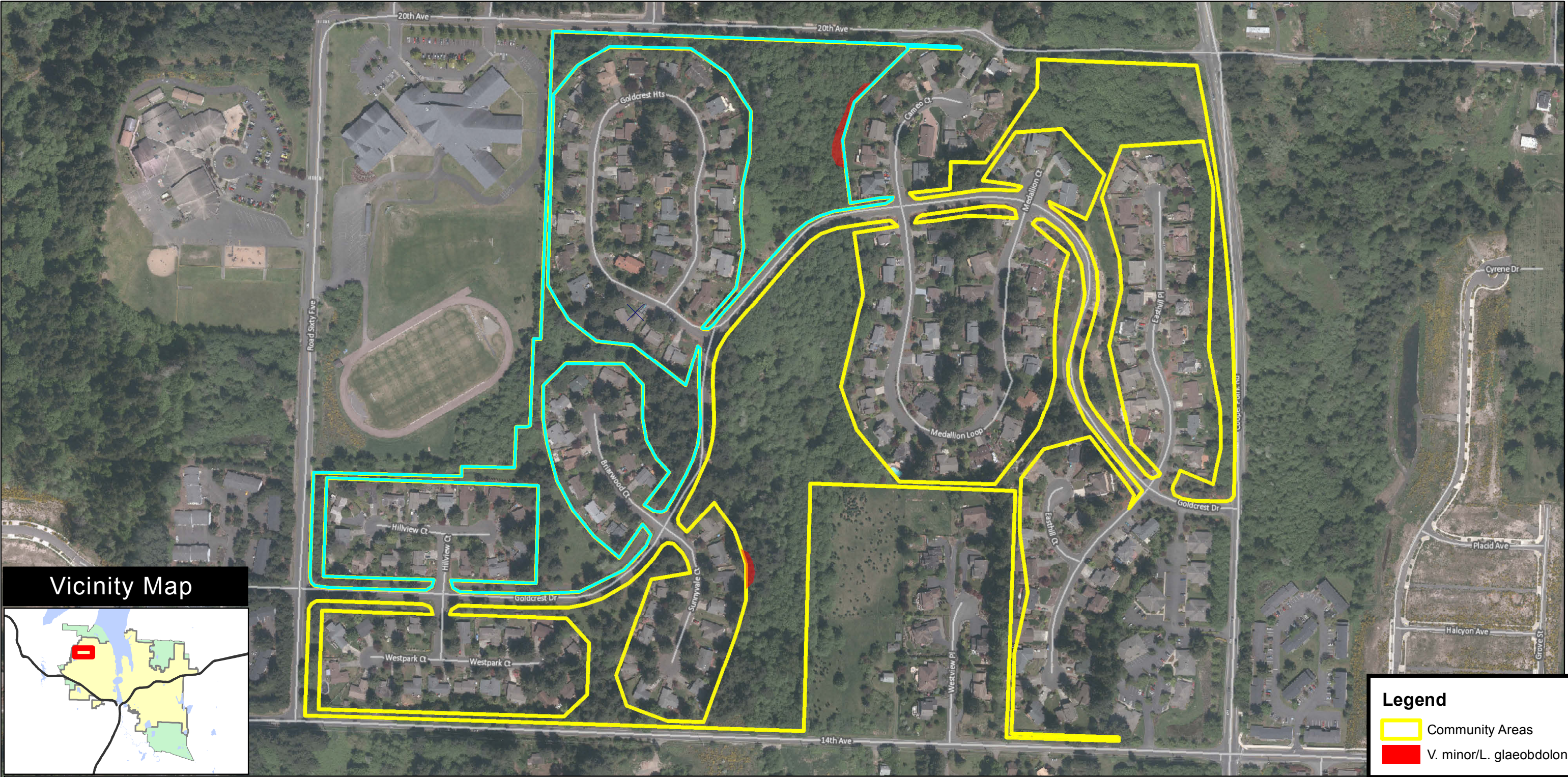
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Goldcrest Community Areas

Periwinkle (Vinca minor) and Yellow Archangel (Lamium galeobdolon) Area of Infestation

