

# KING COUNTY LANDS

## Invasive Vegetation Survey Findings

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King County Noxious Weed Control Program





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## 1.0 INTRODUCTION

King County Noxious Weed Control Program (KCNWCP) has undertaken an effort to inventory and map presence of invasive plant species on King County lands with high to medium-high conservation value. This information will better allow the County to understand the level of infestation and the trends of infestation, and to inform the management and control of these unwanted weed species. The project was designed to focus primarily on invasive plant species that are not actively monitored by the KCNWCP, but are common unregulated weeds that have an impact upon environmental and other values (for example, Himalayan blackberry).

The intent of this project was to:

- Develop a comprehensive inventory of invasive plant species on King County lands of high to medium-high conservation value;
- Build a database from the inventory; and
- Assess the degree of impact to these lands due to invasive plants.

The King County Greenprint Study (KCDNRP and Trust for Public Lands, 2005) was used as a basis for identifying the county-owned lands of high to medium-high conservation value. The intent of the field inventory portion of this project was to comprehensively capture the variation in prevalence of weeds across the landscape of County-owned lands of high to medium-high conservation value. The field survey methodology was chosen to balance the amount of time spent at each site with the KCNWPCP goal of making observations over all of the subject sites. An Access database has been assembled using existing information available in the King County GIS with the addition of the field data from this project.

## 2.0 METHODOLOGY

The following sections describe the methods used in this project, including:

- developing the list of King County lands having high and medium-high conservation values to be field surveyed<sup>1</sup>;
- developing a method of delineating vegetative cover on the subject sites;
- selecting a method of field survey that provides a comprehensive overview of invasive plant species present on King County high conservation lands;
- performing field investigations; and
- analyzing data.

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<sup>1</sup> High and medium-high conservation value lands are county-owned lands identified in the King County Greenprint Study (KCDNRP and Trust for Public Land, 2005).

## **2.1 Selection of King County Lands of High and Medium-High Conservation Value**

### **2.1.1 Use of King County Study Data**

King County provided the GIS and tabular data products from the King County Greenprint study (KCDNRP and Trust for Public Lands, 2005). That study used a GIS-based model to prioritize land within the County for regional conservation strategy purposes. Based on recommendations from KCNWPCP staff, ESA Adolfson used the GIS-modeled output data from three land categories for further analysis in this project: ecological lands, forested lands, and flood hazard reduction lands. By overlaying these Greenprint layers with King County ownership, the total area was approximately 22,000 acres (Figure 1).

### **2.1.2 Selection of Lands to Survey**

ESA Adolfson worked with the KCNWCP project team to select a metric that met the needs of the project. All parcel groups of County Lands with high and medium-high conservation value were surveyed, with the exception of those excluded by mutual agreement.

## **2.2 Delineation of Habitat Cover Types**

The subject lands were delineated into habitat cover types based upon the following general characteristics:

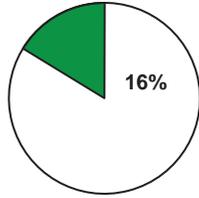
- vegetative cover and/or land use;
- probability that invasive plant species will occur in the different vegetation cover or land use type; and
- susceptibility of the habitat cover type to invasion and/or impact by invasive plant species.

For this project, we selected a minimum mapping unit (MMU)<sup>2</sup> of two acres.

The seven habitat cover types used in this project are outlined below with the relative proportion of the total lands inventoried in this study.

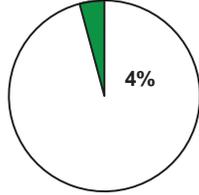
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<sup>2</sup> The minimum mapping unit defines the smallest habitat cover type to be mapped at any given map level.



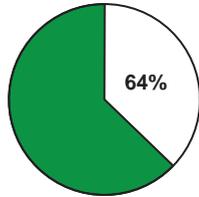
## Road, Trail/Utility Corridor

Managed vegetation (cleared, trimmed, mowed) along, over, or under roads, trails or utility rights-of-way (3,489.41 Acres);



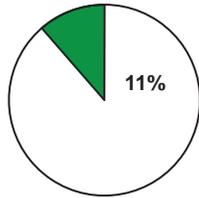
## Structures and Associated Landscaping

Structures (houses, park facilities, etc.) and associated lawns, gardens, turf playfields, etc. (831.52 Acres);



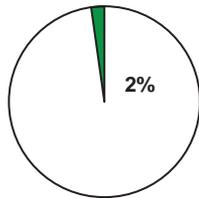
## Closed Canopy Forest

Forested stand with overlapping tree crowns (60 – 100% tree canopy cover per habitat cover type) (13,273.14 Acres);



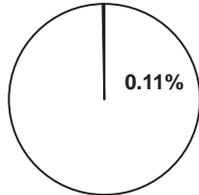
## Open Canopy Forest/Shrub

Open stands of trees, with tree crowns not typically touching (25 – 60% tree canopy coverage per habitat cover type) and shrub-dominated areas (25 % cover or greater) (2,423.27 Acres);



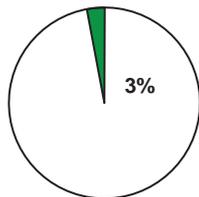
## Herbaceous

Herbs (graminoids, forbs, and ferns) that constitute at least 25% cover of the habitat cover type (419.45 Acres);



## Marine Shoreline

Marine beaches between ordinary high tide line and upland habitat. This vegetation is typically sparse and limited to algae (23.93 Acres);



## Freshwater Shoreline

Rivers and streams and their associated shorelines. This cover type also includes freshwater lakes, ponds, and open water areas and their associated shorelines between open water and upland vegetation (696.02 Acres).

Habitat cover types were initially delineated as polygons from aerial photographs using a combination of the 2005 and 2007 ortho-rectified air-photo imagery provided by the County (Figure 2). The boundaries of each habitat cover type were further refined based on the results of field surveys (described below).

## **2.3 Field Survey Methodology**

The methodology for performing field studies for this project was selected based on one main objective: to map the distribution of invasive plant species occurring on King County high and medium-high valued conservation lands by conducting a comprehensive survey of those areas.

To achieve this goal, we selected a sample design that involves several key phases:

- subjective selection of sites within all cover types delineated on high and medium-high valued conservation lands for data collection (described under 2.1 above);
- identification of habitat cover types (described under 2.2 above); and
- subjective data collection within cover types based on vegetative cover (e.g., herbaceous, road or utility corridor, etc.).

The use of subjective selection of sampling sites is well-documented in scientific literature related to rare plants or invasive plants (Gillison and Brewer, 1985; Heubner, 2007; Wessels et al., 1998; Whiteaker et al., 1998).

### **2.3.1 Identification of Habitat Cover Types**

The initial process of identifying habitat cover types, along with cover type descriptions, is explained above in Section 2.2, Delineation of Habitat Cover Types. The seven cover types represent different habitat units that were surveyed during the project. The boundaries of each habitat cover type were first delineated based upon aerial photographs, then were refined based on ground-truthing during field surveys.

### **2.3.2 Subjective Selection of Sites**

The process for selecting sites for field surveying was subjective, based upon the following three criteria, in order to achieve a representative sample among King County lands of high and medium-high conservation value:

1. size of parcel group<sup>3</sup>;
2. habitat cover types present in each parcel group, and

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<sup>3</sup> “Parcel Groups” are groupings of adjacent county-owned parcels, typically managed as one unit.

3. anticipated pattern of noxious and/or invasive weed distribution in the parcel group (e.g. disturbed areas).

Subjective selection of sites was also based upon a minimum size of five acres for a parcel group.<sup>4</sup>

In addition to grouping parcels for assessment as a unit, same habitat cover types within parcel groups were also grouped (e.g., two closed forest cover types present within a parcel group were combined into one closed forest cover polygon for survey purposes). This grouping reduced the total number of polygons to be visited, increasing sampling efficiency, and allowed field staff to provide a comprehensive survey of King County high and medium-high value conservation lands. ESA Adolfson staff surveyed all habitat cover types within each selected parcel group. A limited number of polygons were excluded from the survey by mutual agreement between ESA Adolfson and King County due to accessibility problems (e.g. no road access; across rivers, etc.). One site, the Mt. Si NRCA parcels, was excluded in error; this site will be surveyed in 2009. These instances were recorded (Appendix A).

### **2.3.3 Subjective Data Sampling within Habitat Cover Types**

Field staff recorded occurrence of invasive plant species on hard copy data forms. The data were joined to the habitat cover polygons previously delineated on the site. Each species on a list provided by KCNWCP (see Appendix B) was assigned an estimate of percent cover in each cover type. ESA Adolfson staff surveyed all delineated cover types within a individual parcel group. In addition, invasive species from a second list (Appendix C), based upon the King County Noxious Weed List (2008) were identified with a GPS waypoint, and information on location and prevalence was transmitted to the KCNWCP as described in Section 2.3.4 below. An overall percent of invasive species presence was also recorded for each habitat cover type.

Percent presence was recorded utilizing the following cover classes: (adapted from North American Weed Management Association cover classes (NAWMA 2002))

1. 0 to 0.4 percent - weed presence not significant
2. 0.5 to 2 percent – weed presence at trace amounts
3. 3 to 5 percent – low weed presence
4. 6 to 10 percent – moderate weed presence
5. 11 to 25 percent– moderate high weed presence
6. 26 to 50 percent – high weed presence
7. greater than 50 percent – very high weed presence

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<sup>4</sup> Sites of less than five acres were individually reviewed by KCNWCP staff to determine if the site had significant conservation value to be included in the study.

The survey effort resulted in a database of invasive plant species observed at all habitat cover types for each site visited, on 112 sites over 21,138 acres. These data were imported to GIS format following the field survey effort. The GIS data allows King County staff to query invasive species by parcel identification number (PIN), parcel group, habitat cover type, King County Parks Resource Coordinator Area, etc. as described in the Results section below.

### **2.3.4 Invasive Species Surveyed**

Appendix B contains a list of the invasive plant species surveyed in this project. In addition, any King County designated class A, B, or C noxious weeds (Appendix C) observed during field surveys, including submerged aquatic weeds, ESA Adolfson reported the locations to the KCNWCP within two working days.

### **2.3.5 Definition of Significant Invasive Cover Presence**

The presence of a species on the survey list having a percent cover of 0.5 percent or greater was determined to be significant on the targeted high and medium-high value conservation lands. In addition to the listed invasive species (Appendix B), other invasive, non-native species not on the list, but estimated to cover at least 0.5 percent of a habitat cover type, (i.e., having a significant cover presence upon the cover type) were also recorded. The presence of a species having a percent cover of below 0.5 percent was determined to not have a significant presence.

### **2.3.6 Data Form / Data Collection**

Data were collected on a data form specifically developed for use in this project (Appendix D). Data forms for each of the habitat cover types surveyed per parcel group included the list of invasive plant species surveyed and estimated percent cover for each observed species and an overall percent cover of weeds for the habitat cover polygon. If no invasive plant species were observed in the habitat cover polygon, this was documented on the data form. Other information recorded on the field form included presence of wetlands with their Cowardin vegetation classification<sup>5</sup>, any evidence of weed control efforts, access constraints that influenced the ability to survey that cover type, as well as any other observations including presence of invasives not listed in Appendix B.