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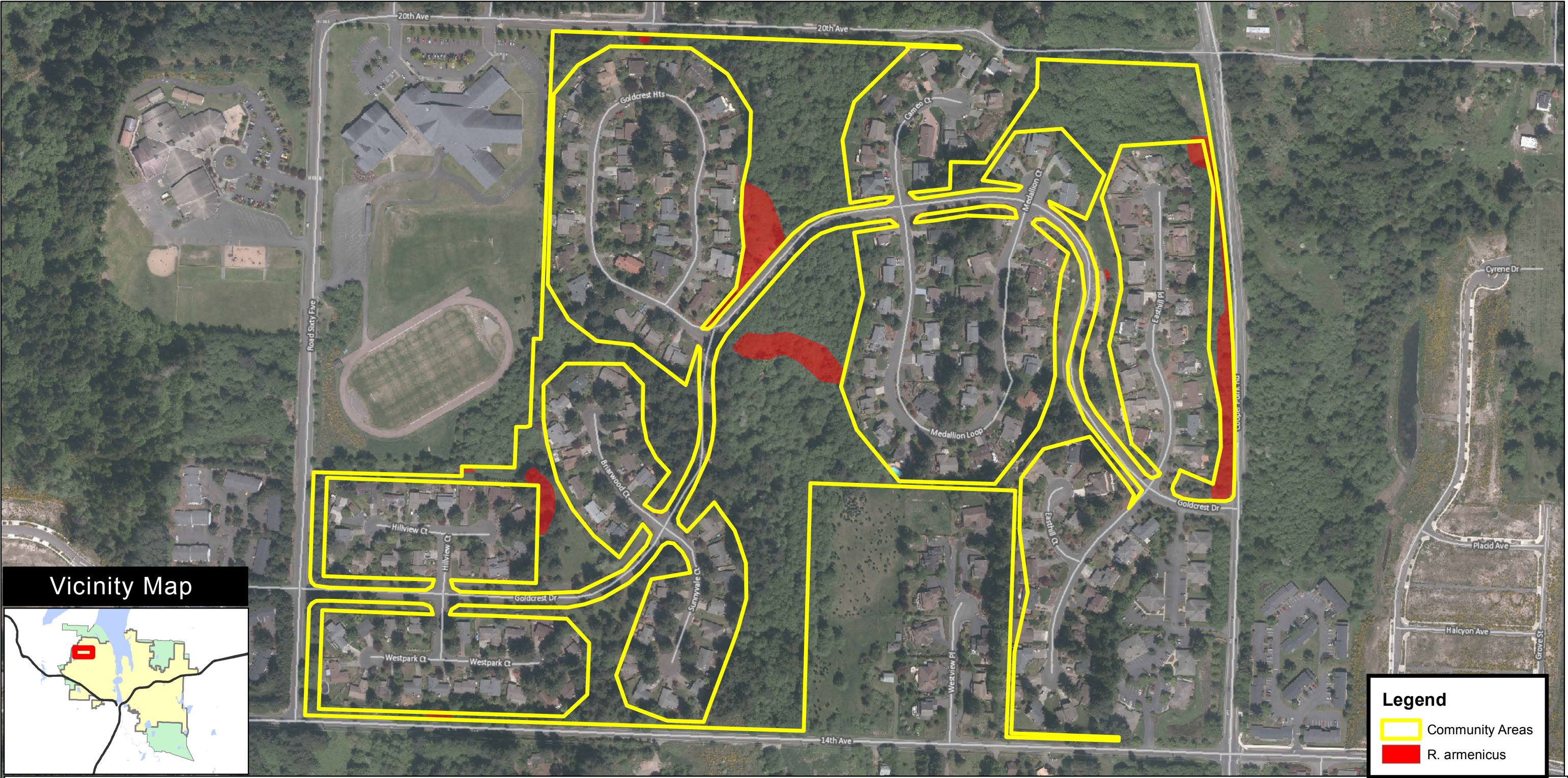


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Goldcrest Community Areas

Armenian (Himalayan) Blackberry (*Rubus armeniacus*) Area of Infestation



Map printed 1/30/2015
For more information, please contact:
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Appendix 2: Noxious and Invasive Weed Fact Sheets

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Appendix 3: Noxious and Invasive Weed Fact Sheets

Spurge Laurel (*Daphne laureola*).....21

English Ivy (*Hedera helix*).....23

English Holly (*Ilex aquifolium*).....25

Yellow Archangel (*Lamium galeobdolon*).....27

Armenian (Himalayan) Blackberry (*Rubus armenicus*).....29

Periwinkle (*Vinca minor*).....31

NOXIOUS WEED FACT SHEET

Spurge Laurel (*Daphne laureola*)

Description: Spurge laurel is an evergreen shrub that grows up to 3-4 feet tall. Whorls of dark green, shiny, leathery leaves grow at the ends of the branches. Leaves are oblong in shape, 1-5 inches long and ½ to 1 inch wide. Spurge laurel blooms in late winter and early spring, producing small (less than ½ inch long) tubular, yellow-green flowers. The flowers, which are sometimes fragrant, grow in small clusters at the base of leaves, near the tops of the stems. Oval, black berries are produced in early summer. Spurge laurel is slow-growing and long-lived.

Impacts: Spurge laurel, a shrub native to Western Europe and the Mediterranean, was introduced into North America as a garden ornamental. It has escaped cultivation, invading roadsides, parks and wooded areas. Spurge laurel can replace native understory plants in forested areas, and can form large single-species stands. It tolerates a wide range of environmental conditions, but grows best in partial to deep shade. Spurge laurel reproduces both by seed and vegetatively, by sprouting from lateral roots. The berries are eaten by birds, which aids in seed dispersal. Spurge laurel contains toxins in its berries, stem, leaves and sap which are poisonous to humans, as well as to dogs and cats, the sap can cause severe skin and eye irritation.