Invasive species field surveys were performed by teams of two biologists. Field maps were used prior to site visits to make an initial determination of which areas of a parcel group would be visited. Field crews surveyed each parcel group by foot, or by vehicle as necessary to cover a large area in a timely manner. Based on size and complexity of the parcel groups, ESA Adolfson staff surveyed at least one of each cover type polygon at each parcel group if cover type polygons appeared homogeneous. Multiple same-cover type polygons were surveyed if they appeared to differ in habitat features (e.g. closed canopy forest with conifer cover versus mixed-forest cover; different age-class of trees). Staff visited one to three different polygons of the

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<sup>5</sup> For example: Palustrine Emergent, Palustrine Scrub-shrub; Riverine Unconsolidated Shore, etc. (Cowardin et al., 1979)

same cover type depending on ease of access within the parcel group. In the absence of roads and maintained trails, field scientists bushwhacked or used wildlife trails.

In small to medium size parcel groups, field staff surveyed in a large loop (meander) throughout the entire site. At large sites, for example Rattlesnake Mountain, field surveys targeted portions of the site that most likely contained weeds (e.g. edges of closed forest cover polygons that abutted disturbed areas; habitat adjacent to Roads, Trails, and Utility cover polygons). This subjective sampling technique is well-documented in botanical literature, where field surveys emphasize habitat that is likely to contain the target plant species, either rare or invasive (Gillison and Brewer, 1985; Heubner, 2007; Wessels et al., 1998; Whiteaker et al., 1998).

While surveying cover types, field scientists indicated on the datasheet as invasive species were observed. After a representative overview pattern of weed species was observed and documented, the survey within that cover type polygon was considered complete.

Estimates for species percent cover and overall percent cover were usually done at the end of the survey before leaving the parcel group. Cover Class estimates (e.g. 0.5-2%, 11-25%) were agreed upon by both field scientists.

An illustrated identification guide of target weed species, prepared for this project, was provided to each field team.

At each parcel group, field crews completed the following tasks;

1. Filling out a hard-copy data form;
2. Generating a field sketch map of general invasive infestation locations; and
3. Taking site photographs.

Data were collected on any invasive plant species observed as described above. King County Class A or B noxious weed presence was recorded in GPS, and these point locations and completed reporting forms were sent to the KCNWCP. Photographs were taken to document species identification and the extent of species presence.

## **2.4 Data Management and GIS Development**

The final GIS dataset of the cover types mapped on high and medium-high valued conservation lands, including the cover class of each target invasive species found within each of the mapped cover types, has been prepared for use by KCNWCP. The GIS has been provided in both (ESRI) Shapefile and Geodatabase feature class formats using the NAD\_1983\_HARN\_StatePlane\_Washington\_North\_FIPS\_4601\_Feet projected coordinate system. All GIS data sets also include completed Metadata in both .xml and .html formats. The GIS data will also be able to be linked to a MS Access database using a unique identifier created for the project.

## **2.5 MS Access Database**

In addition to the GIS files for this project, ESA Adolfson created a basic Microsoft Access database to provide a more robust data management tool for long-term storage of data. All field data were reviewed in the office by staff scientists to ensure that no problems had arisen during the downloading of field data into the KCLIPS Access database. The MS Access Database can be found on the accompanying digital data CD. The digital data will also include all of the scanned field forms (in PDF format) and digital photos collected at each site.

## **3.0 FINDINGS AND DISCUSSION**

A total of 21,138 acres over 112 parcel groups were field surveyed in this study between June 17 and October 2, 2008.

The purpose of the inventory of invasive species in County lands of high and medium-high conservation value was to identify significant presence of invasive plants in order to inform the future management of County lands to protect these conservation lands from further degradation by weeds. Control and management of weeds protects wildlife habitat, botanical diversity, and outdoor recreational value, while serving a vital role in protection of aquatic habitats.

The database created for this project is the primary deliverable for the project. The data collected for this project provide the means for King County land managers to assess the level of threat to various sites from weeds, or threat from a particular species, and to develop and evaluate management strategies. For example, County staff could identify the least- or most-invaded sites for priority action; could identify the locations of a specific species for eradication; could assess the spread of particular species over time; or answer many other important queries. A small selection of key findings is described below.

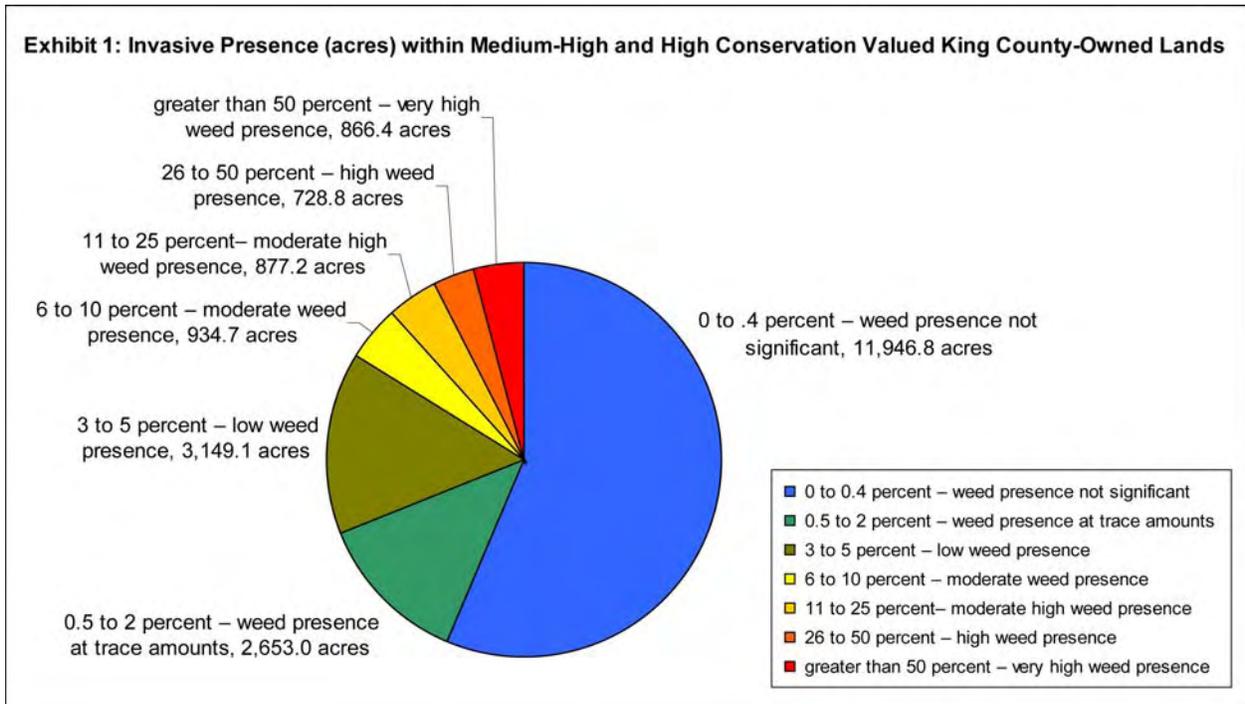
### **3.1 King County Parcel Groups**

There were 98 parcel groups (of 112 total) with a significant presence of weeds (cover of 0.5 or greater) representing 87.5 percent of all parcel groups included in the study. Those 98 parcel groups comprised 9,209.2 acres, 43.5 percent of the total acreage of the study. The remaining 56.5 percent of the study acreage (14 parcel groups) had weed presence below 0.5 percent (Exhibit 1).

### **3.2 Habitat Types**

An analysis of each of the seven identified habitat types was performed to identify the target species most prevalent in each habitat.

Targeted invasive species that had the most significant presence in closed canopy forests were Himalayan blackberry, English holly, and English ivy. This would be consistent with the shade tolerant character of English holly and English ivy (Boersma et al, 2006). The high presence of Himalayan blackberry in the closed canopy forest cover type may be explained by both its ability to persist under deciduous canopy cover (where some light is available) and presence in patches where closed-canopy forests were more open (Table 1).



**Table 1. Targeted weed species observed in Closed Canopy Forest habitat (ranked 1-10).**

Rank	Scientific Name	Common Name	No. of Closed Canopy Forest Polygons
1	Rubus armeniacus (discolor)	Himalayan blackberry	44
2	Ilex aquifolium	English holly	42
3	Hedera helix	English ivy	31
4	Rubus laciniatus	evergreen blackberry	28
5	Phalaris arundinacea	reed canarygrass	17
6	Sorbus aucuparia	European mountain ash	12
7	Solanum dulcamara	Bittersweet nightshade	9
8	Cytisus scoparius	Scot’s broom	7
9	Senecio jacobaea	Tansy ragwort	5
10	Cirsium arvense	Canada thistle	4

Target species with the greatest presence in Open Canopy Forest / Shrub were Himalayan blackberry, reed canarygrass, evergreen blackberry, and Canada thistle (Table 2). All of these species thrive in full sunlight, but also tolerate some shade.

**Table 2. Targeted weed species observed in Open Canopy Forest / Shrub habitat (ranked 1-10).**

Rank	Scientific Name	Common Name	No. Open Canopy Forest / Shrub Polygons
1	<i>Rubus armeniacus (discolor)</i>	Himalayan Blackberry	47
2	<i>Rubus laciniatus</i>	evergreen blackberry	30
3	<i>Phalaris arundinacea</i>	reed canarygrass	28
4	<i>Cirsium arvense</i>	Canada thistle	23
5	<i>Cytisus scoparius</i>	Scots broom	17
6	<i>Senecio jacobaea</i>	tansy ragwort	14
7	<i>Solanum dulcamara</i>	bittersweet nightshade	11
8	<i>Ilex aquifolium</i>	English holly	11
9	<i>Tanacetum vulgare</i>	common tansy	10
10	<i>Hedera helix</i>	English ivy	9

The most common invasive plant species observed in the Herbaceous habitat type were Himalayan blackberry, reed canarygrass, evergreen blackberry, and Scot's broom (Table 3). These species are all known to be adapted to full-sun.

**Table 3. Targeted weed species observed in the Herbaceous habitat (ranked 1-10).**

Rank	Scientific Name	Common Name	No. Herbaceous Polygons
1	<i>Rubus armeniacus (discolor)</i>	Himalayan blackberry	8
2	<i>Phalaris arundinacea</i>	reed canarygrass	6
3	<i>Rubus laciniatus</i>	evergreen blackberry	4
4	<i>Cytisus scoparius</i>	Scot's broom	4
5	<i>Senecio jacobaea</i>	tansy ragwort	3
6	<i>Cirsium arvense</i>	Canada thistle	2
7	<i>Solanum dulcamara</i>	bittersweet nightshade	1
8	<i>Tanacetum vulgare</i>	common tansy	1
9	<i>Buddleja davidii</i>	butterfly bush	1
10	<i>Lythrum salicaria</i>	purple loosestrife	1

Along freshwater shorelines, Himalayan blackberry and reed canarygrass were the most prevalent species (Table 4). These species are adapted to full sun, can tolerate moisture, and have the ability to take advantage of flooding dispersal opportunities due to shallow, adventitious root structure.