Control Options: Thurston County's Integrated Pest Management emphasizes cultural, biological, and manual control methods to keep pests and vegetation problems low enough to prevent damage. The goal of Thurston County's IPM is to minimize the use of pesticides by utilizing and providing information about the most effective control options that are available and practical.

► Cultural / Habitat

A key element in Integrated Pest Management is preventing infestations. While spurge laurel is no longer sold in nurseries as an ornamental, some people have dug this plant from escaped populations and transplanted it into their gardens or shared plants with others. Do not collect spurge laurel plants from the wild because they will likely produce berries and start infestations in new areas. Also, wash off muddy boots and shoes, tools, vehicles and pets after visiting parks, forests or other areas where spurge laurel is growing.

► Manual / Mechanical

Caution must be used when controlling spurge laurel by hand. The plants produce a caustic sap that can cause severe skin and eye irritation. Always wear protective clothing, gloves and eye protection, and never transport plants or cut plant material inside an enclosed vehicle because the caustic compounds can also cause respiratory irritation.



Hand pulling spurge laurel is effective where plants are small or where only a few plants are present. It is most effective in moist, loose soils where a slow and steady pulling action will remove 6 to 8 inches or more of root. Some new plants may emerge from roots that were broken off close to the soil surface. Hand-pulled areas must be monitored at least annually, regrowth and seedlings pulled when they appear. Plants that are cut off at or above the soil surface will resprout and will subsequently become more difficult to remove. Plants that have been removed should be bagged and taken to a Thurston County Waste & Recovery Center where they can be deposited free of charge for Thurston County landowners. Clip and bag ends of branches with ripe berries before digging in order to prevent spreading seeds into new areas.



► Biological

There are currently no biological control methods available for controlling spurge laurel.

► Chemical

At this time, there are no products listed as effective for controlling spurge laurel that are considered "low in hazard" by Thurston County's pesticide review process. Spot spraying of products containing the active ingredient *triclopyr* have been found to be effective. For effective control spray each plant on the leaves and stems until they are wet but not dripping.



Triclopyr products are rated as "moderate in hazard" by Thurston County's pesticide review process because broadcast applications of triclopyr (spraying an entire area of vegetation) can result in contaminating the food supply for birds and small animals. Since this prescription recommends only spraying individual spurge laurel plants, the risk to birds and small animals is greatly reduced.

Look for products that control brush and woody plants and vines that contain triclopyr as the *only* active ingredient. Lilly Miller's liquid concentrate "Blackberry and Brush Killer" and Ortho's "Brush-B-Gon Poison Ivy Killer Concentrate" are examples (be sure to double check the ingredient list as products frequently change formulations). Follow label instructions for application rates and timing for controlling woody plants and brush.

Triclopyr is considered selective, but will injure any other broadleaf plants that it comes in contact with.

Timing

To prevent seed production, treat spurge laurel plants any time from bud to late blooming stage, when appropriate weather & site conditions listed on the label occur. Clip and bag ends of branches with berries before treating in order to prevent seeds from ripening and further infesting the area. Small amounts of seeds and plant material should be carefully double bagged and placed in the trash (not yard waste), and larger amounts of bagged spurge laurel plant material can be taken to Thurston County Waste & Recovery Center free of charge.



READ AND FOLLOW ALL LABEL DIRECTIONS AND RESTRICTIONS.

Obey all label precautions and safety measures. Always use personal protective equipment that includes coveralls, waterproof gloves, shoes plus socks, and protective eyewear. Use of brand names does not connote endorsement and is for reference only; other formulations of the same herbicides may be available under other names. Information provided is current as of the date of the prescription. Pesticide product registration is renewed annually and product names and formulations may vary from year to year.

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Written Findings of the Washington State Noxious Weed Control Board

http://www.nwcb.wa.gov/weed_info/written_findings/CLASS%20B%20PDFs/daphne_laureola_draft.pdf

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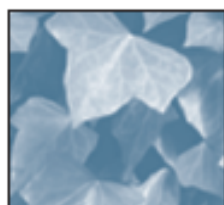
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Invasive Species in Garry Oak and Associated Ecosystems in British Columbia, Daphne laureola www.goert.ca



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INTEGRATED PEST MANAGEMENT PRESCRIPTION

English ivy

Description:

English ivy (*Hedera helix*) is a member of the ginseng family of plants (*Araliaceae*). It grows as a vine for up to ten years producing deeply lobed, alternating, waxy leaves with three to five points. When the plant is mature and ready to bear fruit, the leaves are only slightly lobed, if at all. Leaves are thick, waxy, shiny dark green and have distinct pale colored veins. Mature plants produce umbels (umbrella-shaped clusters) of greenish white flowers in the fall resulting in a deep purple, soft skinned, berry-like fruit in the spring. Each berry may contain up to three seeds that can be widely dispersed by birds.

Vine stems begin pale green and slender when growing along the ground and quickly become woody and stout on climbing vines. Stems produce rootlets that give the vine a hairy appearance and produce a sticky substance that allows the vine to cling to vertical surfaces. Vines can produce roots from each node, allowing it to re-establish itself from cut stems and pieces of stems left on the ground.



Impacts:

English ivy is an invasive vine in the Pacific Northwest. It grows so rapidly that it surrounds and covers many native plants so that sunlight doesn't reach them and they die. Once the vines create a thick mat across the ground, other plants have little chance to get re-established. On trees, the vines can cling to the trunk and branches and grow up and over a 90 foot tree. If left uncontrolled, the ivy will make the tree top-heavy, block out sunlight, and gradually branches will die and further weaken the tree.



Control Options:

Thurston County's integrated pest management emphasizes cultural, biological, and manual control methods to keep pests and vegetation problems low enough to prevent damage. When chemical control is considered, the least toxic product is recommended when no other control methods would be effective or practical.

Most infestations of English ivy can be effectively controlled using manual and cultural control options. Large areas covered in ivy may require the use of herbicide if time and resources are an issue.

► Cultural / Habitat

Do not intentionally plant English ivy in your landscape. This includes the varieties: *Hedera helix* 'Baltica', *Hedera helix* 'Pittsburgh', *Hedera helix* 'Star', and *Hedera hibernica* 'Hibernica'. Mulch over and replant bare areas where ivy has been removed.

► Manual / Mechanical

Hand pulling vines is very effective for controlling English ivy. The plant produces a sap that may irritate some people's skin, so wearing gloves and a long sleeved shirt is recommended. Whenever pulling or cutting vines, be careful to remove all stem fragments from the soil or they will root and start a new plant. Vines that have grown up trees or structures should be cut at an easily reached height (killing the portion above the cut) and, if possible, pulled down. Some vines may be too large to remove from trees, if so, make sure all cut sections are not in contact with soil and evaluate your tree (is it top heavy or diseased from the ivy?).

Removing large infestations along the ground will expose soil making it vulnerable to erosion, especially on steep banks. Replant areas where ground has been made bare with fast-growing native groundcover as soon as possible. Groundcover will help to keep the soil in place and will help minimize the establishment of other non-native plant species.

► Biological

There are currently no known biological controls for English ivy.



► Chemical

Contact herbicides kill the plant tissue it touches, and systemic herbicides are taken into the plant and transported throughout the plant to kill all the tissue. A systemic herbicide is recommended for control of English ivy because even small stem fragments left alive can root and start a new plant.

Glyphosate is an active ingredient in many systemic herbicide products that are effective in the control of English ivy. Application methods vary for the type and size of the infestation; foliar applications (spraying leaves and stems) are recommended for large ground infestations, basal bark applications (applying product to vine after removing some leaves and stems) work when upper portions of vines are inaccessible, and cut stem applications (applying directly onto cut vine stumps) are most effective when combined with manual removal of vines and plant fragments.

Timing

The best chemical control is achieved when temperatures are above 50° F for several days. However, winter may be the best time to apply an herbicide to minimize injury to surrounding plants and trees. Since ivy grows all year long, spraying an herbicide in the winter will effectively control them and will reduce the risk to other plants when they are typically dormant. Shielding or covering neighboring plants is always a good idea to protect them from herbicidal injury.

READ AND FOLLOW ALL PESTICIDE LABEL DIRECTIONS AND RESTRICTIONS. All chemical control products can cause harm if not used properly.



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Invasive.org. English Ivy – Nonnative Invasive Plants of Southern Forests – A Field Guide for Identification and Control. November 05, 2003. Invasive.org is a joint project of The Bugwood Network, USDA, and the University of Georgia.

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KING COUNTY NOXIOUS WEED CONTROL PROGRAM WEED ALERT

English Holly

Ilex aquifolium

Aquifoliaceae or Holly Family

Weed of Concern: Control Recommended

Identification Tips

- Large, dense, slow-growing evergreen tree or shrub
- Can reach 15 to 50 feet tall and up to 15 wide
- Can grow as either a single tree or a multi-stemmed thicket
- Leaves are thick, glossy, dark green and wavy, 1-3 inches long
- Leaves usually have sharp spines along the edges although may be smooth on older branches
- Flowers are small, whitish, sweetly scented
- Produces red, yellow or orange berries in the winter

Biology

- English holly has both male and female plants that are bee pollinated
- Reproduces mainly by seeds that are contained within the berries; birds eat the berries and disperse the seeds to new areas
- Can also spread vegetatively through suckering and layering

Impacts

- Berries are toxic to humans
- Invades native forest habitats where dense thickets suppress germination and growth of native trees and shrubs
- A glutton for water; holly can prevent surrounding plants from obtaining sufficient moisture

Distribution

- Found throughout King County from urban landscapes to undisturbed natural areas and native forests
- Grows in shade or sun in well drained soil
- Is grown commercially for decorations and floral arrangements



It may make a festive holiday decoration, but English holly is not welcomed in natural areas where it crowds out native plants.