**Table 4. Targeted weed species observed in the Freshwater Shoreline habitat (ranked 1-10).**

Rank	Scientific Name	Common Name	No. Freshwater Shoreline Polygons
1	<i>Rubus armeniacus (discolor)</i>	Himalayan blackberry	23
2	<i>Phalaris arundinacea</i>	reed canarygrass	22
3	<i>Rubus laciniatus</i>	evergreen blackberery	8
4	<i>Solanum dulcamara</i>	bittersweet nightshade	7
5	<i>Cytisus scoparius</i>	Scots broom	7
6	<i>Polygonum bohemicum</i>	Bohemian knotweed	6
7	<i>Iris pseudocorus</i>	yellow flag iris	6
8	<i>Tanacetum vulgare</i>	common tansy	5
9	<i>Senecio jacobaea</i>	tansy ragwort	4
10	<i>Ilex aquifolium</i>	English holly	3

Only one Marine Shoreline habitat polygon was identified for assessment in this study (Miletta Creek Heronry / Maury Island Park). Within this habitat cover type, Himalayan blackberry, Scot’s broom, and tansy ragwort were target weed species present (Table 5)

**Table 5. Targeted weed species observed in the Marine Shoreline cover type (ranked 1-3).**

Rank	Scientific Name	Common Name	No. Marine Shoreline Polygons
1	<i>Rubus armeniacus (discolor)</i>	Himalayan Blackberry	1
2	<i>Cytisus scoparius</i>	Scot’s broom	1
3	<i>Tanacetum vulgare</i>	common tansy	1

The most common invasive plant species observed in the Road, Trail, Utility Corridor habitat type were Himalayan blackberry, reed canarygrass, evergreen blackberry, and Scot’s broom (Table 6). These species are all known to be adapted to full-sun, as described above.

**Table 6. Targeted weed species observed in the Road, Trail, Utility Corridor cover type (ranked 1-10).**

Rank	Scientific Name	Common Name	No. Road, Trail, Utility Corridor Polygons
1	<i>Rubus armeniacus (discolor)</i>	Himalayan Blackberry	84
2	<i>Phalaris arundinacea</i>	reed canarygrass	60
3	<i>Rubus laciniatus</i>	evergreen blackberry	53
4	<i>Cytisus scoparius</i>	Scots broom	43
5	<i>Ilex aquifolium</i>	English holly	28
6	<i>Senecio jacobaea</i>	tansy ragwort	27
7	<i>Hedera helix</i>	English ivy	27
8	<i>Cirsium arvense</i>	Canada thistle	25
9	<i>Tanacetum vulgare</i>	common tansy	23
10	<i>Sorbus aucuparia</i>	European mountain ash	19

The most common target invasive species found in Structures and Associated Landscaping habitat type were Himalayan blackberry, Scots broom, and Canada thistle (Table 7). These species were often restricted to edges and fence lines where active weed control (i.e. mowing, cutting) was not present or had not yet been performed for the year.

**Table 7. Targeted weed species observed in the structures and associated landscaping cover type (ranked 1-10).**

Rank	Scientific Name	Common Name	No. Structures and Associated Landscaping Polygons
1	<i>Rubus armeniacus (discolor)</i>	Himalayan blackberry	23
2	<i>Cytisus scoparius</i>	Scot's broom	10
3	<i>Cirsium arvense</i>	Canada thistle	10
4	<i>Phalaris arundinacea</i>	reed canarygrass	9
5	<i>Senecio jacobaea</i>	tansy ragwort	9
6	<i>Tanacetum vulgare</i>	common tansy	9
7	<i>Rubus laciniatus</i>	evergreen blackberry	6
8	<i>Sorbus aucuparia</i>	European mountain ash	5
9	<i>Iris pseudocorus</i>	yellow flag iris	4
10	<i>Ilex aquifolium</i>	English holly	3

### 3.3 Overall Invasive Cover

In addition to percent cover class of each individual target species, the overall cover of all target weed species was assessed for each habitat and parcel group. Of the habitat cover types, Road,

Trail, and Utility Corridor habitat had the highest percent (after normalization) of overall significantly weediness (85 percent). Freshwater Shoreline and Open Canopy Forest / Shrub were next, with 78 and 73 percent respectively of habitat found to be significantly weedy. The Herbaceous (57 percent) and Structures and Associated Landscaping (53 percent) habitat types were similarly weedy (Table 8). Only one Marine Shoreline habitat polygon was identified as part of the survey area. The site had overall invasive cover of greater than or equal to 0.5 percent; thus 100 percent of the Marine Habitat surveyed had significant weed presence. However, due to the small sample size, Marine Shoreline was omitted from Table 8.

**Table 8. Cover types ranked by overall significant presence of invasive plants.**

Cover Type*	No. of Polygons where Overall Invasiveness was > 0.5 percent	Total No. of Polygons Represented	Normalized percent*
Road, Trail Utility Corridor	82	96	85%
Freshwater Shoreline	28	36	78%
Open Canopy Forest / Shrub	49	67	73%
Herbaceous	8	14	57%
Structures and Associated Landscaping	16	30	53%
Closed Canopy Forest	30	92	33%

\*Percent was normalized by dividing the number of habitat polygons with significant weed presence by the total number of polygons of the habitat type

### 3.4 Non-Targeted Invasive Plants with Significance Presence

Fourteen non-targeted weed species were recorded with significant presence (greater than 0.5 percent cover) during the field surveys (Table 9). The most common were: herb Robert, bull thistle European hawthorn, common bindweed, black locust, and Oxeye daisy. The most significant presence was herb Robert, which occurred in 84 percent of all parcel groups in the study. Bull thistle occurred in 61 percent of the parcel groups, and European hawthorn occurred in 33 percent of the parcel groups.

**Table 9. Non-targeted invasive weed species observed during the 2008 survey.T**

Rank	Scientific Name	Common Name	No. of Locations Recorded (112 parcel groups total)
1	<i>Geranium robertianum</i>	herb Robert	95
2	<i>Cirsium vulgare</i>	bull thistle	69
3	<i>Crataegus monogyna</i>	European hawthorn	37
4	<i>Convolvulus arvensis</i>	common bindweed	29
5	<i>Robinia pseudoacacia</i>	black locust	10
6	<i>Leucothemum vulgare</i>	oxeye daisy	10
7	<i>Arctium minus</i>	burdock	6
8	<i>Aesculus sp.</i>	horsechestnut	5
9	<i>Prunus lusitanica</i>	Portugal laurel	5
10	<i>Ajuga sp.</i>	bugleweed	4
11	<i>Ailanthus altissima</i>	tree of heaven	4
12	<i>Conium maculatum</i>	poison hemlock	3
13	<i>Vinca minor, V. major</i>	periwinkle	3
14	<i>Cotoneaster sp.</i>	cotonester	3

### 3.5 King County Council Districts

There are nine King County Council Districts. The number of surveyed acres of King County Lands that were significantly weedy varied from District to District (Figure 3). Council District 1 contained highest percent of land with a significant presence of invasive plant cover, with 27 percent, representing 27.4 acres of total County-owned acreage within that District. Council District 3 contained the highest amount of County-owned acreage (922.8 acres) with significant presence of invasive plant cover. In Council Districts 6 and 7, 14 percent of the County-owned lands in the survey were found to contain significant presence of invasive plant cover (Table 10). Council Districts 2 and 4 were not found to have acreage with significant presence of invasive plant cover.

**Table 10. Percent of Surveyed Lands in King County Council Districts found to have Significant Presence of Invasive Cover**

Council District	Acres with Significant Presence of Invasives	Percent of King County Lands with Significant Presence of Invasives
1	27.4	27 %
2	0.0	0 %
3	922.8	9 %
4	0.0	0 %
5	63.1	8 %
6	6.7	14 %
7	235.1	14 %
8	62.3	10 %
9	515	4 %

### 3.6 Resource Coordinator Areas

King County Parks Resource Coordinator Areas (RCAs) are divisions of King County Lands managed by a single coordinator (Figure 3). Weed management is one of the tasks of the RCA coordinators. The database prepared for this project will provide a means to examine weed infestation within a RCA, and can be used in management solutions developed specific to the RCA.

Himalayan blackberry, evergreen blackberry, Scots broom, reed canarygrass, and English holly were the highest ranked target invasive plant species found across all Resource Coordinator Areas (RCA) in King County (Tables 11 – 15). Certain species appear to have greater presence in individual RCAs and may indicate a need for additional management focus in those regions. Common tansy ranked highest in RCA 2, occurring at a significant level (greater than 0.5 percent cover) in 70.5 percent of the parcel groups (36 / 51). Clematis also appears to be concentrated in RCA 3, with 11 of 13 observations occurring within that region (e.g. Snoqualmie Valley Trail and Tolt River/John MacDonald Park). Area 1 and Area 2, located in the southern half of the county, had 69.8 percent of occurrence of Tansy ragwort. This may be correlated with greater overall land-cover in agriculture and livestock. Tansy ragwort is often a pest on agricultural lands and was thought to have been introduced in animal feed (Boersma et al., 2006).

**Table 11. Most Common Invasive Species found within Resource Coordinator Area (RCA) 1**

Area 1			
Rank	Common Name	Scientific Name	Percent Occurrence within Area 1
1	Himalayan blackberry	<i>Rubus armeniacus (discolor)</i>	70.1
2	evergreen blackberry	<i>Rubus laciniatus</i>	55.1
3	Scot's broom	<i>Cytisus scoparius</i>	38.8
4	tansy ragwort	<i>Senecio jacobaea</i>	34.3
5	English holly	<i>Ilex aquifolium</i>	29.9
6	reed canarygrass	<i>Phalaris arundinacea</i>	23.9
7	English ivy	<i>Hedera helix</i>	22.4
8	Canada thistle	<i>Cirsium arvense</i>	16.4
9	European mountain ash	<i>Sorbus aucuparia</i>	16.4
10	butterfly bush	<i>Buddleja davidii</i>	13.4

**Table 12. Most Common Invasive Species found within Resource Coordinator Area (RCA) 2**

Area 2			
Rank	Common Name	Scientific Name	Percent Occurrence within Area 2
1	Himalayan blackberry	<i>Rubus armeniacus (discolor)</i>	66.4
2	reed canarygrass	<i>Phalaris arundinacea</i>	44.0
3	evergreen blackberry	<i>Rubus laciniatus</i>	30.4
4	common tansy	<i>Tanacetum vulgare</i>	28.8
5	Scot's broom	<i>Cytisus scoparius</i>	24.8
6	English ivy	<i>Hedera helix</i>	22.4
7	English holly	<i>Ilex aquifolium</i>	21.6
8	Canada thistle	<i>Cirsium arvense</i>	20.8
9	tansy ragwort	<i>Senecio jacobaea</i>	17.6
10	bittersweet nightshade	<i>Solanum dulcamara</i>	15.2

**Table 13. Most Common Invasive Species found within Resource Coordinator Area (RCA) 3**

Area 3			
Rank	Common Name	Scientific Name	Percent Occurrence within Area 3
1	Himalayan blackberry	<i>Rubus armeniacus (discolor)</i>	59.0%
2	reed canarygrass	<i>Phalaris arundinacea</i>	37.3%
3	evergreen blackberry	<i>Rubus laciniatus</i>	30.1%
4	Scot's broom	<i>Cytisus scoparius</i>	22.9%
5	English holly	<i>Ilex aquifolium</i>	19.3%
6	English ivy	<i>Hedera helix</i>	15.7%
7	Canada thistle	<i>Cirsium arvense</i>	14.5%
8	tansy ragwort	<i>Senecio jacobaea</i>	14.5%
9	Bohemian knotweed	<i>Polygonum bohemicum</i>	13.3%
10	old man's beard	<i>Clematis vitalba</i>	13.3%