English holly can grow up to 50 feet tall and be extremely difficult to remove once established.

Questions?

King County Noxious Weed Control
Program Line: **206-477-WEED**
www.kingcounty.gov/weeds

What You Can Do

While there is no legal requirement for eradicating or controlling English holly in King County, the King County Noxious Weed Control Board recognizes this plant as a weed of concern and recommends prevention of spread into natural areas and urban forests.

Control Methods

In areas where English holly is established and widespread, removal is generally only recommended as part of a larger effort to restore natural landscapes. For uninfested areas, remove encroaching plants as soon as possible to avoid future problems.

Manual: Small plants can be dug or pulled up when soil is moist. Be aware that mature trees have deep and extensive roots; digging large holly trees or thickets is labor-intensive and results in considerable soil disturbance if all the roots are removed. Weed wrenches can be used on larger shrubs to pry up the entire plant. If you would like to borrow a weed wrench, please contact our office at 206-296-0290.

Mechanical: Cutting holly trees at the base usually results in re-sprouting, but with monitoring and follow up the holly can be suppressed.

Chemical: When dealing with large trees or thick stems, chop or cut the holly as close to the ground as possible and apply a herbicide with the active ingredient glyphosate (such as Roundup) directly into the cut portion. Frilling (making deep cuts at 45 degree angles into the tree's bark using an axe or sharp chisel) and pouring glyphosate into the cuts immediately afterward is also effective. **Always follow label rates and instructions.** Monitor for seedlings and root re-sprouting. Foliar herbicide treatment (spraying herbicides directly on the leaves) is not recommended due to holly's thick, waxy leaves which prevent the chemicals from being absorbed. For more information, please contact the King County Noxious Weed Control Program.

Alternatives to English Holly

English holly's dense evergreen foliage make it a traditional hedgerow shrub in the Pacific Northwest. And its contrasting bright red berries make it a favorite holiday decoration at Christmas time. But there are alternatives that still provide the benefits of traditional English holly without the drawbacks. For screening and hedging in a sunny site, consider tall Oregon grape (*Mahonia aquifolium*). This native plant grows up to 10 feet tall and produces bright yellow flowers in the spring and blue-black berries in the summer. Another alternative is false holly (*Osmanthus heterophyllus*). This plant looks like holly with variegated evergreen leaves, but it does not produce berries. It grows 15 feet or more, making it ideal for screening. For more alternatives, see the Garden Wise booklet produced by the Washington State Noxious Weed Board. Copies may be obtained by calling the King County Noxious Weed Control Program at 206-296-0290 or by going to our website at www.kingcounty.gov/weeds.



Tall Oregon grape is a great alternative.

Photo courtesy of the Native Plant Landscaping Guide website www.kingcounty.gov/GoNative



JEFFERSON COUNTY NOXIOUS WEED CONTROL BOARD



FACT SHEET

YELLOW ARCHANGEL

Lamium galeobdolan

- Fast-growing perennial ground cover.
- Trailing or upright, depending on conditions.
- Leaves, typically variegated with silvery-grey markings, are opposite, hairy, oval shaped and coarsely toothed.
- Stems are square.
- Flowers appear from April through June. They are bright yellow, tubular, growing in pairs of clusters close to the stems.
- Mint family.

ECOLOGY:

- Herbaceous perennial.
- Spreads by stem fragments, rooting at the nodes, and by seed.
- Grows well in a variety of soil types and can grow in full sun, full shade, or any intermediate condition.



Photo Credit—King County Noxious Weed Control Program

DISTRIBUTION:

Yellow archangel is seen increasingly often in Jefferson County but no count of infestations has yet been done. Known infestations occur at Fort Flagler State Park, North Beach and Chetzemoka Park in Port Townsend.

WHY BE CONCERNED?

- Yellow archangel is a popular garden ornamental, especially for use in hanging baskets
- Baskets and their contents often get dumped in woodlands or close to parks
- Stem and root fragments can give rise to new plants
- Yellow archangel is VERY invasive—it forms dense patches, crowding out native plants
- Offers little or no food or habitat for native wild life

Yellow archangel is a Class B Noxious Weed. Control is required in Jefferson County, except in managed garden settings.

CONTROL

Prevention and early detection are the best means of control!

- **Do not buy or plant yellow archangel**
- **Encourage** nurseries to stop selling it
- **Remove** existing plants if possible (they are still allowed in managed garden settings, but removal is encouraged)
- **Replant** with a desirable (preferably native) plant species to discourage re-infestation
- **Monitor** the site for seedlings and remove as they appear
- **Never dump** plants in parks or natural areas, or in backyard compost piles

HAND PULLING is possible; the roots are tough but not deep. However, it is labor-intensive because the plants grow so densely and are often mingled with desirable vegetation. Because of the plant's ability to re-sprout from root or stem fragments, great care should be taken to remove the entire plant and to dispose of it properly. It is easiest to remove the entire plants when the ground is soft, in the fall through early spring.