**Table 14. Most Common Invasive Species found within Resource Coordinator Area (RCA) 4**

Area 4			
Rank	Common Name	Scientific Name	Percent Occurrence within Area 4
1	Himalayan blackberry	<i>Rubus armeniacus (discolor)</i>	81.7%
2	reed canarygrass	<i>Phalaris arundinacea</i>	67.6%
3	evergreen blackberry	<i>Rubus laciniatus</i>	52.1%
4	English holly	<i>Ilex aquifolium</i>	42.3%
5	bittersweet nightshade	<i>Solanum dulcamara</i>	35.2%
6	Scot's broom	<i>Cytisus scoparius</i>	25.4%
7	English ivy	<i>Hedera helix</i>	18.3%
8	yellow flag iris	<i>Iris pseudocorus</i>	18.3%
9	Canada thistle	<i>Cirsium arvense</i>	16.9%
10	purple loosestrife	<i>Lythrum salicaria</i>	16.9%

**Table 15. Most Common Invasive Species found within Resource Coordinator Area (RCA) 5**

Area 5			
Rank	Common Name	Scientific Name	Percent Occurrence within Area 5
1	Himalayan blackberry	<i>Rubus armeniacus (discolor)</i>	60.9%
2	evergreen blackberry	<i>Rubus laciniatus</i>	43.5%
3	Canada thistle	<i>Cirsium arvense</i>	34.8%
4	reed canarygrass	<i>Phalaris arundinacea</i>	30.4%
5	English holly	<i>Ilex aquifolium</i>	30.4%
6	English ivy	<i>Hedera helix</i>	21.7%
7	Bohemian knotweed	<i>Polygonum bohemicum</i>	17.4%
8	European mountain ash	<i>Sorbus aucuparia</i>	13.0%
9	butterfly bush	<i>Buddleja davidii</i>	13.0%
10	Scot's broom	<i>Cytisus scoparius</i>	8.7%

### 3.7 Noxious Weed Occurrence

Of the 27 weed species specifically targeted for this field study, 6 are listed by the KCNWCP for control in the County. Only one of these noxious weeds, tansy ragwort, had significant presence in this survey. Tansy ragwort was recorded at 51 sites; 53 percent of those sightings were along Roads, Trails and Utility Corridors. These results are consistent with another study that found tansy ragwort seed does not often travel more than 10 meters from the parent plant and therefore are more likely distributed by vehicles and machinery (Boersma et al., 2006). Targeted weed species that did not have a significant presence in this survey (recorded at 4 or fewer sites) were Policeman's helmet, giant knotweed, yellow archangel, purple loosestrife, and fragrant water lily. In addition, orange hawkweed, smooth hawkweed, meadow hawkweed, Japanese knotweed, and Himalayan knotweed were not recorded during field surveys.

### 3.8 Conclusions

In summary, the target species most commonly found throughout the study area were Himalayan blackberry, evergreen blackberry, reed canarygrass, Scot's broom, and Canada thistle. These unregulated weeds threaten the conservation value of the surveyed lands. Untargeted weeds, such as herb Robert and bull thistle were widely present in significant percent cover; these are other invasive species that threaten valuable conservation lands.

The target invasive species were found predominantly in Roads, Trails, and Utility Corridor, Freshwater Shoreline, and Open Canopy Forest / Shrub habitats. These habitat types contain disturbed habitat and the means for easy dissemination of weed propagules (e.g. vehicles, animals, wind).

The database prepared for this project provides a tool for the development of management strategies for the control of these unregulated weeds. A management plan developed for these King County conservation lands can be used as a basis for management plans for other county-owned lands and for lands beyond county boundaries.

#### **4.0 LIMITATIONS OF STUDY**

Within the limitations of schedule, budget, and scope-of-work, we warrant that this study was conducted in accordance with generally accepted environmental science practices, including the technical guidelines and criteria in effect at the time this study was performed, as outlined in the Methods section. The results and conclusions of this report represent the authors' best professional judgment, based upon information provided by the project proponent in addition to that obtained during the course of this study. No other warranty, expressed or implied, is made.



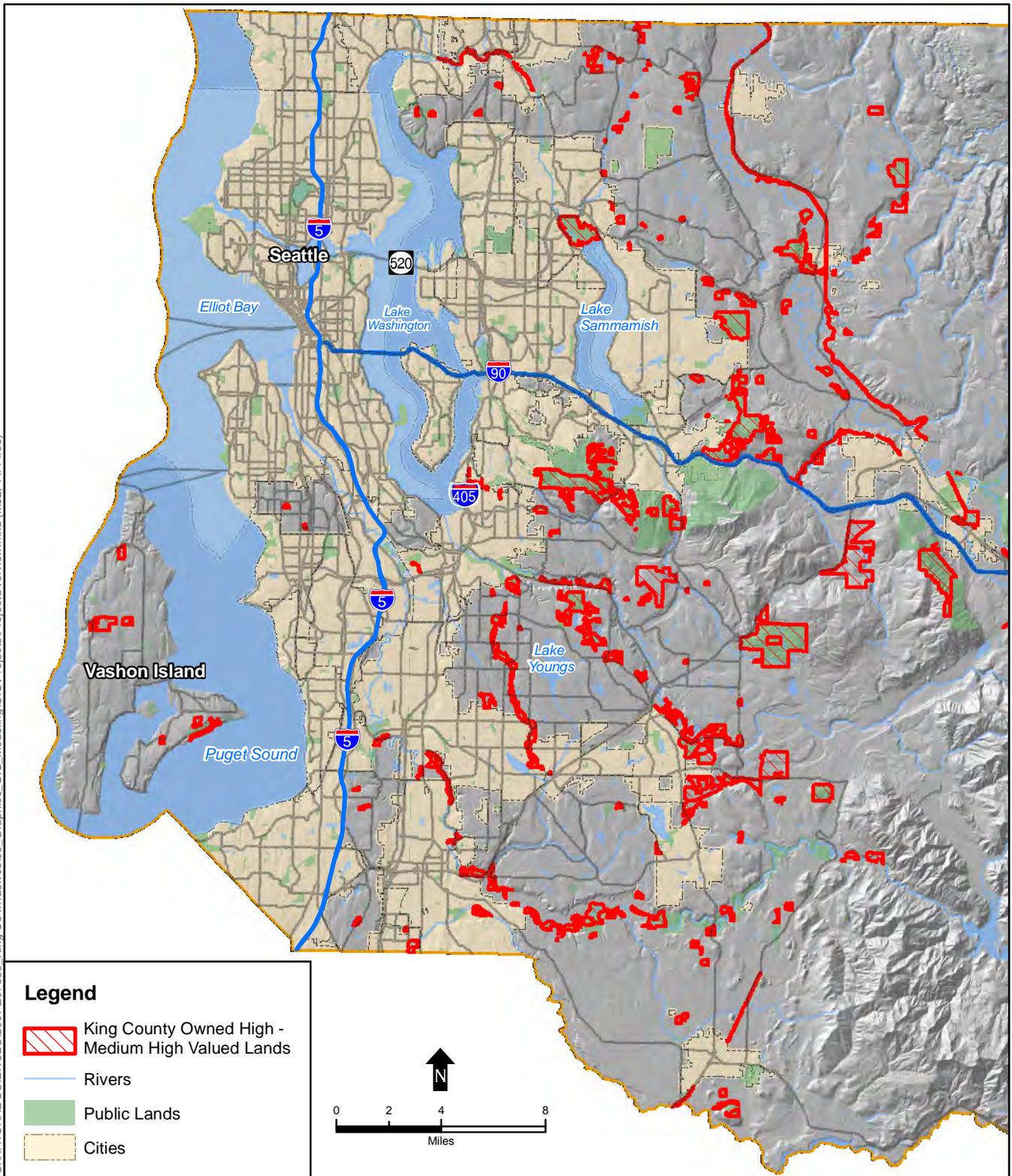
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## **FIGURES**

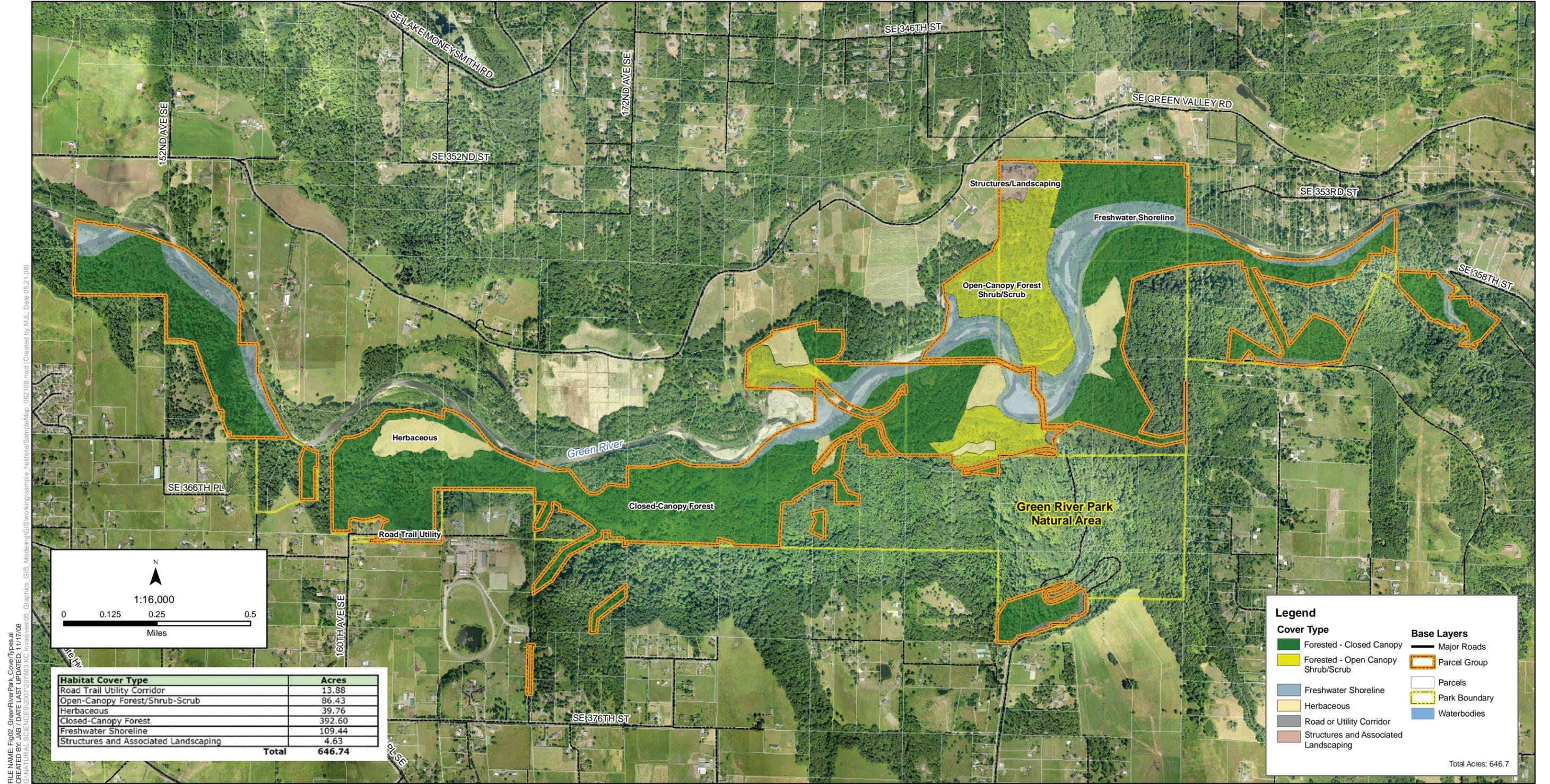
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SOURCE: King County, 2007; Dept. of Ecology, 2005