CUTTING OR MOWING alone will not control this plant.

COVERING with several layers of cardboard topped with several inches of mulch could be a good way to control large infestations. However, this will kill all plants in the area so should not be used if many desirable plants are present.

HERBICIDES can be effective, but should always be applied with care. Do not apply herbicides over or near water bodies. Read the label to check that you are applying a herbicide in the right place, to the right plant, at the right time, and in the right amount. For perennial weeds, long term control requires stopping seed production **and** attacking the weed's root system. Translocated herbicides, (ones that move throughout a plant's system) are recommended. These are most effective on young, actively growing plants because the herbicide moves around the plant more quickly. Also, herbicide is more easily absorbed by clean, new leaves.

- **Note:** Most herbicides will **NOT** prevent germination of weed seeds already in the soil, so monitoring and retreatment are necessary.



Call the Weed Board for specific herbicide advice.

380 Jefferson Street, Port Townsend WA 98368
360 379-5610 Ext. 205
noxiousweeds@co.jefferson.wa.us
<http://www.co.jefferson.wa.us/WeedBoard>



INTEGRATED PEST MANAGEMENT PRESCRIPTION

Himalayan blackberry

Description:

The Himalayan blackberry is the largest and possibly most invasive, non-native variety of blackberries in the Pacific Northwest. It was first introduced from Europe to the area as a crop plant in the 1800's. Since then, it has invaded large areas throughout the west coast.

It is a perennial plant that can reproduce from seed, root crowns, root pieces, and stem cuttings. A root crown is located at the base of a stem (cane) where nutrients are stored and numerous roots and shoots will emerge. Canes are green or green and red, stiff, angular, and have numerous large thorns. Canes have green leaves that are in groups of three or five, have jagged edges, and are round or oval shaped with a slightly pointed tip. In the second year of growth, a cane develops small white or whitish pink flower clusters that produce edible blackberries. The cane dies at the end of the second year although the plant will continue to live by producing new canes each year from root crowns.



Impacts:

Himalayan blackberry grows very rapidly and can cover and replace native habitat that is important for plant and animal diversity. Once established, it will out-compete native vegetation and cover more ground with each season. The fast growing thorny canes make removal difficult and often painful. The canes of Himalayan blackberry can grow ten feet tall and over twenty feet long in a single year.

Control Options:

Thurston County's integrated pest management emphasizes cultural, biological, and manual control methods to keep pests and vegetation problems low enough to prevent damage. When chemical control is considered, the least toxic product is recommended when no other control methods would be effective or practical.

► Cultural / Habitat

Himalayan blackberry does not grow well in areas that are well shaded. Planting an area with trees will help keep blackberry from getting established. If blackberry plants have been removed from an area it is important to remove seedlings as they appear and replant the area with native plant species.



► Manual / Mechanical

Blackberry plants can be effectively, but not easily, controlled using an approach that starts with cutting or mowing down canes and is followed by plant and root removal. Tractor mounted mowers, brush cutters, hedge trimmers, etc. can be used to cut down canes. Mowing can also provide the benefit of mulching and will make the site more accessible. A mattock (pick ax) and shovel can be effective in digging up root crowns located at the base of each cane (both ends of the cane can have roots if the cane tip touches the ground). After the site has been cleared the entire area should be monitored for blackberry seedlings. Mowing is easiest when the plant is shorter than 18 inches high and cutting of blackberry for control needs to be ongoing throughout the growing season (5 or more cuttings) and will require cutting year after year.

► Biological

Goats have been used to control small to modest sized infestations of blackberry and, once the mature plants have been removed, chickens have been used to help in the removal of seeds.

► Chemical

Chemical control combined with site clearing and replanting is the most effective way to remove blackberry. Canes can be cut down and removed in mid-summer to help with site access, emerging shoots and re-growth can be treated with an herbicide later in the season when it is most effective. An area that has had mature plant control will likely require follow-up control of seedlings, either by physical removal or further chemical control. Also, remember to replant the area with desirable native plants to prevent growth of another unwanted species.

Glyphosate is the active ingredient in many herbicides and is very effective in controlling blackberry. Because glyphosate is a systemic herbicide, it is absorbed and circulated to all plant parts and prevents the roots from producing new shoots. A 1% to 1.5% concentration of glyphosate is recommended for effective control. Glyphosate products are non-selective and will likely kill or cause chemical injury to any plant that is sprayed – shield or cover neighboring desirable plants to minimize the chance of unwanted injury.

Timing

Hand removal of root systems is easiest when the ground is very wet (late fall through early spring) but, removal at any time of the year will be effective. Seedling control must be done in the year they appear, prior to flower and seed production – but follow up removal must be performed each year since the seeds can sprout several years after they are in the soil.