King County Lands Invasive Plant Survey. 207683

**Figure 1**  
Project Overview  
King County, Washington

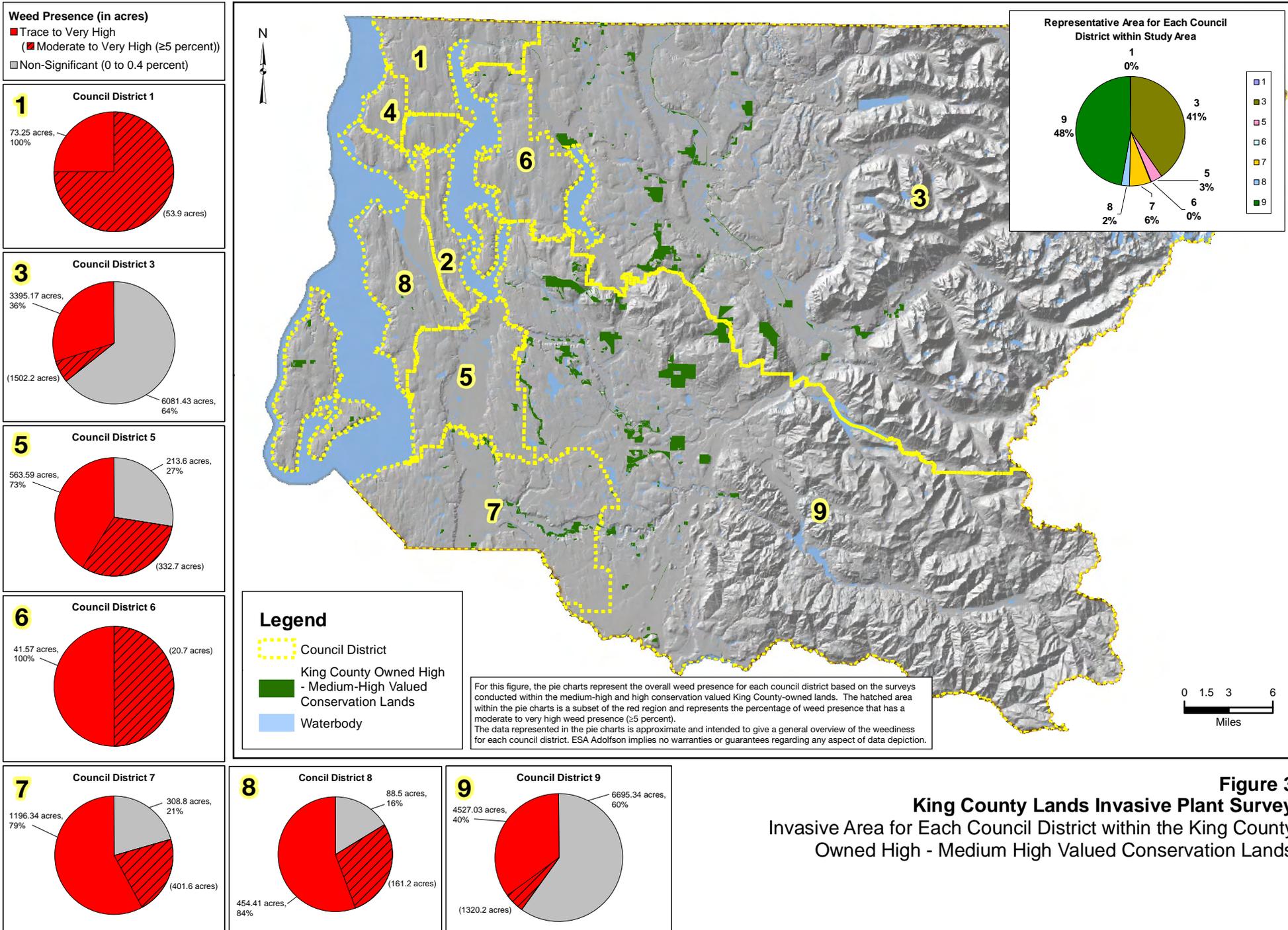


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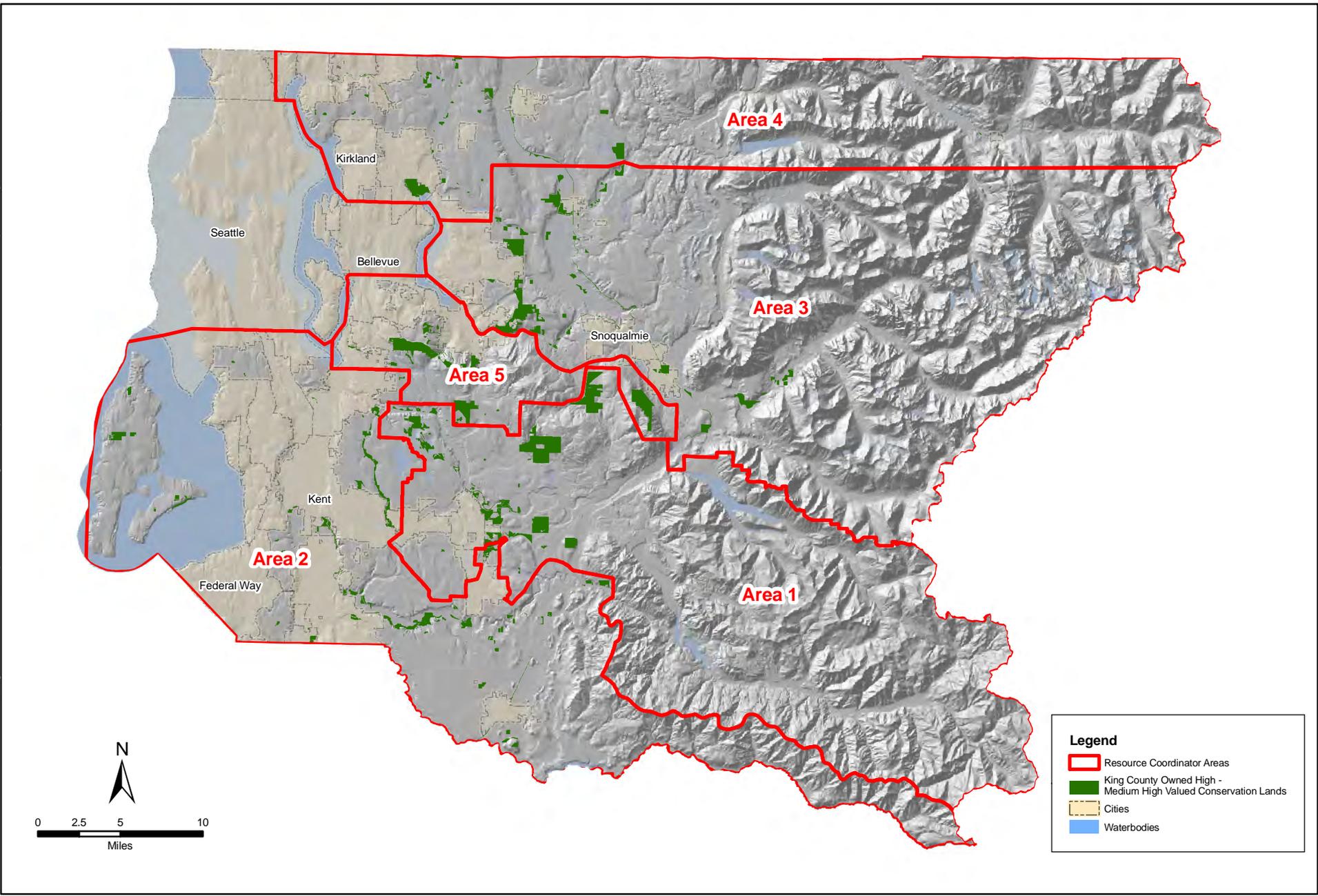
NOTE: The Road and Utility Corridor Cover Type was developed by buffering Roads, Trails and Utilities data layers at specified distances. For more information on the buffer distances, please refer to the metadata.

King County Lands Invasive Plant Survey . 207683  
**Figure 2**  
 Green River Park Natural Area — Metzler Park  
 King County, Washington



**Figure 3**  
**King County Lands Invasive Plant Survey**  
 Invasive Area for Each Council District within the King County Owned High - Medium High Valued Conservation Lands

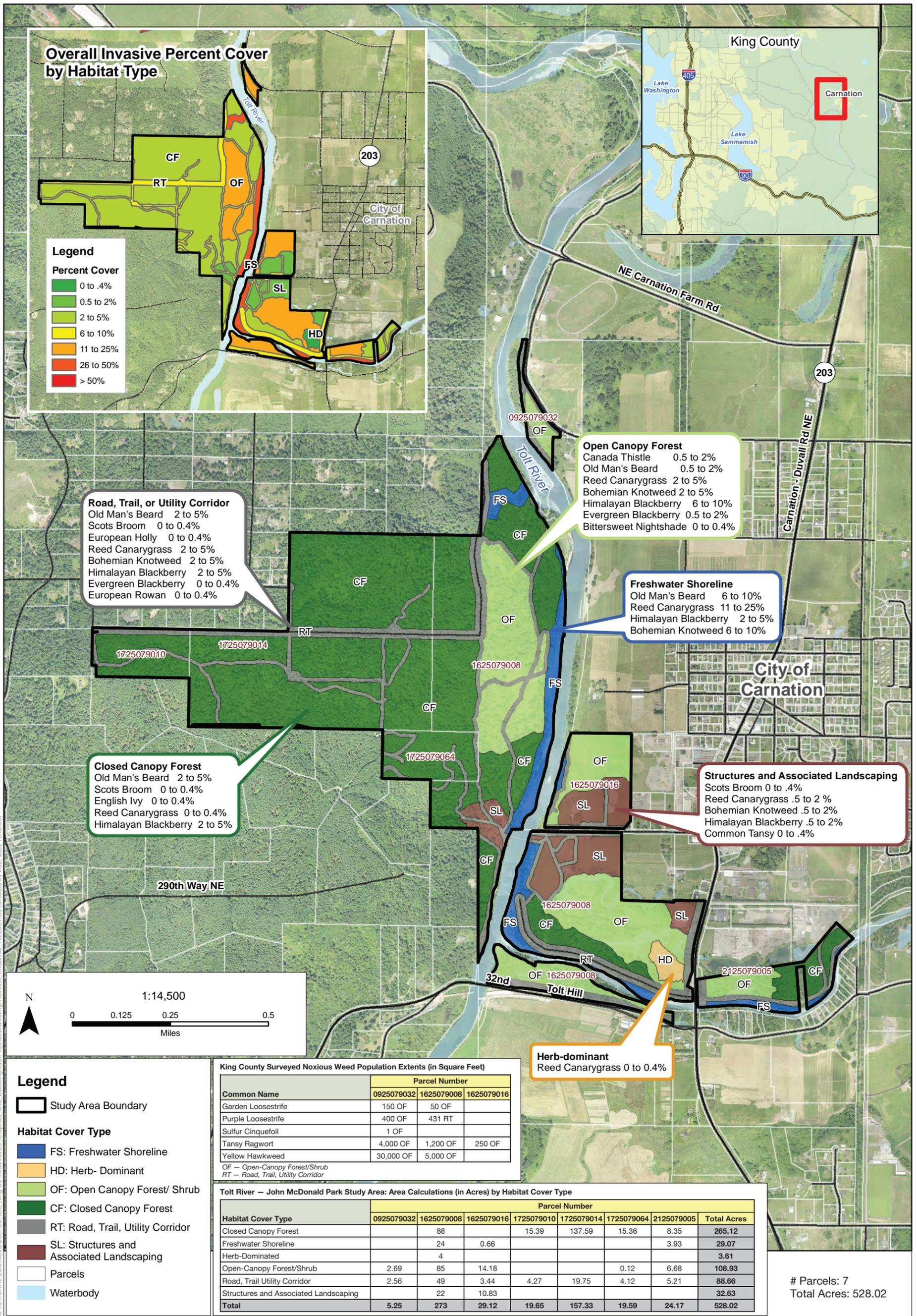
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Source: ESA Adolfsen, 2008; King County, 2007

King County Lands Invasive Plant Survey . 207683

**Figure 4**  
Resource Coordinator Areas  
King County, Washington



**Overall Invasive Percent Cover by Habitat Type**

**Legend**

**Percent Cover**

- 0 to .4%
- 0.5 to 2%
- 2 to 5%
- 6 to 10%
- 11 to 25%
- 26 to 50%
- > 50%

**Road, Trail, or Utility Corridor**

- Old Man's Beard 2 to 5%
- Scots Broom 0 to 0.4%
- European Holly 0 to 0.4%
- Reed Canarygrass 2 to 5%
- Bohemian Knotweed 2 to 5%
- Himalayan Blackberry 2 to 5%
- Evergreen Blackberry 0 to 0.4%
- European Rowan 0 to 0.4%

**Closed Canopy Forest**

- Old Man's Beard 2 to 5%
- Scots Broom 0 to 0.4%
- English Ivy 0 to 0.4%
- Reed Canarygrass 0 to 0.4%
- Himalayan Blackberry 2 to 5%

**Open Canopy Forest**

- Canada Thistle 0.5 to 2%
- Old Man's Beard 0.5 to 2%
- Reed Canarygrass 2 to 5%
- Bohemian Knotweed 2 to 5%
- Himalayan Blackberry 6 to 10%
- Evergreen Blackberry 0.5 to 2%
- Bittersweet Nightshade 0 to 0.4%

**Freshwater Shoreline**

- Old Man's Beard 6 to 10%
- Reed Canarygrass 11 to 25%
- Himalayan Blackberry 2 to 5%
- Bohemian Knotweed 6 to 10%

**Structures and Associated Landscaping**

- Scots Broom 0 to .4%
- Reed Canarygrass .5 to 2%
- Bohemian Knotweed .5 to 2%
- Himalayan Blackberry .5 to 2%
- Common Tansy 0 to .4%

**Herb-dominant**

- Reed Canarygrass 0 to 0.4%

**Legend**

- Study Area Boundary
- Habitat Cover Type**
- FS: Freshwater Shoreline
- HD: Herb- Dominant
- OF: Open Canopy Forest/ Shrub
- CF: Closed Canopy Forest
- RT: Road, Trail, Utility Corridor
- SL: Structures and Associated Landscaping
- Parcels
- Waterbody

**King County Surveyed Noxious Weed Population Extents (in Square Feet)**

Common Name	Parcel Number		
	0925079032	1625079008	1625079016
Garden Loosestrife	150 OF	50 OF	
Purple Loosestrife	400 OF	431 RT	
Sulfur Cinquefoil	1 OF		
Tansy Ragwort	4,000 OF	1,200 OF	250 OF
Yellow Hawkweed	30,000 OF	5,000 OF	

OF - Open-Canopy Forest/Shrub  
RT - Road, Trail, Utility Corridor

**Tolt River - John MacDonal Park Study Area: Area Calculations (in Acres) by Habitat Cover Type**

Habitat Cover Type	Parcel Number							Total Acres
	0925079032	1625079008	1625079016	1725079010	1725079014	1725079064	2125079005	
Closed Canopy Forest		88		15.39	137.59	15.36	8.35	265.12
Freshwater Shoreline		24	0.66				3.93	29.07
Herb-Dominated		4						3.61
Open-Canopy Forest/Shrub	2.69	85	14.18			0.12	6.68	108.93
Road, Trail Utility Corridor	2.56	49	3.44	4.27	19.75	4.12	5.21	88.66
Structures and Associated Landscaping		22	10.83					32.63
<b>Total</b>	<b>5.25</b>	<b>273</b>	<b>29.12</b>	<b>19.65</b>	<b>157.33</b>	<b>19.59</b>	<b>24.17</b>	<b>528.02</b>

# Parcels: 7  
Total Acres: 528.02

Source: ESA Adolfsen, 2007; King County, 2007; WDNR, 2001.  
NOTE: The Road and Utility Corridor Cover Type was developed by buffering Roads, Trails and Utilities data layers at specified distances. For more information on all of the habitat cover type definitions and specifications, please refer to the King County Lands Invasive Plant Survey methodology.

King County Lands Invasive Plant Survey . 207683  
**Figure 5**  
Tolt River - John MacDonal Park Study Area  
King County, Washington

**APPENDIX A:  
PARCELS EXCLUDED FROM THE FIELD STUDY**



EXCLUDED PARCELS LIST				
Site ID	Parcel Number	Acres	King County Parks and Recreation Areas Name	Reason for Exclusion
1	0119069025	7.33		DROPPED per KCNWCB project manager. Site located in Pierce County along White River.
8	3222069125	8.02		Not contiguous with high quality habitat. Highly disturbed.
12	3422069101	24.20	Green River to Cedar River Trail Site	Trail on abandoned railroad. Not contiguous with other high conservation area.
14	3020079006	62.33	Enumclaw Park	Enumclaw fairgrounds, highly disturbed, not associated with other high conservation lands.
35	2472920920	15.20	Snoqualmie Valley Trail Site	Open space requirement for development, small, not associated with additional high quality conservation area.
40	3421059017	106.63		Not enough information to access site; very isolated. DROPPED per KCNWCB project manager.
49	1023089039	26.86	Snoqualmie Valley Trail Site	Trail on abandoned railroad. Not contiguous with other high conservation area.
55	1623049079	16.80	North SeaTac Park	Developed sports park.
58	1023089267	28.51	Mount Si NRCA	Parcel on far side of river; no access.
62	0523089009	158.52		Not enough information to access site; very isolated. DROPPED per KCNWCB project manager.
62	0523089010			Not enough information to access site; very isolated. DROPPED per KCNWCB project manager.
62	0523089011			Not enough information to access site; very isolated. DROPPED per KCNWCB project manager.
62	0523089012			Not enough information to access site; very isolated. DROPPED per KCNWCB project manager.
62	0523089015			Not enough information to access site; very isolated. DROPPED per KCNWCB project manager.
70	3224089080	255.67	Mount Si NRCA	Omitted due to an email mis-communication.

EXCLUDED PARCELS LIST				
Site ID	Parcel Number	Acres	King County Parks and Recreation Areas Name	Reason for Exclusion
70	0323089002		Mount Si NRCA	Omitted due to an email mis-communication.
70	3324089031		Mount Si NRCA	Omitted due to an email mis-communication.
70	3324089032		Mount Si NRCA	Omitted due to an email mis-communication.
70	3324089035		Mount Si NRCA	Omitted due to an email mis-communication.
70	3424089003		Mount Si NRCA	Omitted due to an email mis-communication.
70	3424089006		Mount Si NRCA	Omitted due to an email mis-communication.
70	3424089011		Mount Si NRCA	Omitted due to an email mis-communication.
70	3424089012		Mount Si NRCA	Omitted due to an email mis-communication.
70	3424089027		Mount Si NRCA	Omitted due to an email mis-communication.
70	3424089077		Mount Si NRCA	Omitted due to an email mis-communication.
70	3424089099		Mount Si NRCA	Omitted due to an email mis-communication.
70	3424089115		Mount Si NRCA	Omitted due to an email mis-communication.
70	3424089116		Mount Si NRCA	Omitted due to an email mis-communication.
70	3424089120		Mount Si NRCA	Omitted due to an email mis-communication.
81	2124069020	21.24	East Lake Sammamish Trail Corridor	Trail on abandoned railroad. Not contiguous with other high conservation area.

EXCLUDED PARCELS LIST				
Site ID	Parcel Number	Acres	King County Parks and Recreation Areas Name	Reason for Exclusion
87	0624079017	14.91		Sold, no longer owned by KC.
89	3425079023	18.85	Griffin Creek Park Natural Area	Not enough info and incorrect County access info.
94	2025069023	34.77	East Lake Sammamish Trail Corridor	Trail on abandoned railroad. Not contiguous with other high conservation area.
95	1117200620	6.53		Small parcel not contiguous with high quality habitat.
108	7202261460	7.10		Retention pond for residential development.
109	7202320210	9.40		Developed sports park.
112	8682211620	6.62	Redmond Ridge Little League Field	Outside scope of project, labeled as medium conservation value in green print.
114	3526059088	61.05	West Sammamish Trail Site	Trail on abandoned railroad or on constructed levee. Not contiguous with other high conservation area.
124	1526059070	16.72	West Sammamish Trail Site	Developed abandoned railroad, developed sports park, or on constructed levee. Not contiguous with other high conservation area
130	1126049142	34.14	Swamp Creek Park	Dropped due to transfer of ownership
130	1126049160		Swamp Creek Park	Dropped due to transfer of ownership
132	0626059195	7.08	West Hill Park	Developed sports park
134	1921049051	10.67	Weyerhaeuser KC Aquatic Center Site	Developed sports park
27	0922069034	30.40	Maple Valley Lake Wilderness Trail Site	Trail on abandoned railroad. Not contiguous with other high conservation area
122	2226059084	43.08	West Sammamish Trail Site	Trail on narrow levee. Not contiguous with other high conservation area

EXCLUDED PARCELS LIST				
Site ID	Parcel Number	Acres	King County Parks and Recreation Areas Name	Reason for Exclusion
113	9428500080	94.08	West Sammamish Trail Site	Developed sports park
128	0726059053	69.02	Sammamish River Trail Site	Trail on abandoned railroad. Not contiguous with other high conservation area
42	3323069019	70.77	Cedar River Trail Site	Trail on abandoned railroad. Not contiguous with other high conservation area
	0322049049	3.16		Small isolated drainage easements
	0425079028	5.00		Small parcel not associated with other county property
	0638100003	2.14		Small parcel not associated with other county property
	0722039134	3.86		Small parcel not associated with other county property
	0724069004	3.96		Rails to trails, no associated high value parcels
	0853600250	2.39		Medium-low classification in Greenprint
	0922069033	0.09		Rails to trails, no associated high value parcels
	1117200590	2.28		Medium-low classification in Greenprint
	1225059265	3.64		Medium-low and low classification in Greenprint
	1322029043	3.59		Small parcel not associated with other county property
	1524069069	4.55		Small parcel not associated with other county property
	1526049003	2.21		Medium-low and low classification in Greenprint