Chemical control of mature plants is most effective late in the season (September) when the plant has produced fruit but before the first killing frost. Late summer is when blackberry plants store nutrients in the root system, so systemic herbicides used at this time will also be sent to the roots and improve control.



READ AND FOLLOW ALL LABEL DIRECTIONS AND RESTRICTIONS. Use of brand names is not an endorsement and is for reference only; other formulations of the same herbicides may be available under other names. Information provided is current as of the date of the fact sheet. Pesticide product registration is renewed annually and product names and formulations may vary from year to year.

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Weed of the Week



COMMON PERIWINKLE

Vinca minor L

Common Names: Common periwinkle, myrtle, ground myrtle

Native Origin: Europe; introduced for ornamental purposes

Description: Creeping evergreen vine in the dogbane family (Apocynaceae) growing 3" to 6" tall. It forms a dense tangled mat of long stems and elliptical leaves, rooting at intervals. Shiny dark green leaves are opposite, narrow elliptic, 0.8 to 1.8 inches long and 0.4 to 1 inch wide. Stems are slender, trailing, twining, herbaceous, typically hollow and green. Spring flowers are axillary, usually solitary, and pale blue, lilac or white. Slender, cylindrical fruit to 2 inches long becomes dry and splitting to release three to five seeds. It spreads vegetatively.



Habitat: It grows in partial shade, tends to yellow in full sun and high heat, best soil is moist, well-drained and fertile; relatively soil adaptable; grows in woods, bluffs, and waste ground. Found around home site plantings, grave yards, and scattered in open dense canopied forests.



Distribution: This species is reported from states shaded on Plants Database map. It is reported invasive in CA, CT, DC, DE, GA, IA, IL, IN, KY, MD, MI, NC, NJ, NY, OH, OR, PA, RI, SC, TN, TX, VA, WA, WI, and WV.

Ecological Impacts: This aggressive grower poses a threat to native plants and communities. Its vigorous growth forms mats of monotypic evergreen groundcover that displaces and excludes most other plants, including native wildflowers. Extensive infestations can be found under forest canopies.

Control and Management:

- **Manual-** Digging, raising the runners with a rake to remove all plant parts; mowing
- **Chemical-** It can be effectively controlled using any of several readily available general use herbicides such as glyphosate in the spring. Repeat application to prevent re-growth. Follow label and state requirements.
- **Natural Pest:** Stem blight, caused by *Phoma exigua* var. *exigua* is a serious disease of *Vinca minor*. The fungus causes a dieback that begins soon after new growth appears in the spring.



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Appendix 3: Data Tables

Regeneration Plot Data.....27

Vegetation Plot Data.....28

Snag Plot Data.....32

Coarse Woody Debris Plot Data.....33

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Plot Data for Forest Regeneration Survey, Goldcrest Community Areas

Species	total, 1-5 ft	total, 6-10 ft	total, 11-15 ft	total, 16-20 ft	total, > 20 ft	total, by spp.	Total/ac
Bigleaf maple					1.00	1.00	7.14
Pacific madrone				1.00		1.00	7.14
western redcedar	13.00					13.00	92.86
Totals	13.00	0.00	0.00	1.00	1.00	15.00	
Total/ac	92.86	0.00	0.00	7.14	7.14		107.14

DRAFT

Vegetation/ Plant Community Plot Data, Goldcrest Community Areas, Vegetation Only Plots

Plot	Community	Trees	%	Shrubs	%	Ground Cover	%
V1	red alder/sword fern	red alder	45	Himalayan blackberry*	90	sword fern	15
	(disturbed)	Douglas-fir	25				
		Deodar	10				
		willow spp.	10				
V2	Douglas-fir-western hemlock/ dwarf Oregon grape-sword fern	Douglas-fir	25	red huckleberry	5	English ivy*	95
	(disturbed)	Madrone	15	evergreen huckleberry	5	sword fern	5
				indian plum	10		
				salal	5		
				spurge laurel*	5		
				English holly*	5		
				single-seed hawthorn*	5		
				serviceberry	40		
V3	Douglas-fir-western hemlock/ dwarf Oregon grape-sword fern	Douglas-fir	80	ocean spray	10	yellow archangel*	85
	(disturbed)			evergreen huckleberry	5	bracken fern	5
				spurge laurel*	10		
				indian plum	10		
				baldhip rose	10		
				creeping Oregon grape	5		
				salal	5		
				common snowberry	5		
V4	Douglas-fir-western hemlock/ dwarf Oregon grape-sword fern	Douglas-fir	90	vine maple	5	Grass	50
	(disturbed)	western redcedar	5	spurge laurel*	10	sword fern	10
				English holly*	5	bracken fern	5
				creeping Oregon grape	25	trailing blackberry	10
						Moss	30