EXCLUDED PARCELS LIST				
Site ID	Parcel Number	Acres	King County Parks and Recreation Areas Name	Reason for Exclusion
	1623089077	3.30		Small parcel not associated with other county property
	1624079010	3.94		Gravel pit
	1625069119	2.29		Retention pond, no associated county property
	1825069015	1.43		Rails to trails, no associated high value parcels
	2121069009	0.00		Medium-low and low classification in Greenprint
	2124069095	2.81		District Court Bldg and parking lot
	2222069053	3.82		Medium and medium-low classification in Greenprint
	2523089105	2.88		Small stand-alone parcel, no associated county owned parcels
	2526039215	2.58		Wastewater treatment plant
	2623029085	4.48		Wastewater treatment plant
	2722069019	0.71		Medium and medium-low classification in Greenprint
	2822059312	4.68		Retention pond / green space for residential development
	2826119020	4.14		Remnants of old Steven's Pass Hwy rights-of way, not associated with other county high conservation areas
	2843800005	2.88		Developed park site, already inventoried for weeds
	2923069021	0.21		Rails to trails, no associated high value parcels

EXCLUDED PARCELS LIST				
Site ID	Parcel Number	Acres	King County Parks and Recreation Areas Name	Reason for Exclusion
	2924069042	2.17		Medium classification in Greenprint
	2924079020	0.87		Rails to trails, and an associated drainage pond for industrial area.
	2926069119	2.46		Small stand-alone parcel, no associated county owned parcels, pedestrian path
	3022069006	4.54		Small stand-alone parcel, no associated county owned parcels, bordering SR-18
	3023069037	2.63		Medium-low classification in Greenprint
	3026069046	2.96		Small stand-alone parcel; no associated county-owned parcels (Road mitigation site)
	3216500520	2.32		Medium classification in Greenprint
	3216500530	2.28		Small stand-alone parcel; no associated county owned parcels, retention pond area for private development
	3224079023	0.86		Medium classification in Greenprint
	3324079021	0.00		Rails to trails, no associated high value parcels
	3622059004	2.85		Gravel pit, bordered by railroad and private development
	3623059115	2.46		Medium classification in Greenprint
	3626069020	4.18		Small parcel with no associated county owned parcels, most is river and some farm land
	5412300540	2.82		Small isolated parcel surrounded by residential area.
	6064600020	2.30		Medium-low classification in Greenprint

EXCLUDED PARCELS LIST				
Site ID	Parcel Number	Acres	King County Parks and Recreation Areas Name	Reason for Exclusion
	7202250200	2.17		Medium-low classification in Greenprint
	7202250210	2.37		Medium-low classification in Greenprint
	7202271130	4.17		Medium-low classification in Greenprint
	7214800720	2.51		Greenbelt surrounded by residential area
	7215722030	2.51		Medium and medium-low classification in Greenprint
	7322900420	2.32		Medium-low classification in Greenprint
	7701990780	2.55		Medium-low classification in Greenprint
	7702600035	2.22		Medium-low classification in Greenprint
	7880000140	2.65		Medium-low classification in Greenprint
	8053500300	2.83		small isolated parcel that includes a house and yard taking up most the parcel
	8691311160	4.39		Retention pond / green space for residential development
	9360000005	3.47		Retention pond / green space in an industrial area
	9510300370	3.06		Medium and medium-low classification in Greenprint



**APPENDIX B:  
INVASIVE PLANT SPECIES INCLUDED IN FIELD STUDY**



King County Lands Invasive Plant Survey Target Species List

Scientific Name	Common Name	King County Weed Status*
<i>Buddleja davidii</i>	butterfly bush	Class C
<i>Cirsium arvense</i>	Canada thistle	Class C
<i>Clematis vitalba</i>	old man's beard	Class C
<i>Cytisus scoparius</i>	Scot's broom	Class C
<i>Hedera helix/H. hibernica</i>	English ivy	Class C
<i>Hieracium aurantiacum</i>	orange hawkweed	Class B
<i>Hieracium laevigatum</i>	smooth hawkweed	Class B
<i>Hieracium caespitosum</i>	yellow hawkweed	Class B
<i>Hieracium spp.</i>	other non-native hawkweeds not listed here	Class C
<i>Impatiens glandulifera</i>	policeman's helmet	Class B
<i>Iris pseudacorus</i>	yellow-flag iris	Class C
<i>Lamiastrum galeobdolon</i>	yellow archangel	Class C
<i>Lythrum salicaria</i>	purple loosestrife	Class B
<i>Nymphaea odorata</i>	fragrant waterlily	Class C
<i>Phalaris arundinacea</i>	reed canarygrass	Class C
<i>Polygonum bohemicum</i>	Bohemian knotweed	Class B
<i>Polygonum cuspidatum</i>	Japanese knotweed	Class B
<i>Polygonum polystachyum</i>	Himalayan knotweed	Class B
<i>Polygonum sachalinense</i>	giant knotweed	Class B
<i>Rubus discolor/R. armeniacus</i>	Himalayan blackberry	Weed of Concern
<i>Rubus laciniatus</i>	evergreen blackberry	Weed of Concern
<i>Senecio jacobaea</i>	tansy ragwort	Class B
<i>Solanum dulcamara</i>	bittersweet nightshade	Weed of Concern
<i>Tanacetum vulgare</i>	common tansy	Class C
<i>Ilex aquifolium; Prunus laurocerasus; Sorbus aucuparia; etc.</i>	invasive trees	Weeds of Concern

- King County Noxious Weed Control Program, 2008.



**APPENDIX C:  
INVASIVE PLANT SPECIES REPORTED TO KCNWCP**



## 2008 King County Noxious Weed List

CLASS A (eradication required throughout Washington State including King County)	
Common Name	Scientific Name
velvetleaf	<i>Abutilon theophrasti</i>
garlic mustard	<i>Alliaria petiolata</i>
Italian thistle	<i>Carduus pycnocephalus</i>
slenderflower thistle	<i>Carduus tenuiflorus</i>
purple starthistle	<i>Centaurea calcitrapa</i>
bighead knapweed	<i>Centaurea macrocephala</i>
Vochin knapweed	<i>Centaurea nigrescens</i>
common crupina	<i>Crupina vulgaris</i>
eggleaf spurge	<i>Euphorbia oblongata</i>
goatsrue	<i>Galega officinalis</i>
reed sweetgrass	<i>Glyceria maxima</i>
Texas blueweed	<i>Helianthus ciliaris</i>
giant hogweed	<i>Heracleum mantegazzianum</i>
yellow devil hawkweed	<i>Hieracium floribundum</i>
European hawkweed	<i>Hieracium sabaudum</i>
hydrilla	<i>Hydrilla verticillata</i>
dyers woad	<i>Isatis tinctoria</i>
floating primrose-willow	<i>Ludwigia peploides</i>
wild four o'clock	<i>Mirabilis nyctaginea</i>
variable-leaf milfoil	<i>Myriophyllum heterophyllum</i>
kudzu	<i>Pueraria montana var. lobata</i>
Mediterranean sage	<i>Salvia aethiopsis</i>
clary meadow	<i>Salvia pratensis</i>
sage clary	<i>Salvia sclarea</i>
ricefield bulrush	<i>Schoenoplectus mucronatus</i>
milk thistle	<i>Silybum marianum</i>
silverleaf nightshade	<i>Solanum elaeagnifolium</i>
buffalobur	<i>Solanum rostratum</i>
johnsongrass	<i>Sorghum halepense</i>
common cordgrass	<i>Spartina anglica (upgraded from B to A list)</i>
dense flower cordgrass	<i>Spartina densiflora</i>
salt meadow cordgrass	<i>Spartina patens</i>
Spanish broom	<i>Spartium junceum</i>
spurge flax	<i>Thymelaea passerina</i>
Syrian bean-caper	<i>Zygophyllum fabago</i>

<b>CLASS B DESIGNATES and COUNTY SELECTS (control required in King County)</b>	
<b>Common Name</b>	<b>Scientific Name</b>
Russian knapweed	<i>Acroptilon repens</i>
camelthorn	<i>Alhagi maurorum</i>
blackgrass	<i>Alopecurus myosuroides</i>
annual bugloss	<i>Anchusa arvensis</i>
common bugloss	<i>Anchusa officinalis</i>
wild chervil	<i>Anthriscus sylvestris</i>
hoary alyssum	<i>Bertoroa incana</i>
white bryony	<i>Bryonia alba</i>
fanwort	<i>Cabomba caroliniana</i>
plumeless thistle	<i>Carduus acanthoides</i>
musk thistle	<i>Carduus nutans</i>
longspine sandbur	<i>Cenchrus longispinus</i>
spotted knapweed	<i>Centaurea stoebe</i>
diffuse knapweed	<i>Centaurea diffusa</i>
brown knapweed	<i>Centaurea jacea</i>
meadow knapweed	<i>Centaurea jacea x nigra</i>
black knapweed	<i>Centaurea nigra</i>
yellow starthistle	<i>Centaurea solstitialis</i>
rush skeletonweed	<i>Chondrilla juncea</i>
yellow nutsedge	<i>Cyperus esculentus</i>
blueweed; viper's bugloss	<i>Echium vulgare</i>
Brazilian elodea*	<i>Egeria densa</i>
leafy spurge	<i>Euphorbia esula</i>
polar hawkweed	<i>Hieracium atratum</i>
orange hawkweed	<i>Hieracium aurantiacum</i>
yellow hawkweed	<i>Hieracium caespitosum</i>
queen-devil hawkweed	<i>Hieracium glomeratum</i>
smooth hawkweed	<i>Hieracium laevigatum</i>
mouseear hawkweed	<i>Hieracium pilosella</i>
policeman's helmet	<i>Impatiens glandulifera</i>
kochia	<i>Kochia scoparia</i>
perennial pepperweed	<i>Lepidium latifolium</i>
Lepyrodiclis	<i>Lepyrodiclis holosteoides</i>
Dalmatian toadflax	<i>Linaria dalmatica</i> ssp. <i>dalmatica</i>

<b>CLASS B DESIGNATES and COUNTY SELECTS (control required in King County)</b>	
<b>Common Name</b>	<b>Scientific Name</b>
water primrose	<i>Ludwigia hexapetala</i>
garden loosestrife**	<i>Lysimachia vulgaris</i>
purple loosestrife**	<i>Lythrum salicaria</i>
parrotfeather	<i>Myriophyllum aquaticum</i>
yellow floating heart	<i>Nymphoides peltata</i>
Scotch thistle	<i>Onopordum acanthium</i>
common reed (non-native genotypes)	<i>Phragmites australis (upgraded from C to B list)</i>
hawkweed oxtongue	<i>Picris hieracioides</i>
sulfur cinquefoil	<i>Potentilla recta</i>
Austrian fieldcress	<i>Rorippa austriaca</i>
grass-leaved arrowhead	<i>Sagittaria graminea</i>
tansy ragwort	<i>Senecio jacobaea</i>
perennial sowthistle	<i>Sonchus arvensis</i>
smooth cordgrass	<i>Spartina alterniflora</i>
swainsonpea	<i>Sphaerophysa salsula</i>
saltcedar	<i>Tamarix ramosissima</i>
gorse	<i>Ulex europaeus</i>
* Brazilian elodea is designated for control throughout King County except in Lake Washington, Lake Sammamish, Lake Union and, Lake Fenwick.	
** Purple and garden loosestrife are county-selected for control in all areas of King County including those excluded by WAC 16-750.	

<b>CLASS C COUNTY SELECTS (control required in King County)</b>	
<b>Common Name</b>	<b>Scientific Name</b>
hairy willowherb	<i>Epilobium hirsutum</i>
common hawkweed	<i>Hieracium lachenalii (new)</i>
hawkweeds, non-native and invasive	<i>Hieracium spp.</i>



**APPENDIX D:  
DATA FORM**



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**Habitat Type Data Form**  
**King County Invasive Species Management Project**

Site ID (e.g., 118) \_\_\_\_\_ Habitat Type ID Number (e.g., 118RT01) \_\_\_\_\_

Location Name \_\_\_\_\_ Access Constraints?  (Check only if yes)

Date: \_\_\_\_\_ Investigators: \_\_\_\_\_ Photo Numbers: \_\_\_\_\_

**Observed Cover Type:**

- |  |   |
|--|---|
| <input type="checkbox"/> (1) Road, Trail or Utility Corridor       | <input type="checkbox"/> (5) Clear Cut            |
| <input type="checkbox"/> (2) Structures and Associated Landscaping | <input type="checkbox"/> (6) Herbaceous           |
| <input type="checkbox"/> (3) Closed Canopy Forest                  | <input type="checkbox"/> (7) Marine Shoreline     |
| <input type="checkbox"/> (4) Open Canopy Forest/Shrub              | <input type="checkbox"/> (8) Freshwater Shoreline |

Does observed cover type match mapped cover type?  Yes  No

If No, explain differences and modify field map as needed:

**If Wetland Present:**  (1) PEM  (2) PSS  (3) PFO  (4) POW

Wetland Comment \_\_\_\_\_

**Weed Control Efforts at Habitat Type Surveyed:**

- (1) None  (2) Mowing  (3) Weed-cutting  (4) Hand-pull  (5) Mulching  
 (6) Other \_\_\_\_\_

Weed Control Comment \_\_\_\_\_

**Observed Species\*:**

- Trace: < 0.5% cover

Significant:  $\geq 0.5\%$  cover

<i>Buddleja davidii</i> BUDA2	<input type="checkbox"/> 0 to 0.4%	<input type="checkbox"/> 0.5 – 2%	<input type="checkbox"/> 2 to 5 %	<input type="checkbox"/> 6 to 10%	<input type="checkbox"/> 11 to 25%	<input type="checkbox"/> 26 to 50%	<input type="checkbox"/> >50%
<i>Cirsium arvense</i> CIAR4	<input type="checkbox"/> 0 to 0.4%	<input type="checkbox"/> 0.5 – 2%	<input type="checkbox"/> 2 to 5 %	<input type="checkbox"/> 6 to 10%	<input type="checkbox"/> 11 to 25%	<input type="checkbox"/> 26 to 50%	<input type="checkbox"/> >50%
<i>Clematis vitalba</i> CLVI6	<input type="checkbox"/> 0 to 0.4%	<input type="checkbox"/> 0.5 – 2%	<input type="checkbox"/> 2 to 5 %	<input type="checkbox"/> 6 to 10%	<input type="checkbox"/> 11 to 25%	<input type="checkbox"/> 26 to 50%	<input type="checkbox"/> >50%
<i>Cytisus scoparius</i> CYSC4	<input type="checkbox"/> 0 to 0.4%	<input type="checkbox"/> 0.5 – 2%	<input type="checkbox"/> 2 to 5 %	<input type="checkbox"/> 6 to 10%	<input type="checkbox"/> 11 to 25%	<input type="checkbox"/> 26 to 50%	<input type="checkbox"/> >50%
<i>Hedera helix</i> HEHE	<input type="checkbox"/> 0 to 0.4%	<input type="checkbox"/> 0.5 – 2%	<input type="checkbox"/> 2 to 5 %	<input type="checkbox"/> 6 to 10%	<input type="checkbox"/> 11 to 25%	<input type="checkbox"/> 26 to 50%	<input type="checkbox"/> >50%
<i>Hieracium aurantiacum</i> HIAU	<input type="checkbox"/> 0 to 0.4%	<input type="checkbox"/> 0.5 – 2%	<input type="checkbox"/> 2 to 5 %	<input type="checkbox"/> 6 to 10%	<input type="checkbox"/> 11 to 25%	<input type="checkbox"/> 26 to 50%	<input type="checkbox"/> >50%
<i>Hieracium laevigatum</i> HILA4	<input type="checkbox"/> 0 to 0.4%	<input type="checkbox"/> 0.5 – 2%	<input type="checkbox"/> 2 to 5 %	<input type="checkbox"/> 6 to 10%	<input type="checkbox"/> 11 to 25%	<input type="checkbox"/> 26 to 50%	<input type="checkbox"/> >50%
<i>Hieracium caespitosum</i> HICA10	<input type="checkbox"/> 0 to 0.4%	<input type="checkbox"/> 0.5 – 2%	<input type="checkbox"/> 2 to 5 %	<input type="checkbox"/> 6 to 10%	<input type="checkbox"/> 11 to 25%	<input type="checkbox"/> 26 to 50%	<input type="checkbox"/> >50%
<hr/>							
<i>Hieracium spp.</i> HIERA	<input type="checkbox"/> 0 to 0.4%	<input type="checkbox"/> 0.5 – 2%	<input type="checkbox"/> 2 to 5 %	<input type="checkbox"/> 6 to 10%	<input type="checkbox"/> 11 to 25%	<input type="checkbox"/> 26 to 50%	<input type="checkbox"/> >50%
<i>Ilex aquifolium</i> ILAQ80	<input type="checkbox"/> 0 to 0.4%	<input type="checkbox"/> 0.5 – 2%	<input type="checkbox"/> 2 to 5 %	<input type="checkbox"/> 6 to 10%	<input type="checkbox"/> 11 to 25%	<input type="checkbox"/> 26 to 50%	<input type="checkbox"/> >50%
<i>Impatiens glandulifera</i> IMGL	<input type="checkbox"/> 0 to 0.4%	<input type="checkbox"/> 0.5 – 2%	<input type="checkbox"/> 2 to 5 %	<input type="checkbox"/> 6 to 10%	<input type="checkbox"/> 11 to 25%	<input type="checkbox"/> 26 to 50%	<input type="checkbox"/> >50%
<i>Iris pseudacorus</i> IRPS	<input type="checkbox"/> 0 to 0.4%	<input type="checkbox"/> 0.5 – 2%	<input type="checkbox"/> 2 to 5 %	<input type="checkbox"/> 6 to 10%	<input type="checkbox"/> 11 to 25%	<input type="checkbox"/> 26 to 50%	<input type="checkbox"/> >50%
<i>Lamium galeobdolon</i> LAGA2	<input type="checkbox"/> 0 to 0.4%	<input type="checkbox"/> 0.5 – 2%	<input type="checkbox"/> 2 to 5 %	<input type="checkbox"/> 6 to 10%	<input type="checkbox"/> 11 to 25%	<input type="checkbox"/> 26 to 50%	<input type="checkbox"/> >50%
<i>Lythrum salicaria</i> LYSA2	<input type="checkbox"/> 0 to 0.4%	<input type="checkbox"/> 0.5 – 2%	<input type="checkbox"/> 2 to 5 %	<input type="checkbox"/> 6 to 10%	<input type="checkbox"/> 11 to 25%	<input type="checkbox"/> 26 to 50%	<input type="checkbox"/> >50%
<i>Nymphaea odorata</i> NYOD	<input type="checkbox"/> 0 to 0.4%	<input type="checkbox"/> 0.5 – 2%	<input type="checkbox"/> 2 to 5 %	<input type="checkbox"/> 6 to 10%	<input type="checkbox"/> 11 to 25%	<input type="checkbox"/> 26 to 50%	<input type="checkbox"/> >50%
<i>Phalaris arundinacea</i> PHAR3	<input type="checkbox"/> 0 to 0.4%	<input type="checkbox"/> 0.5 – 2%	<input type="checkbox"/> 2 to 5 %	<input type="checkbox"/> 6 to 10%	<input type="checkbox"/> 11 to 25%	<input type="checkbox"/> 26 to 50%	<input type="checkbox"/> >50%
<i>Polygonum bohemicum</i> POBO10	<input type="checkbox"/> 0 to 0.4%	<input type="checkbox"/> 0.5 – 2%	<input type="checkbox"/> 2 to 5 %	<input type="checkbox"/> 6 to 10%	<input type="checkbox"/> 11 to 25%	<input type="checkbox"/> 26 to 50%	<input type="checkbox"/> >50%
<i>Polygonum cuspidatum</i> POCU6	<input type="checkbox"/> 0 to 0.4%	<input type="checkbox"/> 0.5 – 2%	<input type="checkbox"/> 2 to 5 %	<input type="checkbox"/> 6 to 10%	<input type="checkbox"/> 11 to 25%	<input type="checkbox"/> 26 to 50%	<input type="checkbox"/> >50%
<i>Polygonum polystachyum</i>	<input type="checkbox"/> 0 to 0.4%	<input type="checkbox"/> 0.5 – 2%	<input type="checkbox"/> 2 to 5 %	<input type="checkbox"/> 6 to 10%	<input type="checkbox"/> 11 to 25%	<input type="checkbox"/> 26 to 50%	<input type="checkbox"/> >50%

HABITAT TYPE DATA FORM

Date: \_\_\_\_\_

Location Name \_\_\_\_\_

Habitat Type ID # \_\_\_\_\_

POPO5

*Polygonum sachalinense*  0 to 0.4%  0.5 – 2%  2 to 5 %  6 to 10%  11 to 25%  26 to 50%  >50%

POSA4

*Prunus laurocerasus*  0 to 0.4%  0.5 – 2%  2 to 5 %  6 to 10%  11 to 25%  26 to 50%  >50%

PRLA5

*Rubus armeniacus (discolor)*  0 to 0.4%  0.5 – 2%  2 to 5 %  6 to 10%  11 to 25%  26 to 50%  >50%

RUAR9

*Rubus laciniatus*  0 to 0.4%  0.5 – 2%  2 to 5 %  6 to 10%  11 to 25%  26 to 50%  >50%

RULA

*Senecio jacobaea*  0 to 0.4%  0.5 – 2%  2 to 5 %  6 to 10%  11 to 25%  26 to 50%  >50%

SEJA

*Solanum dulcamara*  0 to 0.4%  0.5 – 2%  2 to 5 %  6 to 10%  11 to 25%  26 to 50%  >50%

SODU

*Sorbus aucuparia*  0 to 0.4%  0.5 – 2%  2 to 5 %  6 to 10%  11 to 25%  26 to 50%  >50%

SOAU

*Tanacetum vulgare*  0 to 0.4%  0.5 – 2%  2 to 5 %  6 to 10%  11 to 25%  26 to 50%  >50%

\*\*\* Sketch distribution patterns of significant impact species (Trace or Significant cover) on field maps using species four-letter code and colored marker (green or red) \*\*\*

Overall presence of invasives (Percent Cover)

0 to 0.4%  0.5 – 2%  2 to 5 %  6 to 10%  11 to 25%  26 to 50%  >50%

List B Noxious Weeds Present (or drop-down list of species from Exhibit B)

Four letter code: \_\_\_\_\_

Be sure to record any of these noxious weeds in GPS, and be sure to report any King County designated (Class A, B, or C) noxious weed to the King County Noxious Weed Control Program as soon as possible (1 to 2 days).

Four letter code: \_\_\_\_\_

Four letter code: \_\_\_\_\_

Four letter code: \_\_\_\_\_

Four letter code: \_\_\_\_\_

**Other Observations (including additional invasive species not listed above):**

**GPS Waypoint Collected for Species on List B:**

**Rover File Name:** \_\_\_\_\_ (Ex: KC\_MMDDYYYY\_01)

**Point(s) Collected (Use Habitat Type ID)**

**\*\*\* use ALL CAPS for consistency \*\*\***