* INDICATES INVASIVE/NOXIOUS VEGETATION

Vegetation/ Plant Community Plot Data, Goldcrest Open Community Areas, Vegetation Only Plots,

V5	Douglas-fir-western hemlock/ dwarf Oregon grape-sword fern	Douglas-fir	60	red huckleberry	20	yellow archangel*	15
	(disturbed)	bigleaf maple	15	evergreen huckleberry	5	sword fern	30
		willow spp.	15	indian plum	5	bracken fern	5
		red alder	10	creeping Oregon grape	10		
				salal	15		
				European Mt. ash*	5		
V6	red alder/sword fern	red alder	70	hazelnut	20	Horsetail	65
	(disturbed)			indian plum	5	English Ivy*	45
	spring/seep on plot					lady fern	5
						skunk cabbage	15
						sword fern	5
						bracken fern	5
						Grass	5
V7	Douglas-fir-western hemlock/ dwarf Oregon grape-sword fern	Douglas-fir	70	ocean spray	10	bracken fern	5
		willow spp.	10	indian plum	5	sword fern	5
		Madrone	5	red huckleberry	5	trailing blackberry	20
				salal	40	serviceberry	20
				creeping Oregon grape	60		
				cascara	5		
				baldhip rose	5		

* INDICATES INVASIVE/NOXIOUS VEGETATION

Vegetation/ Plant Community Plot Data, Goldcrest Community Areas, Nested Plots

N1	red alder/sword fern	red alder	80	Armenian blackberry*	10	sword fern	25
		bigleaf maple	30	salmonberry	15	bleeding heart	10
	(plot not used for BA/TPA calculations)	black cottonwood	25			bracken fern	25
		willow (fallen, still living)	10			Grass	30
N2	Douglas-fir-western hemlock/ dwarf Oregon grape-sword fern	Douglas-fir	95	ocean spray	35	creeping Oregon grape	55
		bigleaf maple	10	baldhip rose	10	salal	40
		madrone	5	Indian plum	5	trailing blackberry	10
						bracken fern	10
						sword fern	5
N3	red alder/sword fern	bigleaf maple	95	salmonberry	25	periwinkle*	30
	(disturbed)			Armenian blackberry*	5	Comfrey*	15
	spring/seep on plot			red elderberry	5	Bedstraw	10
						sword fern	10
						bleeding heart	5
						Pacific waterleaf	5
						lady fern	5
						skunk cabbage	5
						Horsetail	20
N4	red alder/sword fern	western redcedar	70	salmonberry	50	Comfrey*	20
	(disturbed)	red alder	25	English holly*	15	skunk cabbage	25
	spring/seep on plot					lady fern	10
						Horsetail	5
						Sedge	5
						sword fern	5

* INDICATES INVASIVE/NOXIOUS VEGETATION

Vegetation/ Plant Community Plot Data, Goldcrest Community Areas, Nested Plots, continued

N5	red alder/sword fern	bigleaf maple	95	beaked hazelnut	15	sword fern	70
	(disturbed)			red huckleberry	10	Pacific waterleaf	5
				English holly*	5	Grass	5
				single-seed hawthorn*	5		
				Indian plum	5		
N6	red alder/sword fern	bigleaf maple	55	red huckleberry	5	trailing blackberry	10
		red alder	40	salmonberry	10	trillium	5
		western hemlock	10			Pacific waterleaf	5
						sword fern	70
N7	Douglas-fir-western hemlock/ dwarf Oregon grape-sword fern	western redcedar	30	salmonberry	15	sword fern	30
		bigleaf maple	50			lady fern	15
		red alder	25			skunk cabbage	15
						Horsetail	5
						deer fern	5
						Sedge	5

* INDICATES INVASIVE/NOXIOUS VEGETATION

Snag Plot Data, Goldcrest Community Areas

DBH CLASS (in)	ACMA	ALRU	PSME	THPL		
4			2			
6	2		4			
8	2		1			
10	1	1	1			
12	1					
14		1		1		
16		1				
18						
20						
TOTALS	6	3	8	1	GRAND TOTAL	18
TOTAL/AC	9	4	11	1		26
DECAY CLASS	ACMA	ALRU	PSME	THPL		
3	1		5			
4	2		1			
5	3	2	2	1		
6		1				
7						
TOTALS	6	3	8	1	GRAND TOTAL	18
HEIGHT CLASS (ft)	ACMA	ALRU	PSME	THPL		
10	1	1				
15	1			1		
20	2	1				
25						
30	1	1				
35	1		3			
40			3			
45						
50			1			
55						
60			1			
TOTALS	6	3	8	1	GRAND TOTAL	18

Coarse Woody Debris Plot Data, Goldcrest Community Areas

Plot #	mean vol.	mean % cover
plot 1	0	0
plot 2	0	0
plot 3	0	0
plot 4	656.16	0.50
plot 5	864.93	0.57
plot 6	1729.87	0.63
plot 7	119.30	0.13
mean volume/acre	481.47	
mean % cover		0.26